



CHAPTER 13 – GEOTECHNICAL

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List of Acronyms

BRE C4SL CEMP CF CIEH	Building Research Establishment Category 4 Screening Level Construction Environmental Management Plan Cefn Formation Chartered Institute of Environmental Health
CL:AIRE Development	Contaminated Land: Applications in Real Environments All activities within the red line planning boundary (see Drawing ECL-BQ-001 in Technical Appendix TA1-1)
Development Area Development Site	As defined on Figure 13-1. The physical site on which the Development is to be located as defined by the red line planning boundary (see Drawing ECL-BQ-001 in Technical Appendix TA1-1)
DEMP	Decommissioning Environmental Management Plan
DEFRA	Department for Environment, Food and Rural Affairs
DSD	Dangerous Substance Directive
EPR	Environmental Permitting Regulations
EPA	Environmental Protection Agency
ERF	Energy Recovery Facility
LDP	Local Development Plan
LPP	Local Planning Policy
LQM	Land Quality Management
PAH	Polyaromatic Hydrocarbons
PH	Petroleum Hydrocarbons
PPC	Pollution Prevention and Control
PPW	Planning Policy Wales
S4UL	Suitable 4 Use Screening Level
SSSI	Site of Special Scientific Interest
TBMF	Trewern Brook Mudstone Formation
TMF	Tarannon Mudstone Formation
WFD	Water Framework Directive





13. Geotechnical and Materials Management

13.1. Introduction

- 13.1.1. This chapter reports on the existing soil, surface water and groundwater chemical conditions on site and the engineering properties of the ground in relation to development of Buttington Energy Recovery Facility ("ERF").
- 13.1.2. This chapter considers:
 - the potential impact that the construction phase of the Development will have on existing soil, surface water and groundwater environmental quality and the health of construction workers
 - the potential impact Buttington ERF will have on existing soil, surface water and groundwater environmental quality during operation.
 - the potential impact that the development will have on the health of site users during operation of the Buttington ERF.
 - how the integrity of the newly formed development area slopes will be maintained to ensure that there is no impact to the site during its operation phase.
- 13.1.3. A formal request for Scoping Direction was submitted to the Planning Inspectorate Wales in August 2018, with their response received October 2018. In their response, the Planning Inspectorate comments as follows:

'As mentioned in section 6 of this Direction under 'Baseline', the ES should include the impacts of preparatory works. As the SR identifies, the quarry floor requires stabilisation to create a level and stable plateau for construction. Although it may be the case that these work are permitted via extant planning permissions, they still constitute a part of this project, and as described above, the ES should capture the current baseline of on-site conditions and clearly describe the impacts involved in bringing the site to a level, fully prepared state, and then go on to assess the impacts from that point through construction, operation and decommissioning of this proposal. If the works have actually been carried out before the application is submitted, then the ES should confirm that and reflect that baseline.'

'Comments regarding geotechnical assessment, land contamination and materials management contained within the previous Scoping Opinion issued by PCC in 2017 should be considered by the Applicant in production of the ES. The Applicants should satisfy themselves that geological and material management issues have been adequately addressed as part of the ES, including the mitigation of any possible effects throughout the lifetime of the project.'

13.2. Relevant Legislation and Planning Policy

- 13.2.1. Within Powys there are three legislative documents available to address contaminated land:
 - Planning Policy Wales (2018)ⁱ; and
 - Local Planning Policy Powys Local Development Plan (2018)ⁱⁱ;
 - Environmental Protection Act 1990: Part 2A (2012)ⁱⁱⁱ





Planning Policy Wales

- 13.2.2. The Planning Policy Wales ("PPW") framework ensures that through the planning process and application of planning conditions a site is only developed once it has been proved that its intended use will be sustainable and not impose or cause any adverse environmental, social, economical or cultural affects. It aims to ensure balance between the needs of development and conservation and protection of natural resources and the historic environment
- 13.2.3. PPW provides guidance for the development of Local Planning Policy ("LPP"). In Powys local planning policy is presented in the Powys Local Development Plan ("LDP").
- 13.2.4. PPW enables contaminated land to be considered in relation to the planning system. Land intended for development may already be designated as contaminated under Part 2A of the Environmental Protection Act ("EPA"), or the development proposal may introduce changes to a site which may result in land potentially meeting the definition of contaminated under Part 2A.
- 13.2.5. Planning decisions need to consider the potential hazard that contamination presents to development itself, its occupants and the local environment
- 13.2.6. Specialist investigation and risk assessment will be required to determine the extent of any land contamination and to identify remedial measures that may be implemented to enable beneficial use of land.
- 13.2.7. Where acceptable remedial measures can overcome such contamination, planning permission may be granted subject to conditions specifying the necessary measures. If contamination cannot be overcome satisfactorily, the authority may refuse planning permission.

Powys Local Development Plan

- 13.2.8. The Powys Local Development Plan ("LDP") details the Council's development management policies for the sustainable development and use of land in Powys
- 13.2.9. The LDP has been prepared in accordance with PPW and considers the potential impact contamination and land instability may have on human health, property and the environment.
- 13.2.10. Development Management Policy 10 (DM10) Contaminated and Unstable Land specifies that 'development proposals on contaminated or unstable land will be permitted where they do not: 1. Result in any additional problems of ground instability of contamination either on or off site and shall remediate the contamination/instability; 2. Unacceptably adversely affect public health and safety, nature conservation, historic or archaeological interests.'





13.2.11. The LDP deems places the 'responsibility for determining the extent and effects of instability, contamination and other risk' with the developer, who must 'ensure that land is suitable for the development proposed.'

Part 2A of the Environmental Protection Act

- 13.2.12. PPW framework considers designation of contaminated land under Part 2A of the EPA.
- 13.2.13. Part 2A of EPA 1990 provides a risk-based approach to the identification and remediation of land where contamination poses an unacceptable risk to human health or the environment.
- 13.2.14. Under Part 2A the statutory definition of 'contaminated land' is: " any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that—(a)significant harm is being caused or there is a significant possibility of such harm being caused; or(b)pollution of controlled waters is being, or is likely to be, caused;"
- 13.2.15. Where land has been identified as meeting the statutory definition as being contaminated Part 2A considers that such land, where it is reasonable and practical to do so, should be remediated to ensure that is suitable for its current use and no longer represents an unacceptable risk.
- 13.2.16. The term 'Risk' is widely used in different contexts and situations, but a prescriptive definition is given by the Guidelines for Environmental Risk Assessment and Management: Green Leaves III (DEFRA et al, 2011)^{iv} Risk is 'the potential consequence(s) of a hazard combined with their likelihoods/probabilities'. A 'Hazard' is defined as 'a situation or biological, chemical or physical agent that may lead to harm or cause adverse affect'.
- 13.2.17. For land to be classified as 'Contaminated Land' there must be a 'pollutant linkage'. A pollutant linkage requires three essential elements, a contaminant source, a potential receptor to contamination, and a pathway linking the source and receptor, as described in Table 13-1.

Essential Element	Description
Contaminant (Hazard)	 a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters
Receptor (Target)	 something which could be adversely affected by a contaminant
Pathway	 a route or means which either allows the contaminant to cause significant harm to that receptor, or that there is a significant possibility of such harm being caused to the receptor, or that pollution of controlled waters is being or likely to be caused

Table 13-1: Pollution Linkage Essential Element





Other Technical Guidance

- 13.2.18. Other technical guidance considered in order to limit the potential for contamination of soils and waters are:
 - Code of Practice for Site Investigations (BS5930:1990)^v this document outlines the procedures for ground investigation required in assessing the suitability of sites for potential development, detailing the correct methods of investigation, soil and rock sampling and testing, geotechnical testing and interpretation required for geotechnical and civil engineering design.
 - Investigation of Potentially Contaminative Sites Code of Practice (BS 10175:2001)^{vi};
 BS10175 details the procedures required to appropriately design and implement intrusive ground investigation for the identification and characterisation of contaminated land. The publication informs the correct methodologies for collecting relevant soil, groundwater and ground gas data and how all site investigation data should be presented.
 - Contaminated Land Report 11: Model Procedures for the Management of Land Contamination (Environment Agency, 2004)^{vii} - this publication is a technical framework for identifying and managing unacceptable levels of contamination. The first stage of assessment determines the severity and risks from contamination through quantitative risk assessment. Stage two, options appraisal, seeks to identify the most suitable remedial option(s) that would enable the contamination to be treated or managed in a way that best protects human health and the environment conducive to the proposed development. Stage three is the development of a remediation strategy that details how the most suitable remedial option(s) to be implemented will put into practice.
 - Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination (CL:AIRE, December 2013)^{viii} - with the objective of providing support DEFRA's Part 2A of the Environmental Protection Act CL:AIRE has developed a number of generic soil assessment criteria, category 4 screening levels ("C4SLs") for the classification of contaminated land with respect to human health and proposed land use. C4SLs are the levels of contaminant concentrations in soil that are considered an acceptable level of risk to human health, within the context of Part 2A, by combining information on human health toxicology, exposure assessment and normal ambient levels of contaminants in the environment.
 - The LQM/CIEH S4ULs for Human Health Risk Assessment^{ix} Suitable 4 Use Levels ("S4UIs") have been derived for a range of generic land uses and soil organic matter contents in line with C4SL guidance. The S4ULs are based on health criteria that represent minimal or tolerable levels of risk to health.
 - The Water Framework Directive (Standards and Classification) Directions (England and Wales) (2015)^x the Water Framework Directive ("WFD") seeks to achieve good qualitative and quantitative status of all water bodies (surface waters, transitional waters and coastal waters) in the EU. It sets a standard for chemical quality of water bodies, providing guidance thresholds for the acceptable concentrations of numerous potential pollutants. These thresholds can be compared directly with data from groundwater or surface water samples retrieved during site investigation works.
 - Drinking Water Directive (Council Directive 98/83/EC, 1998)^{xi} The Drinking Water Directive ("DWD") provides legislation on the assessment of water intended for





human consumption and provides threshold levels that may be used for assessment of substances in groundwater where WFD thresholds are not available.

- Dangerous Substance Directive (Council Directive 74/464/EEC, 1974)^{xii} The Dangerous Substance Directive ("DSD") provides criteria for pollution caused by certain dangerous substances discharged into the aquatic environment. These criteria have been used for substances where no WFD threshold exists.
- CLAIRE: Petroleum Hydrocarbons in Groundwater (2017): Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies^{xiii} this publication provides guidance on assessing the risks to groundwater and surface water from petroleum hydrocarbon compounds. World Health Organisation criteria cited in this document may be applied to the assessment of petroleum hydrocarbons in groundwater, taken from World Health Organisation publication products in drinking-water WHO/SDE/WSH/05.08.123.

13.3. The Existing Environment

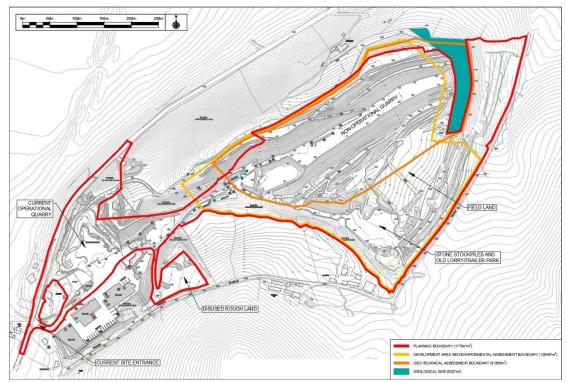
Environmental Assessment Boundary

- 13.3.1. Reference to 'the Development area' in the following sections relates to the current nonoperational quarry void where Buttington ERF will be constructed (e.g. the buildings and ancillary plant) and the area of land directly south of this existing quarry void, as illustrated in Figure 13-1.
- 13.3.2. Geo-environmental and geotechnical assessment has been undertaken and the assessment boundaries for each assessment vary slightly as follows:
 - Geo-environmental assessment of the Development area has been performed using environmental data sourced from this area.
 - The assessment also considers the impact of the current Development area on the wider surrounding area, which includes all land within the Development of National Significance ("DNS") planning boundary and other local sensitive receptors such as neighbouring residents within 250m of the Development area, surface waters downgradient of the DNS planning boundary and groundwater below the DNS planning boundary.
 - Geotechnical assessment is focused on the area of the proposed Buttington ERF only, that is, the quarry void and sides of the quarry void. Just outside the Development area is a designated geological Site of Special Scientific Interest ("SSSI"), which is identified as a sensitive receptor. The location of the SSSI is shown in Figure 13-1.
- 13.3.3. Figure 13-1 illustrates the Development Site (the DNS application boundary), the Development Area Geo-Environmental Assessment boundary and the Geo-Technical Assessment Boundaries.





Figure 13-1: Boundary Definitions



13.3.4. The assessment also considers the impact of the Development (construction, operation and decommissioning phases) upon the Development area itself and its future occupants, upon the remainder of the DNS planning application area including any future occupants, surface and groundwater within and beneath the DNS planning application area, and upon sensitive receptors in the local area: neighbouring residents within 250m of the Development area and surface waters down-gradient of the DNS planning boundary. This includes the preparatory works required to bring the site to a level, fully prepared site, in addition to the construction of the Development itself.

Base Line Conditions

- 13.3.5. The base line condition of the Development, in terms of Geotechnical and Materials Management is as follows:
 - the Development will be placed within an area that is currently an operational quarry;
 - there is an extant planning permission for an improved access approximately 155m north east of the existing quarry access - Planning Permission Ref. P/2015/0439). A Section 73 application (Planning Permission Reference 20/0575/REM) was submitted in April 2020 to request an extension of time which was pending approval at time of writing. Consequently, there is a new access proposed as part of this DNS application which is of the same design as the extant planning permission.
- 13.3.6. The base line conditions have been established for the Development Area as defined in Figure 13-1, that is the area where the Buttington ERF is to be constructed and land directly to the southeast.





- 13.3.7. In order to determine the base line conditions a geo-environmental and geotechnical site investigation was undertaken. The area covered by both assessments is illustrated in Figure 16-1.
- 13.3.8. The geo-environmental and geotechnical site investigation is performed in several stages. As the findings of each stage are understood these may be used to inform and plan the next stage. The stages include the following:
 - preparation of a Desk Study;
 - qualitative Geo-Environmental Risk Assessment;
 - Site Investigation;
 - Quantitative Geo-Environmental Human Health and Environmental Risk Assessment; and
 - Geotechnical Assessment.
- 13.3.9. A copy of the Geo-environmental and Geotechnical Assessment Site Investigation Report Ref, dated March 2019) produced for the site, is reproduced in Technical Appendix 13-1.
- 13.3.10. The findings of the geo-environmental and geotechnical investigation have confirmed the baseline conditions set out in this section of the Chapter.

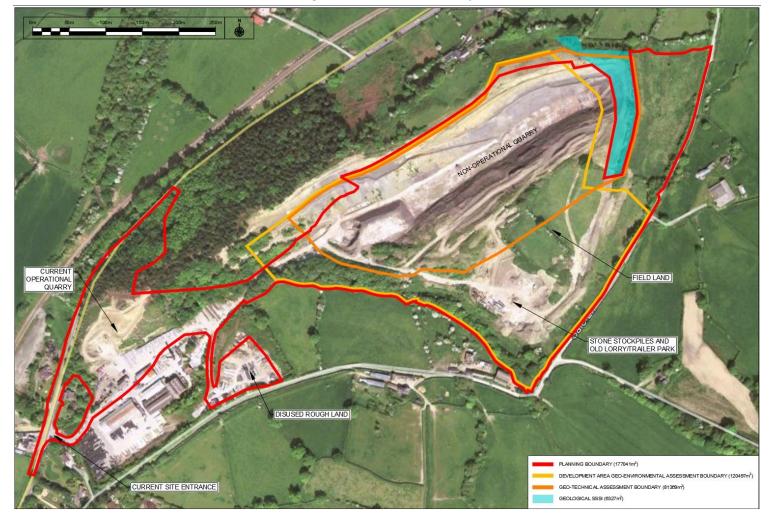
Current Land Use

- 13.3.11. The Development Area, as defined in Figure 13-1, comprises the operational quarry and an area to the south of the quarry above the quarry void, which is partially field land and partially rough ground where various stone stockpiles remain, as well as an old defunct lorry and several lorry trailers (see Chapter 1 paragraph 1.4.7. for further details).
- 13.3.12. Land excluded from the Buttington ERF Development area, but within the DNS planning application boundary comprises active access roads between the current site entrance, current operation quarry and non-operational quarry. Also included is an area of disused rough land east of off-site warehouse buildings, which lies at a higher topographic level to the adjacent access road.
- 13.3.13. An aerial image of the Development Site and surrounding areas illustrating current land use is provided as Figure 13-2.





Figure 13-2: Current Development Area



ECL Ref: ECL.001.01.02/ES DATE August 2020 ISSUE: FOR CONSULTATION





13.3.14. Land outside the planning application boundary primarily comprises field land with intersecting roads. The area adjacent to and directly south of proposed access road and current operation quarry (see Figure 13-2) is occupied by two large warehouse type buildings and offices. One of the warehouses provides storage of classic cars and caravans, and Speed Welshpool Limited, a pallet and parcel delivery company, occupy the other large unit.

History

- 13.3.15. The Development Area historically remained as field land until the existing quarry was formed, first recorded as a quarry or clay pit on historical plans in 1954. The area south of the quarry void remains partly as field land, but in part is currently used for access.
- 13.3.16. The area adjacent to Development Site access road was historically primarily field land and woodland in 1885, but a small quarry and gravel pit were present at that time. The quarry and gravel pit closed but quarrying continued in this area. Small-scale quarrying is currently ongoing. A brick works was established between 1885 and 1902 and closed in 1990.
- 13.3.17. Beyond the Development Site boundary rural land use prevails to the present day, with neighbouring properties comprising houses or farms. A rail line that presently runs northeast-southwest on the opposing side of the A458, about 40m from the Development at its closest point, had already been constructed by 1885. A second rail line previously diverged from the main line towards the north, however, this was dismantled between 1954 and 1973.
- 13.3.18. Historical plans may be found within Annex A of the Geo-environmental and Geotechnical Assessment Site Investigation Report, as found in Technical Appendix 13-1.

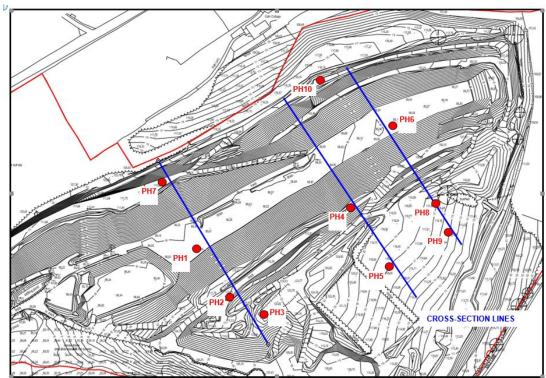
Geology and Ground Conditions

- 13.3.19. The geological and ground conditions across the Development Area were determined through study of available geological maps, a field survey of the exposed geology within the sides of the quarry void and through intrusive site investigation comprising ten rotary probeholes (PH1 PH10) which retrieved cores of the various rock formations. The findings are described in detail in the Geo-environmental and Geotechnical Assessment Site Investigation Report, see Technical Appendix 13-1.
- 13.3.20. Probehole Locations are provided on Figure 13-3.









- 13.3.21. The Development Site is underlain by Silurian mudstones, which are bedded very steeply, typically between 75°–85° towards the southeast, and young towards the southeast. The three lithologies encountered are the Cefn Formation ("CF"), Tarannon Mudstone Formation ("TMF") and Trewern Brook Mudstone Formation ("TBMF").
- 13.3.22. The TMF was found as weak dark reddish brown locally light greenish grey mudstone with closely spaced fractures stained orangish brown. Bedding fractures were recorded as orientated 75°-85° with primarily planar smooth to polished surfaces. Other fractures were found to be variable in orientation with no consistent fracture surface type, but fractures were clean and generally tight to open.
- 13.3.23. The CF was found to be completed weathered to soil to around 1m depth. This grades into extremely weak dark grey mudstone with bands of non-intact laminated mudstone and siltstone retrieved as angular gravel in places. Bedding fractures are identified by their 80°-85° orientation, with variable surfaces but often striated. Other fracture planes are dominantly found to be 15°-45° to around 11m depth before favouring a 35°-60° orientation but 60°-70° fracture planes were also found to regularly feature to the full depth of the probehole. Fractures were generally clean. Non-intact greenish grey mudstone retrieved as gravel extended to 3.0m depth in PH10 (as located on Figure 13-3), succeeded by very weak grey mudstone with very close to closely and occasionally medium spaced fractures dominantly orientated 5°-35° and stained orangish brown or dark grey/black. Bedding fractures were consistently dipping 80°-85°.





- 13.3.24. The TBMF was found weathered to very gravelly clay soil in some areas to 1.0m depth. In general, it is formed of weak grey to dark grey mudstone beds, initially non-intact or very weak in areas and becoming medium strong to strong at depth. Bedding fractures follow a 75°- 85° orientation. Other fractures and joints are prevalent but no relationship between spacing and orientation may be determined between different boreholes. Most fractures are clean but occasionally found to be infilled with soft to stiff grey clay to no more than a few centimetres in thickness. Mineralisation of some fractures was also noted, but these were typically no wider than 1mm. Graptolite fossils (monograptids) were observed in particular beds and often seen on bedding fracture surfaces.
- 13.3.25. The geological map of the area records superficial Devensian fluvioglacial fan deposits (sand and gravel) or Devensian till in the immediate areas surrounding the quarry top but cover was found to comprise weathered bedrock deposits.
- 13.3.26. Imported materials/made ground were noted to form part of the access track into the base of the quarry, and surface some of the area of rough ground south of the quarry. Rubble hardcore material was also noted on a section of track mid-way up the southeast quarry face.
- 13.3.27. A section of rock exposure just beyond the northeast end of the proposed Development area and non-operation quarry is classed as a geological SSSI. The location of the SSSI is illustrated on Figure 16-1. Geological SSSIs are designated for their geological national importance where they present an example of a specific geological feature that must be protected and preserved for future study.
- 13.3.28. The SSSI exposes a continuous sequence of Llandovery to Wenlock rocks encompassing the Buttington Shale Formation (TMF) from the upper Llandovery through to the TBMF. These rocks are hold significance for their particular fossil content, particularly of graptolites.

Hydrology and Hydrogeology

- 13.3.29. The bedrock underlying the Development Site has been defined as a Secondary B Aquifer as confirmed by a dataset created by collaboration of the Environment Agency, National Resources Wales and British Geological Survey. Groundwater flow within the underlying bedrock will be controlled by the strata dip and any fractures or bedding planes within the rock units.
- 13.3.30. Surface water features include the stream that flows along part of the Development Site's southern boundary and the two settlement lagoons at the entrance to the quarry. The stream route across the west of the Development Site is no longer recorded. This may have been culverted, or it may perhaps 'sink' within the Development Site following localised quarrying and alteration of the ground.
- 13.3.31. Beyond the Development Site there are numerous drains along field boundaries and two wells are also located within 20m of the northern site boundary.
- 13.3.32. The River Severn is located approximately 1.1km southwest of the Development Site.





13.3.33. The Development Site does not lie within a groundwater source protection zone, nor are there any groundwater abstraction points within 750m of the DNS application boundary.

Radon Gas

13.3.34. The underlying geology is deemed to be a source of radon gas and the Development Site lies within an intermediate probability radon area.

Environmental Information

- 13.3.35. Border Hardcore currently operates on the current operational quarry (see Figure 13-1) and within the Development Area (as defined on Figure 13-1) and maintains a permit relating to general mineral process. This was originally issued as a Local Authority Pollution Prevention and Control permit (permit reference PPC 47) on 11th September 2006 but Border Hardcore automatically continued operating under Environmental Permitting Regulations (England and Wales) when these permits replaced PPC permits in 2010.
- 13.3.36. No historic or active landfill sites, or licensed waste management facilities are present within 250m of the site.
- 13.3.37. Potentially infilled land is recorded in the west of the Development Site in relation to an historical small quarry and an area of former quarrying/clay pit.
- 13.3.38. No pollution incidents are detailed to have occurred within a 250m radial area around the Development Site since 1997.
- 13.3.39. The remaining woodland in the northwest of the Development Site is designated ancient woodland.
- 16.1.1. Border Hardcore is listed as a contemporary trade. The former brick works and clay pit are also listed. No contemporary trades are recorded in the Envirocheck Report at properties adjacent to the site. However, Speed Welshpool Limited, a pallet and parcel delivery company are known to occupy one of the large units directly adjacent to the Development Site.
- 13.3.40. No premises with consent to discharge waste waters are present within 150m of the Development Site.

Soil Chemistry

13.3.41. A series of 25 samples were taken from the surface or shallow trial holes excavated by hand or by using a tracked machine. 'Soil' samples comprised superficial soil cover, fill materials or weathered rock/scree.





- 13.3.42. Samples were retrieved from the quarry floor, quarry sides and from the area south of the quarry.
- 13.3.43. Samples were submitted for laboratory chemical analysis for a range of metals and organic and in-organic substances, as well as asbestos, to ascertain the baseline chemistry of site soils/rock.
- 13.3.44. As part of the geo-environmental assessment test results were compared with regulatory human health commercial threshold levels. These guidelines were used to determine whether site soils present a risk to the human health or the environment both during and beyond construction of Buttington ERF. Only the threshold for sulphate is not human health related, but this is important in relation to construction concrete only. Test results are summarised in Tables 13-2 and 13-3.
- 13.3.45. Full details of the sample locations, analysis results and assessment may be found in the Geo-environmental and Geotechnical Assessment Site Investigation Report provided in Technical Appendix 13-1.

Substance	Human Health Threshold Level		Measured Concentrations (mg/kg)	
	(mg/kg)	Minimum	Maximum	 Exceedances
Aluminium	-	5900	22,000	-
Arsenic	640	1.8	47	0
Boron	240000	0.4	1.1	0
Cadmium	190	<0.1	13	0
Calcium	-	2000	100,000	-
Chromium III	8600	21	110	0
Chromium VI	33	<1.0	<1.0	0
Copper	68000	10	260	0
Iron	-	11000	43000	-
Lead	2330	5.4	37	0
Manganese	-	160	27000	-
Mercury	1100	<0.05	<0.05	0
Nickel	980	22	170	0
Selenium	12000	<0.5	9.7	0
Sodium	-	130	2300	-
Tin	-	<1.0	2.1	-
Zinc	730000	63	690	0
Cyanide	480	<0.1	0.3	0
Phenol	440	<0.3	<0.3	0
Sulphate	2400	<100	2700	1

Table 13-2: Soil Chemical Test Results – Metals and In-organics





Substance	Human Health Threshold Level		oncentrations g/kg)	Number of
	(mg/kg)	Minimum	Maximum	 Exceedances
Ammoniacal Nitrogen	-	<0.5	19	-
Chloride	-	<1.0	35.1	-
Nitrite	-	<1.0	9.2	-
Ortho Phosphate	-	<0.1	0.11	-
Organic Matter	-	0.1	3.2	-
рН	-	6.7	9.9	-
Asbestos	-	Not detected	Not detected	0

Table13-2: Soil Chemical Test Results – Metals and In-organics (cont)

Table 13-3: Soil Chemical Test Results – Speciated Polyaromatic Hydrocarbons and Petroleum Hydrocarbons

Substance	Human Health Threshold Level	Measured Concentrations (mg/kg)		Number of
	(mg/kg)	Minimum	Maximum	- Exceedances
Naphthalene	190	<0.03	<0.03	0
Acenaphthylene	83000	<0.03	<0.03	0
Acenaphthene	84000	<0.03	<0.03	0
Fluorene	63000	<0.03	<0.03	0
Phenanthrene	22000	<0.03	<0.03	0
Anthracene	520000	<0.03	<0.03	0
Fluoranthene	23000	<0.03	<0.03	0
Pyrene	54000	<0.03	<0.03	0
Benzo(a)anthracene	170	<0.03	<0.03	0
Chrysene	350	<0.03	<0.03	0
Benzo(b)fluoranthene	44	<0.03	<0.03	0
Benzo(k)fluoranthene	1200	<0.03	<0.03	0
Benzo(a)pyrene	35	<0.03	<0.03	0
Indeo(123cd) pyrene	500	<0.03	<0.03	0
Dibenzo(ah)anthracene	3.5	<0.03	<0.03	0
Benzo(ghi)perylene	3900	<0.03	<0.03	0
PH C5 – C6 Ali	3200	<0.01	<0.01	0
PH C6 – C8 Ali	7800	<0.01	<0.01	0
PH C8 – C10 Ali	2000	<0.01	<0.01	0
PH C10 – C12 Ali	9700	<1.5	<1.5	0





Table13-3: Soil Chemical Test Results – Speciated Polyaromatic Hydrocarbons and Petroleum Hydrocarbons (cont)

Substance	Human Health Ibstance Threshold Level		Measured Concentrations (mg/kg)	
	(mg/kg)	Minimum	Maximum	- Exceedances
PH C12 – C16 Ali	59000	<1.2	2.8	0
PH C16 – C21 Ali*	1600000	<1.5	9.9	0
PH C21 – C35 Ali*	1600000	<3.4	<3.4	0
PH C5 – C7 Arom	26000	<0.01	<0.01	0
PH C7 – C8 Arom	56000	<0.01	<0.01	0
PH C8 – C10 Arom	3500	<0.01	<0.01	0
PH C10 – C12 Arom	16000	<0.9	<0.9	0
PH C12 – C16 Arom	36000	<0.5	13	0
PH C16 – C21 Arom	28000	<0.6	29	0
PH C21 – C35 Arom	28000	<1.4	6.9	0

Note to Table PH = petroleum hydrocarbon C = Carbon Ali = aliphatic Arom = aromatic

- 13.3.46. All substances tested for in soil were found to be present at level below their threshold level with the exception of sulphate in one sample. However, the threshold used in assessment of the results is relevant to construction concrete only. Sulphate does not present at risk to human health or the environment.
- 13.3.47. The soils may therefore be confirmed to be uncontaminated and do not present a risk to human or environmental receptors.

Groundwater Chemistry

- 13.3.48. Groundwater monitoring wells were installed in the probeholes drilled on Site as part of the geotechnical and geo-environmental site investigation. Groundwater samples were extracted from the boreholes on one occasion as part of the investigation.
- 13.3.49. Samples were submitted for laboratory chemical analysis for a range of metals and organic and in-organic substances to ascertain the baseline chemistry of groundwater beneath the site.
- 13.3.50. As part of the geo-environmental assessment test results were compared with regulatory threshold levels for freshwater. These guidelines were used to determine whether groundwater presents a risk to the aquatic environment both on and off Site.





- 13.3.51. Full details of the sample locations, analysis results and assessment may be found in the Geo-environmental and Geotechnical Assessment Site Investigation Report provided in Technical Appendix 13-1.
- 13.3.52. Test results are summarised in Tables 13-4 for metals and inorganic compounds, and Table 13-5 for speciated polyaromatic compounds ("PAH") and petroleum hydrocarbons ("PH").

Substance	Freshwater Threshold Level	Measured Concentrations (µg/l)		Number of
	(μg/l)	Minimum	Maximum	 Exceedances
Aluminium	-	58	790	-
Arsenic	50	0.73	45	0
Boron	-	<0.03	0.17	-
Cadmium	0.08-0.25*	<0.03	0.17	1*
Calcium	-	7700	240000	-
Chromium III	4.7	<1.0	75	1
Chromium VI	3.4	<7.0	<7.0	BLDL
Copper	1.0	<0.4	100	1
Iron	1000	5.5	1600	1
Lead	1.2	0.1	14	1
Manganese	123	3.9	270	1
Mercury	0.07	<0.01	<0.01	0
Nickel	4.0	<0.5	150	2
Selenium	10	0.83	7.4	0
Sodium	-	24000	200000	-
Tin	25	<0.4	2.5	0
Zinc	12.9	2.1	340	6
Phenol	7.7	<100	<100	BLDL
рН	-	6.6	8.3	-
Cyanide	1.0	<40	<40	BLDL
Hardness	-	23.3mg/l	898mg/l	-
Ammoniacal Nitrogen	-	79	8500	-
Chloride	250,000	1100	18,000	0
Nitrite	50,000	<35	79	0
Ortho Phosphate	-	<0.01	0.1	-
Sulphate	_	2100	330,000	-

Table 13-4: Groundwater Chemical Test Results – Metals and In-organics

Note to Table16- 4:

BLDL – Below Laboratory Detection Limit

* Threshold range where sample specific dependant on groundwater hardness





Table 13-5: Groundwater Chemical Test Results – Speciated PAH and PetroleumHydrocarbons

Substance	Freshwater Threshold	Measured Concentrations (µg/I)		Number of
	Level (µg/l)	Minimum	Maximum	Exceedances
Naphthalene	2.0	<0.05	0.09	0
Acenaphthylene	-	<0.01	<0.01	BLDL
Acenaphthene	-	<0.01	<0.01	BLDL
Fluorene	-	<0.01	0.03	2 ALDL
Phenanthrene	-	<0.01	0.11	2 ALDL
Anthracene	0.1	<0.01	<0.01	0
Fluoranthene	0.0063	<0.01	0.01	1
Pyrene	-	<0.01	0.02	1 ALDL
Benzo(a)anthracene	-	<0.01	<0.01	BLDL
Chrysene	-	<0.01	<0.01	BLDL
Benzo(b)fluoranthene	0.017	<0.01	<0.01	0
Benzo(k)fluoranthene	0.017	<0.01	<0.01	0
Benzo(a)pyrene	0.00017	<0.01	<0.01	BLDL
Indeo(123cd)pyrene	-	<0.01	<0.01	BLDL
Dibenzo(ah)anthracene	-	<0.01	<0.01	BLDL
Benzo(ghi)perylene	0.0082	<0.01	<0.01	BLDL
PH C5 – C6 Ali	15000	<0.1	<0.1	0
PH C6 – C8 Ali	15000	<0.1	<0.1	0
PH C8 – C10 Ali	300	<0.1	<0.1	0
PH C10 – C12 Ali	300	<0.1	<0.1	0
PH C12 – C16 Ali	300	<0.1	<0.1	0
PH C16 – C21 Ali*	-	<0.1	<0.1	BLDL
PH C21 – C35 Ali*	-	<0.1	48	1 ALDL
PH C5 – C7 Arom	-	<0.1	<0.1	BLDL
PH C7 – C8 Arom	-	<0.1	<0.1	BLDL
PH C8 – C10 Arom	300	<0.1	<0.1	0
PH C10 – C12 Arom	90	<0.1	<0.1	0
PH C12 – C16 Arom	90	<0.1	<0.1	0
PH C16 – C21 Arom	90	<0.1	<0.1	0
PH C21 – C35 Arom	90	<0.1	<0.1	0

Note to Table

PH = petroleum hydrocarbon C = Carbon

Ali = aliphatic Arom = aromatic

BLDL – Below Laboratory Detection Limit

ALDL – Above Laboratory Detection Limit





- 13.3.53. Laboratory testing of groundwater identified numerous substances above their quoted threshold level in one or more locations.
- 13.3.54. There appears to be no correlation between these results and the results of soil samples analysed.
- 13.3.55. Given the lack of on-site and neighbouring site sources of contamination it is surmised that the substances of concern in groundwater are naturally occurring, groundwater chemistry being influenced by the chemistry of the underlying rocks or mineralised fractures.
- 13.3.56. In addition, it should be noted that the new Development will collect surface waters in new drains installed across the Development Area that will be covered with either new buildings or hardstanding.
- 13.3.57. Groundwater is not therefore considered to present a risk to the wider aquatic environment.

Geotechnical Parameters

- 13.3.58. Geotechnical properties of the existing rock types have been determined through laboratory testing.
- 13.3.59. Slake durability testing may be used to understand how susceptible rock may be to degradation when subject to weathering processes such as wetting and drying and freezing and thawing cycles. This is particularly important with respect to mudstones and shales. Slake durability test results are compared to Gamble's Slake Durability Classification.
- 13.3.60. The slake durability results are summarised in Table 13-6.

Sample	Strata	Percentage retained after one 10 min cycle	Durability Classification	Percentage retained after two 10 min cycles	Durability Classification
S1	TMF	88	Medium	76	Medium
S2	TMF	88	Medium	75	Medium
S3	CF	96	Medium High	93	Medium High
S4	TBMF	93	Medium	88	Medium High
S5	TBMF	94	Medium	89	Medium High
S6	TBMF	91	Medium	88	Medium High

Table 13-6: Slake Durability Test Results

Note to Table

TMF – Tarannon Mudstone Formation

CF – Cefn Formation

13.3.61. Samples were tested in the laboratory by dry and wet sieving analysis to determine their grading characteristics.





13.3.62. Based upon the soil property test results, and referring to Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements and Table 6/2: Grading Requirements for Acceptable Earthworks Materials, of the 'Series 600 Specification for Highway Works^{xiv'}, the samples can be classified shown in Table 13-7.

Sample	Strata	Type (Table 6/2)	Classification (Table 6/1)
S1	TMF		
S2	TMF		Well graded granular
S3	CF	1.0	material
S4	TBMF	— 1A	
S5	TBMF		Compaction Method 2
S6	TBMF		

Table 13-7: Grading Analysis Results and Soil Classification

Note to Table

TMF – Tarannon Mudstone Formation

CF – Cefn Formation

TBMF – Trewern Brook Mudstone Formation

13.3.63. Compaction should be undertaken in accordance with Table 6/4: Method Compaction for Earthworks Materials: Plant and Methods of the 'Series 600 Specification for Highway Works'. Table 16-8 details the geotechnical parameters of the strata considered in the sloe stability assessment.

Strata	Angle of Shearing Resistance ° (φ´)	Effective Cohesion kPa (c´)	Bulk Density kN/m ³
CF	60°	20	26
TMF (quarried)	60°	20	26
CF (scree)	34°	0	16
TMF (quarried scree)	34°	0	20

Table 13-8: Geotechnical Soil and Rock Parameters for Slope Stability Assessment

Note to Table

TMF – Tarannon Mudstone Formation

CF – Cefn Formation

Slope Stability Analysis

- 13.3.64. Slope stability modelling on the existing scree slopes either side of the quarry void was performed using Geo5 software. This software program may be utilised to analyse a variety of slope stability scenarios based on a two-dimensional environment, where topographic and site derived geotechnical parameters may be inputted to model the real environment.
- 13.3.65. Analysis of slope stability was also performed using stereonets. A stereonet is a geological graphical method of assessment whereby the orientation and dip of 3D geological planes may be illustrated in 2D on a circular projection plane. Stereographic projection permits a 3D representation of the planes on a half-sphere pictorially. A stereonet may be used to





understand the relationship between different geological planes and whether the intersection between different geological planes may indicate a potential method of rock failure.

13.3.66. Slope stability analysis concluded that the degree of any slope stabilisation required is dependent on the angle of newly created slopes. Assessment has shown that a slope angle of 34° is deemed to be what the strata will naturally attain if left exposed. This is the steepest angle slope permitted to require the minimum protection measures. An angle of 60° is considered the steepest angle at which the slope may be safety stabilised for long term integrity. The Slope Stability Assessment undertaken may be found as Technical Appendix 13-2.

Likely Future Conditions

- 13.3.67. If the project is not approved and the site remains unchanged then long-term site conditions will not alter significantly. The site has already been confirmed to be uncontaminated. If the ground will not be disturbed there will be no adverse effects on the SSSI, or the current stability of the quarry faces that will continue to weather to its natural angle of repose of 34°.
- 13.3.68. If the project is not approved it is anticipated that quarry would continue to be worked at permitted levels until the quarried product is exhausted. Once this has been achieved the Development area would be ground engineered to form a level plateau upon which a new development comprising industrial units would be constructed. Continuation of quarrying would not be expected to have an adverse effect on the environment. Consideration would have to be given to construction works and future site use specific to any future development with regards to traffic, proposed industrial processes and emissions, etc. The SSSI may be protected by applying a surrounding development exclusion zone.

13.4. Environmental Effects Assessment

Construction Phase – Physical Effects

- 13.4.1. Construction works will be carried out in a series of stages:
 - widening of the quarry bottom and reprofiling of the existing south-eastern quarry face in order to bring the site to a level, fully prepared state;
 - placement of excavated quarry materials in the area immediately south of the Buttington ERF as engineered fill (surplus material would be moved off-site); and
 - erection of the Buttington ERF upon strip or pad foundations including roads and installation of services.
- 13.4.2. Soils excavated out during modification of the existing quarry will include movement and relocation of these materials to other areas of the site. This will include laying the excavated materials as engineer fill both in the current quarry bottom and on land southeast of the quarry.





13.4.3. Soils or aggregate could be imported for use in the new development.

Construction Phase – Construction Workers

13.4.4. There is potential human health risk to construction workers via exposure to imported soils/aggregate and any unexpected made ground discovered on site via dermal contact, ingestion and inhalation of dust if these are contaminated. Imported materials or unexpected site soils may also present a risk from inhalation of asbestos fibres or vapours.

Construction Phase – Local Residents

13.4.5. Local residents may be at risk through exposure to dust or asbestos fibres generated through from site activities with unexpected made ground or imported soils/aggregate.

Construction Phase – Site Soils

13.4.6. The introduction of imported materials could potentially have a negative impact on site soils or groundwater if contaminated.

Construction Phase – Surface Water and Groundwater

13.4.7. If any unexpected made ground is discovered on site or soils or aggregate is imported these may potentially have a negative impact on site soils or groundwater if contaminated.

Construction Phase – Building Materials

13.4.8. Concrete used in construction is potentially at risk from chemical attack from substances in site soils.

Construction Phase – Construction Chemicals, Fuels and Waste Products

13.4.9. There are potential environmental risks to the development site during the construction period in connection with construction activities, vehicles and construction materials such as fuels and concrete.

Construction Phase – Geological SSSI

13.4.10. Construction works have been designed so that the geological SSSI will remain unaffected.





Construction Phase - Mitigation

- 13.4.11. During the construction phase, risks to construction workers, local residents and the environment from any imported soils or aggregate will be mitigated by:
 - review of chemical test certificates for intended imported materials to ensure only materials deemed uncontaminated when compared to regulatory soil thresholds are considered for import;
 - independent sampling and testing of soils or aggregate once received on site and results compared to regulatory soil thresholds to confirm only intended soils have been imported and that these are acceptable;
 - compilation of all testing and assessment data for imported soils and aggregate in the form of a soils validation report; and
 - removal of any materials found to be unsuitable
- 13.4.12. If previously undetected made ground is identified on site during the construction period the following mitigation measures will be employed:
 - inspection, sampling and testing of soils by a geo-environmental engineer;
 - undertake a quantitative human health and environmental risk assessment and comparison to laboratory test results to regulatory soil thresholds to determine whether soils are contaminated; and
 - removal of any materials found to be unsuitable for retention on site.
- 13.4.13. A Construction Environmental Management Plan ("CEMP") has been prepared for the Development and may be found in Technical Appendix 4-2. The construction contractors will be responsible for implementing measures to control or prevent run-off of construction materials or leaks and spills. This will include:
 - prepare a drainage plan;
 - store all oils, fuels and chemicals in a fully bunded area;
 - carry out any activities (such as refuelling) that could cause pollution (leaks/spills) in a designated area, away from surface water or boreholes. Where possible it should drain to the foul sewer;
 - use settlement ponds to remove silty water; and
 - emergency procedure plan.
- 13.4.14. The appointed contractor will provide Method Statements and Risk Assessments to deal with these matters. During the ground works, the contractor will comply with all current Health and Safety regulations.
- 13.4.15. Discharge of waste materials/waters will be regulated in accordance with any relevant environmental permits.
- 13.4.16. Based on chemical test data from site soils an assessment has been made in accordance with publication BRE Special Digest 1:2005 Concrete in Aggressive Ground^{xv} to the risk to concrete from the chemical agents in the ground. This confirms that all buried concrete should as a minimum conform to Class AC-1 to resist chemical attack.





Operational Phase – Effects

- 13.4.17. Buttington ERF will introduce and store specific non-hazardous and hazardous substances and chemicals on site. These will comprise waste to be processed and substances associated with plant activity: calcium hydroxide (hydrated lime); 24% aqueous ammonia; activated carbon; boiler treatment chemicals (trisodium phosphate); low sulphur gas oil.
- 13.4.18. Incinerator bottom ash and air pollution control residues will also be produced as waste through plant activity.
- 13.4.19. There is the potential for leaks or spills of chemicals and waste to occur, which would impact the underlying soils and groundwater.
- 13.4.20. Future site users will potentially be at risk through exposure to naturally occurring radon gas.
- 13.4.21. Concrete used in construction is potentially at risk from chemical attack from substances in site soils.

Operational Phase - Mitigation

- 13.4.22. A risk to human health from radon gas is identified. Basic radon protection measures will be incorporated into Buttington ERF.
- 13.4.23. The following pollution prevention measures will be implemented to minimise the potential contamination of the land as a result of the operation of the Installation:
 - all chemical storage tanks, silos or sumps will be impermeable and resistant to the materials to be stored therein;
 - all bunds, hard standing area and sumps will be subject to regular inspection and, in the case of bunds and sumps, the contents will be removed to allow for checking;
 - all operation areas will have an impervious surface with sealed construction joints and spill containment kerbs;
 - surfacing in all areas of the site will be fit for purpose, i.e. it will be chemically resistant to the materials that will be stored/treated in that area; and
 - all storage tanks will be bunded, impermeable to the materials they contain, have all delivery and discharge pipe work and valves contained within the bund, are inspected on a regular basis (including emptying the contents) and will be subject to integrity testing as and when required.
- 13.4.24. Emergency procedures for any unexpected pollution incidents will be in place and will be detailed in the Installations Emergency Plan.
- 13.4.25. Discharge of waste materials/waters will be regulated in accordance with any relevant environmental permits.
- 13.4.26. Buttington ERF will operate under an NRW environmental permit. In order to comply with this permit periodic monitoring will be carried out at least once every five years for





groundwater and ten years for soil, unless such monitoring is based on a systematic appraisal of the risk of contamination.

- 13.4.27. The permit will specify that waste produced by Buttington ERF (bottom ash and APC residue) will be sampled and analysed in accordance with NRW protocol for total organic carbon, heavy metals, dioxins and furans, dioxin-like poly-chlorinated biphenyls quarterly and for soluble heavy metal content before use of a new disposal or recycling route.
- 13.4.28. The permit will also stipulate that 'all liquids in containers, whose emission to water or land could cause pollution, shall be provided with secondary containment, unless the operator has used other appropriate measures to prevent or where that is not practicable, to minimise, leakage and spillage from the primary container'.

Decommissioning Phase - Effects

- 13.4.29. Decommissioning of Buttington ERF would see the site return to its current form.
- 13.4.30. Removal of any remaining processing substances/chemicals and waste products and storage containers presents a risk from accidental spillage or leaks, which could impact site soils or groundwater.
- 13.4.31. There are potential environmental risks to the site during the decommission period in connection with demolition and clearance activities such as accidental spillage or leaks of vehicle fuel.

Decommissioning Phase - Mitigation

- 13.4.32. The Decommissioning will be undertaken in accordance with a Decommissioning Environmental Management Plan ("DEMP"). This will include emergency procedures for any unexpected pollution incidents to be put in place during removal of remnant plant chemicals, bottom ash and APC residue.
- 13.4.33. The demolition contractors will be responsible for implementing measures to control or prevent run-off of materials or leaks and spills. This will include:
 - prepare a drainage plan;
 - store all oils, fuels and chemicals in a fully bunded area;
 - carry out any activities (such as refuelling) that could cause pollution (leaks/spills) in a designated area, away from surface water or boreholes. Where possible it should drain to the foul sewer;
 - emergency procedure plan.
- 13.4.34. Following decommission samples of site soils and groundwater will be taken and analysed to confirm decommissioning works has had no adverse effects on the environment.
- 13.4.35. If decommissioning works have impacted site soils or groundwater, appropriate management or treatment of contamination will be undertaken.





The Development Overall

- 13.4.36. Provided that any soils, aggregates, fuels, oils and other substances brought on to site during construction phase and during operation of Buttington ERF are correctly regulated, used and stored to prevent potential spills and leaks then the Development should not have an impact on the Development area.
- 13.4.37. Provided that any remnant chemicals and waste products are removed appropriately prior to decommissioning, and any, fuels, oils and other substances brought on to site during demolition and clearance of Buttington ERF are correctly regulated, used and stored to prevent potential spills and leaks then the decommissioning should not have an adverse impacts upon the environment.

The Development in Combination with Other Developments

13.4.38. There will be no cumulative effects with other developments in the local area.

Interactive Effects

13.4.39. Interactions with other KEA's – to be provided in Table 13-9.

KEA Interaction	Interactive Effects
Geotechnical and Materials Management and Air Quality	During the construction phase the site soils have the potential to become airborne and decrease air quality. The impact of dust from construction has been considered in Chapter 6 Air Quality.
Geotechnical and Materials Management and Transport	Removal/Import of material onsite in the construction phase has been addressed in Chapter 8 Highways and Transport.
Geotechnical and Materials Management and Water Environment	The geotechnical requirement for earthworks including slope stabilisation works during the site preparation phase has the potential to impact surface water quality due to the generation of suspended solids. Management of site runoff during the site preparation and construction phase has been incorporated into the SWMP in Technical Appendix 11-2.
Geotechnical and Materials Management and Ecology	During the construction phase modelling of the quarry faces and the excavation and deposition of site-won soils across the site could potentially impact site flora and fauna as this will involve the direct removal of trees and vegetation, and animal territories. The impact on local ecology has been considered in Chapter 10.

Table 13-9: Interactive Effects on KEA





13.5. Environmental Effects Assessment Evaluation

- 13.5.1. Based on the Environmental Effect Assessment for all Development phases discussed in Section 13.4, a detailed environmental effects analysis is provided in Tables 13-11 and 13-13.
- 13.5.2. The evaluation criteria provided in Table 13-10 are considered relevant in respect of the geotechnical and geo-environmental impacts of the Development within the study area and have been used to describe the effects.

Criteria	Description
Magnitude of Impact (Mg) Effects on Human Health	 U - Unknown - there is insufficient evidence to indicate the magnitude of the effect. N -Nil – Comparison of analysis data does not find any substance to be present at a concentration above its respective C4SL or S4UL soil guideline value. No risks to human health will be presented. L - Low risk to human health. Substances present in soils at concentrations marginally above their respective C4SL or S4UL guidelines. M -Medium risk to human health. Substances present in soils at concentrations above their respective C4SL or S4UL guidelines. H - High Risk to human health. Substances present in soils at concentrations severely above their respective regulatory C4SL or S4UL guideline.
Magnitude of Impact (Mg) Risk from Radon Gas	 N - No risk from radon gas L - Low risk from radon gas H - High risk from radon gas
Magnitude of Impact (Mg) Effects on Soils and Groundwater	 U - Unknown - there is insufficient evidence to indicate the magnitude of the effect. N - Nil – Comparison of soil analysis data does not find any substance to be present at a concentration above its respective C4SL or S4UL guideline. No contamination of the ground or groundwater will occur. L - Low – Contamination of the ground and groundwater may occur. Substances present at concentrations marginally above their respective C4SL or S4UL soil guideline or groundwater WFD, DWD or DSD threshold. M - Medium – Contamination of the ground and groundwater will occur. Substances present at concentrations above their respective C4SL or S4UL soil guideline or groundwater WFD, DWD or DSD threshold. M - Medium – Contamination of the ground and groundwater will occur. Substances present at concentrations above their respective C4SL or S4UL soil guideline or groundwater WFD, DWD or DSD threshold. H - High – Contamination of the ground and groundwater will occur. Substances present at concentrations severely above respective C4SL or S4UL soil guideline or groundwater WFD, DWD or DSD threshold.
Magnitude of Impact (Mg) Effect on concrete	 L - Low risk from aggressive ground. Site soils contain low levels of substances that may chemically attack concrete H - High risk from aggressive ground. Site soils contain high levels of substances that may chemically attack concrete

Table 13-10: Environmental Effects Assessment Evaluation Criteria





Criteria	Description				
Geographic Extent	DA - Within Development area Boundary				
of Impact (GE)	 DNS - Within DNS planning application boundary 				
	<250m - Up to 250m from Development Area				
Frequency of	• S - Single event				
Impact (F)	A - Annual activity				
	M - Monthly occurrence				
	C - Continuous activity				
Duration of Impact	• D – 1 day				
(D)	• M - 1 month				
	• Y - 1 year				
	>2Y Greater than 2 years				
Reversibility of	U -Unknown - there is insufficient research/experience to indica				
Impact (R)	whether the environmental effect is reversible				
	 N -Nil - previous research/ experience indicates that the environmental effect is irreversible 				
	• L - Low - previous research/ experience indicates that there is a small likelihood that the environmental effect is reversible				
	• M - Medium - previous research/experience indicates the				
	environmental effect may be reversible				
	• H - High - previous research/experience indicates the				
	environmental effect is reversible				
Ecological, Cultural	• P - Relatively pristine area not adversely affected by human activity				
and Socio-	E - Evidence of human activity				
economic Context of Impact (ESC)	H - High level of human activity				

Table13-10: Environmental Effects Assessment Evaluation Criteria (cont)

Table 13-11: Environmental Effects Analysis - Geotechnical: Construction Phase

Activity	Potential Effect		Evaluation Criteria						
Activity	Potential Effect	Mg	GE	F	D	R	ESC		
Import of soils and aggregate	Contamination of site soils, surface waters and groundwater. Risk to human health of construction workers & neighbouring site users Conclusion: Contamination of site so human health from the in significant provided that	mport of	f soils and	d aggreg	ate is cor				
	Mitigation: Pre-import asse Post-import san materials to con Any materials fo	npling, te nfirm suit	esting an table for	d quanti use	tative as	sessment	·		





Activity	Potential Effect	E	valuat	tion Criter	ia		
		Mg	GE	F	D	R	ESC
Accidental	Contamination of site	Н	<250m	S	М	Н	Р
spillage of	soils, surface waters and						
construction	groundwater and risks						
materials, fuels	to human health of						
etc	construction workers &						
	neighbouring site users						
	Conclusion:						
	Contamination of site soi	ls, surfa	ce waters a	nd gro	oundwater	r and ris	k to
	human health from accid						
	chemicals should not be s	significa	nt provideo	that t	the mitiga	tion belo	ow is
	followed.	-	-		_		
	Mitigation						
	Prepare a drainage	plan.					
	• Store all oils, fuels a		nicals in a f	[:] ullv bı	unded area	a.	
	 Carry out any activ 			-			pollutic
	(leaks/spills) in a de	-					-
	Where possible it sl	-	-				
	 Use settlement pon 						
	Emergency procedu		-	water.			
Encountering	Contamination of site		DA	S	D	Н	Р
unexpected	soils, surface waters and	L	DA	3	D	п	F
potentially	groundwater and risk to						
contaminated	human health of						
soils	construction workers						
50115							
	and neighbouring site						
	users						
	Conclusion:	ام من سائم		م ما م		، ما د ام م	
	Contamination of site soi			-			
	human health from is cor below is followed.	isidered	not signifi	cant pi	rovided th	at the m	iitigatioi
	Mitigation						
	Inspection, samplin	g and te	sting to de	termin	e whethe	r unexpe	ected sol
	are contaminated						
	If unacceptable con		ion is ident	tified a	iffected sc	oils can b	be treate
	or removed from si	te					
Chemical attack	Degradation of concrete	L	DA	С	>2Y	L	Р
of construction							
concrete	Conclusion:						
	Risk to buried concrete is		ered not sig	nificar	it provide	a that th	ie
	mitigation below is follow	ved.					
	Mitigation						
	 Use of correct class 	of conc	rete in con	structi	on		

Table 13-11: Environmental Effects Analysis - Geotechnical: Construction Phase (cont)





	Potential Effect Evaluation Criteria								
Activity	Polential Effect	Mg	GE	F	D	R	ESC		
Accidental	Contamination of site	Н	<250m	S	>2Y	Н	Р		
spillage of	soils, surface waters and								
stored fuels,	groundwater and risk to								
chemical and	human health of site								
waste products	occupiers and								
	neighbouring site users								
	Conclusion:								
	Contamination of site soil	s, surfac	e waters ar	nd grou	undwate	r and ris	ks to		
	human health are conside	red not	significant	provid	ed that t	he mitig	ation		
	below is followed.								
	Mitigation								
	 Storage containers/ 	anks wi	ill be suitabl	y bun	ded				
	Operations will be a					urface t	o prevei		
	downward migration			•			•		
	Spill response proce								
Chemicals in	Degradation of concrete	L	DA	C	>2Y	L	Р		
site soils	Conclusion:	-	27.	•					
	Risk to buried concrete is considered not significant provided that the								
	mitigation below is follow				-				
	Mitigation:								
	Use of correct class	of concr	ete in const	tructio	n				
Radon Gas	Human exposure to	M	DA	C	>2yr	N	Р		
	Radon Gas		277	Ũ			•		
	Conclusion:								
	Risk to human health is considered not significant provided that the								
	mitigation below is followed.								
	Mitigation:								
	 Installation of Radon (Sas Prot	ection						
Fire and fire	Contamination of the	U	<250m	S	D	U	Р		
suppression	Ground	0	<230m	5	D	0			
water may	Conclusion:								
mobilise		significa	ant provider	that	the mitig	ation he	low is		
potentially	The risk is considered not significant provided that the mitigation below is followed.								
polluting									
materials into	Mitigation:								
the underlying	On site material stora	-	-						
soils	Sensitive materials wi	ll be loc	ated secure	ly abo	ve antici	pated flo	ood wat		
	levels								
/groundwater	• Fire water is containe	-							

Table 13-12: Environmental Effects Analysis - Geotechnical: Operational





	Detential Effect	Evalu	ation Crite	ria				
Activity	Potential Effect	Mg	GE	F	D	R	ESC	
Accidental	Contamination of site	Н	<250m	S	D	Н	1	
spillage of stored	soils, surface waters and							
fuels, chemical	groundwater and risk to							
and waste	human health of site							
products during	occupiers and							
removal from	neighbouring site users							
site	Conclusion:							
	Contamination of site soils			-				
Accidental	human health are conside	red not	significant	prov	ided tha	t the mit	igation	
spillage of	tance used Mitigation:							
during								
decommission	Storage containers/tan		-			feee te		
including fuels	 Operations will be uno downward migration o 							
		• •				-		
	• A spill response procedure will be included in the Decommissioning							
	Environmental Management Plan ("DEMP").							
	 Measures to avoid accidental spillage of materials Measures to control surface run-off 							
	 measures to control surface run-on prepare a drainage plan; 							
	 store all oils, fuels and chemicals in a fully bunded area; 							
	 carry out any activities (such as refuelling) that could cause pollution 							
	, ,	•		0,			•	
	(leaks/spills) in a designated area, away from surface water or boreholes. Where possible it should drain to the foul sewer;							
	 emergency procedure plan. 							
	 Sample, test and assert 		, coile and	are	undwate	r to co	nfirm no	
	contamination has occ		sons and	giu	unuwale			
			ion found +	o ovi	+			
	 Treat/remove any cont 	ammat	ion iound t	o exis	δί			

Table 13-13: Environmental Effects Analysis - Geotechnical: Decommissioning Phase

13.6. Residual Environmental Effects

- 13.6.1. This section considers the residual environmental effect of the Development, i.e. those effects which remain after the application of mitigation or engineering design.
- 13.6.2. In addition to the above significance rating the nature / type and duration of the impacts will be assessed using the following criteria:
 - Major (significant) residual environmental effect = contamination of the ground will occur and will exceed soil guideline values for residential use and groundwater guidelines and there is a high risk from radon gas or degradation of concrete; or
 - Moderate (significant) residual environmental effect = contamination of the ground will occur and will exceed soil guideline values for industrial use and groundwater guidelines and there is a medium risk from radon gas or degradation of concrete; or
 - Minor (not significant) residual environmental effect = contamination of the ground may occur but will not exceed soil guideline values for industrial use or





groundwater guidelines and there is a low risk from radon gas or degradation of concrete; or

- **Negligible (not significant) residual environmental effect** = contamination of the ground will not occur and there is no risk from radon gas or degradation of concrete.
- **Beneficial** An impact that is considered to represent an improvement on the baseline or introduces a positive change
- 13.6.3. The type of impact will also be defined according to the following criteria:
 - **Direct Impact** Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors.
 - **Indirect Impact** Impacts that result from other activities that are encouraged to happen as a consequence of the Project.
- 13.6.4. Residual adverse environmental effects for the Project are provided in Table 13-14.

Development	Residual Adverse	Significance	Likely Effect on the		
Phase	Environmental Effect	Significance	Environment		
Construction	Contamination of site soils, surface waters and groundwater. Risk to human health of construction workers & neighbouring site users	Negligible Not Significant Indirect	Incorporated mitigation and control procedures will ensure there is no effect on the environment or human health.		
	Degradation of concrete	Negligible Not Significant Direct	No effect.		
	Contamination of site soils, surface waters and groundwater and risk to human health of site occupiers and neighbouring site users	Negligible Not Significant Indirect	Incorporated mitigation and control procedures will ensure there is no effect on the environment or human health.		
Operation	Degradation of concrete	Negligible Not Significant Direct	No effect.		
	Human exposure to Radon Gas	Negligible Not Significant Direct	Incorporated mitigation and control procedures will ensure there is no effect on human health.		
Decommissioning	Contamination of site soils, surface waters and groundwater and risk to human health of site occupiers and neighbouring site users	Negligible Not Significant Indirect	Incorporated mitigation and control procedures will ensure there is no effect on the environment or human health.		

Table 13-14: Summary of Residual Adverse Environmental Effects – Geo-environmental and Geotechnical





13.7. Summary

- 13.7.1. The Development area historically remained as field land until the existing quarry was formed, first recorded as a quarry or clay pit on historical plans in 1954. The area south of the existing quarry remains partly as field land, but in part is currently used for access. Other areas within the DNS planning boundary remain in use for access and small-scale quarrying.
- 13.7.2. Intrusive investigation of the Development area has confirmed the underlying ground conditions and characterised the chemistry of soils and groundwater.
- 13.7.3. The Development area is underlain by Silurian mudstones, which are bedded very steeply towards the southeast, and young towards the southeast. Slope stability analysis concluded that the slope stabilisation will be required for all newly created slopes angled between 34° and 60°. An angle of 60° is considered the steepest angle at which the slope may be safety stabilised for long term integrity.
- 13.7.4. A section of rock exposure just beyond the northeast end of the proposed Development area and non-operation quarry is classed as a geological SSSI. The new Development and associated earthworks and slope stabilisation have been designed to ensure long term preservation of the SSSI.
- 13.7.5. Soils were confirmed to be uncontaminated with regards to the human health of construction workers, future site occupiers and neighbouring site users. Groundwater is not considered to present a risk to the aquatic environment.
- 13.7.6. Best practice will be employed during the construction phase of development and therefore no adverse environmental effects on human health or the soil and water environment. Prior to construction a construction environmental management plan will be developed to ensure that are sufficient control measures in place to prevent or control any potential adverse effects on human health and the aquatic environment.
- 13.7.7. Buttington ERF has been designed to meet best available techniques as described in NRW guidance and associated Bref documents and as such it is not anticipated that the operational phase of the development will have any impact on human health or the aquatic environment.
- 13.7.8. During the decommissioning phase, as with the construction phase, best practice will be employed to ensure that there are no adverse environmental effects. Control measures as specified in a Decommissioning Environmental Management Plan will be followed.
- 13.7.9. It is considered that the implementation of the above construction phase and operation phase design and control features will ensure any potential detrimental effects to land and human health are minimised.





13.8. References

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ⁱⁱ Powys Local Development Plan, (2018

ⁱⁱⁱ Department for Environment, Food and Rural Affairs, 2012. Environmental Protection Act 1990: Part 2A ^{iv}Department for Environment, Food and Rural Affairs et al, 2011. Guidelines for Environmental Risk Assessment and Management: Green Leaves III

^v British Standards Institution, 2015. Code of Practice for Site Investigations (BS5930)

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viii CL:AIRE, 2013. Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination

^{ix} LQM/CIEH, 2015. Suitable 4 Use Levels for Human Health Risk Assessment

^{*} European Commission, 2015. Water Framework Directive (Standards and Classification) Directions (England and Wales) (Council Directive 2000/60/EC)

^{xi} European Commission, 1998. Drinking Water Directive (Council Directive 98/83/EC)

xii European Commission, 1975. Dangerous Substances Directive (Council Directive 74/464/EC)

xiii CL:AIRE, 2017. Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies

xiv Department of Transport, 2008. Specification for Highway Works: Series 600.

^{xv} British Research Establishment, 2005. BRE Special Digest 1: Concrete in Aggressive Ground





Technical Appendix 13-1 Geotechnical and Geo-Environmental Site Investigation Report Geotechnical & Geo-environmental Site Investigation Report: Buttington Quarry Buttington Welshpool

Prepared For: Broad Energy (Wales) Limited

March 2019

Report No. 14880/GGR







REPORT TITLE	:	Geotechnical and Geo-environmental Site
		Investigation Report: Buttington Quarry,
		Buttington, Welshpool
REPORT STATUS	:	FINAL
JOB NUMBER	:	14880/GGR
JOB NOWBER	-	14000/GGR
DATE	:	March 2019
	_	K. Howells.
PREPARED BY	:	Mrs Ruth Howells
REVIEWED BY	:	Mr Mathew Lake
		Chin Pok
APPROVED BY	:	Dr Gwyn C Lake



Executive Summary

Proposed Development	Broad Energy (Wales) Limited is proposing the development of an Energy Recovery Facility (ERF) at Buttington Quarry, near Welshpool, a renewable energy plant that will fuelled by non-recyclable waste.
Site Location	Buttington Quarry sits into a natural hillside just northeast of Buttington, adjacent to and east of the A458 between Welshpool and Shrewsbury. The surrounding area is entirely rural. The site is centred on a National Grid Reference of 326380 309950. It occupies a plan area of approximately 25 hectares.
Site History	Set in a rural area, small scale quarrying is recorded in the west of the site on the 1885 historical map and a brick works had opened in the west by 1902. Quarrying continued on site until 15-20 years ago, extending across the proposed development area. The brick works closed in 1990.
Geology and Ground Conditions	The site is underlain by three main geological units, the Cefn Formation, Tarannon Mudstone Formation and the Trewern Brook Mudstone Formation. All three lithologies are exposed within the exiting quarry and areas investigated adjacent to the quarry found very shallow soils grading in to weathered rock to be present. Localised small areas of made ground exist where hardcore materials have been imported to form access tracks.
Radon	Basic radon protection is required for new development.
Ground Gas/Landfill Gas	No sources of potential ground gas or landfill gas are identified upon or within influencing distance of the site.
Laboratory Chemical Testing and Proposed Remediation	Laboratory analysis of site soils has confirmed that site soils are uncontaminated and present no risk to human health of the environment. Laboratory testing of groundwater identified numerous substances above their quoted threshold level in one or more locations. There appears to be no correlation between these results and the results of soil samples analysed and given the lack of on-site and neighbouring site sources of contamination it is surmised that the substances of concern in groundwater are naturally occurring, groundwater chemistry being influenced by the chemistry of the underlying rocks or mineralised fractures. There are no recorded groundwater abstraction points within 750m of the site. The River Severn situates approximately 1.1km southwest of the site. Groundwater is not therefore considered to present a risk to the wider aquatic environment.



	The new ERF plant may be constructed upon strip or pad foundations taken down in to the engineered fill or bedrock. Due to the new development spanning across both the fill and bedrock foundations should be designed as reinforced to prevent any differential settlement. Reinforcement will also provide added protection from the two faults known to cross the development area, although in the event of any earthquake activity in the area any movement of faults would not be expected to be significant.
Foundation Solution	For design purposes an allowable bearing pressure of 150kN/m ² may be used for foundations constructed within the engineered fill. Those foundations seated solely on bedrock may be designed to allowable bearing pressure of 300kN/m ² .
	Reinforced strip/pad foundations may also be used for construction of the new bunker as described above. However, it is recommended that appropriate waterproofing be incorporated into the bunker construction and allowances made for potential buoyancy effects.
	Floor slabs may be designed as ground bearing.



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SECTION 1 Introduction and Proposed Development

1.1 Introduction

Broad Energy (Wales) Limited is proposing the development of an Energy Recovery Facility (ERF) at Buttington Quarry, near Welshpool, a renewable energy plant that will be fuelled by non-recyclable waste. The new ERF is to be constructed in the bottom of the former quarry. To accommodate this the quarry is to be widened. Some of the material removed during creation of the new development area will be deposited within the existing quarry bottom or on land directly southeast as engineered fill.

A new access road to the ERF will be formed from the main road and through the western side of the site and enter the development area approximately where the current access road enters the existing quarry.

Terra Firma (Wales) Limited has been commissioned to undertake a geoenvironmental assessment and geotechnical investigation of the site.

The main objectives of the geoenvironmental assessment programme were to:

- Investigate the potential environmental liabilities at the site associated with any soil contamination
- Provide a summary of the environmental conditions at the site, together with any necessary further intrusive works and / or remediation works to render the site fit for its intended use

The main objectives of the geotechnical site investigation were to:

- Determine the type, strength and bearing characteristics of the shallow superficial and underlying solid geology
- Provide engineering foundation and floor slab recommendations for the development
- Provide recommendations with regard to any other geotechnical aspects pertaining to the development

In order to achieve the above objectives, Terra Firma (Wales) Limited carried out an assessment programme including a review of existing data, followed by a field investigation to collect geotechnical and environmental data from selected locations.

1.2 Limitations and Exceptions of Investigation

Broad Energy (Wales) Limited has requested that a Geo-environmental Site Assessment (GSA) and Geotechnical Investigation (GI) be performed in order to determine if contamination is present beneath the site and to determine an appropriate foundation and floor slab solution for the proposed development.

The GSA and GI were conducted, and this report has been prepared for the sole internal reliance of Broad Energy (Wales) Limited and its design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill. The report represents the findings and opinions of experienced geo-environmental and geotechnical consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may be required.



1.2 Limitations and Exceptions of Investigation (Continued)

The subsurface geological profiles, any contamination and other plots are generalised by necessity and have been based on the information found at the locations of the exploratory holes and depths sampled and tested.

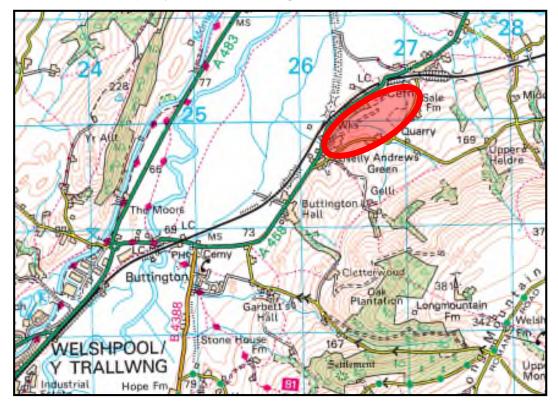


SECTION 2 Review of Existing Data

2.1 Physical Setting and Current Site Use

Buttington Quarry sits into a natural hillside just northeast of Buttington, adjacent to and east of the A458 between Welshpool and Shrewsbury. The surrounding area is entirely rural.

The site is centred on a National Grid Reference of 326380 309950. It occupies a plan area of approximately 25 hectares.



The location of the quarry is illustrated in **Figure 2.1** below.

Figure 2.1: Site Location – OS Map 216 Welshpool & Montgomery

The site area may be split into several areas.

The far south-western portion of the site lies outside the main development area. This is currently occupied by several buildings, including two large warehouse type buildings and offices, and a small quarry. There is also a weighbridge. Most of this area is surfaced with hardstanding, but the staff car park is gravelled. Border Hardcore operate the quarry and also provide storage of classic cars and caravans in one of the large units. Speed Welshpool Limited, a pallet and parcel delivery company, occupy the other large unit. In this western region of the site there is also an area of rough land east of the warehouse buildings, which lies at a higher topographic level and is accessed via a rough track.

A track leads from the western section of the site to the main quarry, now disused. The base of the quarry aligns northeast-southwest and lies at 88m - 89m AOD. The quarry sides extend up to approximately 118.5m - 127m AOD to the northwest and a maximum of 119.5m AOD to the southeast.



2.1 Physical Setting and Current Site Use (Continued)

The quarry sides remain exposed and unvegetated, and weathering of these surfaces has led to ravelling where the rock has deteriorated to form fine gravel. Where rock faces are exposed this gravel debris has accumulated at the base of the face. Exposed rock faces are primarily present towards the top of the quarry sides, particularly on its north-western side.

An area south and south-east of the quarry, which is included in the development area, slopes downhill towards the southeast. It may be accessed via an inclined track that cuts from the main entrance track into the bottom of the quarry. The hillside remains unaltered towards the northeast and comprises two grassy fields declining from around 119.5m to 111.5m AOD. The smaller of these fields is heavily overgrown and largely enclosed by hedgerows. The hillside has also been quarried south of the fields and numerous stockpiles of stone material remain in this disused area or rough ground, which sits at around 108m – 109.5m AOD.

A newly formed earth bund defines the south-eastern boundary of the development area.

Two settlement ponds are present at the entrance to the quarry, either side of the access track. During wet weather surface waters were also noted to collect in areas of the quarry floor.

An area between the northwest side of the quarry spanning west towards the currently operating small quarry is wooded.

A site layout plan is found in **Drawing 01**.



2.2 Site History

The history of the site has been traced using historical Ordnance Survey maps from an Envirocheck Report obtained from Landmark Information Group. The Envirocheck Report is presented in **Annex A**.

1885

The site at this time is seen to be situated across field land, and woodland towards the northwest. Within the woodland a small quarry is denoted, adjacent to a road that runs along the north-western site boundary. An old quarry is also recorded in this area and a small gravel pit lies further southwest (at or close to the current site entrance). A line of the Cambrian Railway is seen to traverse north to southwest to the west, where Buttington Junction locates 40m to the west on the opposing side of the road. A second rail line diverges from the junction, initially following the northwest site boundary before continuing further northeast. A stream flows west initially along the southern site boundary and continuing through the southwest of the site. The surrounding area comprises field land with isolated houses and farms, including Brookside, which nestles between the southwest portion of the site and the road.

1902

The majority of the site remains unchanged and the above-mentioned quarry and gravel pit are no longer shown to be in use. However, a brick works has been established in the southwest of the site comprising several buildings and a tramway leading from the brick works towards the northwest on the edge of the wood. Although not labelled, it appears that the tramway accesses a small quarry.

1954

No maps are available within the period 1902-1954. The 1954 edition map shows continued quarrying in the west of the site, where the quarry has migrated further towards the east.

1972/1973

The brick works is shown to have expanded with the demolition of some buildings and erection of several larger units. The tramway has been dismantled. A trackway leads from the brick works towards a clay pit that occupies the central portion of the site. The section of rail line leading north of Butting Junction has been dismantled.

1993

Filling of land adjacent to and east and south of the brick works is apparent. It is likely that fill materials were site-won, perhaps those extracted but unsuitable for brick formation. It is understood from an online source that the brick works closed in 1990.

2000

Aerial photographs from this period record significant extension of the clay pit into the eastern half of the site, but it is now recorded to be disused. A trackway also leads to an area in the far south of the site that appears to be a rough area used for access and possibly storage. The brick works buildings remain.

2019

The quarry area remains the same as 2000, but some localised small-scale quarrying beyond 2000 appears to have deepened the quarry to today's level. All but one of the former brick works buildings currently remains. The stream still follows the southern edge of the site, but where it previously continued through the site towards its western boundary it is no longer recorded.



2.3 Geological Setting

2.3.1 Geology

The solid geology at the quarry is illustrated in **Figure 3.1** below. Please note that this plan is not to scale and actual boundaries between each strata will vary.

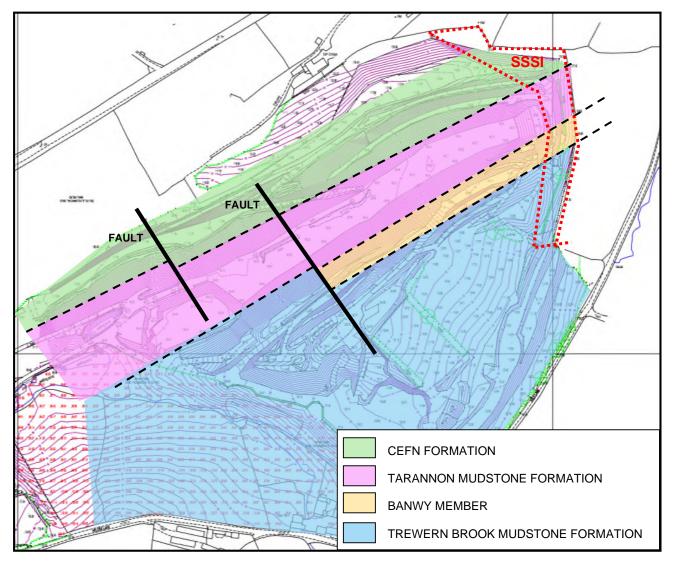


Figure 2.2: Site Geology

Figure 3.1 shows four different strata to be present at Buttington Quarry, younging towards the southeast. Table 3.1 summarises the stratigraphic sequence.

Table 2.1 Stratigraphic Sequence			
	Wenlock	Sheinwoodian	Trewern Brook Mudstone Formation
Silurian	Wenlock	Shelliwoodian	Banwy River Member
Shuhan	Llandovery T	Telychian	Tarannon Mudstone Formation
		reiyonan	Cefn Formation



2.3.1 Geology (Continued)

Cefn Formation (CF)

This is comprised of primarily of grey to dark grey mudstones, with thin sandstone beds. Concretions and nodules recorded.

Tarannon Mudstone Formation (TMF)

The Tarannon Mudstone Formation is comprised of purple/red brown mudstone/shale, also fossiliferous, with graptolites. It is this strata that has been extracted for brick making.

Banwy Member (BM)

A section of mudstone upon the quarry face that is defined by its specific graptolite fossil biostratigraphy that spans the lower Wenlock and upper Llandovery boundary.

Trewern Brook Mudstone Formation (TBMF)

Comprised of blue-grey mudstone beds, also host to graptolite fossils. At the base of the TBMF the Butterley Member is recorded, comprising an approximate 9m thick horizon of bio-turbated silty mudstone with shelly, trilobite and graptolite fossils (Lydell *et al*).

Two faults have been found to cross roughly perpendicular to the length of the quarry, as illustrated in **Figure 3.1**. These down-throw strata towards the southwest.

A continuous sequence of Llandovery to Wenlock rocks is designated as a geological SSSI (Site of Special Scientific Interest). This encompasses the Buttington Shale Formation (TMF) from the upper Llandovery through to the TBMF. The approximate area of the SSSI is illustrated on **Figure 3.1**.

Superficial Devensian fluvioglacial fan deposits (sand and gravel) or Devensian till is recorded in the immediate areas surrounding the quarry top but cover is anticipated to be very shallow, with bedrock at or near the surface.

2.3.2 Radon

The Envirocheck Report (Annex A) details that the site lies within an intermediate probability radon area.

Basic radon protection is required for new buildings.



2.4 Environmental Setting

The following sections have been compiled using the Envirocheck datasheet and maps which can be found in **Annex A**.

2.4.1 Hydrogeology and Hydrology

The bedrock underlying the site has been classed by the Environment Agency as a Secondary B Aquifer. Superficial cover, where present, is classified as a Secondary Undifferentiated Aquifer.

Surface water features include the stream that flows along part of the site's southern boundary and the two settlement lagoons at the entrance to the quarry. The stream route across the west of the site is no longer recorded. This may have been culverted, or it may perhaps 'sink' on site following localised quarrying and alteration of the ground.

Beyond the site there are numerous drains along field boundaries and two wells are also denoted within 20m of the northern site boundary.

The River Severn situates approximately 1.1km southwest of the site.

Deeper groundwater flow within the underlying bedrock will be controlled by the strata dip and any fractures or bedding planes within the rock units.

2.4.2 Groundwater

The Envirocheck Report confirms that the site does not situate within a groundwater source protection zone.

There are no groundwater abstraction points within 750m of the site.

No premises with consent to discharge waste waters are present within 150m of the site.

2.4.3 Flooding

There is considered to be localised risk from flooding of surface water features on site, which includes the settlement lagoons and the stream.

2.4.4 Waste

Border hardcore, which currently operates on site, maintains a permit as a local authority pollution prevention and control site relating to general mineral process.

No historic or active landfill sites, or licensed waste management facilities are present within 250m of the site.

Potentially infilled land is recorded on site in relation to an historical small quarry in the west of the site and an area of former quarrying/clay pit.

2.4.5 Pollution

No pollution incidents are detailed to have occurred within a 250m radial area around the site since 1997.

2.4.6 Sensitive Land Use

The geological SSSI at the north-eastern end of the site is recorded.

The remaining woodland in the northwest of the site is designated ancient woodland.

2.4.7 Contemporary Trades

Border Hardcore are listed as a contemporary trade. The former brick works and clay pit are also listed.

No contemporary trades are recorded on properties adjacent to the site.

2.4.8 Recorded Mineral Sites

The main site quarry/former clay pit is listed as a dormant recorded mineral site. The small quarry still operated by Border Hardcore is also recorded by the Envirocheck Report.

2.4.9 Natural Cavities

The bedrock beneath the site is not susceptible to the formation of dissolution features such as underground cavities and sink holes.

The site is therefore not deemed to be at risk from natural cavities.



SECTION 3 Preliminary Human Health and Environmental Risk Assessment

3.1 General

The contaminated land regime is set out in Part IIA of the Environmental Protection Act (EPA) 1990 and was introduced on the 1st April 2000 in England and 1st July 2001 in Wales. A similar regime was introduced in Scotland on 14th July 2000. Part IIA was introduced to achieve two aims:

- (1) The identification of contaminated land
- (2) The remediation of contaminated land that poses an unacceptable risk to human health and/or the environment

Under Part IIA the statutory definition of 'contaminated land' is: any land which appears to the local authority in whose area it is situated, to be in such a condition, by reason of substances in, on, or under the land, that:

- (a) Significant harm is being caused or there is a significant possibility of such harm being caused; or
- (b) Pollution of controlled waters is being, or is likely to be, caused."

For land to be classified as 'Contaminated Land' there must be a 'pollutant linkage'.

For our definitions of pollution linkage and how we define risk please refer to **Annex B** which includes our classifications of consequence and probability and risk assessment matrix.

3.2 Preliminary Site Conceptual Model

Assessment of the development area only is considered.

The development area is confined to and south of the existing quarry. The development area will be formed by widening the quarry and excavated materials will be laid within the existing quarry bottom or on land directly to the southeast of the newly formed development area.

A new access road to the ERF will be formed from the main road and through the western side of the site and enter the development area approximately where the current access road enters the existing quarry.

The risks to human health and the environmental for the development area has been considered.

The preceding sections enable a preliminary conceptual model of the development area to be drawn up, to illustrate the likely geological and hydrological ground conditions beneath the site and to identify any potential sources of contamination.

3.3 Potential Sources of Contamination and Gas

The potential contamination beneath the site, whether in the matrix of soil or any groundwater will be related to the sites past use and the history of the surrounding area.

Historical records have shown that the development area remained as undeveloped field land until quarrying took place. Quarrying ceased approximately 15-20 years ago.

Part of the area south of the existing quarry is currently used for access and here an old disused lorry and several lorry trailers remain. Here the ground is surfaced with imported hardcore type material. Imported materials are also noted to form part of the access track into the base of the quarry.

Other tracks on site appear to either cut straight in to the in-situ weathered rock or are formed of site won stone.

No potential sources of contamination are identified in connection with site quarrying.

Any imported fill or hardcore is from unknown origin and therefore must be considered as a potential source of contamination.

The old lorry parked may have presented a risk from a fuel/oil leak.

There are no recorded landfills or significant areas infilled land within influencing distance of the site and there is not deemed to be any a gas risk on site. However, basic radon protection is required for the new development.

3.4 **Potential Receptors and Pollution Pathways**

There are both human and hydrological receptors to be considered should any contamination be detected on site.

Construction workers will be excavating the in-situ rock and shallow surface soils/imported fill where present, and will be exposed via dermal contact with soil/rock and dust, ingestion of dust and inhalation of dust.

Future site users are taken to be workers at the new ERF plant. These receptors will potentially be at risk from any contamination from the same pathways as well as through intake of potable water.

The risk from dermal contact from a leak/spill from the parked lorry to construction workers. However, it is anticipated that the fuel tank would have been emptied prior to disuse. This area will not be accessible to the future ERF plant workers.

If any contamination is identified this may be leachable, enabling it to mobilise through perched groundwater and impact surface waters or deeper groundwater.

A qualitative preliminary Human Health and Environmental Risk Assessment summarises the above and is detailed in the **Tables 3.1 and 3.2** on the following pages.

Potential Source	Pathway	Receptor During Construction	Level of Risk	Receptor Post Construction	Level of Risk
In-situ Soil/Rock	Ingestion, inhalation and dermal contact with soil/rock and dust.	Construction Workers	No Risk No potential source of contamination	Future site users	No Risk No potential source of contamination
Leaked fuel/oil	Ingestion, inhalation and dermal contact with soil/rock and dust. Inhalation of vapours	Construction Workers	Negligible Risk Any such leaks would have been isolated and very small	N/A	N/A
Imported Fill	Ingestion, inhalation and dermal contact with soil/rock and dust.	Construction Workers	Low Risk	Future site users	Negligible Risk The materials to be removed or covered by the new buildings or hardstanding upon development
Radon Gas	Inhalation Accumulation of gas indoors in confined spaces- asphyxiation and explosion	N/A	N/A	Future site users	Unacceptable Risk BGS confirm BASIC Radon Protectio required for new buildings
Landfill Gas	Inhalation Accumulation of gas indoors in confined spaces- asphyxiation and explosion	N/A	N/A	Future site users	No Risk No landfills within influencing distance of the site
Ground Gas	Inhalation Accumulation of gas indoors in confined spaces- asphyxiation and explosion	N/A	N/A	Future site users	No Risk No on-site source of ground gas identified
Made Ground Anticipated made ground at location of infilled pond	Ingestion of potable water Absorption of contamination from made ground into potable water pipes	N/A	N/A	Future site users	Negligible Risk

Table 3.2 – Qualitative Preliminary Environmental Risk Assessment					
Potential Source	Pathway	Receptor During Construction	Level of Risk	Receptor Post Construction	Level of Risk
Surface Water	Run-off	Site and Adjacent Sites Shallow/Perched Groundwater	Low	Site and Adjacent Sites Shallow/Perched Groundwater	Low
Accidental spillage	Run-off, digging foundations, moving contaminated soil, drainage misconnections, discharges to local surface waters or the ground, construction materials and/or exposed ground, wheel washings, oil or chemical spills	Site and Adjacent Sites	Low On site procedures will ensure that all efforts are made to prevent accidental spillage	N/A	N/A
In-situ Soil/Rock	Leaching of contamination	Site and Adjacent Sites	No Risk No potential source of contamination	Site and Adjacent Sites	No Risk No potential source of contamination
Imported Fill	Leaching of contamination	Shallow/Perched Groundwater	Low Risk	Shallow/Perched Groundwater	Low Risk
Contaminated Groundwater	Direct migration and Perched Groundwater migration	Secondary B Aquifer	Negligible Risk	Secondary B Aquifer	Negligible Risk
Contaminated Groundwater	Groundwater Migration	Stream and drains	Negligible Risk	Stream and drains	Negligible Risk



SECTION 4 Field Investigation

4.1 General

A geo-technical and geo-environmental site investigation was performed during October and November 2018.

The purpose of this investigation was to:

- 1. Confirm the existing sub-surface geology in the development area, and its strength and structure to inform on the stability of newly formed slopes and foundation recommendations for the new ERF plant
- 2. Provide recommendations for earthworks
- 3. Determine the chemistry of soils/rock in the development area and assess whether any contamination exists that presents a risk to human health or the environment are present.
- 4. Determine the chemistry of groundwater and surface water and assess whether groundwater presents a risk to the environment.

The investigation comprised:

- 1. Ten rotary probeholes (PH1–PH10) within and outside the quarry. The purpose of the drilling works was to obtain information on the rock units across the site, required to perform a slope stability assessment
- 2. Sampling of groundwater and settlement lagoon waters
- 3. Sampling of surface/shallow soil/weathered rock samples for laboratory chemical testing and human health and environmental risk assessment.
- 4. Bulk sampling and geotechnical testing of the three main lithologies

4.2 Probeholes

PH1 and PH6 were situated with the quarry bottom, targeting the TMF. PH7 and PH10 were drilled into the CMF. The remaining probeholes extended in to the TBMF. The probeholes were sunk using a Beretta T44 drilling rig.

The probehole locations are illustrated on **Figure 4.1** on the following page.



4.2 **Probeholes** (Continued)

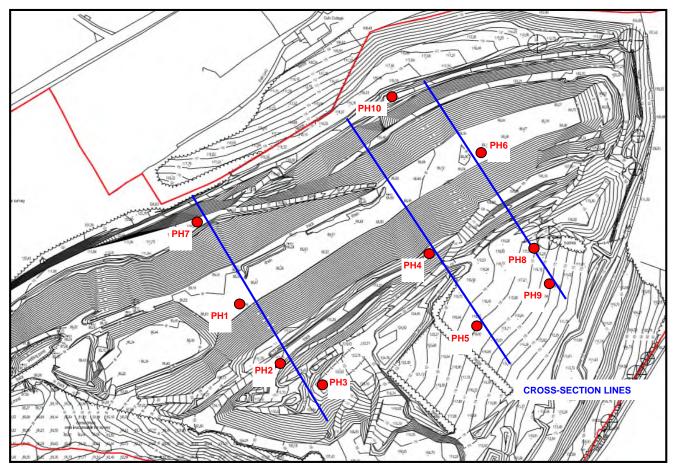


Figure 4.1: Probehole Locations

The exact borehole co-ordinates and levels are detailed on the probehole logs, see **Annex C**.

The probeholes were almost entirely drilled via core sampling and only limited open hole drilling was carried out. Open hole drilling was carried out using compressed air as the flushing medium.

The fieldworks were supervised by Terra Firma (Wales) Limited. The probehole cores were logged to the requirements of BS5930: 1999.

4.2 **Probeholes** (Continued)

A summary of the probehole depths and the geology they intercepted is detailed in **Table 4.1**.

	Table 4.1 Probehole Depths and Geology Encountered				
Location	Probehole Level at Surface (m AOD)	Depth of Probehole (mbgl)	Base of Probehole (m AOD)	Geology Encountered	
PH1	88.71	13.85	74.86	TMF	
PH2	111.92	43.45	68.47	TMF	
PH3	112.23	18.10	94.13	TBMF	
PH4	114.35	39.45	74.90	TBMF	
PH5	118.22	17.80	100.42	TBMF	
PH6	89.17	14.0	75.17	TBMF	
PH7	110.52	24.25	86.27	CF	
PH8	117.23	46.45	70.78	TBMF	
PH9	115.26	14.0	101.26	TBMF	
PH10	114.16	11.5	102.66	CF	

Photographs of the extracted rock cores may be found in Annex D.

Selected samples of rock cores were retrieved for laboratory geotechnical testing. Test results are provided in **Annex E**.

The Tarannon Mudstone (PH1 and PH6) was found as weak dark reddish brown locally light greenish grey mudstone with closely spaced fractures stained orangish brown. Bedding fractures were recorded as orientated 75°- 85° with primarily planar smooth to polished surfaces. Other fractures were found to be variable in orientation with no consistent fracture surface type, but fractures were clean and generally tight to open.

The Cefn Mudstone (PH7 and PH10) was found to be completed weathered to soil to around 1m depth. In PH7 this grades in to extremely weak dark grey mudstone with bands of non-intact laminated mudstone and siltstone retrieved as angular gravel between 3.85–5.05m, 6.45–7.15m and 9.65m–10.75m depth. Bedding fractures are identified by their 80°- 85° orientation, with variable surfaces but often striated. Other fracture planes are dominantly found to be 15°- 45° to around 11m depth before favouring a 35°- 60° orientation but 60°- 70° fracture planes were also found to regularly feature to the full depth of the probehole. Fractures were generally clean. Non-intact greenish grey mudstone retrieved as gravel extended to 3.0m depth in

PH10, succeeded by very weak grey mudstone with very close to closely and occasionally medium spaced fractures dominantly orientated 5°- 35° and stained orangish brown or dark grey/black. Bedding fractures were consistently dipping 80°-85°.

4.2 **Probeholes** (Continued)

The Trewern Brook Mudstone Formation (PH2 – PH6) was found weathered to very gravelly clay soil in some areas to 1.0m depth, and made ground was noted in PH2 to 1.0m depth comprised of rubble hardcore material. In general, the strata is formed of weak grey to dark grey mudstone beds, initially non-intact or very weak in areas and becoming medium strong to strong at depth (PH2 & PH8). Bedding fractures follow a 75°- 85° orientation. Other fractures and joints are prevalent but no relationship between spacing and orientation may be determined between different boreholes. Most fractures are clean but occasionally found to be infilled with soft to stiff grey clay to no more than a few centimetres in thickness. Mineralisation of some fractures was also noted, but these were typically no wider than 1mm. Graptolite fossils (monograptids) were observed in particular beds and often seen on bedding fracture surfaces.

4.3 Groundwater Sampling and Testing

	Table 4.2 Gro	oundwater Well Installations
Location	Full Installation Depth (m)	Installation Details
PH1	13.85	
PH2	43.45	
PH4	39.45	Each installation comprises plain pipe with bentonite
PH6	14.0	seal to 1.0m depth, with slotted pipe, geotextile sock
PH7	24.25	and gravel surround to the full probehole depth
PH8	46.45	
PH9	14.0	

Groundwater monitoring wells were installed in seven of the ten probeholes. The well installations are detailed in the following table.

Table 4.3 records groundwater encountered during the drilling works and during a monitoring/sampling round completed on the 21.11.2018.

	Table 4.3 Groundwater Levels			
Borehole	Groundwater level (mbgl) noted during drilling	Groundwater level 21.11.2018 (mbgl)	Groundwater level AOD 21.11.2018	
PH1	0.6	0.3	88.408	
PH2	-	18.35	93.569	
PH3	-	-		
PH4	-	12.69	101.649	
PH5	-	-		
PH6		0.27	89.499	
PH7	-	11.8	98.719	
PH8	-	11.3	105.934	
PH9	6.7m borehole wet	10.2	105.064	
PH10	-	-	-	



4.3 Groundwater Sampling and Testing (Continued)

During the monitoring round on the 21.11.2018 water samples were taken from the seven wells.

The following method was employed in the taking the water samples:

- 1. Measurement of groundwater levels was taken with a dip meter.
- 2. Each borehole was purged prior to sampling. This was undertaken using a battery operated pump. The volume of perched groundwater purged was calculated by:

Volume $purged = (3 \times cross \ sectional \ area \ of \ borehole, \ including \ gravel) \times depth \ of groundwater \ within \ borehole.$

3. The groundwater samples were stored within the appropriate sample jar within a cool box. The samples were taken to the laboratory on the day of their collection.

A water sample was also retrieved from the settlement lagoon north of the quarry entrance track. The lagoon is set within the TMF below the groundwater table and is therefore effectively holding groundwater.

Water samples were submitted for laboratory analysis for the substances listed in **Table 4.4**.

	Table 4.4 Gro	oundwater Testing Suit	te
Metals and Metalloids		Organics	In-organics
Aluminium Arsenic Boron Cadmium Calcium Chromium III Chromium VI Copper Iron	Lead Magnesium Manganese Mercury Nickel Selenium Sodium Tin Zinc	Phenol PAHs) TPHCWG	Conductivity pH BOD COD Cyanide Hardness Ammoniacal Nitrogen Chloride Nitrite Ortho Phosphate Sulphate

The following chemical tests were undertaken on groundwater samples:

The laboratory groundwater chemical test results are presented in Annex F.

Refer to Section 5 for groundwater assessment.



4.4 Soil Sampling and Testing

A series of samples (S1 - S25) were taken from the surface or shallow trial holes excavated by hand or by using a tracked machine. Samples comprised superficial soil cover, fill materials or weathered rock/scree.

The sample locations are illustrated on Figure 4.2 below.

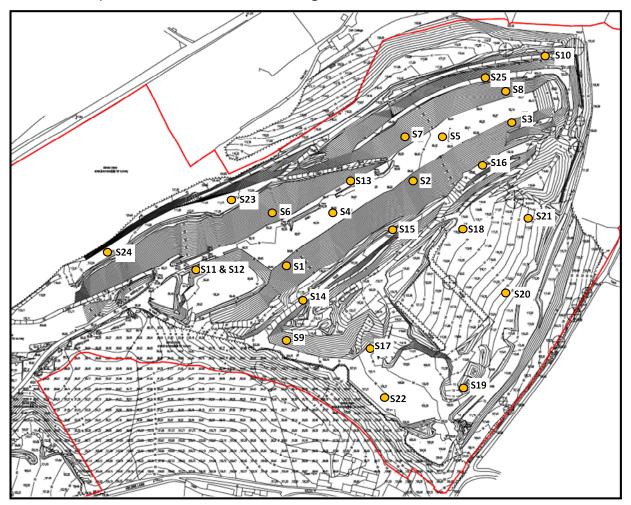


Figure 4.2: Soil Sample Locations

The sampling regime was conducted in accordance with BS5930: 2015 in order to satisfy the following criteria:

- Identify and confirm suspected sources of contamination
- Determine type and concentration of contamination
- Determine lateral and vertical spread of contaminants
- Ensure representation of the entire site
- Provide sufficient data to determine suitable remedial measures if necessary

S22 targeted the area adjacent to the old lorry.



4.4 Soil Sampling and Testing (Continued)

Sample descriptions are detailed in Table 4.5.

Table 4.5 Soil Sample Descriptions			
Sample	Description		
S1			
S2			
S3			
S4	Very fine gravel of mudstone (scree)		
S5	very line graver of mudstone (scree)		
S6			
S7			
S8			
S9	Grey very clayey gravel of mudstone		
S10	Very gravelly CLAY		
S11	Slight clayey GRAVEL (grey mudstone)		
S12	Slight clayey GRAVEL (purple mudstone)		
S13	Imported track fill – sand and gravel of granite		
S14	Made ground: Brown sand and gravel with fine to coarse angular to rounded gravel with bricks, plastic, metal. Rebar, nail, can to 0.3m underlain by Made		
(0.2m)	ground: grey very clayey fine to coarse angular gravel of mudstone with brick. Weathered mudstone at 0.7m.		
S15	Very fine gravel of mudstone (scree)		
S16	Very fine gravel of mudstone (scree)		
S17	Made Ground: Clayey gravel		
S18			
S19	(Topsoil over) Very gravelly clay		
S20			
S21	1		
S22	Made ground: Clayey sand and gravel.		
S23			
S24	Very fine gravel of mudstone (scree)		
S25			

The soil samples were submitted for laboratory analysis for the substances listed in **Table 4.6**.

Table 4.6 Soil Testing Suite					
Metals and	l Metalloids	Organics	In-organics		
Aluminium Arsenic Boron Cadmium Calcium Chromium III Chromium VI Copper Iron	Lead Magnesium Manganese Mercury Nickel Selenium Sodium Tin Zinc	Phenol PAHs) TPHCWG	Conductivity pH Cyanide Ammoniacal Nitrogen Chloride Nitrite Ortho Phosphate Sulphate Asbestos		

The laboratory soil chemical test results are presented in **Annex G.** Please refer to **Section 6** for the soil assessment.



4.5 Bulk Sampling

A number of bulk samples (B1 - B6) were retrieved for geotechnical property testing from shallow depth, with representative samples from each of the three main strata.

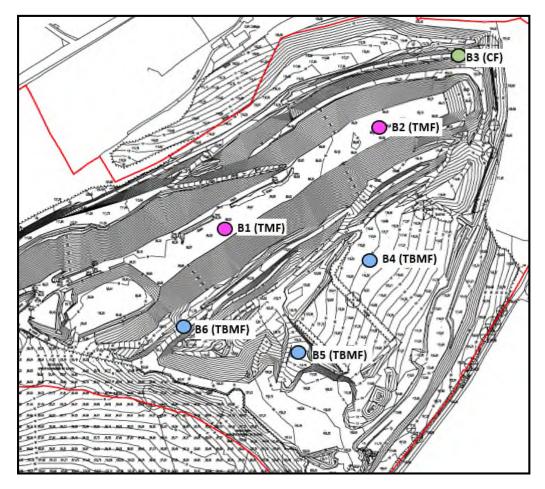


Figure 4.3: Bulk Sample Locations

Samples were submitted for slake durability tests and grading analysis

Test certificates may be found in Annex H.

Please refer to **Section 9** for interpretation of the test results.

SECTION 5 Groundwater Assessment

5.1 Groundwater Assessment Methodology

Groundwater results have been compared to thresholds for inland freshwater environments (annual average or maximum allowable concentration where annual average not available) provided by the 2015 UK Water Framework Directive (WFD). No WFD thresholds are available for reference has therefore been made to Dangerous Substance Directive (DSD) or Drinking Water Directive (DWD) criteria in their absence. For TPHCWG WHO thresholds as quoted by 'CLAIRE: Petroleum Hydrocarbons in Groundwater (2017)' have been utilised where available.

5.2 Groundwater Test Results

Table 5.1 Summary of Groundwater Chemical Test ResultsMetals and In-organics					
Substance	Threshold (ug/l)	Source	Measured Cor Tested Subs	Number of Exceedances	
			Minimum	Maximum	
Aluminium	-	-	58	790	-
Arsenic	50	WFD	0.73	45	0
Boron	-	-	<0.03	0.17	-
Cadmium	0.08 - 0.25*	WFD	<0.03	0.17	1
Calcium	-	-	7700	240000	-
Chromium III	4.7	WFD	<1.0	75	1
Chromium VI	3.4	WFD	<7.0	<7.0	BLDL
Copper	1.0	WFD	<0.4	100	1
Iron	1000	WFD	5.5	1600	1
Lead	1.2	WFD	0.1	14	1
Manganese	123	WFD	3.9	270	1
Mercury	0.07	WFD	<0.01	<0.01	0
Nickel	4.0	WFD	<0.5	150	2
Selenium	10	DWD	0.83	7.4	0
Sodium	-	-	24000	200000	-
Tin	25	DSD	<0.4	2.5	0
Zinc	12.9**	WFD	2.1	340	6
Phenol	7.7	WFD	<100	<100	BLDL
Ph	-	-	6.6	8.3	-
Cyanide	1.0	WFD	<40	<40	BLDL
Hardness	-	-	23.3mg/l	898mg/l	-
Ammoniacal Nitrogen	-	-	79	8500	-
Chloride	250,000	DWD	1100	18,000	0
Nitrite	50,000	DWD	<35	79	0
Ortho Phosphate	-	-	<0.01	0.1	-
Sulphate	-	-	2100	330,000	-

Groundwater results are summarised in the following tables.

Notes:

• *Cadmium threshold dependant on hardness

• ** Takes into account ambient background concentration of the River Wye (closest to site with available ambient data (WFD publication 2015)

• BLDL – Below Laboratory Detection Limit

5.2 Groundwater Test Results (Continued)

All samples were tested for speciated PAH and petroleum hydrocarbons.

Substance	Threshold (ug/l)	Source	Measured Concentrations of Tested Substances (ug/l)		Number of Exceedances		
			Minimum	Maximum	-		
SPECIATED PAH							
Naphthalene	2.0	WFD	<0.05	0.09	0		
Acenaphthylene	-	-	<0.01	<0.01	BLDL		
Acenaphthene	-	-	<0.01	<0.01	BLDL		
Fluorene	-	-	<0.01	0.03	2 ALDL		
Phenanthrene	-	-	<0.01	0.11	2 ALDL		
Anthracene	0.1	WFD	<0.01	<0.01	0		
Fluoranthene	0.0063	WFD	<0.01	0.01	1		
Pyrene	-	-	<0.01	0.02	1 ALDL		
Benzo(a)anthracene	-	-	<0.01	<0.01	BLDL		
Chrysene	-	-	<0.01	<0.01	BLDL		
Benzo(b)fluoranthene	0.017	WFD	<0.01	<0.01	0		
Benzo(k)fluoranthene	0.017	WFD	<0.01	<0.01	0		
Benzo(a)pyrene	0.00017	WFD	<0.01	<0.01	BLDL		
Indeno(123cd)pyrene	-	-	<0.01	<0.01	BLDL		
Dibenzo(ah)anthracene	-	-	<0.01	<0.01	BLDL		
Benzo(ghi)perylene	0.0082	WFD	<0.01	<0.01	BLDL		
	PETR	ROLEUM H	DROCARBONS	·			
<u>Aliphatic</u>							
PH C5 – C6 Ali	15000	WHO	<0.1	<0.1	0		
PH C6 – C8 Ali	15000	WHO	<0.1	<0.1	0		
PH C8 – C10 Ali	300	WHO	<0.1	<0.1	0		
PH C10 – C12 Ali	300	WHO	<0.1	<0.1	0		
PH C12 – C16 Ali	300	WHO	<0.1	<0.1	0		
PH C16 – C21 Ali	-	-	<0.1	<0.1	BLDL		
PH C21 – C35 Ali	-	-	<0.1	48	1 ALDL		
<u>Aromatic</u>							
PH C5 – C7 Arom	-	-	<0.1	<0.1	BLDL		
PH C7 – C8 Arom	-	-	<0.1	<0.1	BLDL		
PH C8 – C10 Arom	300*	WHO	<0.1	<0.1	0		
PH C10 – C12 Arom	90	WHO	<0.1	<0.1	0		
PH C12 – C16 Arom	90	WHO	<0.1	<0.1	0		
PH C16 – C21 Arom	90	WHO	<0.1	<0.1	0		
PH C21 – C35 Arom	90	WHO	<0.1	<0.1	0		

Notes:

• - No guideline available

• ALDL – Above Laboratory Detection Limit

• BLDL – Below Laboratory Detection Limit

• * Threshold for ethylbenzene



5.2 Groundwater Test Results (Continued)

Those substances found to be in exceedance of their threshold level or above the limit of detection are detailed in **Table 5.3**.

Table 5.3 Contaminants of Concern in Groundwater					
Substance	Threshold (ug/l)	Recorded Concentration (ug/l)	Location		
Cadmium	0.08	0.17	PH6		
Chromium III	4.7	75	PH6		
Copper	1.0	100	PH6		
Iron	1000	1600	PH6		
lead	1.1	14	PH7		
Manganese	123	270	PH4		
Nickel	4.0	12 150	PH4 PH6		
Zinc	12.9	61 22 110 60 37 340	PH2 PH4 PH7 LAGOON PH1 PH6		
Fluorene	-	0.02 0.03	PH7 LAGOON		
Phenanthrene	-	0.06 0.11	PH7 LAGOON		
Fluoranthene	0.0063	0.01	LAGOON		
Pyrene	-	0.02	LAGOON		
PH C21 – C35 Ali	-	48ug/l	PH7		

SECTION 6 Soil Analytical Results

6.1 Soil Assessment Methodology

Comparison of the analytical results has been made with commercial Suitable 4 Use Levels (S4ULs) provided by Land Quality Management Limited and the Chartered Institute of Environmental Health (CIEH). Where CIEH thresholds are not available reference has been made to Category 4 Screening Levels (C4SLs).

Sulphate results have been compared to British Research Establishment (BRE) guidelines as sulphate levels need only be considered for buried concrete risk assessment only, not human health related.

6.2 Soil Test Results

A summary of the chemical test results is given in **Tables 6.1** and **6.2**.

Table 6.1 Summary of Soil Chemical Test Results Metals and In-Organics					
Substance	SGV/GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		Number of Exceedences
			Minimum	Maximum	
Aluminium	-	-	5900	22,000	-
Arsenic	640	CIEH	1.8	47	0
Boron	240000	CIEH	0.4	1.1	0
Cadmium	190	CIEH	<0.1	13	0
Calcium	-	-	2000	100,000	-
Chromium III	8600	CIEH	21	110	0
Chromium VI	33	CIEH	<1.0	<1.0	0
Copper	68000	CIEH	10	260	0
Iron	-	-	11000	43000	-
Lead	2330	C4SL	5.4	37	0
Manganese	-	-	160	27000	-
Mercury	1100	CIEH	<0.05	<0.05	0
Nickel	980	CIEH	22	170	0
Selenium	12000	CIEH	<0.5	9.7	0
Sodium	-	-	130	2300	-
Tin	-	-	<1.0	2.1	-
Zinc	730000	CIEH	63	690	0
Cyanide	-	-	<0.1	0.3	-
Phenol	440	CIEH	<0.3	<0.3	0
Sulphate	2400	BRE	<100	2700	1
Ammoniacal Nitrogen	-	-	<0.5	19	-
Chloride	-	-	<1.0	35.1	-
Nitrite	-	-	<1.0	9.2	-
Ortho Phosphate	-	-	<0.1	0.11	-
Organic Matter	-	-	0.1	3.2	-
рН	-	-	6.7	9.9	-

Notes:

• - no available guideline



6.2 Soil Test Results (Continued)

Table Speciated Poly		-		l Test Resu etroleum Hy	
Substance	GAC (mg/kg)	Source	Measured Concentrations of Tested Substances (mg/kg)		Number of Exceedences
			Minimum	Maximum	
		SPECIA	TED PAH		
Naphthalene	190	CIEH	<0.03	<0.03	0
Acenaphthylene	83000	CIEH	<0.03	<0.03	0
Acenaphthene	84000	CIEH	<0.03	<0.03	0
Fluorene	63000	CIEH	<0.03	<0.03	0
Phenanthrene	22000	CIEH	<0.03	<0.03	0
Anthracene	520000	CIEH	<0.03	<0.03	0
Fluoranthene	23000	CIEH	<0.03	<0.03	0
Pyrene	54000	CIEH	<0.03	<0.03	0
Benzo(a)anthracene	170	CIEH	<0.03	<0.03	0
Chrysene	350	CIEH	<0.03	<0.03	0
Benzo(b)fluoranthene	44	CIEH	<0.03	<0.03	0
Benzo(k)fluoranthene	1200	CIEH	<0.03	<0.03	0
Benzo(a)pyrene	35	CIEH	<0.03	<0.03	0
Indeno(123cd)pyrene	500	CIEH	<0.03	<0.03	0
Dibenzo(ah)anthracene	3.5	CIEH	<0.03	<0.03	0
Benzo(ghi)perylene	3900	CIEH	<0.03	<0.03	0
	PE		YDROCARBON	S	
<u>Aliphatic</u>					
PH C5 – C6 Ali	3200	CIEH	<0.01	<0.01	0
PH C6 – C8 Ali	7800	CIEH	<0.01	<0.01	0
PH C8 – C10 Ali	2000	CIEH	<0.01	<0.01	0
PH C10 – C12 Ali	9700	CIEH	<1.5	<1.5	0
PH C12 – C16 Ali	59000	CIEH	<1.2	2.8	0
PH C16 – C21 Ali*	1600000	CIEH	<1.5	9.9	0
PH C21 – C35 Ali*	1600000	CIEH	<3.4	<3.4	0
<u>Aromatic</u>					
PH C5 – C7 Arom	26000	CIEH	<0.01	<0.01	0
PH C7 – C8 Arom	56000	CIEH	<0.01	<0.01	0
PH C8 – C10 Arom	3500	CIEH	<0.01	<0.01	0
PH C10 – C12 Arom	16000	CIEH	<0.9	<0.9	0
PH C12 – C16 Arom	36000	CIEH	<0.5	13	0
PH C16 – C21 Arom	28000	CIEH	<0.6	29	0
PH C21 – C35 Arom	28000	CIEH	<1.4	6.9	0

Notes:

• Thresholds based on 1.0% SOM

• CIEH for Ali C16 - 21 and C21 - C35 based on CIEH for EC >16 - 35

All samples were screened for asbestos. No asbestos was detected.



SECTION 7 Quantitative Risk Assessment

7.1 Soils

All substances tested for in soil were found to be present at level below their threshold level with the exception of sulphate in one sample.

In sample S10 sulphate was recorded at 2700mg/kg, above its threshold of 2400mg.kg. However, the threshold is a BRE threshold relevant to construction concrete (see **Section 8.4**). Sulphate does not present at risk to human health or the environment.

Soils may therefore be confirmed to be uncontaminated and do not present a risk to human or environmental receptors.

If during site excavation materials are encountered that are significantly different to those encountered in the investigation the occurrence should be reported to a geoenvironmental engineer and appropriate action taken prior to continuing with the works.

As good practice, construction workers should adhere to good site management, COSHH, good standards of hygiene and appropriate health & safety on site, with personal protection equipment (PPE).

Any imported soils or aggregate should be validated as clean and suitable for use in accordance with 'Requirements for the Chemical testing of Imported Soils for Various End Uses and Validation Cover Systems'.

For proposed new supply water pipes, the UK Water Industry Research publication 'Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (Report 10/WM/03/21)' should be consulted.

In accordance with EC Regulation 1272/2008 and Environment Agency Guidance WM3 any soils destined for off-site disposal should be classified on the basis of their hazard phrases prior to disposal. Soils are classified as a mirror entry waste and should be classified on the basis of their specific chemical properties. Terra Firma (Wales) Ltd offer this service if required.

7.2 Groundwater

Laboratory testing of groundwater identified numerous substances above their quoted threshold level in one or more locations.

There appears to be no correlation between these results and the results of soil samples analysed.

Given the lack of on-site and neighbouring site sources of contamination it is surmised that the substances of concern in groundwater are naturally occurring, groundwater chemistry being influenced by the chemistry of the underlying rocks or mineralised fractures.

In addition, it should be noted that the new development will collect surface waters in new drains installed across the development area that will be covered with either new buildings or hardstanding.

7.2 **Groundwater** (Continued)

There are no recorded groundwater abstraction points within 750m of the site. The River Severn situates approximately 1.1km southwest of the site.

Groundwater is not therefore considered to present a risk to the wider aquatic environment.

During the construction period, there is a risk to the environment/adjacent sites from de-watering, digging foundations, moving contaminated soil, drainage misconnections, discharges to local surface waters or the ground, runoff from construction materials and/or exposed ground, wheel washings and oil or chemical spills.

The risk is considered to be negligible as any adverse effects will be easily preventable by due diligence to good construction practise and housekeeping in preventing surface runoff and the spillage of materials.

The basic measures that should be taken are as follows:

- Prepare a drainage plan and mark the manholes to prevent pollutants accidently reaching the surface water sewers;
- Carry out any activities that could cause pollution in a designated, bunded area, away from rivers or boreholes. Where possible it should drain to the foul sewer;
- Use settlement ponds to remove silty water;
- Store all oils and chemicals in a fully bunded area to prevent leaks or spills;
- Get advice on whether you need an environmental permit and apply in good time



SECTION 8 Engineering Recommendations for the New ERF Plant

8.1 Preparation of Site

Any vegetation in the development area, including all roots, should be stripped and removed prior to site works.

Prior to introduction of engineered fill in to the quarry all soft surface material should be stripped and the underlying weathered bedrock exposed.

Contingencies should be made for the protection/diversion any underground services present beneath the site brought about as a result of the proposed works.

Allowances should be made for the excavation of any soft spots/areas. Any reduced levels may be brought up to the required levels with site won granular materials and compacted in layers to the requirements of the Specification for Highway works.

8.2 Foundation and Floor Slab Solution

The development area will be created by extensive cut into the existing southeast quarry face and the creation of a new slope.

The existing quarry floor will be raised to 90AOD, rising to 95AOD towards the northeast using site-won engineered fill. The corresponding cut in to the current southeast quarry face will at its lowest point be to 90AOD and 95AOD.

The new ERF plant may be constructed upon strip or pad foundations taken down in to the engineered fill or bedrock.

Due to the new development spanning across both the fill and bedrock foundations should be designed as reinforced to prevent any differential settlement. Reinforcement will also provide added protection from the two faults known to cross the development area, although in the event of any earthquake activity in the area any movement of faults would not be expected to be significant.

For design purposes an allowable bearing pressure of 150kN/m² may be used for foundations constructed within the engineered fill. Those foundations seated solely on bedrock may be designed to allowable bearing pressure of 300kN/m². For the given foundation solution and bearing pressure, maximum total settlements of 25mm should result with differential movements of the superstructure not exceeding 1:750.

Reinforced strip/pad foundations may also be used for construction of the new bunker as described above. However, it is recommended that appropriate waterproofing be incorporated into the bunker construction and allowances made for potential buoyancy effects.

Allowances should be made for the removal of any 'soft spots' and their replacement with well-compacted site-won granular materials compacted in layers to the specification for Highway Works.

Floor slabs may be designed as reinforced ground bearing.

All foundation formations should be inspected by a suitably qualified Engineer before being concreted.

8.3 Excavations and Formations

Excavations will require specialist equipment for excavating and breaking bedrock,

Shallow perched water flows are not expected. Any water inflows together with rainwater infiltration should be dealt with by conventional pumping techniques.

The sides of any excavations deeper than 1.0m, or shallower if unstable, should be supported by planking and strutting or other proprietary means.

The sub-formations/formations may be susceptible to loosening, softening and deterioration by exposure to weather (rain, frost and drying conditions), the action of water (flood water or removal of groundwater) and site traffic.

Formations should never be left unprotected and continuously exposed to rain causing degradation, or left exposed/uncovered overnight, unless permitted by a qualified engineer.

Construction plant and other vehicular traffic should not be operated on unprotected formations.

As a minimum the formation/excavation surfaces must be protected by blinding concrete immediately after exposure.

Allowances should be made for the removal of soft spots/areas and their replacement with well compacted granular materials.

Allowances should also be made for special precautions to prevent formation deterioration in addition to the above.

8.4 **Protection of Buried Concrete**

Levels of total sulphate recorded within the in-situ materials in the development area measured between <100mg/kg to 1000mg/kg and the pH varied between 6.7 and 8.7.

When these results are compared with Tables C1 of BRE Digest 1:2005, they indicate that all buried concrete should most likely as a minimum conform to Class AC-1.

8.6 Slopes

The development will include extensive reprofiling of the north and south-eastern existing quarry faces.

Please refer to Terra Firma (Wales) Limited Slope Stability Report (Report No. 14880/ss, dated March 2019)

SECTION 9 Earthworks

9.1 General

Upon development the excavated rock material is to be retained on site where possible. This will include filling the current quarry bottom from approximately 88 - 89AOD to 95AOD.

Some filling on land southeast of the quarry is also intended.

During site works representative bulk samples of each of the three main strata were taken for laboratory geotechnical property testing.

Samples 1 and 2 were taken from the Tarannon Mudstone. Sample 3 was taken from the Cefn Formation. Samples 4, 5 and 6 represent the Trewern Mudstone Formation.

It should be noted that the samples tested represent weathered materials that could be retrieved at or close to the surface.

Test certificates may be found in **Annex G**.

9.2 Slake Durability Testing

Slake durability testing may be used to understand how susceptible rock may be to degradation when subject to weathering processes such as wetting and drying and freezing and thawing cycles. This is particularly important with respect to mudstones and shales.

	Table 9.1 Slake Durability Test Results							
Sample	Strata	% retained after one 10 min cycle	Durability Classification	% retained after two 10 min cycles	Durability Classification			
S1	TMF	88	Medium	76	Medium			
S2	TMF	88	Medium	75	Medium			
S3	CF	96	Medium High	93	Medium High			
S4	TBMF	93	Medium	88	Medium High			
S5	TBMF	94	Medium	89	Medium High			
S6	TBMF	91	Medium	88	Medium High			

Slake durability test results are compared to Gamble's Slake Durability Classification

The samples used for testing comprised weathered rock (although not as weathered as the exposed scree materials) and results for more competent undisturbed rock may be expected to show the rock to be more durable.

9.3 Grading Analysis

All our samples were tested in the laboratory by dry and wet sieving analysis to determine their grading characteristics. These tests were conducted in accordance with BS1377: Part 2, Clause 9.2: 1990.

Based upon the soil property test results, and referring to Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements and Table 6/2: Grading Requirements for Acceptable Earthworks Materials, of the 'Series 600 Specification for Highway Works', the samples can be classified as:

Table 9.2 Grading Analysis Results and Soil Classification							
Sample	Strata	Type (Table 6/2)	Classification (Table 6/1)				
S1	TMF						
S2	TMF		Well graded grapular				
S3	CF		Well graded granular material				
S4	TBMF	1A					
S5	TBMF		Compaction Method 2				
S6	TBMF						

A 1A classification assumes a maximum particle size of 300mm. Please note that on removal, how the rock will fragment will be governed largely by the bedding and fracture planes and the way it is extracted.

Segments larger than 300mm are likely to be retrieved, particularly with depth where the competency of the rock increases.

Where this occurs, the rock should be crushed to conform with a 1A particle size classification or re-classified and the appropriate compaction method determined.



9.4 Compaction Specification

Compaction should be undertaken in accordance with Table 6/4: Method Compaction for Earthworks Materials: Plant and Methods of the 'Series 600 Specification for Highway Works', as summarised in **Table 9.3**

The minimum number of passes, 'N', is the minimum number of times that each point on the surface of the layer being compacted should be traversed by the compaction plant, in its operating mode 'D' is the maximum depth of the compacted layer.

	Table 9.3 Compaction Method						
Plant Type			Plant Type				
Smooth Wheeled Roller	<u>D = 125mm</u> 2100-2700kg 2700-5400kg <u>D = 150mm</u> >5400kg	N = 8 N = 6 N = 4	Grid Roller	$\frac{D = 125mm}{5400-8000kg} N = 12$ $\frac{D = 150mm}{>8000kg} N = 12$			
Dead Weight Tamping Roller	<u>D = 200mm</u>	N = 12 N = 12	Pneumatic Tyred Roller	$\frac{D = 125mm}{2000-2500kg} N = 12$ $2500-4000kg N = 10$ $4000-6000kg N = 10$ $\frac{D = 150mm}{6000-8000kg N = 8}$ $8000-12000kg N = 8$ $\frac{D = 175mm}{>12000kg N = 6}$			

Please refer to Series 600 Specification for Highway Works for specifications for alternative plant.

Compaction should be undertaken in accordance with Table 6/1 and 6/4, as soon as practicable after deposition.

Where combinations of different types or categories of plant are used, the depth of the layer should be for the type of plant requiring the least depth of layer, and the number of passes should be that for the type of plant requiring the greatest number of passes.

Earthmoving plants are not recommended for use as compaction plant, nor are lighter categories of plants used to provide preliminary compaction to assist the use of heavier plant.

The maximum particle size of any fill material should not exceed more than two thirds of the compacted layer thickness. Any larger fragments should be crushed or removed prior to use.

The stability of excavations or fills should not be compromised by the location of stockpiled materials or use of plant or location of temporary buildings/structures.

All earthworks must be kept free of water including arranging for the rapid removal of water, water shed onto the earthworks and water entering the earthworks from any source.

9.4 Compaction Specification (Continued)

All exposed fill surfaces must be adequately weather proofed during inclement weather or at the end of the working day/compaction process.

Any exposed cohesive fill that becomes wet and slurrified due to water ingress or weather erosion must be stripped off, spread into thin layers and aerated. The fill should then be re-compacted.

Plant movement across compaction layers should be restricted to that plant necessary for its deposition, spreading and compaction.

Fill areas should be constructed evenly over their full width and their fullest possible extent and the contractor should control and direct constructional plant and other traffic uniformly over them. Damage by construction plant should be made good with material having the same characteristics and strength as the material had before it was damaged.

Where fill is to be placed against an existing slope, the existing slope should be cut and benched before placing the fill. This will include the transition from the existing quarry floor to the new base of the development are.

It is recommended that a number of in-situ plate load tests be performed throughout the earthworks and at the final finished level, particularly beneath any proposed buildings or the access road. This is to confirm the compaction works have been carried out satisfactorily.

The earthworks should be supervised by a suitably qualified engineer.

The tests should be conducted in accordance with BS 1377: Part 9: 1990 under the supervision of a qualified geotechnical engineer.

Allowances should also be made for the removal of soft spots and their replacement with imported suitable selected inert granular materials or suitable inert site won materials.



ANNEX A Envirocheck Report



Envirocheck® Report:

Datasheet

Order Details:

Order Number: 196125587_1_1

Customer Reference: 14880

National Grid Reference: 327660, 310170

Slice: B

Site Area (Ha): 25.12

Search Buffer (m): 1000

Site Details:

Quarry Buttington Welshpool SY21 8SZ

Client Details:

Ms R Liley Terra Firma (Wales) Ltd 5 Deryn Court Wharfdale Road Pentwyn Cardiff CF23 7HB



Report Section	Page Number
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Waste	10
Hazardous Substances	-
Geological	11
Industrial Land Use	14
Sensitive Land Use	15
Data Currency	16
Data Suppliers	22
Useful Contacts	23

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread,

and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client. In this datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Report Version v53.0



Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes	Yes	Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 2			5	4
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls					
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature	pg 4		Yes		
Pollution Incidents to Controlled Waters	pg 4			2	
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality					
River Quality Biology Sampling Points					
River Quality Chemistry Sampling Points					
Substantiated Pollution Incident Register					
Water Abstractions					
Water Industry Act Referrals					
Groundwater Vulnerability	pg 5	Yes	n/a	n/a	n/a
Drift Deposits			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 5	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 5	Yes	n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences				n/a	n/a
Flooding from Rivers or Sea without Defences	pg 5		Yes	n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 5		3	8	25



Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Landfill Coverage	pg 10	1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)					
Potentially Infilled Land (Water)					
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					



Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 11	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 11	Yes		Yes	Yes
BGS Recorded Mineral Sites					
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 12	Yes		n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 12	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 12		Yes	n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 12	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 12		Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 12	Yes	Yes	n/a	n/a
Radon Potential - Radon Affected Areas	pg 13	Yes	n/a	n/a	n/a
Radon Potential - Radon Protection Measures			n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 14				1
Fuel Station Entries					
Points of Interest - Commercial Services					
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 14				3
Points of Interest - Public Infrastructure					
Points of Interest - Recreational and Environmental	pg 14			1	
Gas Pipelines					
Underground Electrical Cables					



Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland	pg 15			1	8
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest	pg 15	1			
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	0	1	327100 310200
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	0	1	327100 309950
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	0	1	326750 310050
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	0	1	327050 310050
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	0	1	326850 309950
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	0	1	326800
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	0	1	310200 327100
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	(W)	0	1	310173 326700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	(SW)	0	1	310050 327300
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	0	1	309750 327050
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	0	1	310100 327100
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	0	1	310300 326700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	0	1	310000 326750
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	0	1	310000 327000
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(W)	0	1	310100 326800
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	0	1	310000 327000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	(W)	0	1	310000 327100
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	(W)	0	1	310100 327100
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	B13SW	0	1	310000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	71	1	310750
	BGS Groundwater Flooding Susceptibility				310350
	Flooding Type: Limited Potential for Groundwater Flooding to Occur BGS Groundwater Flooding Susceptibility	(SW)	80	1	326750 309600
	Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	89	1	326700 309850



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater	Flooding Susceptibility				
	Flooding Type:	Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	93	1	326750 309800
		Flooding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	(W)	109	1	326700 309800
	BGS Groundwater Flooding Type:	Flooding Susceptibility Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	111	1	327050 310400
	BGS Groundwater	Flooding Susceptibility				
	Flooding Type:	Potential for Groundwater Flooding of Property Situated Below Ground Level	(W)	111	1	327100 310400
	BGS Groundwater	Flooding Susceptibility				
	Flooding Type:	Potential for Groundwater Flooding of Property Situated Below Ground Level	(SW)	151	1	326800 309700
	BGS Groundwater	Flooding Susceptibility				
	Flooding Type:	Potential for Groundwater Flooding of Property Situated Below Ground Level	(NW)	163	1	327050 310450
	BGS Groundwater	Flooding Susceptibility				
	Flooding Type:	Potential for Groundwater Flooding to Occur at Surface	B9NW (NW)	336	1	327500 310350
	BGS Groundwater	Flooding Susceptibility				
	Flooding Type:	Limited Potential for Groundwater Flooding to Occur	(SW)	354	1	326750 309500
	BGS Groundwater	Flooding Susceptibility				
	Flooding Type:	Potential for Groundwater Flooding of Property Situated Below Ground Level	(SW)	365	1	327250 309650
	BGS Groundwater	Flooding Susceptibility				
	Flooding Type:	Potential for Groundwater Flooding to Occur at Surface	B9NW (N)	488	1	327650 310650
	BGS Groundwater	Flooding Susceptibility				
	Flooding Type:	Potential for Groundwater Flooding of Property Situated Below Ground Level	(SW)	498	1	326750 309350
	Discharge Consent					
1	Operator: Property Type:	Powys County Council Not Given	B13SW (NW)	492	2	327400 310695
	Location:	Trewern School	()			010000
	Authority: Catchment Area:	Environment Agency, Midlands Region Not Given				
	Reference:	S175/1 /1				
	Permit Version:	Not Supplied				
	Effective Date: Issued Date:	Not Supplied 23rd September 1955				
	Revocation Date:	Not Supplied				
	Discharge Type:	Sewage Treatment Works - Final Effluent Into And/Or Watercourse				
	Discharge Environment:	Into And/OF Watercourse				
	Receiving Water:	Pwll Trewern				
	Status: Positional Accuracy:	Not Supplied Located by supplier to within 100m				
	Discharge Consent					
1	Operator:	Powys County Council	B13SW	496	3	327400
	Property Type:	Sewage Disposal Works - Other	(NW)			310700
	Location: Authority:	Buttington Trewern County School, Welshpool, Powys Natural Resources Wales				
	Catchment Area:	Severn Upper				
	Reference: Permit Version:	S/01/55057/S				
	Effective Date:	1 27th January 1997				
	Issued Date:	27th January 1997				
	Revocation Date:	27th April 2006 Sowage Discharges Final/Treated Effluent Not Water Company				
	Discharge Type: Discharge Environment:	Sewage Discharges - Final/Treated Effluent - Not Water Company Freshwater Stream/River				
	Receiving Water:	Pwll Trewern				
	Status:	Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995)				
	Positional Accuracy:	Located by supplier to within 100m				



Map ID	Details		Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	Discharge Consent: Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	s Powys County Council Sewage Disposal Works - Other Buttington Trewern County School Buttington, Welshp Environment Agency, Midlands Region Upper Severn Catchment (Above Montford) S/01/55057/S 1 27th January 1997 27th January 1997 27th April 2006 Sewage Discharges - Final/Treated Effluent - Not Water Company Freshwater Stream/River Pwll Trewern Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995) Located by supplier to within 100m	B13SW (NW)	496	2	327400 310700
1	Discharge Consent: Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	s Powys County Council Not Given Trewern School Environment Agency, Midlands Region Not Given S/01/04175/S /1 Not Supplied Not Supplied 17th March 1992 Not Supplied Sewage Treatment Works - Final Effluent Into And/Or Watercourse Pwll Trewern Not Supplied Located by supplier to within 100m	B13SW (NW)	496	2	327400 310700
1	Discharge Consents Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	s Powys County Council Sewage Disposal Works Buttington Trewern County, Primary School, Buttington, Welshpool, Powys Environment Agency, Midlands Region Upper Severn Catchment (Above Montford) CS/01/55057/S/1 Not Supplied Not Supplied 27th January 1997 Not Supplied Sewage Treatment Works - Final Effluent Unknown Pwll Trewern Not Supplied Located by supplier to within 100m	B13SW (NW)	499	2	327405 310700
2	Discharge Consent: Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	s Mr Keith Mallows Domestic Property (Single) Stp @ Ty Ger Y Nant, Heldre Lane, Trewern, Welshpool, Powys, Sy21 8du Natural Resources Wales Not Supplied Eprpb3993hk 1 23rd January 2014 23rd January 2014 Not Supplied Sewage Discharges - Final/Treated Effluent - Not Water Company Freshwater Stream/River Pwll Trewern New issued under EPR 2010 Located by supplier to within 10m	B13SW (N)	742	3	327631 310828



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Discharge Consent	S				
2	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Environment: Receiving Water: Status: Positional Accuracy:	Keith Mallows Domestic Property (Single) Stp @ Ty Ger Y Nant, Heldre Lane, Trewern, Welshpool, Powys, Sy21 8du Natural Resources Wales PWLL TREWERN - SOURCE TO CONF R SEVERN Pb3993hk 1 23rd January 2014 23rd January 2014 23rd January 2014 Not Supplied Sewage Discharges - Final/Treated Effluent - Not Water Company Freshwater Stream/River Pwll Trewern Effective Located by supplier to within 10m	B13SW (N)	742	3	327631 310828
	Discharge Consent	S				
2	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	Min-Y-Nant Sewage Disposal Works - Other Min-Y-Nant, Trewern, Welshpool, Powys Natural Resources Wales Severn Upper S/01/10959/S 1 7th January 1988 7th January 1988 19th September 1991 Sewage Discharges - Final/Treated Effluent - Not Water Company Freshwater Stream/River Pwll Trewern Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995) Located by supplier to within 10m	B13SW (N)	771	3	327650 310850
	Discharge Consent	S				
2	,	Min-Y-Nant Sewage Disposal Works - Other Min-Y-Nant, Trewern, Welshpool, Powys Environment Agency, Midlands Region Upper Severn Catchment (Above Montford) S/01/10959/S 1 7th January 1988 7th January 1988 19th September 1991 Sewage Discharges - Final/Treated Effluent - Not Water Company Freshwater Stream/River Pwll Trewern Revoked (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995) Located by supplier to within 10m	B13SW (N)	771	2	327650 310850
	Nearest Surface Wa		(SW)	70	-	327329 309891
		to Controlled Waters				
3	Property Type: Location: Authority: Pollutant: Note: Incident Date: Incident Reference: Catchment Area: Receiving Water: Cause of Incident: Incident Severity: Positional Accuracy:	Water Company Sewage: Pumping Station Location Description Not Available Environment Agency, Midlands Region Crude Sewage Amenity Affected 12th February 1996 2500271 Severn Catchment : Upper Severn (Above Montford) Watercourse Mechanical Failure Category 3 - Minor Incident Located by supplier to within 100m	B9NW (NW)	397	2	327420 310550



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
3	Pollution Incidents to Controlled Waters Property Type: Private Sewage (Non-PLC): Pumping Station Location: Location Description Not Available Authority: Environment Agency, Midlands Region Pollutant: Crude Sewage Note: Amenity Affected Incident Date: 19th December 1995 Incident Reference: 2500219 Catchment Area: Severn Catchment : Upper Severn (Above Montford) Receiving Water: Watercourse Cause of Incident: Mechanical Failure Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	B9NW (NW)	431	2	327420 310600
	Groundwater Vulnerability Soil Classification: Not classified Map Sheet: Sheet 21 West Shropshire Scale: 1:100,000	B9SW (NW)	0	2	327656 310173
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - B	B9SW (S)	0	3	327656 310000
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - B	B9SW (NW)	0	3	327656 310173
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - Undifferentiated	(W)	0	3	326986 310000
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - A	(W)	0	3	327104 310000
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - Undifferentiated	(W)	0	3	326793 309927
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - Undifferentiated	(W)	0	3	327106 310273
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - A	(SW)	0	3	327125 309950
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	B9NW (N)	113	3	327600 310645
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
4	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 323.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	(SW)	70	5	327329 309891
5	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 375.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B5NW (SW)	113	5	327339 309744



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
6	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 282.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9SW (SW)	231	5	327547 310040
7	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 438.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	B9SW (SW)	329	5	327521 310088
8	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 10.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	B9NW (NW)	341	5	327437 310416
9	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 327.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	B9NW (NW)	348	5	327440 310426
10	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 160.0 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B5NW (SW)	422	5	327339 309744
11	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 7.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B5NW (SW)	422	5	327346 309746
12	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 224.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9SW (SW)	477	5	327547 310040
13	OS Water Network Lines Watercourse Form: Inland river Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9SW (SW)	477	5	327565 310035
14	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 371.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9SW (SW)	495	5	327572 310031



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
15	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 187.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Pwll Trewern Catchment Name: Severn Primacy: 1	B13SW (N)	504	5	327452 310731
16	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 416.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	(SW)	521	5	327307 309533
17	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 235.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Pwll Trewern Catchment Name: Severn Primacy: 1	B13SW (N)	550	5	327486 310714
18	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 162.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B5SW (SW)	564	5	327415 309603
19	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 375.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9NW (N)	573	5	327671 310449
20	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 13.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9NE (N)	574	5	327676 310437
21	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 107.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9NE (N)	575	5	327697 310332
22	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 3.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9NE (N)	579	5	327697 310329
23	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 276.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9SE (NE)	579	5	327723 310218



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
24	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 176.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Pwll Trewern Catchment Name: Severn Primacy: 1	B13SW (N)	727	5	327622 310816
25	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B5NE (S)	790	5	327768 309756
26	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 925.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B5NE (S)	796	5	327771 309747
27	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 223.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9SE (E)	852	5	327991 310290
28	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 392.8 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B9NE (NE)	852	5	327945 310499
29	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 199.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Nant y Neuadd Dingle Catchment Name: Severn Primacy: 1	B13SE (N)	869	5	327727 310913
30	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 106.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Pwll Trewern Catchment Name: Severn Primacy: 1	B13SE (N)	869	5	327727 310913
31	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 151.2 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B10SW (E)	926	5	328045 310201
32	OS Water Network Lines Watercourse Form: Inland river Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B10SW (E)	936	5	328055 310295



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
33	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 535.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Pwll Trewern Catchment Name: Severn Primacy: 1	B13SE (N)	936	5	327757 310979
34	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 398.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B10SW (E)	938	5	328043 310129
35	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 137.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B13SE (N)	938	5	327760 310978
36	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 106.8 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B10NW (NE)	960	5	328070 310422
37	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 11.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B10NW (NE)	973	5	328063 310529
38	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 245.3 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	B10NW (NE)	974	5	328061 310540
39	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 188.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Nant y Neuadd Dingle Catchment Name: Severn Primacy: 1	B14SW (NE)	998	5	328066 310785



Waste

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authorit	ty Landfill Coverage				
	Name:	Powys County Council - Has supplied landfill data		0	6	327656 310173



Geological

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Description:	d Geology Llandovery Rocks (Undifferentiated)	B9SW (NW)	0	1	327587 310286
	BGS 1:625,000 Solid Description:	d Geology Caradoc Rocks (Undifferentiated)	B9NW (NW)	0	1	327484 310457
	BGS 1:625,000 Solid Description:	d Geology Wenlock Rocks (Undifferentiated)	B9SW	0	1	327656
	BGS Estimated Soil Source: Soil Sample Type: Arsenic Concentration: Cadmium Concentration: Chromium Concentration: Lead Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil <15 mg/kg <1.8 mg/kg 60 - 90 mg/kg <100 mg/kg	(NW) B9SW (NW)	0	1	310173 327656 310173
	Nickel Concentration: BGS Estimated Soil Source: Soil Sample Type: Arsenic Concentration: Cadmium Concentration: Chromium Concentration: Lead Concentration: Nickel Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil <15 mg/kg <1.8 mg/kg 90 - 120 mg/kg	B5NE (SE)	388	1	327763 309950
	BGS Estimated Soil Source: Soil Sample Type: Arsenic Concentration: Cadmium Concentration: Chromium Concentration: Lead Concentration: Nickel Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil <15 mg/kg <1.8 mg/kg 60 - 90 mg/kg	B9NW (N)	401	1	327558 310628
	BGS Estimated Soil Source: Soil Sample Type: Arsenic Concentration: Cadmium Concentration: Chromium Concentration: Lead Concentration: Nickel Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil <15 mg/kg <1.8 mg/kg 60 - 90 mg/kg	B9NW (N)	522	1	327592 310513
	BGS Estimated Soil Source: Soil Sample Type: Arsenic Concentration: Cadmium Concentration: Chromium Concentration: Lead Concentration: Nickel Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil <15 mg/kg <1.8 mg/kg 60 - 90 mg/kg	B9NE (N)	785	1	327832 310620
	BGS Measured Urba	an Soil Chemistry				
	BGS Urban Soil Che No data available	emistry Averages				



Geological

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Coal Mining Affected Areas				
	In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain Risk: Highly Unlikely	B9SW	0	1	327656
	Source: British Geological Survey, National Geoscience Information Service	(S)	0	I	310000
	Non Coal Mining Areas of Great Britain				
	Risk: Highly Unlikely Source: British Geological Survey, National Geoscience Information Service	B9SW (NW)	0	1	327656 310173
	Potential for Collapsible Ground Stability Hazards				
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	B9SW (S)	0	1	327656 310000
	Potential for Collapsible Ground Stability Hazards	(3)			310000
	Hazard Potential: Very Low	B9SW	0	1	327656
	Source: British Geological Survey, National Geoscience Information Service	(NW)			310173
	Potential for Collapsible Ground Stability Hazards Hazard Potential: No Hazard	B9NW	134	1	327558
	Source: British Geological Survey, National Geoscience Information Service	(N)	134	I	310628
	Potential for Compressible Ground Stability Hazards			-	
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	B9SW (NW)	0	1	327656 310173
	Potential for Compressible Ground Stability Hazards	()			010110
	Hazard Potential: No Hazard	B9SW	0	1	327656
	Source: British Geological Survey, National Geoscience Information Service	(S)			310000
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate	B9NW	19	1	327526
	Source: British Geological Survey, National Geoscience Information Service	(NW)	19	I	310467
	Potential for Compressible Ground Stability Hazards				
	Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	B9NW (N)	134	1	327558 310628
	Potential for Ground Dissolution Stability Hazards	(14)			010020
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	B9SW (NW)	0	1	327656 310173
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	B9SW (S)	0	1	327656 310000
	Potential for Landslide Ground Stability Hazards	(-)			
	Hazard Potential: Low	B9SW	0	1	327656
	Source: British Geological Survey, National Geoscience Information Service	(S)			310000
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low	B9SW	0	1	327656
	Source: British Geological Survey, National Geoscience Information Service	(NW)		·	310173
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	B5SE (S)	0	1	327718 309602
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Very Low	B9SW	19	1	327468
	Source: British Geological Survey, National Geoscience Information Service	(NW)			310320
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard	B9SW	0	1	327656
	Source: British Geological Survey, National Geoscience Information Service	(NW)	U	I	310173
	Potential for Running Sand Ground Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	B9SW (S)	0	1	327656 310000
	Potential for Running Sand Ground Stability Hazards	(0)			010000
	Hazard Potential: Low	B9NW	134	1	327558
	Source: British Geological Survey, National Geoscience Information Service	(N)			310628
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low	B9SW	0	1	327656
	Source: British Geological Survey, National Geoscience Information Service	(NW)	U	I	310173
	Potential for Shrinking or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	B9SW	0	1	327656 310000
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	B9SW (S)	0	1	



Geological

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Shrink	ing or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	Low British Geological Survey, National Geoscience Information Service	B9NW (NW)	19	1	327526 310467
	Radon Potential - R	adon Affected Areas				
	Affected Area: Source:	The property is in an Intermediate probability radon area (1 to 3% of homes are estimated to be at or above the Action Level). British Geological Survey, National Geoscience Information Service	B9SW (S)	0	1	327656 310001
	Radon Potential - R	adon Protection Measures				
	Protection Measure: Source:	No radon protective measures are necessary in the construction of new dwellings or extensions British Geological Survey, National Geoscience Information Service	B9SW (S)	0	1	327656 310001



Industrial Land Use

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
40	Location: T Classification: F Status: A	Directory Entries Powys Transport Ltd Prewern, Welshpool, Powys, SY21 8DU Road Haulage Services Active Manually positioned within the geographical locality	B13SW (N)	600	-	327456 310787
41	Name:FLocation:SCategory:FClass Code:F	anufacturing and Production Poultry Houses SY21 arming Poultry Farming, Equipment and Supplies Positioned to an adjacent address or location	B13NW (N)	910	7	327518 311109
41	Name:TLocation:SCategory:IIClass Code:T	anufacturing and Production Fank SY21 ndustrial Features Fanks (Generic) Positioned to an adjacent address or location	B13NW (N)	987	7	327589 311159
42	Name:FLocation:MCategory:FClass Code:L	anufacturing and Production Fred Mountford Middle Heldre, Buttington, Welshpool, SY21 8TE Farming Livestock Farming Positioned to address or location	B10SW (E)	919	7	328031 310182
43	Name: F Location: H Category: F Class Code: F	Perceational and Environmental Playground Hazel Close, SY21 Recreational Playgrounds Positioned to address or location	B9NW (NW)	426	7	327361 310642



Sensitive Land Use

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
44	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 44244 10612.88 Plantation on Ancient Woodland	B9SW (SW)	346	3	327555 310070
45	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 27143 7025.73 Ancient and Semi-Natural Woodland	B9SE (NE)	560	3	327707 310212
46	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 29223 30108.06 Restored Ancient Woodland Site	(SW)	663	3	327096 309152
47	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 26855 1471.76 Ancient and Semi-Natural Woodland	B5SW (S)	685	3	327348 309330
48	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 28059 16908.93 Ancient and Semi-Natural Woodland	B5SW (S)	686	3	327439 309398
49	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 28058 4896.52 Ancient and Semi-Natural Woodland	(SW)	701	3	326845 309111
50	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 33924 5632.36 Ancient and Semi-Natural Woodland	(SW)	709	3	326725 309112
51	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 27140 13843.73 Ancient and Semi-Natural Woodland	B5NE (S)	810	3	327773 309705
52	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 28060 9010.02 Ancient and Semi-Natural Woodland	B5SE (S)	938	3	327818 309540
53	Sites of Special Sci Name: Multiple Areas: Total Area (m2): Source: Reference: Designation Details: Designation Date: Date Type:	Gwaith Brics Buttington / Buttington Brickworks N 6545.96 Natural Resources Wales 279733wpy	(W)	0	3	327014 310205



Contaminated Land Register Entries and NoticesShrewsbury and Atcham Borough Council (now part of Shropshire Council) - Environmental Health DepartmentAugust 2008Powys County Council - Public Protection DepartmentFebruary 2015 March 2015Shropshire Council - Environmental Health DepartmentMarch 2015 March 2015South Shropshire District Council (now part of Shropshire Council) - Environmental Health DepartmentJanuary 2019 January 2019Discharge ConsentsEnvironment Agency - Midlands RegionJanuary 2019 January 2019Enforcement and Prohibition NoticesMarch 2013Environment Agency - Midlands RegionMarch 2013Integrated Pollution ControlsOctober 2008Environment Agency - Midlands RegionOctober 2008Integrated Pollution ControlsJanuary 2019Environment Agency - Midlands RegionOctober 2008Integrated Pollution Prevention And ControlJanuary 2019Environment Agency - Midlands RegionJanuary 2019Integrated Pollution Prevention And ControlJanuary 2019Environment Agency - Midlands RegionJanuary 2019Integrated Pollution Prevention And ControlJanuary 2019Environment Agency - Welsh RegionJanuary 2019Integrated Pollution Prevention And ControlShrewsbury and Atcham Borough Council (now part of Shropshire Council) - Environmental Health DepartmentSouth Shropshire District Council (now part of Shropshire Council) - Environmental Health DepartmentJune 2008Deves Council - Public Protection DepartmentMay 2014Shropshire District Council (now pa	Not Applicable Annual Rolling Update Annually Not Applicable Quarterly Quarterly
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Powys Council - Public Protection Department May 2014	Annual Rolling Update
Shropshire Council - Environmental Health Department October 2014	Annually
Local Authority Pollution Prevention and Control Enforcements	
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South Shropshire District Council (now part of Shropshire Council) - Environmental Health June 2008 Department	Not Applicable
Powys Council - Public Protection Department May 2014	Variable
Shropshire Council - Environmental Health Department October 2014	Variable
Nearest Surface Water Feature	
Ordnance Survey January 2019	
Pollution Incidents to Controlled Waters	
Environment Agency - Midlands Region December 1999	Not Applicable
Prosecutions Relating to Authorised Processes	
Environment Agency - Midlands Region July 2015	Annual Rolling Update
Environment Agency - Welsh Region March 2013	Annual Rolling Update
Natural Resources Wales March 2013	Annual Rolling Update
Prosecutions Relating to Controlled Waters	
Environment Agency - Midlands Region March 2013	
Environment Agency - Welsh Region March 2013	
Natural Resources Wales March 2013	Annual Rolling Update Annual Rolling Update



Agency & Hydrological	Version	Update Cycle
Registered Radioactive Substances		
Natural Resources Wales	January 2015	Annually
Environment Agency - Midlands Region	June 2016	
Environment Agency - Welsh Region	June 2016	
Substantiated Pollution Incident Register		
Environment Agency - Midlands Region - Upper Severn Area	January 2019	Quarterly
Environment Agency - Midlands Region - West Area	January 2019	Quarterly
Environment Agency Wales - North Area	January 2019	Quarterly
Natural Resources Wales	October 2018	Quarterly
Water Abstractions		
Natural Resources Wales	February 2019	Quarterly
Environment Agency - Midlands Region	January 2019	Quarterly
Water Industry Act Referrals		
Natural Resources Wales	January 2019	Quarterly
Environment Agency - Midlands Region	October 2017	Quarterly
Environment Agency - Welsh Region	October 2017	Quarterly
Groundwater Vulnerability		
Environment Agency - Head Office	April 2015	Not Applicable
Bedrock Aquifer Designations		
Environment Agency - Head Office	January 2018	Annually
Natural Resources Wales	January 2018	Annually
Superficial Aquifer Designations		
Environment Agency - Head Office	January 2018	Annually
Natural Resources Wales	January 2018	Annually
Source Protection Zones		, unitadity
Natural Resources Wales	November 2016	Annual Rolling Update
	November 2010	
Extreme Flooding from Rivers or Sea without Defences	Fahruary 2010	Questarlu
Natural Resources Wales	February 2019	Quarterly
Flooding from Rivers or Sea without Defences		
Natural Resources Wales	February 2019	Quarterly
Areas Benefiting from Flood Defences		
Natural Resources Wales	February 2019	Quarterly
Flood Water Storage Areas		
Natural Resources Wales	February 2019	Quarterly
Flood Defences		
Natural Resources Wales	February 2019	Quarterly
OS Water Network Lines		
Ordnance Survey	October 2018	Quarterly
Surface Water 1 in 30 year Flood Extent Natural Resources Wales	October 2013	Annually
		Annually
Surface Water 1 in 100 year Flood Extent		A
Natural Resources Wales	October 2013	Annually
Surface Water 1 in 1000 year Flood Extent		
Natural Resources Wales	October 2013	Annually
Surface Water Suitability		
Natural Resources Wales	October 2013	Annually
BGS Groundwater Flooding Susceptibility		
British Geological Survey - National Geoscience Information Service	May 2013	Annually



	Version	Update Cycle
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites		
Natural Resources Wales	July 2017	Quarterly
Integrated Pollution Control Registered Waste Sites		
Environment Agency - Midlands Region	October 2008	Not Applicable
Environment Agency - Welsh Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries)		-
Environment Agency - Midlands Region - Upper Severn Area	July 2018	Quarterly
Environment Agency - Midlands Region - West Area	July 2018	Quarterly
Environment Agency Wales - North Area	July 2018	Quarterly
Natural Resources Wales	July 2018	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - Midlands Region - Upper Severn Area	January 2019	Quarterly
Environment Agency - Midlands Region - West Area	January 2019	Quarterly
Environment Agency Wales - North Area	January 2019	Quarterly
Natural Resources Wales	January 2019	Quarterly
Local Authority Landfill Coverage		-
Powys Council	May 2000	Not Applicable
Shrewsbury and Atcham Borough Council (now part of Shropshire Council) - Environmental Health Department	May 2000	Not Applicable
Shropshire County Council (now part of Shropshire Council) - Shropshire Records And Research Centre	May 2000	Not Applicable
South Shropshire District Council (now part of Shropshire Council) - Environmental Health Department	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
Shrewsbury and Atcham Borough Council (now part of Shropshire Council) - Environmental Health Department	December 2002	Not Applicable
Powys County Council	May 2000	Not Applicable
Shropshire County Council (now part of Shropshire Council) - Shropshire Records And Research Centre	May 2000	Not Applicable
South Shropshire District Council (now part of Shropshire Council) - Environmental Health Department	May 2003	Not Applicable
Potentially Infilled Land (Non-Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Potentially Infilled Land (Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Registered Landfill Sites		
Environment Agency - Midlands Region - Upper Severn Area	March 2003	Not Applicable
Environment Agency - Midlands Region - West Area	March 2003	Not Applicable
Environment Agency Wales - North Area	March 2003	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - Midlands Region - Upper Severn Area	March 2003	Not Applicable
Environment Agency - Midlands Region - West Area	March 2003	Not Applicable
Environment Agency Wales - North Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites		
Environment Agency - Midlands Region - Upper Severn Area	March 2003	Not Applicable
Environment Agency - Midlands Region - Opper Severn Area	March 2003	Not Applicable
Environment Agency Wales - North Area	March 2003	Not Applicable



Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH)		
Health and Safety Executive	April 2018	Bi-Annually
Explosive Sites Health and Safety Executive	March 2017	Variable
Notification of Installations Handling Hazardous Substances (NIHHS)		
Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements		
Shrewsbury and Atcham Borough Council (now part of Shropshire Council)	December 2008	Not Applicable
Powys County Council - Planning Department	February 2016	Variable
Shropshire Council - Planning Department	February 2016	Variable
South Shropshire District Council (now part of Shropshire Council) - Planning Department	January 2008	Not Applicable
Shropshire County Council (now part of Shropshire Council)	March 2009	Annual Rolling Update
Planning Hazardous Substance Consents		
Shrewsbury and Atcham Borough Council (now part of Shropshire Council)	December 2008	Not Applicable
Powys County Council - Planning Department	February 2016	Variable
Shropshire Council - Planning Department	February 2016	Variable
South Shropshire District Council (now part of Shropshire Council) - Planning Department	January 2008	Not Applicable
Shropshire County Council (now part of Shropshire Council)	March 2009	Annual Rolling Update
Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology		
British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Estimated Soil Chemistry		
British Geological Survey - National Geoscience Information Service	October 2015	Annually
BGS Recorded Mineral Sites		
British Geological Survey - National Geoscience Information Service	November 2018	Bi-Annually
		Di-Anindaliy
CBSCB Compensation District	August 2011	Not Appliachia
Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Coal Mining Affected Areas	Marsh 0014	Annual Dallian Undate
The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Mining Instability		
Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain		
British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Compressible Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards	-	
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards		
British Geological Survey - National Geoscience Information Service	January 2019	Annually
Radon Potential - Radon Affected Areas		, and any
	July 2011	Annually
British Geological Survey - National Geoscience Information Service	July 2011	Annually
Radon Potential - Radon Protection Measures		.
British Geological Survey - National Geoscience Information Service	July 2011	Annually



Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries		
Thomson Directories	January 2019	Quarterly
Fuel Station Entries		
Catalist Ltd - Experian	November 2018	Quarterly
Gas Pipelines		
National Grid	July 2014	
Points of Interest - Commercial Services		
PointX	November 2018	Quarterly
Points of Interest - Education and Health		
PointX	November 2018	Quarterly
Points of Interest - Manufacturing and Production		
PointX	November 2018	Quarterly
Points of Interest - Public Infrastructure		
PointX	November 2018	Quarterly
Points of Interest - Recreational and Environmental		
PointX	November 2018	Quarterly
Underground Electrical Cables		
National Grid	December 2015	



Sensitive Land Use	Version	Update Cycle
Ancient Woodland		
Natural England	August 2018	Bi-Annually
Natural Resources Wales	August 2018	Bi-Annually
Areas of Adopted Green Belt		
Shropshire Council - Planning Department	August 2018	As notified
Areas of Unadopted Green Belt		
Shropshire Council - Planning Department	August 2018	As notified
Areas of Outstanding Natural Beauty		
Natural England	August 2018	Bi-Annually
Natural Resources Wales	August 2018	Bi-Annually
Environmentally Sensitive Areas		
Natural England	January 2017	
The National Assembly for Wales - GI Services (Department of Planning & Countryside)	January 2017	
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Natural England	August 2018	Bi-Annually
Powys County Council	August 2018	Bi-Annually
Marine Nature Reserves		
Natural Resources Wales	August 2018	Bi-Annually
National Nature Reserves		
Natural Resources Wales	August 2018	Bi-Annually
National Parks		
Natural England	April 2017	Bi-Annually
Natural Resources Wales	August 2018	Annually
Nitrate Vulnerable Zones		
Natural Resources Wales	July 2017	Bi-Annually
The National Assembly for Wales - GI Services (Department of Planning & Countryside)	October 2005	
Ramsar Sites		
Natural Resources Wales	February 2019	Bi-Annually
Sites of Special Scientific Interest		
Natural Resources Wales	February 2018	Bi-Annually
Natural England	October 2018	Bi-Annually
Special Areas of Conservation		
Natural Resources Wales	August 2018	Bi-Annually
Special Protection Areas		
Natural Resources Wales	August 2018	Bi-Annually



A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	Map data
Environment Agency	Environment Agency
Scottish Environment Protection Agency	Scottish Environment Protection Agency
The Coal Authority	The Coal Authority
British Geological Survey	British Geological Survey
Centre for Ecology and Hydrology	Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL
Natural Resources Wales	Cyfoeth Naturiol Cymru Natural Resources Wales
Scottish Natural Heritage	SCOTTISH NATURAL HERITAGE (관소)(취)
Natural England	NATURAL ENGLAND
Public Health England	Public Health England
Ove Arup	ARUP
Peter Brett Associates	peterbrett



Useful Contacts

Contact	Name and Address	Contact Details
1	British Geological Survey - Enquiry Service British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
3	Natural Resources Wales Ty Cambria, 29 Newport Road, Cardiff, CF24 0TP	Telephone: 0300 065 3000 Email: enquiries@naturalresourceswales.gov.uk
4	Environment Agency - Head Office Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
5	Ordnance Survey Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
6	Powys County Council County Hall, Llandrindod Wells, Powys, LD1 5LG	Telephone: 01597 826000 Fax: 01597 826230 Website: www.powys.gov.uk
7	PointX 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
8	Natural England County Hall, Spetchley Road, Worcester, WR5 2NP	Telephone: 0300 060 3900 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
-	Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.



Envirocheck[®] Report:

Datasheet

Order Details:

Order Number: 196125587_1_1

Customer Reference: 14880

National Grid Reference: 326380, 309950

Slice: A

Site Area (Ha):

25.12

Search Buffer (m): 1000

Site Details:

Quarry Buttington Welshpool SY21 8SZ

Client Details:

Ms R Liley Terra Firma (Wales) Ltd 5 Deryn Court Wharfdale Road Pentwyn Cardiff CF23 7HB



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Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread,

and to the vulnerable targets of contamination, as it does the potential sources of contamination. For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client. In this datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Agency & Hydrological					
BGS Groundwater Flooding Susceptibility	pg 1	Yes	Yes	Yes	n/a
Contaminated Land Register Entries and Notices					
Discharge Consents	pg 3		5	2	
Prosecutions Relating to Controlled Waters			n/a	n/a	n/a
Enforcement and Prohibition Notices					
Integrated Pollution Controls					
Integrated Pollution Prevention And Control					
Local Authority Integrated Pollution Prevention And Control					
Local Authority Pollution Prevention and Controls	pg 4	1			
Local Authority Pollution Prevention and Control Enforcements					
Nearest Surface Water Feature		Yes			
Pollution Incidents to Controlled Waters	pg 4		2		
Prosecutions Relating to Authorised Processes					
Registered Radioactive Substances					
River Quality	pg 5				1
River Quality Biology Sampling Points					
Substantiated Pollution Incident Register					
River Quality Chemistry Sampling Points					
Water Abstractions	pg 5				2 (*24)
Water Industry Act Referrals					
Groundwater Vulnerability	pg 11	Yes	n/a	n/a	n/a
Drift Deposits			n/a	n/a	n/a
Bedrock Aquifer Designations	pg 11	Yes	n/a	n/a	n/a
Superficial Aquifer Designations	pg 11	Yes	n/a	n/a	n/a
Source Protection Zones					
Extreme Flooding from Rivers or Sea without Defences	pg 12		Yes	n/a	n/a
Flooding from Rivers or Sea without Defences	pg 13		Yes	n/a	n/a
Areas Benefiting from Flood Defences				n/a	n/a
Flood Water Storage Areas				n/a	n/a
Flood Defences				n/a	n/a
OS Water Network Lines	pg 13	7	58	31	92



Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Waste					
BGS Recorded Landfill Sites					
Historical Landfill Sites					
Integrated Pollution Control Registered Waste Sites					
Licensed Waste Management Facilities (Landfill Boundaries)					
Licensed Waste Management Facilities (Locations)					
Local Authority Landfill Coverage	pg 35	1	n/a	n/a	n/a
Local Authority Recorded Landfill Sites					
Potentially Infilled Land (Non-Water)	pg 35	2			1
Potentially Infilled Land (Water)	pg 35			2	2
Registered Landfill Sites					
Registered Waste Transfer Sites					
Registered Waste Treatment or Disposal Sites					
Hazardous Substances					
Control of Major Accident Hazards Sites (COMAH)					
Explosive Sites					
Notification of Installations Handling Hazardous Substances (NIHHS)					
Planning Hazardous Substance Consents					
Planning Hazardous Substance Enforcements					



Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Geological					
BGS 1:625,000 Solid Geology	pg 36	Yes	n/a	n/a	n/a
BGS Estimated Soil Chemistry	pg 36	Yes		Yes	
BGS Recorded Mineral Sites	pg 36	3	1		2
BGS Urban Soil Chemistry					
BGS Urban Soil Chemistry Averages					
CBSCB Compensation District			n/a	n/a	n/a
Coal Mining Affected Areas			n/a	n/a	n/a
Mining Instability			n/a	n/a	n/a
Man-Made Mining Cavities					
Natural Cavities					
Non Coal Mining Areas of Great Britain	pg 37	Yes		n/a	n/a
Potential for Collapsible Ground Stability Hazards	pg 37	Yes		n/a	n/a
Potential for Compressible Ground Stability Hazards	pg 38	Yes	Yes	n/a	n/a
Potential for Ground Dissolution Stability Hazards				n/a	n/a
Potential for Landslide Ground Stability Hazards	pg 38	Yes	Yes	n/a	n/a
Potential for Running Sand Ground Stability Hazards	pg 39	Yes	Yes	n/a	n/a
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 40	Yes	Yes	n/a	n/a
Radon Potential - Radon Affected Areas	pg 40	Yes	n/a	n/a	n/a
Radon Potential - Radon Protection Measures	pg 40	Yes	n/a	n/a	n/a
Industrial Land Use					
Contemporary Trade Directory Entries	pg 41	1		1	
Fuel Station Entries					
Points of Interest - Commercial Services	pg 41			1	
Points of Interest - Education and Health					
Points of Interest - Manufacturing and Production	pg 41	6			3
Points of Interest - Public Infrastructure	pg 42				1
Points of Interest - Recreational and Environmental					
Gas Pipelines					
Underground Electrical Cables					



Data Type	Page Number	On Site	0 to 250m	251 to 500m	501 to 1000m (*up to 2000m)
Sensitive Land Use					
Ancient Woodland	pg 43	6	2	1	11
Areas of Adopted Green Belt					
Areas of Unadopted Green Belt					
Areas of Outstanding Natural Beauty					
Environmentally Sensitive Areas					
Forest Parks					
Local Nature Reserves					
Marine Nature Reserves					
National Nature Reserves					
National Parks					
Nitrate Sensitive Areas					
Nitrate Vulnerable Zones					
Ramsar Sites					
Sites of Special Scientific Interest	pg 44	1			
Special Areas of Conservation					
Special Protection Areas					
World Heritage Sites					



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A7NE	0	1	326350
		(S)	0	I	309700
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A12SE (E)	0	1	327050 310200
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A7NE (SE)	0	1	326450 309900
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NW (E)	0	1	326850 309900
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A11SE	0	1	326500
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(E) A12SW	0	1	310000 326700
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(E) A12SE	0	1	310000 327000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(E) A7NE	0	1	310000 326400
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	(S) A7NE	0	1	309800 326400
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(E) A8NW	0	1	309950 326800
	BGS Groundwater Flooding Susceptibility	(E)			309950
	Flooding Type: Limited Potential for Groundwater Flooding to Occur	A11SE (NE)	0	1	326650 310150
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12SE (E)	0	1	327050 310150
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A11SE	0	1	326550
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	(E) A7NE	0	1	310000 326500
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(E) A7NE	0	1	309954 326382
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(S) A12SE	0	1	309750 327000
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(E) A12SW	0	1	310050 326800
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(NE) A7NE	0	1	310250 326450
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(E) A7NE	0	1	309954 326650
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	(E) A8NW	0	1	309954 326700
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	(E) A12SW	0	1	309954 326750
	BGS Groundwater Flooding Susceptibility	(E)			310000
	Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8NW (E)	0	1	326750 309954



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NW (E)	0	1	326950 309954
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A12SE (E)	0	1	327050 310000
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A8NE	0	1	327000
		(E)			309954
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A7NE (SE)	0	1	326450 309850
	BGS Groundwater Flooding Susceptibility	(02)			000000
	Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A7NW (W)	0	1	326200 309954
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A11SW (NW)	0	1	326300 310050
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding to Occur at Surface	A7NE (S)	0	1	326382 309800
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12NW (NE)	71	1	326800 310350
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Limited Potential for Groundwater Flooding to Occur	A7NE (SE)	80	1	326550 309750
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A7NE (E)	89	1	326650 309850
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NW (SE)	93	1	326700 309800
	BGS Groundwater Flooding Susceptibility Flooding Type: Limited Potential for Groundwater Flooding to Occur	A7NE	109	1	326650
		(SE)			309800
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12NW (NE)	111	1	326950 310400
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12NE (NE)	111	1	327050 310400
	BGS Groundwater Flooding Susceptibility Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NW (SE)	151	1	326750 309700
	BGS Groundwater Flooding Susceptibility	()			
	Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A12NE (NE)	163	1	327000 310450
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding to Occur at Surface	(E)	336	1	327450 310350
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Limited Potential for Groundwater Flooding to Occur	A8SW (SE)	354	1	326700 309500
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8NE (E)	365	1	327200 309650
	BGS Groundwater Flooding Susceptibility				
	Flooding Type: Potential for Groundwater Flooding to Occur at Surface	(NE)	488	1	327400 310700
	BGS Groundwater Flooding Susceptibility				7
	Flooding Type: Potential for Groundwater Flooding of Property Situated Below Ground Level	A8SW (SE)	498	1	326700 309350



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	Discharge Consent Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	s Nigel G Pryce Not Given The Developmentoff Sale Lane, Trewern, WELSHPOOL, Powys Environment Agency, Midlands Region Not Given WQ/72/919 /1 Not Supplied 23rd December 1976 Not Supplied Sewage Effluent Groundwater Not Supplied Not Supplied Located by supplier to within 100m	A12SE (E)	172	2	327201 310001
2	Discharge Consent Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	s Forte (Uk) Limited Snack Bars,Cafes Etc. Little Chef Restaurant - A458 A458 Trewern, Trewern, Nr Welshpool, Powys Environment Agency, Midlands Region Upper Severn Catchment (Above Montford) S/01/14372/Sg 2 2nd April 2012 2nd April 2012 2nd April 2012 Not Supplied Sewage Discharges - Final/Treated Effluent - Not Water Company Land/Soakaway Underground Strata Varied under EPR 2010 Located by supplier to within 10m	A12NE (NE)	237	2	327180 310520
2	Discharge Consent Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	s Forte (Uk) Limited Snack Bars, Cafes Etc. Little Chef Restaurant - A458, A458 Trewern, Nr Welshpool, Powys Natural Resources Wales PWLL TREWERN - SOURCE TO CONF R SEVERN S/01/14372/Sg 2 2nd April 2012 2nd April 2012 2nd April 2012 27th March 2018 Sewage Discharges - Final/Treated Effluent - Not Water Company Land/Soakaway Underground Strata Revoked Located by supplier to within 10m	A12NE (NE)	237	3	327180 310520
2	Discharge Consent Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status: Positional Accuracy:	s Forte (Uk) Limited Snack Bars, Cafes Etc. Little Chef Restaurant - A458, A458 Trewern, Nr Welshpool, Powys Natural Resources Wales Severn Upper S/01/14372/Sg 1 30th January 1986 30th January 1986 1st April 2012 Sewage Discharges - Final/Treated Effluent - Not Water Company Land/Soakaway Underground Strata Lapsed (under Environment Act 1995, Schedule 23) Located by supplier to within 10m	A12NE (NE)	237	3	327180 310520



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Discharge Consent	S				
2	Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Environment: Receiving Water: Status:	Forte (Uk) Limited Snack Bars, Cafes Etc. Little Chef Restaurant - A458 A458 Trewern, Trewern Environment Agency, Midlands Region Upper Severn Catchment (Above Montford) S/01/14372/Sg 1 30th January 1986 30th January 1986 1st April 2012 Sewage Discharges - Final/Treated Effluent - Not Water Company Land/Soakaway Underground Strata Lapsed (under Environment Act 1995, Schedule 23)	A12NE (NE)	237	2	327180 310520
	Positional Accuracy:	Located by supplier to within 100m				
3	Discharge Consent: Operator: Property Type: Location: Authority: Catchment Area: Reference: Permit Version: Effective Date: Issued Date: Revocation Date: Discharge Type: Discharge Type: Discharge Type: Discharge Type: Status: Positional Accuracy:	s Laurie Ritchie Domestic Property (Single) Plas-Y-Don, Trewern, Welshpool, Powys, Wales, Sy21 8sz Natural Resources Wales Not Supplied Rb3793hx Not Supplied 4th May 2017 6th April 2017 Not Supplied Sewage Discharges - Final/Treated Effluent - Not Water Company Freshwater Stream/River Not Supplied Effective Located by supplier to within 10m	A12NE (NE)	289	3	327093 310579
	Discharge Consent	S				
3	-	Laurie Ritchie Domestic Property (Single) Plas-Y-Don, Trewern, Welshpool, Powys, Wales, Sy21 8sz Natural Resources Wales Not Supplied Rb3793hx 2 4th May 2017 6th April 2017 Not Supplied Sewage Discharges - Final/Treated Effluent - Not Water Company Freshwater Stream/River Unnamed Trib Of Pwll Trewern Effective Located by supplier to within 10m	A12NE (NE)	289	3	327093 310579
	Local Authority Pol	lution Prevention and Controls				
4	Name: Location: Authority: Permit Reference: Dated: Process Type: Description: Status: Positional Accuracy:	Border Hardcore Trewern, Welshpool Powys County Council, Public Protection Department PPC 47 11th September 2006 Local Authority Pollution Prevention and Control Part B - General Mineral Process (No Specific Reference) Permitted Manually positioned to the address or location	A7NW (SW)	0	4	326311 309827
	Nearest Surface Wa	ter Feature				
			A7NE	0	-	326474
5	Property Type: Location: Authority: Pollutant: Note: Incident Date: Incident Reference: Catchment Area: Receiving Water: Cause of Incident: Incident Severity:	to Controlled Waters Construction Location Description Not Available Environment Agency, Midlands Region Oils - Diesel (Including Agricultural) No Adverse Effects 12th April 1997 2501683 Severn Catchment : Upper Severn (Above Montford) Watercourse Accidental Spillage/Leakage Category 3 - Minor Incident Located by supplier to within 100m	(E) A7NW (SW)	29	2	309953 326200 309800



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Pollution Incidents	to Controlled Waters				
6	Property Type: Location: Authority: Pollutant: Note: Incident Date: Incident Reference: Catchment Area: Receiving Water: Cause of Incident: Incident Severity: Positional Accuracy:	Beef Cattle Location Description Not Available Environment Agency, Midlands Region Organic Wastes: Cattle Manure (solid) No Adverse Effects 15th June 1997 2501876 Severn Catchment : Upper Severn (Above Montford) Watercourse Land Runoff Category 3 - Minor Incident Located by supplier to within 100m	A8NE (E)	137	2	327100 309900
	River Quality					
	Name: GQA Grade: Reach:	Severn R River Quality A Welshpool Stw To Conf. A. Vyrnwy 25 Flow less than 40 cumecs River 2000	A14SE (NW)	969	2	325744 310844
	Water Abstractions					
7	Operator: Licence Number: Permit Version: Location: Authority: Abstraction: Abstraction Type: Source: Daily Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Positional Accuracy:	Mr&Mrs R & J Tutton 18/54/01/0421 100 Buttington New Hall - Surface Spring Environment Agency, Midlands Region Private Water Undertaking: General Farming And Domestic Water may be abstracted from a single point Surface Not Supplied Not Supplied Buttington New Hall - Surface Spring 01 April 31 March 1st March 2005 Not Supplied Located by supplier to within 100m	A3SW (S)	786	2	326200 308900
	Water Abstractions					
7		Mr&Mrs R & J Tutton 18/54/01/0421 100 Buttington New Hall - Surface Spring Natural Resources Wales Private Water Undertaking: General Farming And Domestic Water may be abstracted from a single point Surface Not Supplied Not Supplied Buttington New Hall - Surface Spring 01 April 31 March 1st March 2005 Not Supplied Located by supplier to within 100m	A3SW (S)	786	3	326200 308900
	Water Abstractions					
	Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 4 The Moors Farm Buttington - River Severn-E Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 29th June 2005 Not Supplied Located by supplier to within 10m	A10NW (NW)	1026	2	325430 310550



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 3 The Moors Farm Buttington - River Severn-E Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 7th May 2002 Not Supplied Located by supplier to within 10m	A10NW (NW)	1026	2	325430 310550
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 2 The Moors Farm Buttington - River Severn-E Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 28th June 2000 Not Supplied Located by supplier to within 10m	A10NW (NW)	1026	2	325430 310550
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 1 The Moors Farm Buttington - River Severn-E Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 30th November 1999 Not Supplied Located by supplier to within 10m	A10NW (NW)	1026	2	325430 310550
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 4 The Moors Farm Buttington - River Severn-D Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 29th June 2005 Not Supplied Located by supplier to within 10m	A9NE (W)	1096	2	325260 310380



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit Content Accurates	J & M Suckley 18/54/01/0636 3 The Moors Farm Buttington - River Severn-D Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 7th May 2002 Not Supplied Located by supplier to within 10m	A9NE (W)	1096	2	325260 310380
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date:	J & M Suckley 18/54/01/0636 2 The Moors Farm Buttington - River Severn-D Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 28th June 2000 Not Supplied Located by supplier to within 10m	A9NE (W)	1096	2	325260 310380
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 1 The Moors Farm Buttington - River Severn-D Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 30th November 1999 Not Supplied Located by supplier to within 10m	A9NE (W)	1096	2	325260 310380
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 4 The Moors Farm Buttington- River Severn-B Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 29th June 2005 Not Supplied Located by supplier to within 10m	A1SW (SW)	1734	2	324670 308930



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 3 The Moors Farm Buttington- River Severn-B Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 7th May 2002 Not Supplied Located by supplier to within 10m	A1SW (SW)	1734	2	324670 308930
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 2 The Moors Farm Buttington- River Severn-B Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 28th June 2000 Not Supplied Located by supplier to within 10m	A1SW (SW)	1734	2	324670 308930
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 1 The Moors Farm Buttington- River Severn-B Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Not Supplied Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 30th November 1999 Not Supplied Located by supplier to within 10m	A1SW (SW)	1734	2	324670 308930
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 4 The Moors Farm Buttington - River Severn-C Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 29th June 2005 Not Supplied Located by supplier to within 10m	(SW)	1783	2	324560 309050



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator:	J & M Suckley	(SW)	1783	2	324560
	Licence Number: Permit Version:	18/54/01/0636 3				309050
	Location: Authority:	The Moors Farm Buttington - River Severn-C Environment Agency, Midlands Region				
A A	Abstraction: Abstraction Type:	General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints				
5	Source: Daily Rate (m3):	Surface Not Supplied				
	Yearly Rate (m3): Details:	Not Supplied The Moors Farm Buttington				
A	Authorised Start:	01 April				
F	Authorised End: Permit Start Date:	31 October 7th May 2002				
	Permit End Date: Positional Accuracy:	Not Supplied Located by supplier to within 10m				
\ \	Water Abstractions					
	Operator: Licence Number:	J & M Suckley 18/54/01/0636	(SW)	1783	2	324560 309050
F	Permit Version: Location:	2 The Moors Farm Buttington - River Severn-C				
I A	Authority: Abstraction:	Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct				
A	Abstraction Type:	Water may be abstracted from a river or stream reach, or a row of wellpoints				
C	Source: Daily Rate (m3):	Surface Not Supplied				
	Yearly Rate (m3): Details:	Not Supplied The Moors Farm Buttington				
	Authorised Start: Authorised End:	01 April 31 October				
	Permit Start Date: Permit End Date:	28th June 2000 Not Supplied				
		Located by supplier to within 10m				
	Water Abstractions Operator:	J & M Suckley	(SW)	1783	2	324560
L 1	Licence Number:	18/54/01/0636	(011)	1700	2	309050
L 1	Permit Version: Location:	1 The Moors Farm Buttington - River Severn-C				
	Authority: Abstraction:	Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct				
	Abstraction Type: Source:	Water may be abstracted from a river or stream reach, or a row of wellpoints Surface				
	Daily Rate (m3): Yearly Rate (m3):	Not Supplied Not Supplied				
C	Details: Authorised Start:	The Moors Farm Buttington 01 April				
A	Authorised End: Permit Start Date:	31 October 30th November 1999				
F	Permit End Date:	Not Supplied				
	Water Abstractions	Located by supplier to within 10m				
0	Operator:	Eric Ivor Lloyd	(N)	1900	2	325800
	Licence Number: Permit Version:	18/54/01/05741 Not Supplied				311955
L	Location: Authority:	Tributary Of River Severn, WELSHPOOL Environment Agency, Midlands Region				
A	Abstraction: Abstraction Type:	Impounding Not Supplied				
5	Source:	Surface				
	Daily Rate (m3): Yearly Rate (m3):	0 0				
	Details: Authorised Start:	Upper Severn Catchment (Above Montford) Not Supplied				
	Authorised End: Permit Start Date:	Not Supplied Not Supplied				
F	Permit End Date:	Not Supplied Located by supplier to within 100m				



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 4 The Moors Farm Buttington- River Severn -A Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 29th June 2005 Not Supplied Located by supplier to within 10m	(SW)	1951	2	324540 308720
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 3 The Moors Farm Buttington- River Severn -A Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 7th May 2002 Not Supplied Located by supplier to within 10m	(SW)	1951	2	324540 308720
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 2 The Moors Farm Buttington- River Severn -A Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 28th June 2000 Not Supplied Located by supplier to within 10m	(SW)	1951	2	324540 308720
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	J & M Suckley 18/54/01/0636 1 The Moors Farm Buttington- River Severn -A Environment Agency, Midlands Region General Agriculture: Spray Irrigation - Direct Water may be abstracted from a river or stream reach, or a row of wellpoints Surface Not Supplied Not Supplied The Moors Farm Buttington 01 April 31 October 30th November 1999 Not Supplied Located by supplier to within 10m	(SW)	1951	2	324540 308720



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Water Abstractions					
	Operator: Licence Number: Permit Version: Location: Authority: Abstraction: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details:	Welshpool Livestock Sales Limited Md/054/0001/011 2 Borehole Adj Buttington Cross Natural Resources Wales Other Industrial/Commercial/Public Services: General Washing/Process Washing Water may be abstracted from a single point Groundwater Not Supplied Not Supplied Not Supplied Welshpool Livestock Market, Welshpool	(SW)	1969	3	324450 308844
	Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	01 April 31 March 24th June 2011 Not Supplied Located by supplier to within 10m				
	Water Abstractions Operator: Licence Number: Permit Version: Location: Authority: Abstraction:	Welshpool Livestock Sales Limited Md/054/0001/011 2 Borehole Adj Buttington Cross Environment Agency, Midlands Region Other Industrial/Commercial/Public Services: General Washing/Process	(SW)	1969	2	324450 308844
	Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised End: Permit Start Date: Permit End Date: Positional Accuracy:	Washing Water may be abstracted from a single point Groundwater Not Supplied Not Supplied Welshpool Livestock Market, Welshpool 01 April 31 March 24th June 2011 Not Supplied Located by supplier to within 10m				
	Water Abstractions					
	Operator: Licence Number: Permit Version: Location: Authority: Abstraction: Abstraction Type: Source: Daily Rate (m3): Yearly Rate (m3): Details: Authorised Start: Authorised Start: Authorised End: Permit Start Date: Permit End Date:	Welshpool Livestock Sales Limited Md/054/0001/011 1 Borehole Adj Buttington Cross Environment Agency, Midlands Region Other Industrial/Commercial/Public Services: General Washing/Process Washing Water may be abstracted from a single point Groundwater Not Supplied Not Supplied Welshpool Livestock Market, Welshpool 01 April 31 March 10th February 2010 Not Supplied Located by supplier to within 10m	(SW)	1969	2	324450 308844
	Soil Classification: Map Sheet: Scale:	Not classified Sheet 21 West Shropshire 1:100,000	A7NE (W)	0	2	326382 309954
	Drift Deposits None					
	Bedrock Aquifer De Aquifer Designation:	signations Secondary Aquifer - B	A7NE (W)	0	3	326382 309954
	Bedrock Aquifer De Aquifer Designation:	signations Secondary Aquifer - B	A11SE (N)	0	3	326382 310000
	Superficial Aquifer Aquifer Designation:	Designations Secondary Aquifer - Undifferentiated	A12SW (E)	0	3	326936 309987
	Superficial Aquifer Aquifer Designation:	Designations Secondary Aquifer - A	A12SW (E)	0	3	326986 310000
	Superficial Aquifer Aquifer Designation:	Designations Secondary Aquifer - Undifferentiated	A7NE (E)	0	3	326595 309966



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Superficial Aquifer Designations				
	Aquifer Designation: Secondary Aquifer - Undifferentiated	A11SW (W)	0	3	326238 310000
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - Undifferentiated	A12SW (E)	0	3	326952 310000
	Superficial Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A8NW	0	3	326771
	Extreme Flooding from Rivers or Sea without Defences	(E)			309845
	Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Events Boundary Accuracy: As Supplied	A11SW (NW)	63	3	326291 310096
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models and Fluvial Events Boundary Accuracy: As Supplied	A11SW (NW)	104	3	326244 310094
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences	A11SE	106	3	326444
	Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	(N)			310269
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11SE (N)	109	3	326435 310264
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11SW (NW)	113	3	326199 310059
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Events Boundary Accuracy: As Supplied	A11SE (N)	115	3	326439 310270
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences	A11SW	120	3	326194
	Flood Plain Type: Fluvial Events Boundary Accuracy: As Supplied	(NW)			310062
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11SW (NW)	123	3	326184 310054
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Events Boundary Accuracy: As Supplied	A11SW (NW)	138	3	326169 310058
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11SW (NW)	143	3	326159 310054
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11NE (N)	164	3	326535 310384
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Events Boundary Accuracy: As Supplied	A11NE (N)	166	3	326534 310384
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11NE (N)	202	3	326566 310429
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Events Boundary Accuracy: As Supplied	A11NE (N)	202	3	326564 310427



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Extreme Flooding from Rivers or Sea without Defences				
	Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Events Boundary Accuracy: As Supplied	A11NE (N)	205	3	326569 310431
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11NE (N)	207	3	326571 310434
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models and Fluvial Events Boundary Accuracy: As Supplied	A11NE (N)	248	3	326399 310514
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11SW (NW)	113	3	326234 310099
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial Models Boundary Accuracy: As Supplied	A11SW (W)	230	3	326039 309994
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
8	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 267.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NE (E)	0	5	326480 309945
9	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 118.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (E)	0	5	326723 309938
10	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 194.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (E)	0	5	326723 309938
11	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 53.4 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	0	5	326277 309807
12	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 43.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	0	5	326303 309840



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
13	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 125.0 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NE (SE)	0	5	326404 309914
14	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 96.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NE (SE)	0	5	326412 309930
15	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 103.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	8	5	327074 310098
16	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 14.1 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	8	5	326222 309780
17	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 19.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	10	5	327058 310086
18	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 15.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	10	5	326230 309778
19	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 28.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	11	5	326208 309784
20	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 81.9 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (E)	12	5	326867 309817
21	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 145.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	13	5	327106 310184



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
22	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 78.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	13	5	327106 310184
23	OS Water Network Lines Watercourse Form: Inland river Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (E)	17	5	326867 309817
24	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 67.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	18	5	326182 309795
25	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 103.0 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	20	5	326187 309727
26	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 81.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	20	5	326187 309727
27	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.8 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	21	5	327075 310092
28	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 45.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	28	5	327078 310083
29	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 42.0 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	28	5	327078 310083
30	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 118.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7SW (S)	34	5	326289 309643



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
31	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 80.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (E)	36	5	326875 309795
32	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 34.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	38	5	326182 309795
33	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 22.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (E)	49	5	326772 309846
34	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 485.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (E)	53	5	326947 309834
35	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 93.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NE (E)	57	5	327097 309975
36	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 122.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (E)	61	5	326773 309823
37	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 323.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	70	5	327113 310053
38	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 208.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	70	5	327113 310053
39	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (NE)	72	5	327192 310295



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
40	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 42.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	72	5	326155 309816
41	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 13.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (NE)	76	5	327195 310297
42	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 144.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (NE)	89	5	327207 310303
43	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 68.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (NE)	89	5	327207 310303
44	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 110.7 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	98	5	326156 309653
45	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 229.6 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7SE (S)	109	5	326370 309615
46	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NE (E)	110	5	327100 309953
47	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (SE)	112	5	326909 309723
48	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 396.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7NW (SW)	112	5	326118 309837



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
49	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 375.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NE (E)	113	5	327101 309948
50	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 80.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7SW (S)	116	5	326234 309574
51	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 308.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (SE)	117	5	326913 309719
52	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 89.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12NW (NE)	129	5	326736 310367
53	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.1 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (SE)	136	5	326789 309714
54	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 543.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8NW (SE)	141	5	326789 309714
55	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 32.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A11NE (N)	142	5	326488 310331
56	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 95.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12NW (NE)	143	5	326678 310339
57	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 13.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12NE (NE)	156	5	327101 310445



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
58	OS Water Network Lines Watercourse Form: Inland river Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	161	5	326497 310361
59	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 41.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	162	5	326494 310361
60	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 7.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12NE (NE)	169	5	327098 310458
61	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12NE (NE)	176	5	327095 310465
62	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 198.0 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12NE (NE)	178	5	327242 310420
63	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 323.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7SW (S)	180	5	326263 309502
64	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 230.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7SE (S)	180	5	326349 309495
65	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (NE)	185	5	326615 310410
66	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 79.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	186	5	326514 310396



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
67	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 75.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (NE)	188	5	326611 310414
68	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 177.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	202	5	326466 310388
69	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 179.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	224	5	326555 310465
70	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	225	5	327307 310113
71	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 282.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12SE (E)	231	5	327313 310115
72	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 267.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11SW (NW)	248	5	326127 310229
73	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.2 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	252	5	326329 310363
74	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 250.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	259	5	326330 310372
75	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 262.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12NW (NE)	274	5	326795 310552



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
76	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 159.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	285	5	326452 310478
77	OS Water Network Lines Watercourse Form: Inland river Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16SW (NE)	290	5	326914 310701
78	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 60.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7SE (S)	301	5	326479 309456
79	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 40.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7SE (S)	301	5	326502 309469
80	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	310	5	326564 310536
81	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 30.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	314	5	326567 310541
82	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 254.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A7SE (S)	318	5	326564 309493
83	OS Water Network Lines Watercourse Form: Inland river Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A12NE (NE)	344	5	327229 310617
84	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 533.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	352	5	326565 310606



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
85	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 28.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	362	5	326563 310589
86	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	383	5	326543 310607
87	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	385	5	326541 310609
88	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 192.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NE (N)	388	5	326538 310612
89	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 206.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6SE (SW)	398	5	325901 309481
90	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16SW (NE)	409	5	326910 310698
91	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 3.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8SE (SE)	414	5	327124 309498
92	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8SE (SE)	418	5	327127 309495
93	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 151.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A10SE (NW)	424	5	325979 310278



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
94	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.6 Watercourse Level: Underground Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A10SE (NW)	427	5	325986 310291
95	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 89.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A11SW (NW)	428	5	325990 310296
96	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 171.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A11NW (NW)	442	5	326042 310368
97	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 94.0 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NW (NW)	442	5	326042 310368
98	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A10SE (W)	476	5	325804 310064
99	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 162.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A10SE (W)	479	5	325834 310154
100	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 448.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A10SE (W)	482	5	325800 310069
101	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 314.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A10SE (W)	482	5	325800 310069
102	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.9 Watercourse Level: Underground Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A10SE (NW)	486	5	325858 310217



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
103	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 144.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A11NW (NW)	494	5	326123 310512
104	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 187.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Pwll Trewern Catchment Name: Severn Primacy: 1	A16SE (NE)	504	5	327314 310756
105	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 767.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Pwill Trewern Catchment Name: Severn Primacy: 1	A16SE (NE)	504	5	327079 310841
106	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 110.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A10NE (NW)	516	5	325948 310380
107	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8SE (SE)	517	5	327307 309540
108	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 416.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A8SE (SE)	521	5	327307 309533
109	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 333.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SE (N)	523	5	326439 310728
110	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 51.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SE (N)	523	5	326439 310728
111	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 122.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A3NW (S)	524	5	326091 309191



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
112	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 70.8 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6SE (SW)	525	5	325710 309560
113	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 91.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A6NE (W)	539	5	325670 309664
114	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 270.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A6NE (W)	539	5	325670 309664
115	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 140.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NW (NW)	579	5	326049 310586
116	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 277.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A11NW (N)	579	5	326165 310646
117	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 253.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A6SW (SW)	582	5	325643 309583
118	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 42.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NW (NW)	589	5	326008 310538
119	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 64.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A11NW (NW)	589	5	326008 310538
120	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 163.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NE (SW)	599	5	325983 309158



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
121	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 162.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NE (SW)	599	5	325983 309158
122	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 43.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	610	5	326147 310672
123	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 11.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NE (SW)	620	5	325852 309228
124	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 208.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NE (SW)	621	5	325842 309234
125	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 283.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A4NW (SE)	634	5	326746 309211
126	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 79.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A4NW (SE)	634	5	326746 309211
127	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 93.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	635	5	326164 310711
128	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 149.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	635	5	326164 310711
129	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 328.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6NW (W)	676	5	325525 309854



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
130	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 66.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NE (SW)	681	5	325699 309282
131	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 11.0 Watercourse Level: Underground Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A15SW (N)	689	5	326321 310862
132	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 28.6 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6NW (W)	690	5	325525 309854
133	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 153.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A15SE (N)	690	5	326330 310868
134	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A4NW (S)	690	5	326718 309147
135	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 90.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	691	5	326200 310798
136	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 130.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	691	5	326200 310798
137	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 20.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6NW (W)	692	5	325531 309896
138	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 398.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6NW (W)	692	5	325530 309934



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
139	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 31.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (NW)	692	5	326016 310679
140	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 262.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A4NW (S)	695	5	326716 309141
141	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 311.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6NW (W)	703	5	325516 309881
142	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.7 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16SW (N)	717	5	326668 310971
143	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 2.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16SW (N)	720	5	326671 310975
144	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.1 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	720	5	326297 310885
145	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 85.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16SW (N)	722	5	326673 310977
146	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 276.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A16SW (N)	722	5	326673 310977
147	OS Water Network Lines Watercourse Form: Inland river Watercourse Level: 0n ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	722	5	326302 310889



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
148	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 42.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16SW (N)	723	5	326752 310997
149	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 112.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A3NW (S)	729	5	326020 308999
150	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6SW (SW)	736	5	325582 309346
151	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6SW (SW)	741	5	325578 309341
152	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 7.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NW (SW)	745	5	325631 309262
153	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 95.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A6SW (SW)	745	5	325575 309338
154	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 13.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NW (SW)	746	5	325636 309256
155	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 371.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A6SW (SW)	746	5	325575 309338
156	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 7.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NW (SW)	747	5	325643 309245



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
157	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.0 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NW (SW)	748	5	325647 309239
158	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 241.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NE (SW)	750	5	325656 309227
159	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NE (SW)	750	5	325652 309231
160	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 269.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A3SW (S)	762	5	326177 308926
161	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 1.5 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16NW (N)	765	5	326750 311038
162	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 104.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16NW (N)	765	5	326750 311038
163	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 18.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16NW (N)	766	5	326734 311036
164	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 28.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A15SE (N)	767	5	326393 310974
165	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 65.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A15SE (N)	767	5	326421 310975



Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
166	OS Water Network Lines Watercourse Form: Marsh Watercourse Length: 72.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A15SW (N)	772	5	326321 310967
167	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 6.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A10SW (W)	777	5	325559 310270
168	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 20.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A10SW (W)	783	5	325554 310274
169	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 31.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A3SW (S)	785	5	326096 308918
170	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 21.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A15SW (N)	787	5	326312 310966
171	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 19.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	793	5	326300 310965
172	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 94.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	796	5	326132 310880
173	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.4 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A10SW (W)	803	5	325538 310287
174	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 472.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A3SW (S)	804	5	326067 308906



Agency & Hydrological

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
175	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 2	A10SW (W)	808	5	325534 310290
176	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 3.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	813	5	326292 310983
177	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 20.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A10SW (W)	814	5	325530 310294
178	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 71.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	816	5	326290 310986
179	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 302.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Main Ditch Catchment Name: Severn Primacy: 1	A15NE (N)	825	5	326441 311038
180	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 270.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A10SW (NW)	825	5	325527 310314
181	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 345.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A10SW (NW)	825	5	325527 310314
182	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	829	5	326191 310954
183	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 68.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15SW (N)	830	5	326194 310957



Agency & Hydrological

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
184	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 178.2 Watercourse Level: Not Supplied Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A2NE (SW)	832	5	325738 309046
185	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 385.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Pwll Trewern Catchment Name: Severn Primacy: 1	A16NW (N)	866	5	326749 311141
186	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 113.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15NW (N)	869	5	326228 311017
187	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 126.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15NW (N)	869	5	326228 311017
188	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 282.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16NE (NE)	879	5	327202 311167
189	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.8 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16NE (NE)	880	5	327204 311167
190	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 267.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A16NE (NE)	883	5	327210 311170
191	OS Water Network Lines Watercourse Form: Inland river Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A5NE (W)	909	5	325299 309658
192	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 101.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A5NE (W)	913	5	325295 309653



Agency & Hydrological

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
193	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 181.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15NW (N)	934	5	326103 311025
194	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 71.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A15NW (N)	965	5	326307 311151
195	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 64.4 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Severn Primacy: 1	A5SE (W)	979	5	325240 309569



Waste

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority La	ndfill Coverage				
	Name:	Powys County Council - Has supplied landfill data		0	6	326382 309954
	Potentially Infilled	tially Infilled Land (Non-Water)				
196	Bearing Ref: Use: Date of Mapping:	NW Unknown Filled Ground (Pit, quarry etc) 1976	A11SW (NW)	0	-	326298 309990
	Potentially Infilled	Land (Non-Water)				
197	Bearing Ref: Use: Date of Mapping:	E Unknown Filled Ground (Pit, quarry etc) 1976	A7NE (E)	0	-	326431 309947
	Potentially Infilled	Land (Non-Water)				
198	Bearing Ref: Use: Date of Mapping:	S Unknown Filled Ground (Pit, quarry etc) 1976	A4SW (S)	938	-	326790 308897
	Potentially Infilled	Land (Water)				
199	Use: Date of Mapping:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc) 1888	A12NE (NE)	330	-	327207 310609
	Potentially Infilled	Land (Water)				
200	Use: Date of Mapping:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc) 1888	A12NE (NE)	337	-	327231 310608
	Potentially Infilled	Land (Water)				
201	Use: Date of Mapping:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc) 1954	A2NE (SW)	666	-	325977 309087
	Potentially Infilled	Land (Water)				
202	Use: Date of Mapping:	Unknown Filled Ground (Pond, marsh, river, stream, dock etc) 1954	A15NW (N)	1000	-	326033 311059



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid	l Geology				
	Description:	Llandovery Rocks (Undifferentiated)	A7NE (SE)	0	1	326398 309920
	BGS 1:625,000 Solid	l Geology				
	Description:	Caradoc Rocks (Undifferentiated)	A7NE (W)	0	1	326382 309954
	BGS 1:625,000 Solid	l Geology				
	Description:	Wenlock Rocks (Undifferentiated)	A7NE (SE)	0	1	326478 309736
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil <15 mg/kg	A7NE (W)	0	1	326382 309954
	Cadmium	<1.8 mg/kg				
	Concentration: Chromium	60 - 90 mg/kg				
	Concentration: Lead Concentration: Nickel Concentration:	<100 mg/kg 15 - 30 mg/kg				
	BGS Estimated Soil	Chamiatry				
	Source: Soil Sample Type: Arsenic Concentration:	British Geological Survey, National Geoscience Information Service Rural Soil <15 mg/kg	A8SE (SE)	388	1	327000 309391
	Cadmium Concentration: Chromium	<1.8 mg/kg 90 - 120 mg/kg				
	Concentration: Lead Concentration:	<100 mg/kg				
	Nickel Concentration:	15 - 30 mg/kg				
	BGS Estimated Soil	Chemistry				
	Source: Soil Sample Type: Arsenic	British Geological Survey, National Geoscience Information Service Rural Soil <15 mg/kg	A16SE (NE)	401	1	327000 310687
	Concentration: Cadmium Concentration:	<1.8 mg/kg				
	Chromium Concentration:	60 - 90 mg/kg				
	Lead Concentration: Nickel Concentration:	<100 mg/kg 30 - 45 mg/kg				
	BGS Recorded Mine	eral Sites				
203	Site Name: Location: Source: Reference: Type: Status: Operator: Operator Location: Periodic Type: Geology:	Buttington Quarry Buttington, Welshpool, Powys British Geological Survey, National Geoscience Information Service 190918 Opencast Active Border Hardcore & Rockery Stone Co., Ltd. Not Supplied Silurian Tarannon Mudstone Formation	A12SW (E)	0	1	326795 310120
	Commodity:	Common Clay and Shale Located by supplier to within 10m				
	BGS Recorded Mine					
204	Site Name: Location: Source: Reference: Type: Status: Operator: Operator Location: Periodic Type:	Buttington Quarry Buttington, Welshpool, Powys British Geological Survey, National Geoscience Information Service 3780 Opencast Dormant Border Hardcore & Rockery Stone Co., Ltd. Not Supplied Silurian	A8NW (E)	0	1	326855 309940
	Geology: Commodity:	Tarannon Mudstone Formation Common Clay and Shale Located by supplier to within 10m				



Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Recorded Mine	eral Sites				
205	Site Name: Location: Source: Reference: Type: Status: Operator: Operator Location: Periodic Type: Geology: Commodity:	Buttington Station Buttington, Welshpool, Powys British Geological Survey, National Geoscience Information Service 113107 Opencast Ceased Unknown Operator Not Supplied Ordovician Stone House Shale Formation Common Clay and Shale Located by supplier to within 10m	A11SE (N)	0	1	326388 310062
	BGS Recorded Mine	eral Sites				
206	Site Name: Location: Source: Reference: Type: Status: Operator: Operator Location: Periodic Type: Geology: Commodity:	Buttington Junction Buttington, Welshpool, Powys British Geological Survey, National Geoscience Information Service 113108 Opencast Ceased Unknown Operator Not Supplied Ordovician Stone House Shale Formation Common Clay and Shale Located by supplier to within 10m	A11SW (NW)	2	1	326297 310000
	BGS Recorded Mine	eral Sites				
207	Site Name: Location: Source: Reference: Type: Status: Operator: Operator Location: Periodic Type: Geology: Commodity: Positional Accuracy:	Gelli Buttington, Welshpool, Powys British Geological Survey, National Geoscience Information Service 113109 Opencast Ceased Unknown Operator Not Supplied Silurian Knucklas Castle Formation Sandstone Located by supplier to within 10m	A4NW (SE)	801	1	326946 309033
	BGS Recorded Mine	eral Sites				
208	Site Name: Location: Source: Reference: Type: Status: Operator: Operator Location: Periodic Type: Geology: Commodity:	Gelli Buttington, Welshpool, Powys British Geological Survey, National Geoscience Information Service 113110 Opencast Ceased Unknown Operator	A4SW (S)	917	1	326777 308915
	BGS Measured Urba	an Soil Chemistry				
	No data available					
	BGS Urban Soil Che No data available					
	Coal Mining Affecte					
		not be affected by coal mining				
	Non Coal Mining Ar Risk: Source:	eas of Great Britain Highly Unlikely British Geological Survey, National Geoscience Information Service	A7NE (W)	0	1	326382 309954
	Non Coal Mining Ar Risk: Source:	eas of Great Britain Highly Unlikely British Geological Survey, National Geoscience Information Service	A11SE (N)	0	1	326382 310000
	Potential for Collaps Hazard Potential: Source:	sible Ground Stability Hazards Very Low British Geological Survey, National Geoscience Information Service	A7NE (W)	0	1	326382 309954
	Potential for Collaps Hazard Potential: Source:	sible Ground Stability Hazards Very Low British Geological Survey, National Geoscience Information Service	A11SE (N)	0	1	326382 310000
		sible Ground Stability Hazards No Hazard British Geological Survey, National Geoscience Information Service	A11SW (W)	121	1	326140 310000
	10040550		dmork Informa			

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Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Collapsible Ground Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A11SW (NW)	134	1	326177 310067
	Potential for Compressible Ground Stability Hazards				
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11SE (NE)	0	1	326482 310000
	Potential for Compressible Ground Stability Hazards		_		
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A7NE (SE)	0	1	326407 309940
	Potential for Compressible Ground Stability Hazards	A4405	0	4	200000
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A11SE (N)	0	1	326382 310000
	Potential for Compressible Ground Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A7NE (W)	0	1	326382 309954
	Potential for Compressible Ground Stability Hazards				
	Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A12NW	19	1	326823
	Source: British Geological Survey, National Geoscience Information Service Potential for Compressible Ground Stability Hazards	(NE)			310505
	Hazard Potential: Very Low	A11SW	39	1	326268
	Source: British Geological Survey, National Geoscience Information Service	(NW)			310023
	Potential for Compressible Ground Stability Hazards Hazard Potential: Low	A11SW	121	1	326140
	Source: British Geological Survey, National Geoscience Information Service	(W)	121	I	310000
	Potential for Compressible Ground Stability Hazards				
	Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A11SW (NW)	134	1	326177 310067
	Potential for Ground Dissolution Stability Hazards				
	Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A11SE (N)	0	1	326382 310000
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard	A7NE	0	1	326382
	Source: British Geological Survey, National Geoscience Information Service	(W)	0	I	309954
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A7NE (W)	0	1	326382 309954
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A8NW (E)	0	1	326781 309981
	Potential for Landslide Ground Stability Hazards	(-)			
	Hazard Potential: Low	A7NE	0	1	326647
	Source: British Geological Survey, National Geoscience Information Service	(E)			309962
	Potential for Landslide Ground Stability Hazards Hazard Potential: Low	A11SE	0	1	326382
	Source: British Geological Survey, National Geoscience Information Service	(N)			310000
	Potential for Landslide Ground Stability Hazards		0	4	226607
	Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A8NW (E)	0	1	326697 309958
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A7NE (S)	0	1	326432 309803
	Potential for Landslide Ground Stability Hazards	(-)			
	Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A12SE (E)	0	1	327013 310087
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11SE (NE)	0	1	326482 310000
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A12SW (E)	0	1	326986 310000
	Potential for Landslide Ground Stability Hazards				
	Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A7NE (SE)	0	1	326407 309940
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Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11SW (W)	0	1	326203 310000
	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A11SE (NE)	19	1	326490 310199
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11SW (NW)	19	1	326268 310023
	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A11SW (NW)	51	1	326318 310090
	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A12SW (NE)	92	1	326721 310322
	Potential for Landslide Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A7NE (SE)	103	1	326558 309728
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A7NE (SE)	149	1	326589 309688
	Moderate Moderate Source: British Geological Survey, National Geoscience Information Service	A8NW (SE)	193	1	326663 309679
	Moderate Moderate Source: British Geological Survey, National Geoscience Information Service	A7SE (S)	202	1	326525 309608
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11SW (W)	0	1	326238 310000
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11SE (NE)	0	1	326482 310000
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A7NE (SE)	0	1	326407 309940
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A11SE (N)	0	1	326382 310000
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A7NE (E)	0	1	326496 309942
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A7NE (W)	0	1	326382 309954
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A12SE (E)	0	1	327047 310198
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A8NW (E)	0	1	326781 309981
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A11SW (NW)	19	1	326268 310023
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A7NE (SE)	103	1	326558 309728
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A11SW (W)	121	1	326140 310000
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A11SW (NW)	134	1	326177 310067

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Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Shrink	ing or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	Very Low British Geological Survey, National Geoscience Information Service	A11SE (N)	0	1	326382 310000
	Potential for Shrink	ing or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	Very Low British Geological Survey, National Geoscience Information Service	A7NE (W)	0	1	326382 309954
	Potential for Shrink	ing or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	Low British Geological Survey, National Geoscience Information Service	A12NW (NE)	19	1	326823 310505
	Potential for Shrink	ing or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	No Hazard British Geological Survey, National Geoscience Information Service	A7NE (SE)	110	1	326546 309717
	Potential for Shrink	ing or Swelling Clay Ground Stability Hazards				
	Hazard Potential: Source:	No Hazard British Geological Survey, National Geoscience Information Service	A7NE (SE)	128	1	326611 309723
	Radon Potential - R	adon Affected Areas				
	Affected Area:	The property is in an Intermediate probability radon area (1 to 3% of homes are estimated to be at or above the Action Level).	A11SE (NE)	0	1	326425 310001
	Source:	British Geological Survey, National Geoscience Information Service				
	Radon Potential - R Affected Area:	adon Affected Areas The property is an Intermediate probability radon area (3 to 5% of homes are	A12SW	0	1	326875
	Source:	estimated to be at or above the Action Level). British Geological Survey, National Geoscience Information Service	(NE)	0	·	310276
	Radon Potential - R	adon Affected Areas				
	Affected Area:	The property is in an Intermediate probability radon area (5 to 10% of homes are estimated to be at or above the Action Level).	A12SW (E)	0	1	326925 310051
	Source:	British Geological Survey, National Geoscience Information Service				
		adon Affected Areas				000405
	Affected Area: Source:	The property is in an Intermediate probability radon area (1 to 3% of homes are estimated to be at or above the Action Level). British Geological Survey, National Geoscience Information Service	A7NE (E)	0	1	326425 309954
	Radon Potential - R	adon Affected Areas				
	Affected Area:	The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level).	A11SE (N)	0	1	326382 310001
	Source:	British Geological Survey, National Geoscience Information Service				
	Radon Potential - R Affected Area:	adon Affected Areas The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level).	A7NE (W)	0	1	326382 309954
	Source:	British Geological Survey, National Geoscience Information Service	. ,			
		adon Protection Measures No radon protective measures are necessary in the construction of new dwellings or extensions British Geological Survey, National Geoscience Information Service	A11SE (NE)	0	1	326425 310001
		adon Protection Measures				
		Basic radon protective measures are necessary in the construction of new dwellings or extensions	A12SW (NE)	0	1	326875 310276
	Source:	British Geological Survey, National Geoscience Information Service				
		adon Protection Measures				
	Protection Measure: Source:	Basic radon protective measures are necessary in the construction of new dwellings or extensions British Geological Survey, National Geoscience Information Service	A12SW (E)	0	1	326925 310051
		adon Protection Measures				
		No radon protective measures are necessary in the construction of new	A7NE	0	1	326425
	Source:	dwellings or extensions British Geological Survey, National Geoscience Information Service	(E)			309954
	Radon Potential - R	adon Protection Measures				
		No radon protective measures are necessary in the construction of new dwellings or extensions	A11SE (N)	0	1	326382 310001
	Source:	British Geological Survey, National Geoscience Information Service				
		adon Protection Measures No radon protective measures are necessary in the construction of new dwellings or extensions	A7NE (W)	0	1	326382 309954
	Source:	British Geological Survey, National Geoscience Information Service	(/			



Industrial Land Use

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
209	Contemporary Trad Name: Location: Classification: Status: Positional Accuracy:	le Directory Entries Border Hardcore Co Ltd Buttington Quarry, Cefn, Buttington, Welshpool, Powys, SY21 8SZ Quarries Active Automatically positioned to the address	A7NW (SW)	0	-	326310 309827
210	Contemporary Trad Name: Location: Classification: Status:		A12NE (NE)	345	-	327294 310588
211	Name: Location: Category: Class Code:	Commercial Services D Marston 99 Parc Caradog, Trewern, Welshpool, SY21 8DS Transport, Storage and Delivery Distribution and Haulage Positioned to address or location	A12NE (NE)	345	7	327294 310588
212	Name: Location: Category: Class Code:	Manufacturing and Production Border Stone Buttington Quarry, Cefn, Buttington, Welshpool, SY21 8SZ Extractive Industries Stone Quarrying and Preparation Positioned to address or location	A7NW (SW)	0	7	326310 309827
212	Name: Location: Category: Class Code:	Manufacturing and Production Border Hardcore Buttington Quarry, Cefn, Buttington, Welshpool, SY21 8SZ Extractive Industries Unspecified Quarries Or Mines Positioned to address or location	A7NW (SW)	0	7	326310 309827
212	Name: Location: Category: Class Code:	Manufacturing and Production Brick Works Not Supplied Industrial Features Unspecified Works Or Factories Positioned to an adjacent address or location	A7NW (S)	0	7	326324 309758
212	Name: Location: Category: Class Code:	Manufacturing and Production Border Hardcore Co Ltd Buttington Quarry, Buttington, Welshpool, SY21 8SZ Extractive Industries Unspecified Quarries Or Mines Positioned to address or location	A7NW (SW)	0	7	326309 309827
213	Name: Location: Category: Class Code:	Manufacturing and Production Clay Pit SY21 Extractive Industries Sand, Gravel and Clay Extraction and Merchants Positioned to an adjacent address or location	A11SE (E)	0	7	326514 309993
214	Name: Location: Category: Class Code:	Manufacturing and Production Clay Pit (Disused) SY21 Extractive Industries Sand, Gravel and Clay Extraction and Merchants Positioned to an adjacent address or location	A12SW (E)	0	7	326743 310066
215	Name: Location: Category: Class Code:	Manufacturing and Production Tank SY21 Industrial Features Tanks (Generic) Positioned to an adjacent address or location	A6SE (SW)	518	7	325886 309329
216	Name: Location: Category: Class Code:	Manufacturing and Production Tank SY21 Industrial Features Tanks (Generic) Positioned to an adjacent address or location	A3NW (SW)	630	7	326028 309103
216	Name: Location: Category: Class Code:	Manufacturing and Production Tank SY21 Industrial Features Tanks (Generic) Positioned to an adjacent address or location	A2NE (SW)	705	7	325979 309042



Industrial Land Use

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Points of Interest - I	Public Infrastructure				
217	Name: Location: Category: Class Code: Positional Accuracy:	Weir SY21 Water Weirs, Sluices and Dams Positioned to an adjacent address or location	A16SW (NE)	656	7	326971 310944



Sensitive Land Use

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
218	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 46822 9428.31 Plantation on Ancient Woodland	A7NE (NW)	0	3	326381 309957
219	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 36224 11601.71 Restored Ancient Woodland Site	A7NE (N)	0	3	326374 309986
220	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 44245 2955.45 Plantation on Ancient Woodland	A11SE (NE)	0	3	326561 310121
221	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 50864 8920.64 Ancient Woodland Site of Unknown Category	A7NE (W)	0	3	326374 309953
222	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 36224 9999.27 Restored Ancient Woodland Site	A7NE (W)	0	3	326382 309954
223	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 46822 423.51 Plantation on Ancient Woodland	A11SE (NE)	0	3	326457 310095
224	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 33925 14487.02 Ancient and Semi-Natural Woodland	A11SW (NW)	55	3	326289 310068
225	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 33926 18498.29 Ancient and Semi-Natural Woodland	A11SW (NW)	91	3	326270 310101
226	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 44244 10612.88 Plantation on Ancient Woodland	(E)	346	3	327439 310141
227	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 27143 7025.73 Ancient and Semi-Natural Woodland	(E)	560	3	327679 310281
228	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 29223 30108.06 Restored Ancient Woodland Site	A4NE (SE)	663	3	327002 309180
229	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 26855 1471.76 Ancient and Semi-Natural Woodland	A8SE (SE)	685	3	327328 309313
230	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 28059 16908.93 Ancient and Semi-Natural Woodland	(SE)	686	3	327348 309330
231	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 33927 23211.48 Ancient and Semi-Natural Woodland	A15SE (N)	696	3	326331 310875



Sensitive Land Use

Map ID		Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
232	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 28058 4896.52 Ancient and Semi-Natural Woodland	A4NW (SE)	701	3	326782 309137
233	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 33924 5632.36 Ancient and Semi-Natural Woodland	A4NW (S)	709	3	326690 309107
234	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 27140 13843.73 Ancient and Semi-Natural Woodland	(E)	810	3	327752 309662
235	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 27473 6160.29 Ancient and Semi-Natural Woodland	A3SW (S)	826	3	326121 308871
236	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 32035 3827.74 Ancient and Semi-Natural Woodland	A3SW (S)	846	3	326112 308852
237	Ancient Woodland Name: Reference: Area(m ²): Type:	Not Supplied 28060 9010.02 Ancient and Semi-Natural Woodland	(E)	938	3	327813 309530
238	Sites of Special Sci Name: Multiple Areas: Total Area (m2): Source: Reference: Designation Details: Designation Date: Date Type:	Gwaith Brics Buttington / Buttington Brickworks N 6545.96 Natural Resources Wales 279733wpy	A12SW (E)	0	3	326968 310110



Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Powys County Council - Public Protection Department	February 2015	Annual Rolling Update
Shropshire Council - Environmental Health Department	March 2015	Annually
South Shropshire District Council (now part of Shropshire Council) - Environmental Health Department	May 2009	Not Applicable
Discharge Consents		
Environment Agency - Midlands Region	January 2019	Quarterly
tural Resources Wales January 20		Quarterly
Enforcement and Prohibition Notices		
Environment Agency - Midlands Region	March 2013	Annual Rolling Update
Environment Agency - Welsh Region	March 2013	Annual Rolling Update
Integrated Pollution Controls		
Environment Agency - Midlands Region	October 2008	Variable
Environment Agency - Welsh Region	October 2008	Variable
Integrated Pollution Prevention And Control		
Environment Agency - Midlands Region	January 2019	Quarterly
Environment Agency - Welsh Region	January 2019	Quarterly
Natural Resources Wales	January 2019	Quarterly
Local Authority Integrated Pollution Prevention And Control		
South Shropshire District Council (now part of Shropshire Council) - Environmental Health Department	June 2008	Not Applicable
Powys County Council - Public Protection Department	May 2014	Variable
Shropshire Council - Environmental Health Department	October 2014	Variable
Local Authority Pollution Prevention and Controls		
South Shropshire District Council (now part of Shropshire Council) - Environmental Health Department	June 2008	Not Applicable
Powys County Council - Public Protection Department	May 2014	Annual Rolling Update
Shropshire Council - Environmental Health Department	October 2014	Annually
Local Authority Pollution Prevention and Control Enforcements South Shropshire District Council (now part of Shropshire Council) - Environmental Health Department	June 2008	Not Applicable
Powys County Council - Public Protection Department	May 2014	Variable
Shropshire Council - Environmental Health Department	October 2014	Variable
Nearest Surface Water Feature		
Ordnance Survey	January 2019	
Pollution Incidents to Controlled Waters		
Environment Agency - Midlands Region	December 1999	Not Applicable
Prosecutions Relating to Authorised Processes		
Environment Agency - Midlands Region	July 2015	Annual Rolling Update
Environment Agency - Welsh Region	March 2013	Annual Rolling Update
Natural Resources Wales	March 2013	Annual Rolling Update
Prosecutions Relating to Controlled Waters		
Environment Agency - Midlands Region	March 2013	Annual Rolling Update
Environment Agency - Welsh Region	March 2013	Annual Rolling Update
Natural Resources Wales	March 2013	Annual Rolling Update
Registered Radioactive Substances		
Natural Resources Wales	January 2015	Annually
Environment Agency - Midlands Region	June 2016	
Environment Agency - Welsh Region	June 2016	
River Quality		
Environment Agency - Head Office	November 2001	Not Applicable



Agency & Hydrological	Version	Update Cycle	
Substantiated Pollution Incident Register			
Environment Agency - Midlands Region - Upper Severn Area	January 2019	Quarterly	
Environment Agency - Midlands Region - West Area	January 2019	Quarterly	
Environment Agency Wales - North Area	January 2019	Quarterly	
Natural Resources Wales	October 2018	Quarterly	
Water Abstractions			
Natural Resources Wales	February 2019	Quarterly	
Environment Agency - Midlands Region	January 2019	Quarterly	
Water Industry Act Referrals			
Natural Resources Wales	January 2019	Quarterly	
Environment Agency - Midlands Region	October 2017	Quarterly	
Environment Agency - Welsh Region	October 2017	Quarterly	
Groundwater Vulnerability			
Environment Agency - Head Office	April 2015	Not Applicable	
Drift Deposits			
Environment Agency - Head Office	January 1999	Not Applicable	
Bedrock Aquifer Designations			
Natural Resources Wales	January 2018	Annually	
Superficial Aquifer Designations			
Natural Resources Wales	January 2018	Annually	
Source Protection Zones			
Natural Resources Wales	November 2016	Annual Rolling Update	
Extreme Flooding from Rivers or Sea without Defences			
Natural Resources Wales	February 2019	Quarterly	
Flooding from Rivers or Sea without Defences			
Natural Resources Wales	February 2019	Quarterly	
Areas Benefiting from Flood Defences			
Natural Resources Wales	February 2019	Quarterly	
Flood Water Storage Areas		,	
Natural Resources Wales	February 2019	Quarterly	
Flood Defences			
Natural Resources Wales	February 2019	Quarterly	
OS Water Network Lines		Quantony	
Ordnance Survey	October 2018	Quarterly	
Surface Water 1 in 30 year Flood Extent		Quantony	
Natural Resources Wales	October 2013	3 Annually	
		Annually	
Surface Water 1 in 100 year Flood Extent Natural Resources Wales	October 2013	ober 2013 Annually	
		Annually	
Surface Water 1 in 1000 year Flood Extent	0-1-1	A	
Natural Resources Wales	October 2013	Annually	
Surface Water Suitability		.	
Natural Resources Wales	October 2013	Annually	
BGS Groundwater Flooding Susceptibility			
British Geological Survey - National Geoscience Information Service	May 2013	Annually	



Waste	Version	Update Cycle
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites		
Natural Resources Wales	July 2017	Quarterly
Integrated Pollution Control Registered Waste Sites		
Environment Agency - Midlands Region	October 2008	Not Applicable
Environment Agency - Welsh Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - Midlands Region - Upper Severn Area	July 2018	Quarterly
Environment Agency - Midlands Region - West Area	July 2018	Quarterly
Environment Agency Wales - North Area	July 2018	Quarterly
Natural Resources Wales	July 2018	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - Midlands Region - Upper Severn Area	January 2019	Quarterly
Environment Agency - Midlands Region - West Area	January 2019	Quarterly
Environment Agency Wales - North Area	January 2019	Quarterly
Natural Resources Wales	January 2019	Quarterly
Local Authority Landfill Coverage		
Powys County Council	May 2000	Not Applicable
Shropshire County Council (now part of Shropshire Council) - Shropshire Records And Research Centre	May 2000	Not Applicable
South Shropshire District Council (now part of Shropshire Council) - Environmental Health Department	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
Powys County Council	May 2000	Not Applicable
Shropshire County Council (now part of Shropshire Council) - Shropshire Records And Research Centre	May 2000	Not Applicable
South Shropshire District Council (now part of Shropshire Council) - Environmental Health Department	May 2003	Not Applicable
Potentially Infilled Land (Non-Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Potentially Infilled Land (Water)		
Landmark Information Group Limited	December 1999	Not Applicable
Registered Landfill Sites		
Environment Agency - Midlands Region - Upper Severn Area	March 2003	Not Applicable
Environment Agency - Midlands Region - West Area	March 2003	Not Applicable
Environment Agency Wales - North Area	March 2003	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - Midlands Region - Upper Severn Area	March 2003	Not Applicable
Environment Agency - Midlands Region - West Area	March 2003	Not Applicable
Environment Agency Wales - North Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites		
Environment Agency - Midlands Region - Upper Severn Area	March 2003	Not Applicable
Environment Agency - Midlands Region - West Area	March 2003	Not Applicable
Environment Agency Wales - North Area	March 2003	Not Applicable



Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	April 2018	Bi-Annually
Explosive Sites Health and Safety Executive	March 2017	Variable
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements Powys County Council - Planning Department Shropshire Council - Planning Department South Shropshire District Council (now part of Shropshire Council) - Planning Department Shropshire County Council (now part of Shropshire Council)	February 2016 February 2016 January 2008 March 2009	Variable Variable Not Applicable Annual Rolling Update
Planning Hazardous Substance Consents Powys County Council - Planning Department Shropshire Council - Planning Department South Shropshire District Council (now part of Shropshire Council) - Planning Department Shropshire County Council (now part of Shropshire Council)	February 2016 February 2016 January 2008 March 2009	Variable Variable Not Applicable Annual Rolling Update
Geological	Version	Update Cycle
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Estimated Soil Chemistry British Geological Survey - National Geoscience Information Service	October 2015	Annually
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	November 2018	Bi-Annually
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service		
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service		
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	Annually
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	Annually



Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries		
Thomson Directories	January 2019	Quarterly
Fuel Station Entries		
Catalist Ltd - Experian	November 2018	Quarterly
Gas Pipelines		
National Grid	July 2014	
Points of Interest - Commercial Services		
PointX	November 2018	Quarterly
Points of Interest - Education and Health		
PointX	November 2018	Quarterly
Points of Interest - Manufacturing and Production		
PointX	November 2018	Quarterly
Points of Interest - Public Infrastructure		
PointX	November 2018	Quarterly
Points of Interest - Recreational and Environmental		
PointX	November 2018	Quarterly
Underground Electrical Cables		
National Grid	December 2015	



Sensitive Land Use	Version	Update Cycle
Ancient Woodland		
Natural Resources Wales	August 2018	Bi-Annually
Areas of Adopted Green Belt		
Shropshire Council - Planning Department	August 2018	As notified
Areas of Unadopted Green Belt		
Shropshire Council - Planning Department	August 2018	As notified
Areas of Outstanding Natural Beauty		
Natural England	August 2018	Bi-Annually
Natural Resources Wales	August 2018	Bi-Annually
Environmentally Sensitive Areas		
Natural England	January 2017	
The National Assembly for Wales - GI Services (Department of Planning & Countryside)	January 2017	
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Natural England	August 2018	Bi-Annually
Powys County Council	August 2018	Bi-Annually
Marine Nature Reserves		
Natural Resources Wales	August 2018	Bi-Annually
National Nature Reserves		
Natural Resources Wales	August 2018	Bi-Annually
National Parks		
Natural England	April 2017	Bi-Annually
Natural Resources Wales	August 2018	Annually
Nitrate Vulnerable Zones		
Natural Resources Wales	July 2017	Bi-Annually
The National Assembly for Wales - GI Services (Department of Planning & Countryside)	October 2005	
Ramsar Sites		
Natural Resources Wales	February 2019	Bi-Annually
Sites of Special Scientific Interest		
Natural Resources Wales	February 2018	Bi-Annually
Special Areas of Conservation		
Natural Resources Wales	August 2018	Bi-Annually
Special Protection Areas		
Natural Resources Wales	August 2018	Bi-Annually



A selection of organisations who provide data within this report

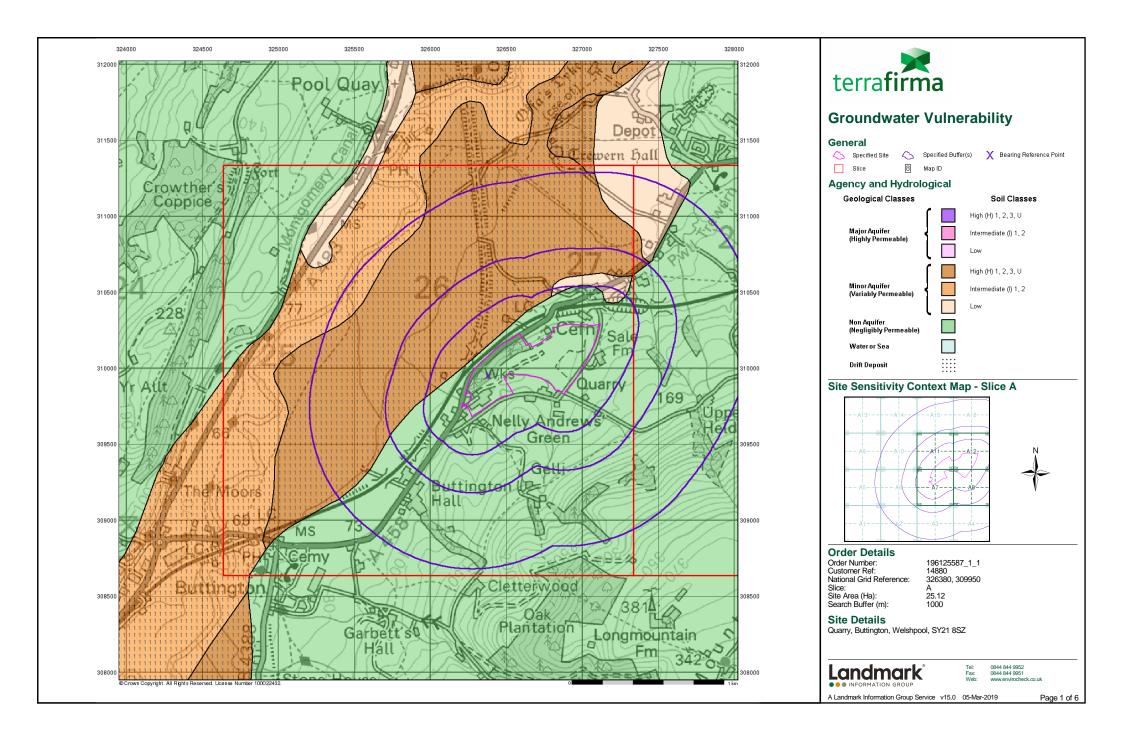
Data Supplier	Data Supplier Logo
Ordnance Survey	Map data
Environment Agency	Environment Agency
Scottish Environment Protection Agency	Scottish Environment Protection Agency
The Coal Authority	The Coal Authority
British Geological Survey	British Geological Survey
Centre for Ecology and Hydrology	Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL
Natural Resources Wales	Cyfoeth Naturiol Cymru Natural Resources Wales
Scottish Natural Heritage	SCOTTISH NATURAL HERITAGE (관소)(취)
Natural England	NATURAL ENGLAND
Public Health England	Public Health England
Ove Arup	ARUP
Peter Brett Associates	peterbrett

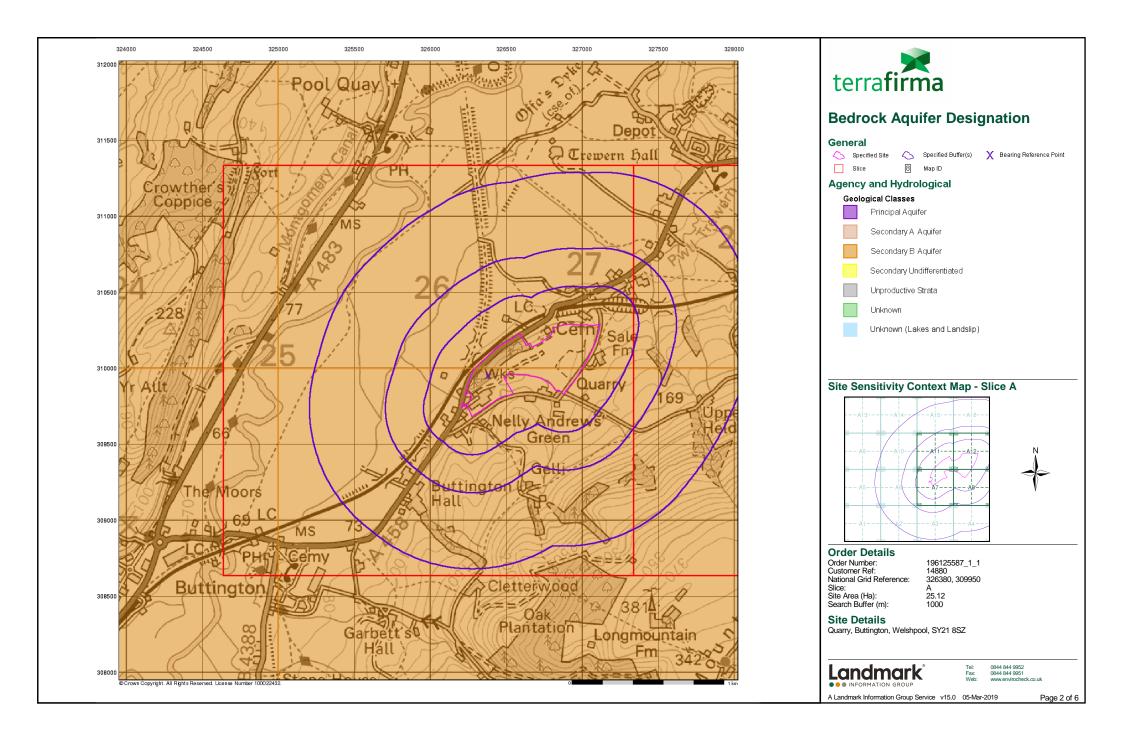


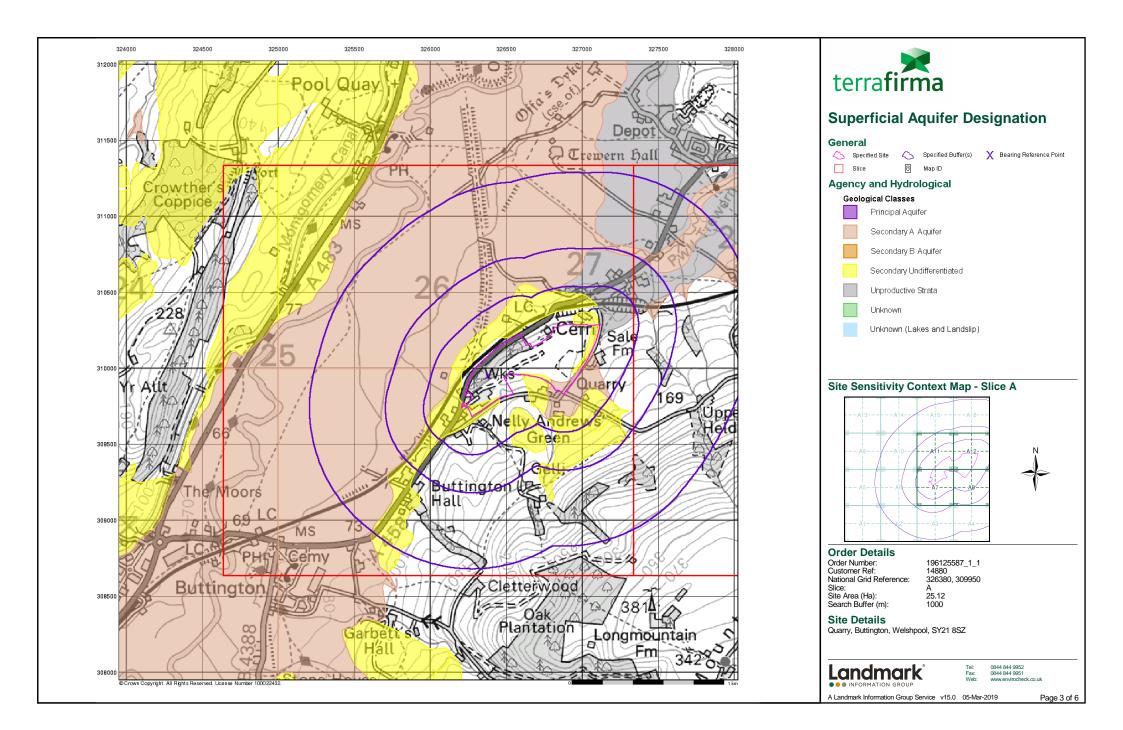
Useful Contacts

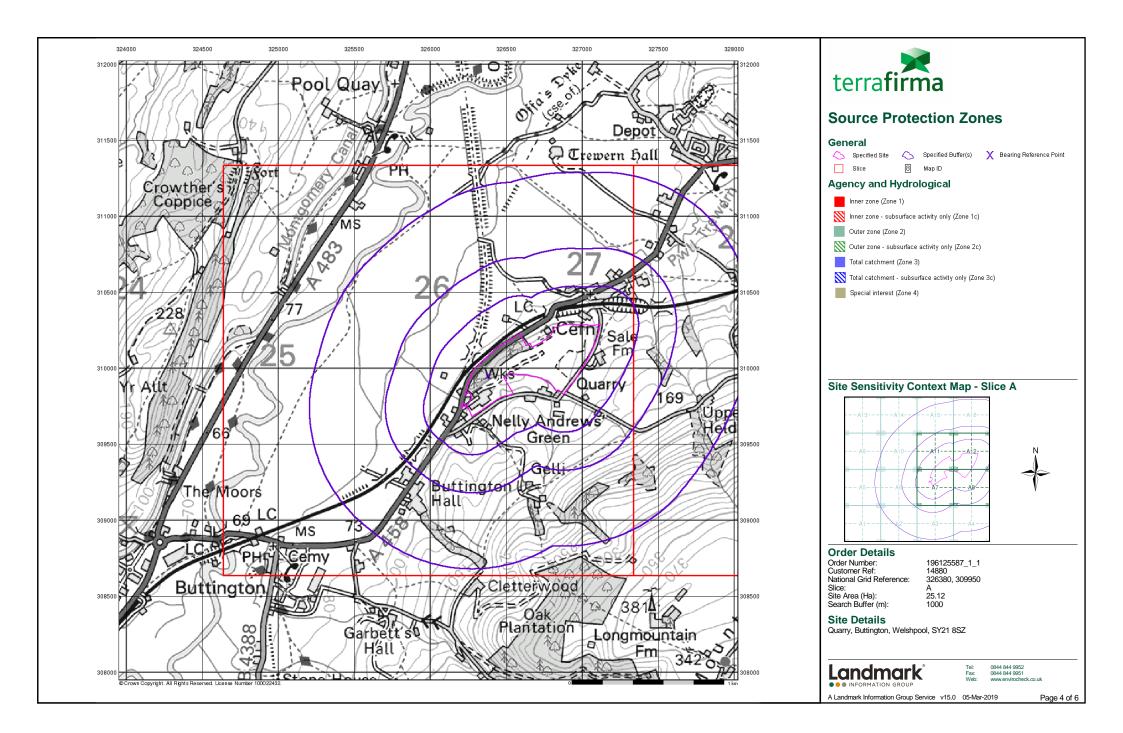
Contact	Name and Address	Contact Details
1	British Geological Survey - Enquiry Service British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
2	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
3	Natural Resources Wales Ty Cambria, 29 Newport Road, Cardiff, CF24 0TP	Telephone: 0300 065 3000 Email: enquiries@naturalresourceswales.gov.uk
4	Powys County Council - Public Protection Department Neuadd Maldwyn, Severn Road, Welshpool, Powys, SY21 7AS	Telephone: 01597 826662 Fax: 01597 826669 Website: www.powys.gov.uk
5	Ordnance Survey Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
6	Powys County Council County Hall, Llandrindod Wells, Powys, LD1 5LG	Telephone: 01597 826000 Fax: 01597 826230 Website: www.powys.gov.uk
7	PointX 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.uk
-	Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	Landmark Information Group Limited Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

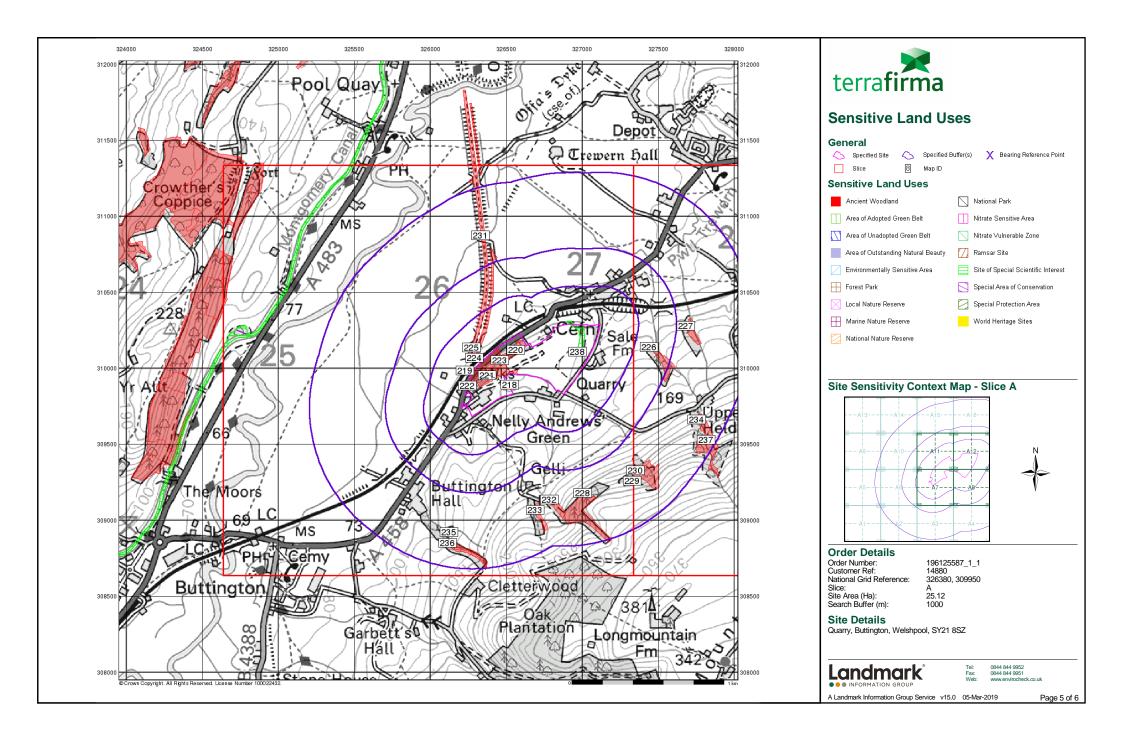
Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.

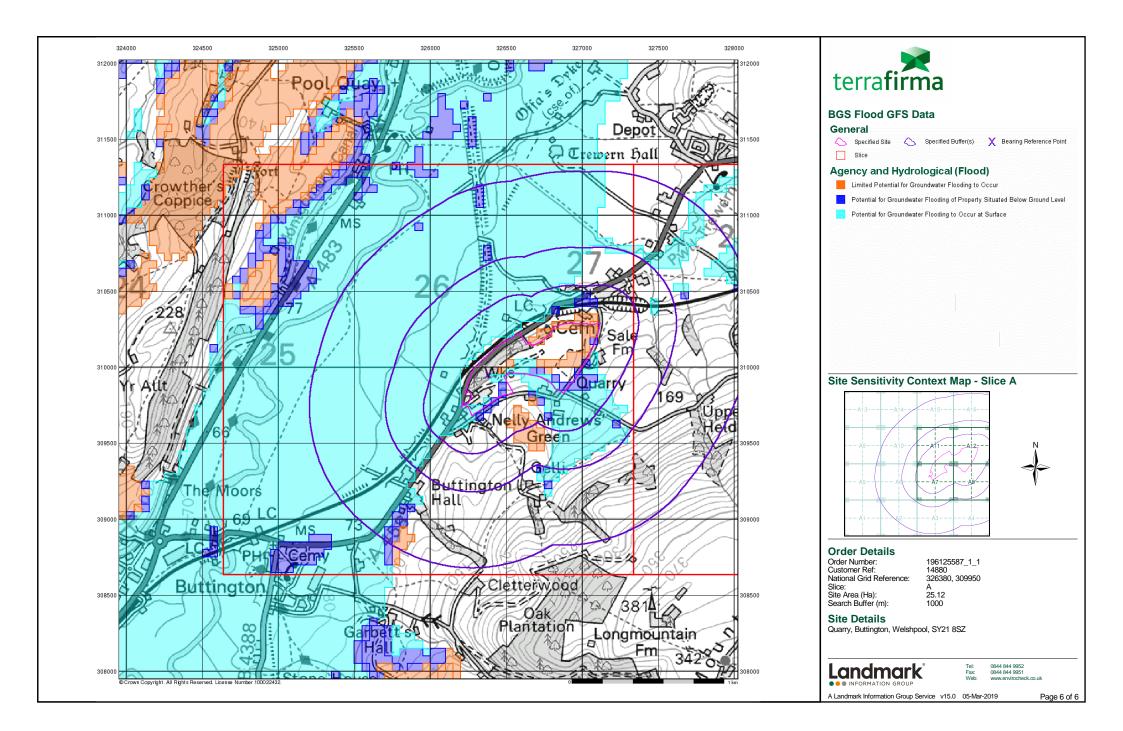


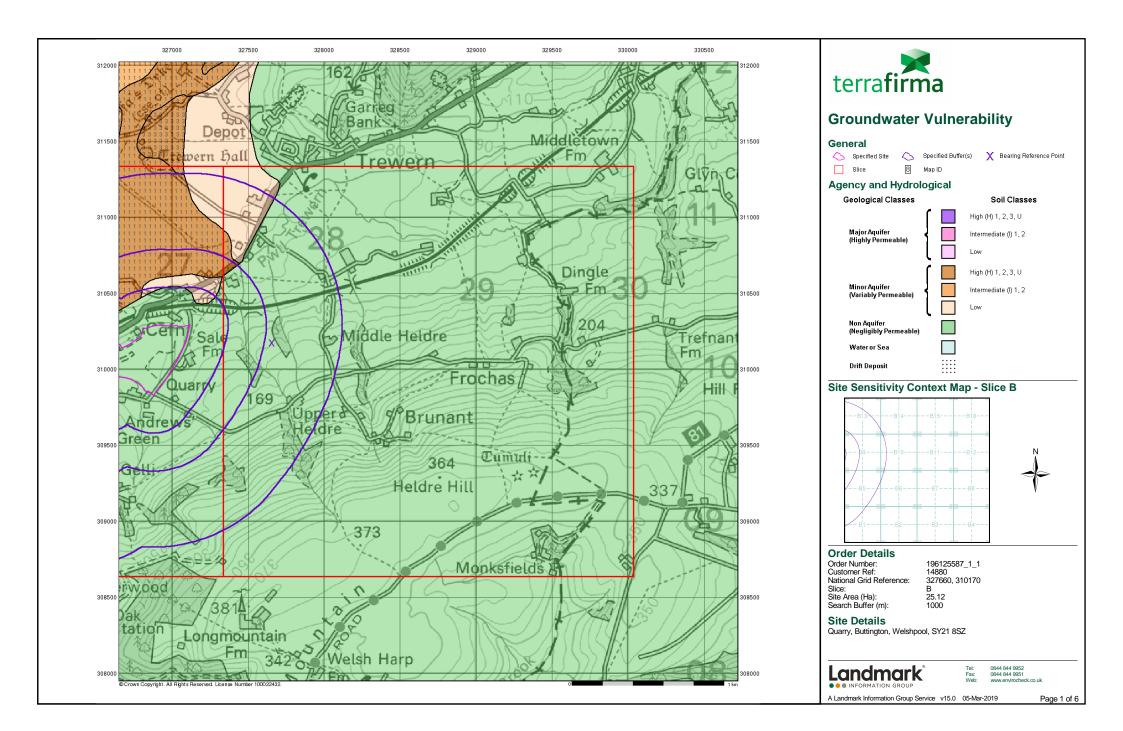


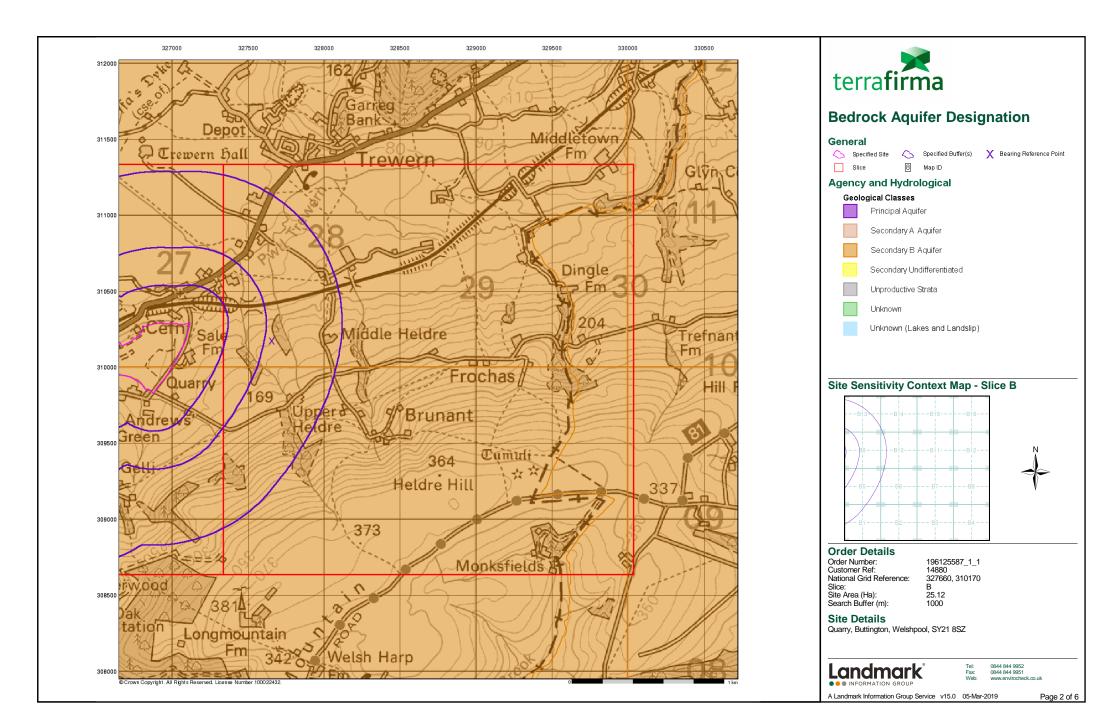


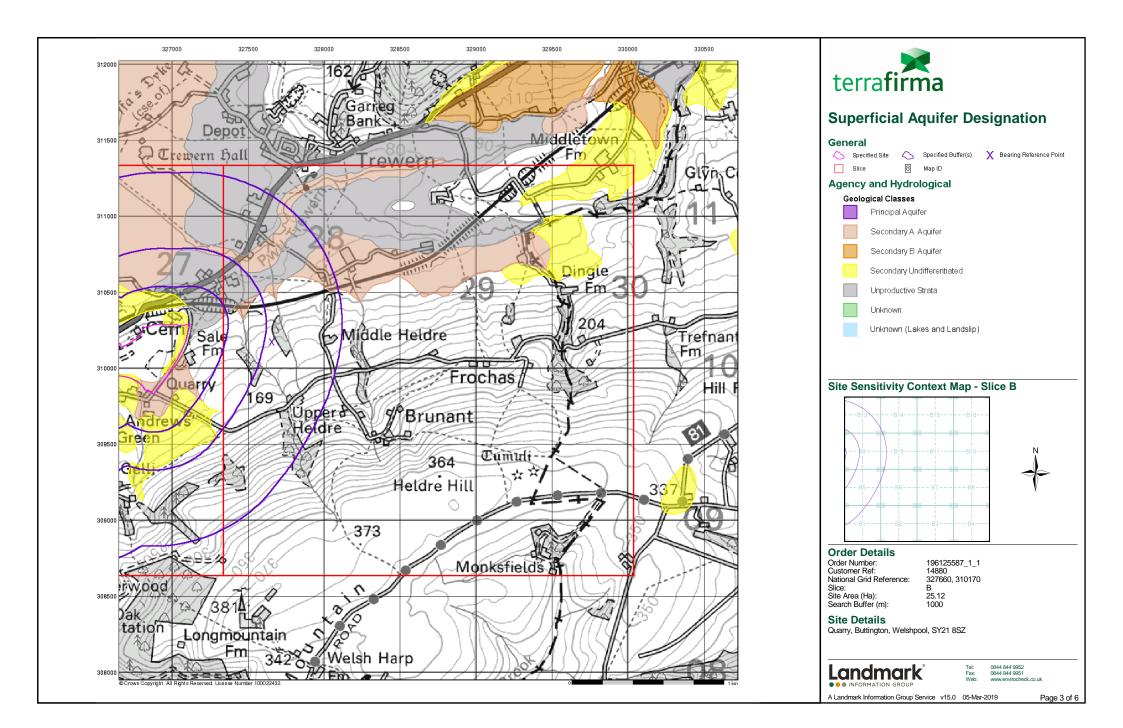


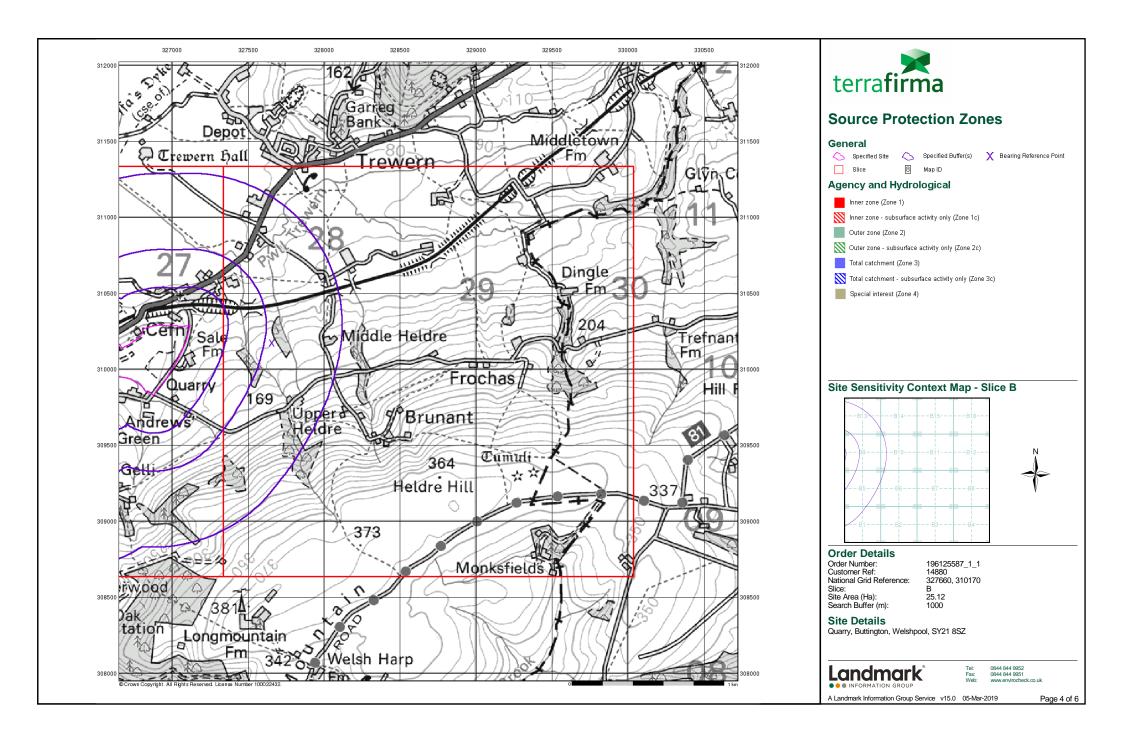


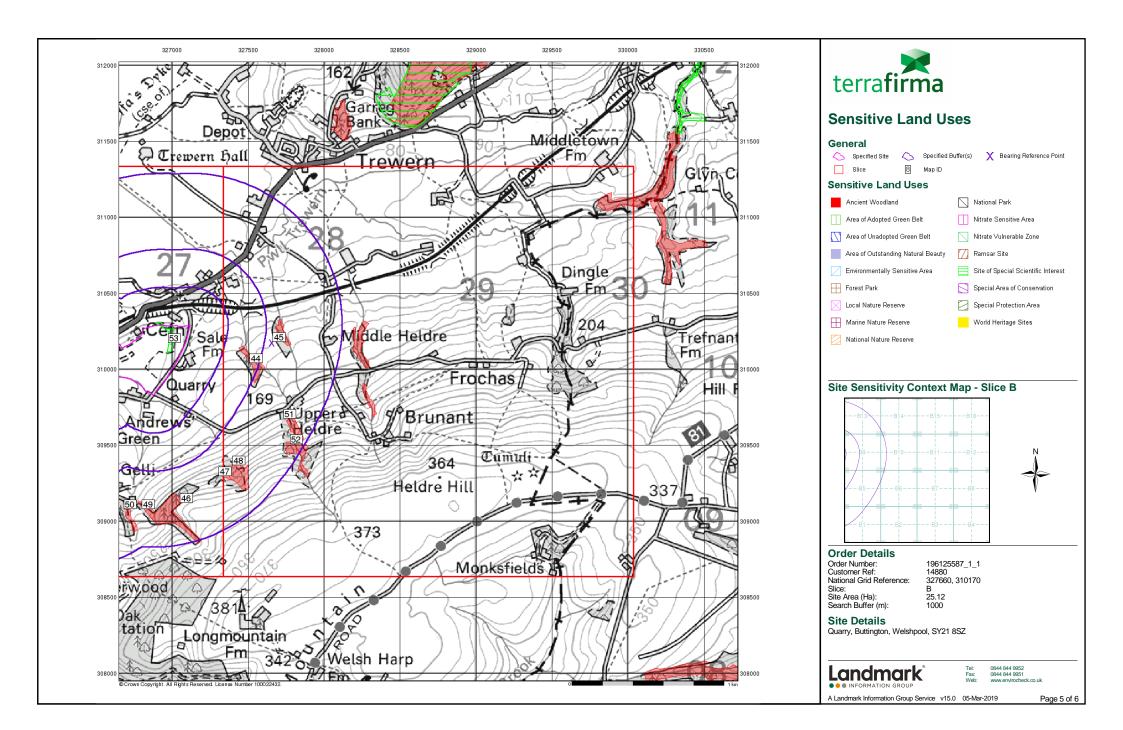


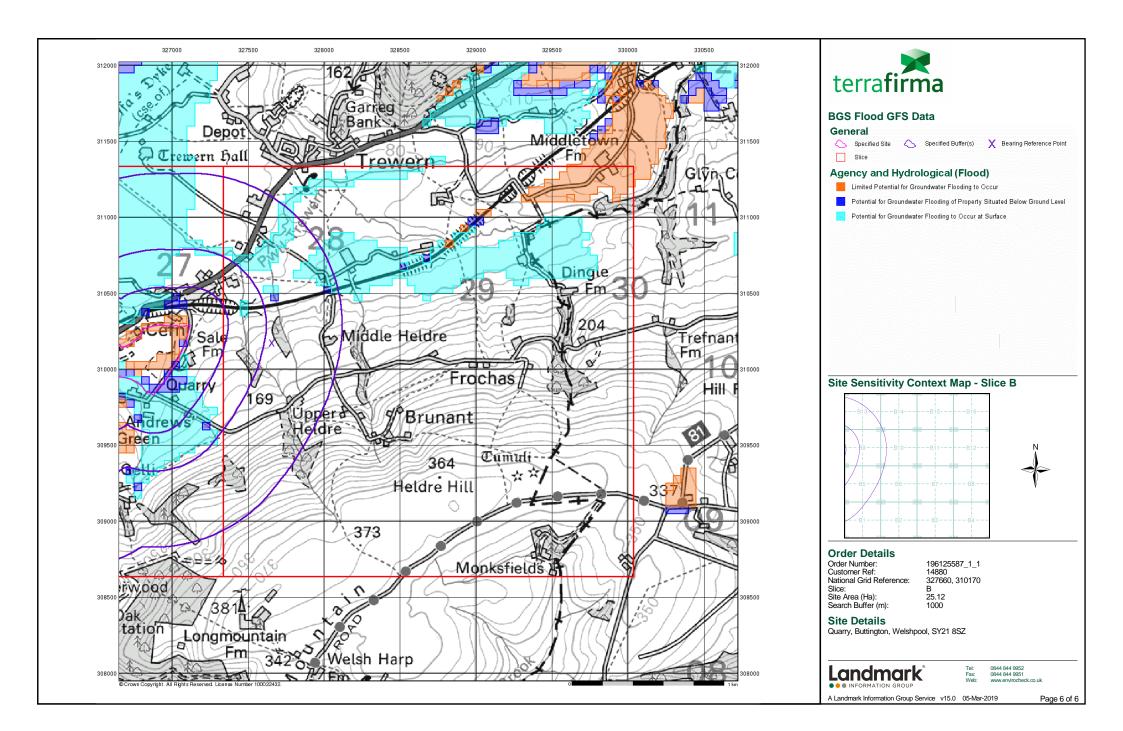


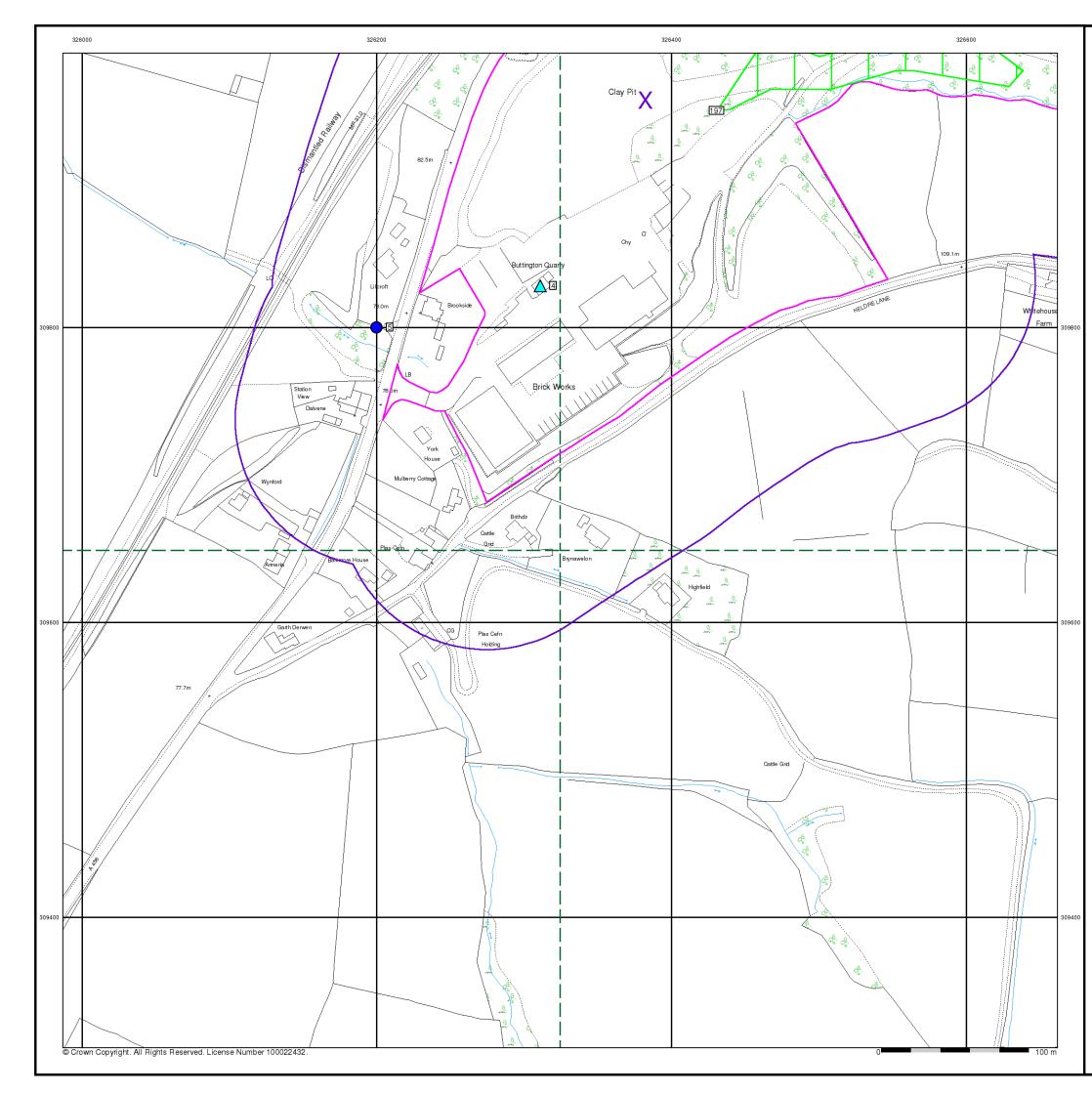










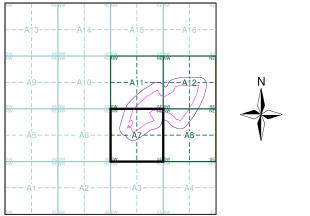




General



Site Sensitivity Map - Segment A7



Order Details

Order Number:
Customer Ref:
National Grid Reference
Slice:
Site Area (Ha):
Plot Buffer (m):

196125587_1_1 14880 e: 326380, 309950 А 25.12 100

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



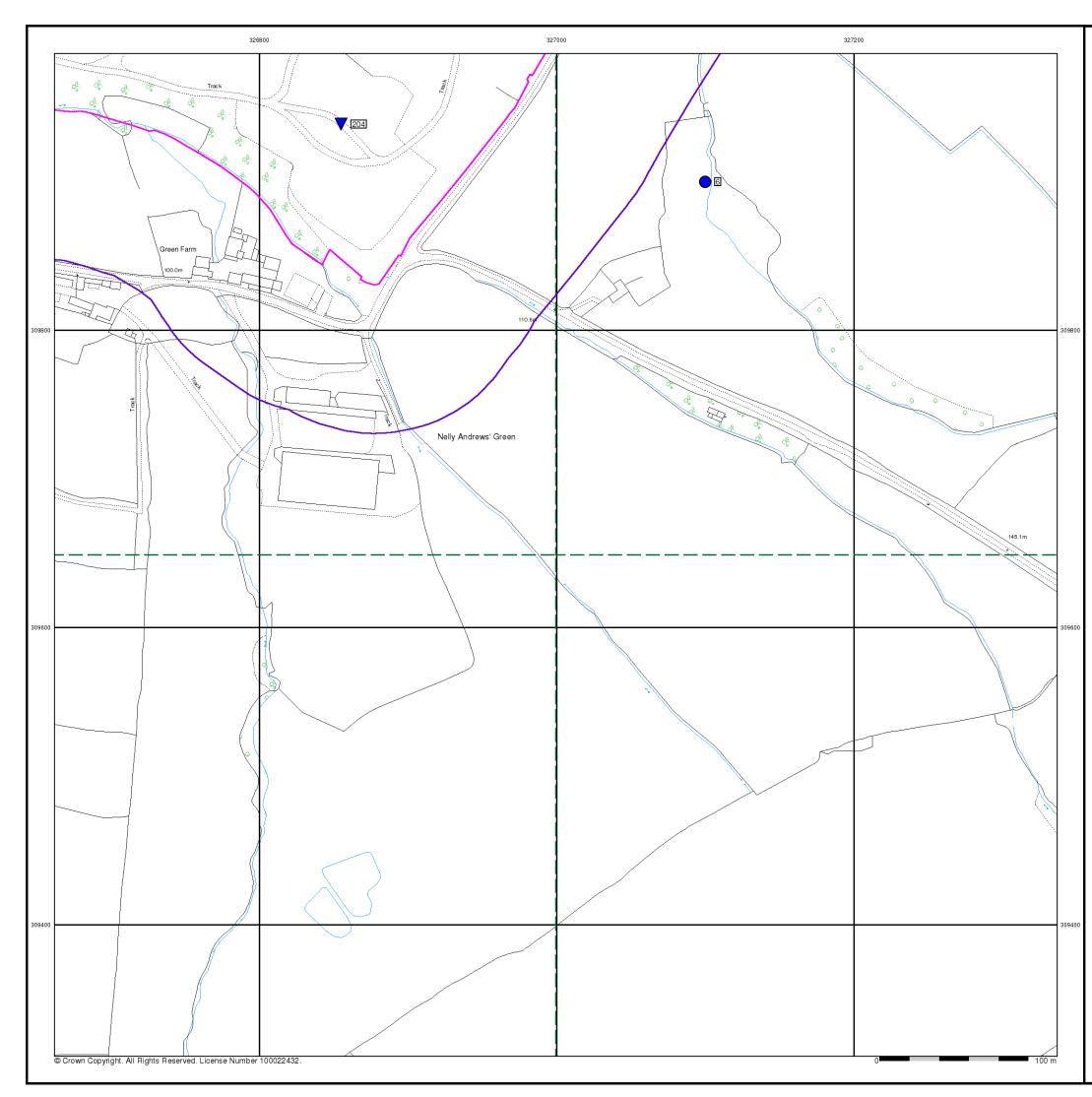
0844 844 9952

Tel:

Fax:

Web:

0844 844 9951 www.envirocheck.co.uk

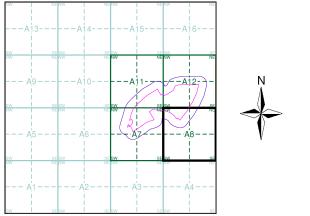




General



Site Sensitivity Map - Segment A8



Order Details

Order Number:
Customer Ref:
National Grid Reference
Slice:
Site Area (Ha):
Plot Buffer (m):

196125587_1_1 14880 ce: 326380, 309950 А 25.12 100

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



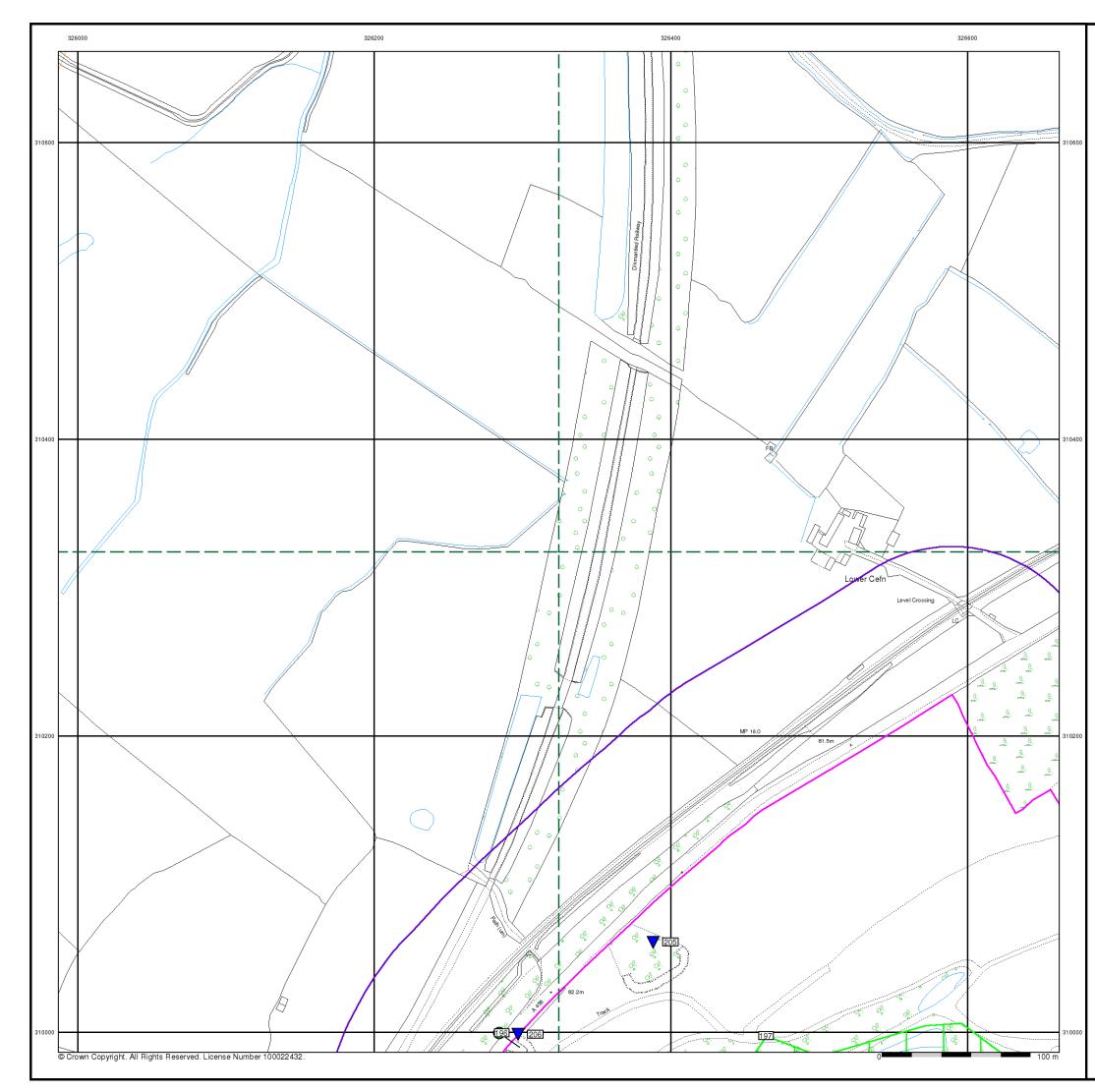
0844 844 9952

Tel: Fax:

Web:

0844 844 9951 www.envirocheck.co.uk

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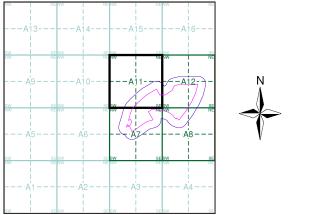




General



Site Sensitivity Map - Segment A11



Order Details

Order Number:
Customer Ref:
National Grid Reference
Slice:
Site Area (Ha):
Plot Buffer (m):

196125587_1_1 14880 e: 326380, 309950 A 25.12 100

Tel:

Fax:

Web:

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



0844 844 9952 0844 844 9951 www.enviroched

www.envirocheck.co.uk

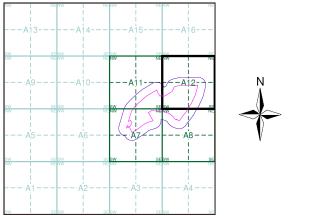
A Landmark Information Group Service v50.0 05-Mar-2019 Page 3 of 4







Site Sensitivity Map - Segment A12



Order Details

Order Number:
Customer Ref:
National Grid Reference
Slice:
Site Area (Ha):
Plot Buffer (m):

196125587_1_1 14880 e: 326380, 309950 A 25.12 100

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ

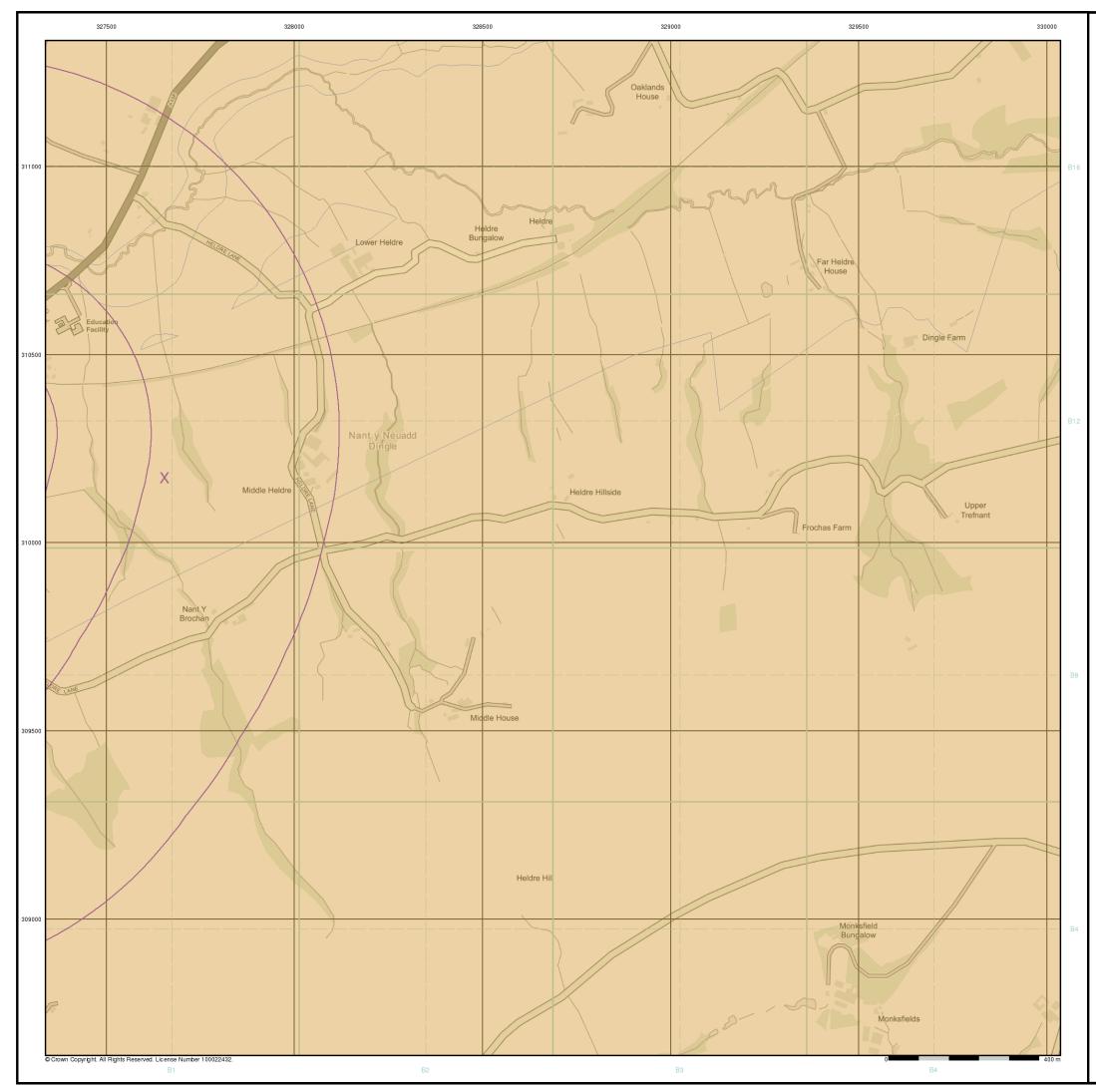


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Tel: Fax:

Web:

v.envirocneck.co.ul





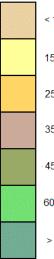
🔼 Specified Site

Specified Buffer(s)

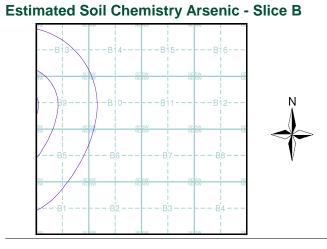
X Bearing Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg







Order Details

 Order Details:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 327660, 310170

 Slice:
 B

 Site Area (Ha):
 25.12

 Search Buffer (m):
 1000

Site Details

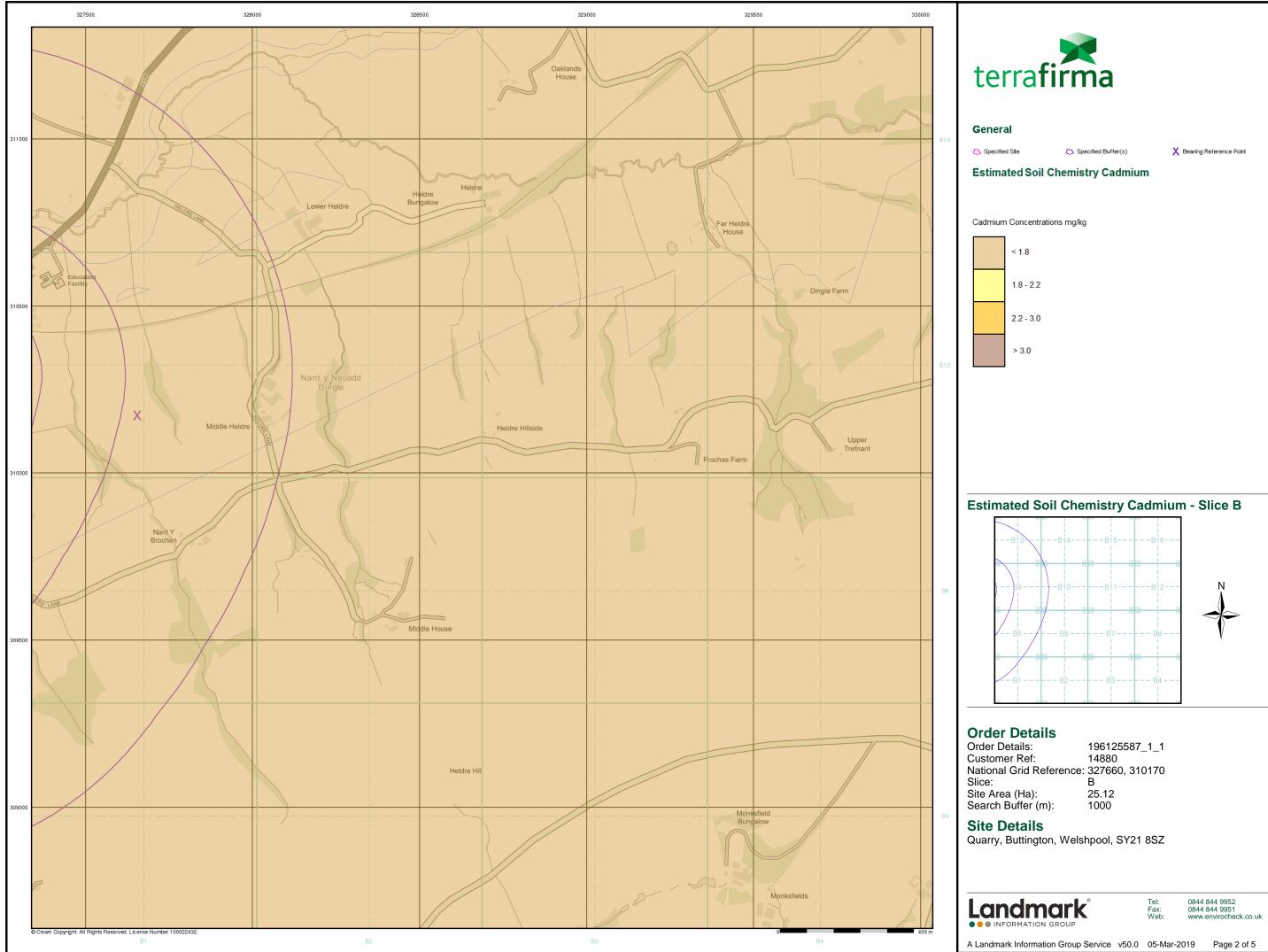
Quarry, Buttington, Welshpool, SY21 8SZ



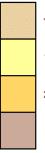


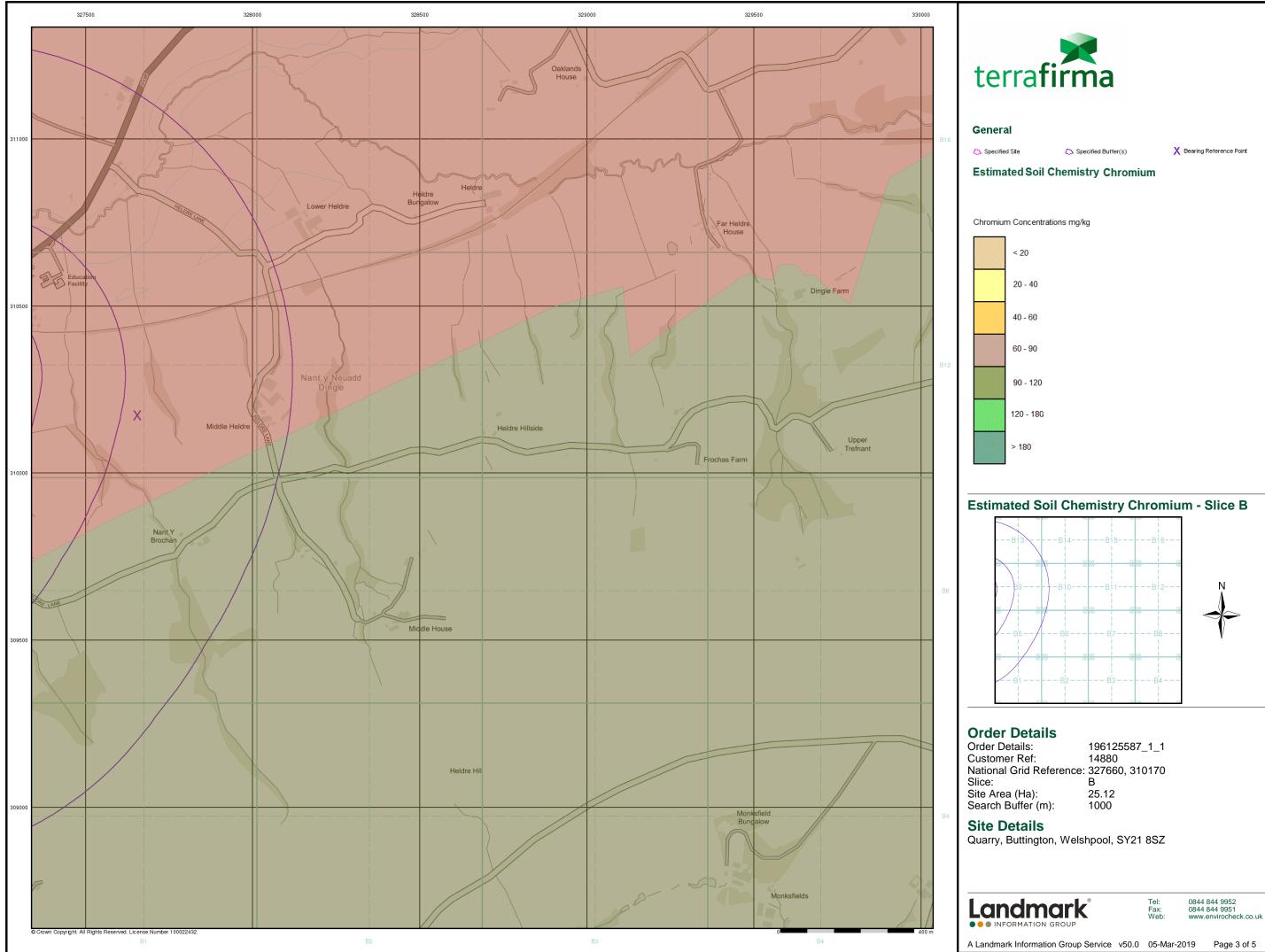
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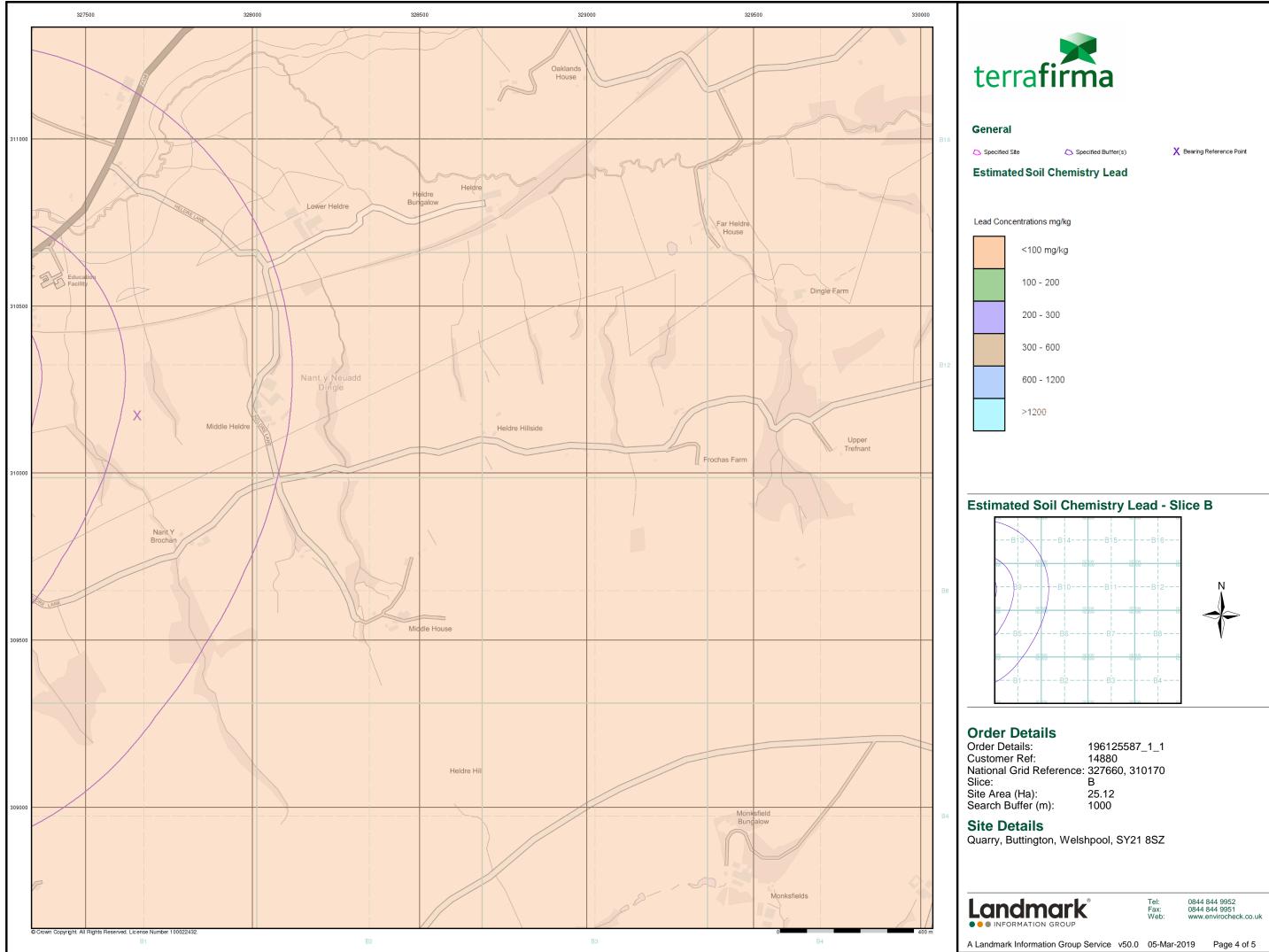




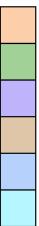


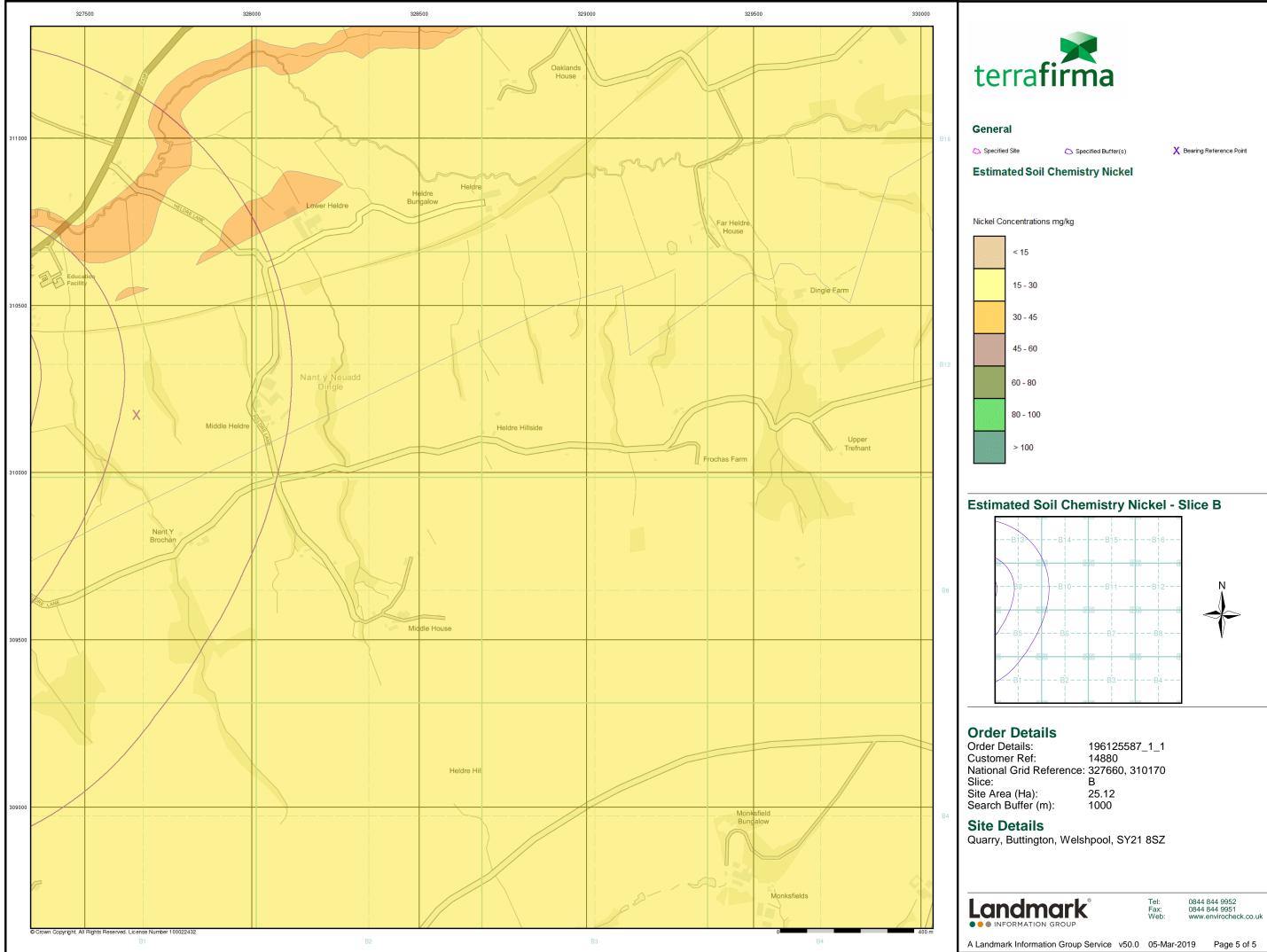




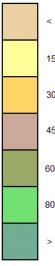




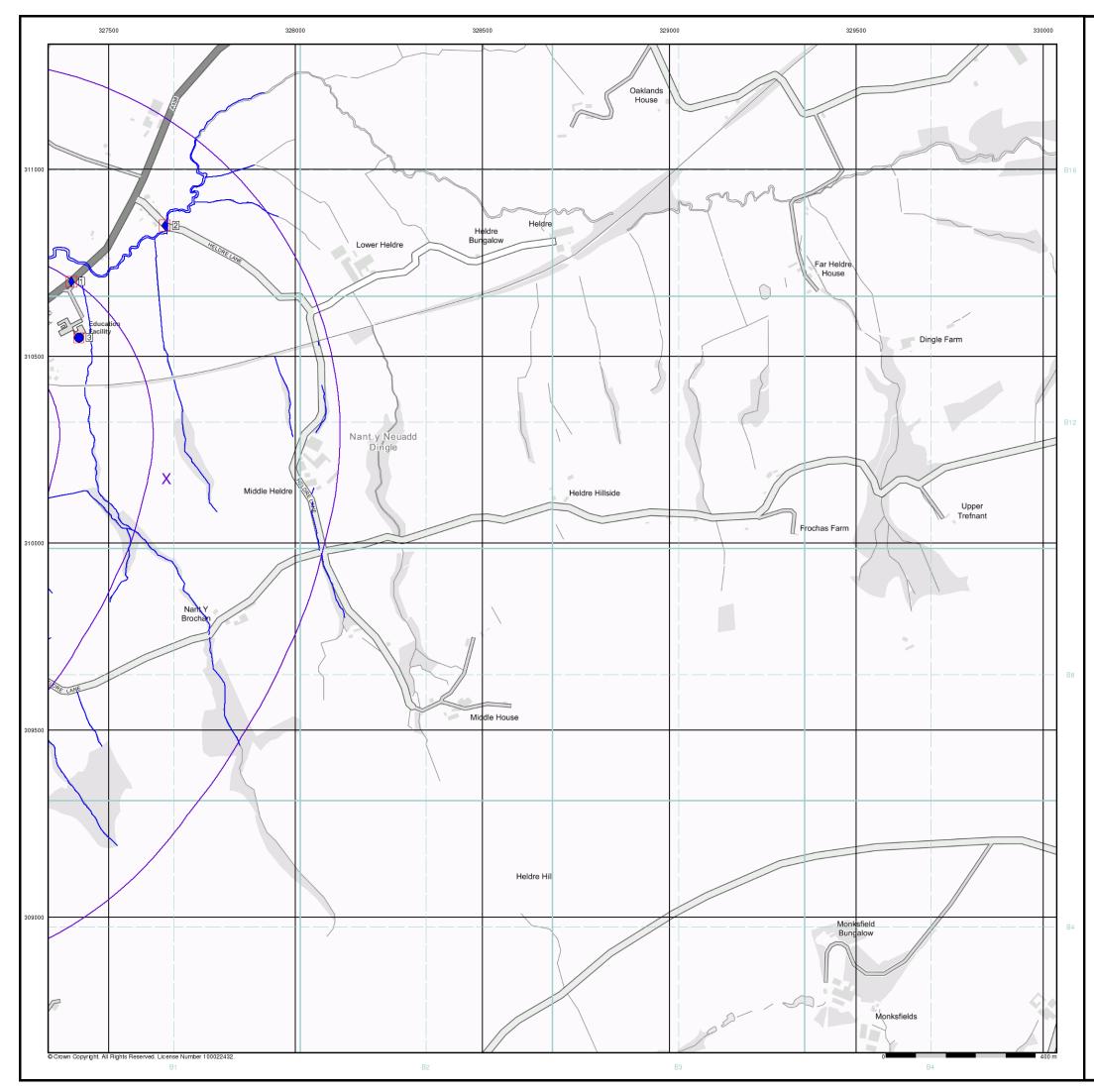








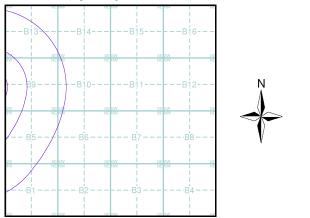






General	Specified Buffer(s)	X Bearing Reference Point 🛛 🛽 8 Map ID
Several of Type a	at Location	
Agency and	Hydrological	Waste
Contaminated Lar (Location)	nd Register Entry or Notice	BGS Recorded Landfill Site (Location)
Contaminated La	nd Register Entry or Notice	🔀 BGS Recorded Landfill Site
🔶 Discharge Conse	ent	🛑 EA Historic Landfill (Buffered Point)
A Enforcement or P	Prohibition Notice	EA Historic Landfill (Polygon)
🛕 Integrated Pollutio	on Control	Integrated Pollution Control Registered Waste Site
Integrated Pollutio	on Prevention Control	Licensed Waste Management Facility (Landfill Boundary)
Local Authority In and Control	ntegrated Pollution Prevention	 Licensed Waste Management Facility (Location)
	ollution Prevention and Control	Local Authority Recorded Landfill Site (Location)
Control Enforcem	ollution Prevention and hent	IIII Local Authority Recorded Landfill Site
Pollution Incident	to Controlled Waters	😑 Potentially Infilled Land (Non-water)
V Prosecution Rela	ting to Authorised Processes	≻ Potentially Infilled Land (Non-water)
🔶 Prosecution Rela	ting to Controlled Waters	Non-water)
🔺 Registered Radio	active Substance	Potentially Infilled Land (Water)
🥆 River Network or	Water Feature	Y Potentially Infilled Land (Water)
🕂 River Quality San	npling Point	Potentially Infilled Land (Water)
🔶 Substantiated Po	llution Incident Register	🚫 Registered Landfill Site
🔶 Water Abstractio	n	Registered Landfill Site (Location)
🔶 Water Industry A	ct Referral	Registered Landfill Site (Point Buffered to 100m)
Hazardous S	Substances	Registered Landfill Site (Point Buffered to 250m)
🛃 COMAH Site 🛛 🦌	Explosive Site	👚 Registered Waste Transfer Site (Location)
🙀 NIHHS Site		IIII Registered Waste Transfer Site
🗱 Planning Hazardo	us Substance Consent	Registered Waste Treatment or Disposal Site
	us Substance Enforcement	Registered Waste Treatment or Disposal Site
Geological	4 101	
BGS Recorded N	Aineral Site	

Site Sensitivity Map - Slice B



Order Details

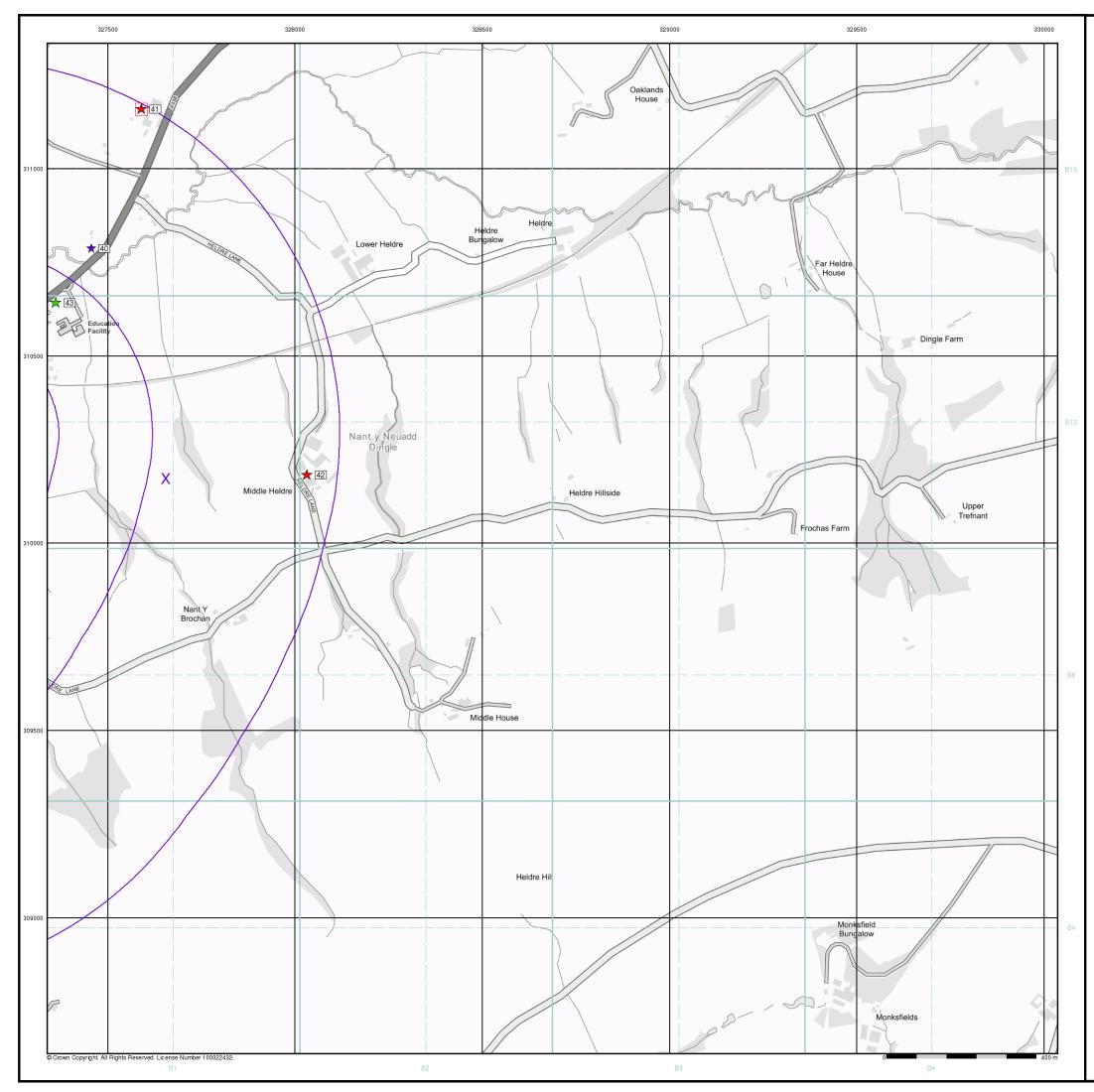
Order Number:	196125587_1_1
Customer Ref:	14880
National Grid Reference:	327660, 310170
Slice:	В
Site Area (Ha):	25.12
Search Buffer (m):	1000

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



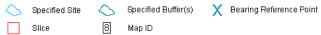
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Industrial Land Use Map

General



8 Map ID

Industrial Land Use

- ★ Contemporary Trade Directory Entry
- 🛧 Fuel Station Entry
- 📉 Gas Pipeline
- 🔆 Points of Interest Commercial Services
- 🔆 Points of Interest Education and Health
- ★ Points of Interest Manufacturing and Production
- 🚖 Points of Interest Public Infrastructure
- 🜟 Points of Interest Recreational and Environmental
- 🛰 Underground Electrical Cables





Order Details

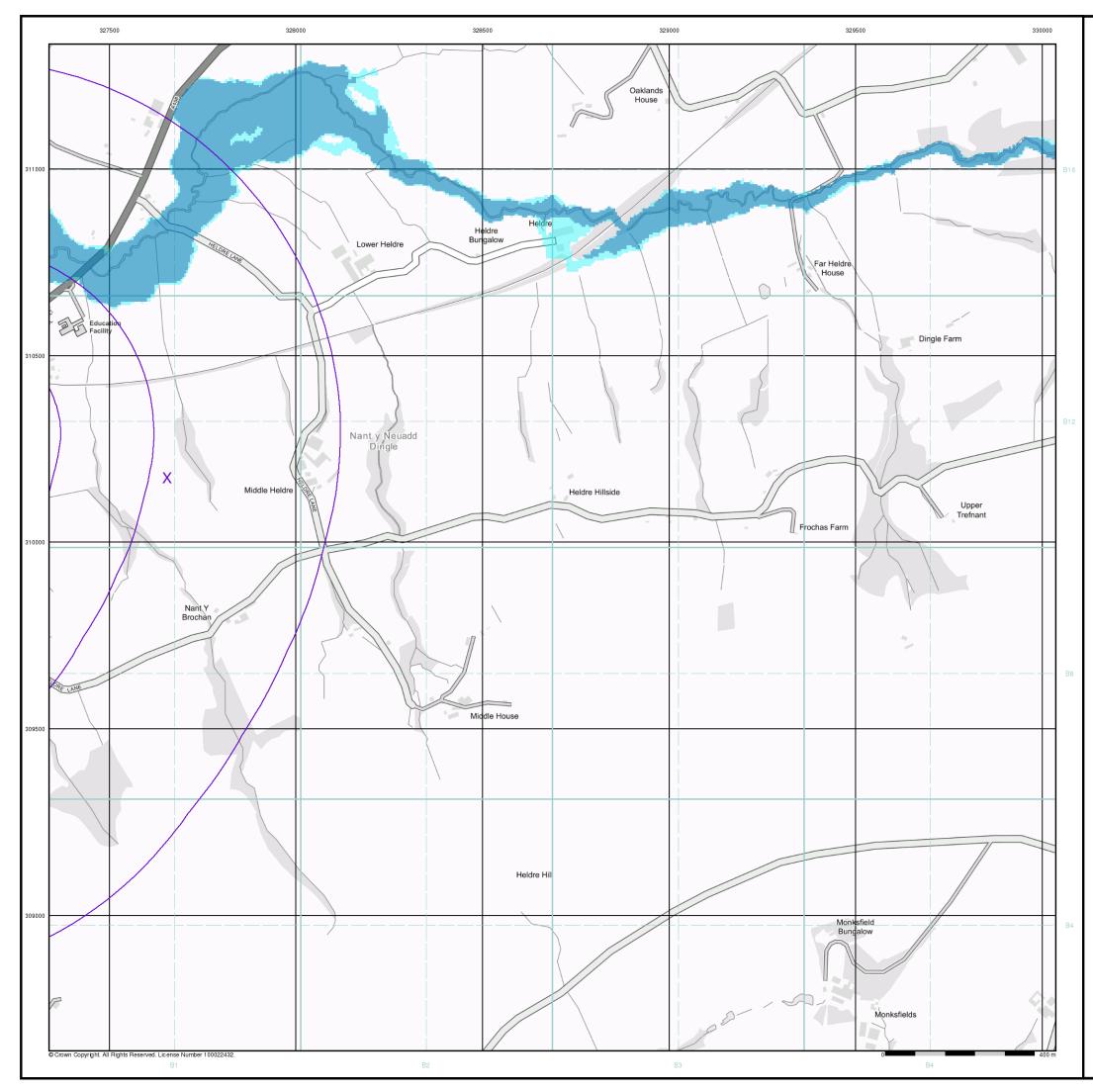
Order Number: 196125587_1_1 Customer Ref: 14880 National Grid Reference: 327660, 310170 Slice: В Site Area (Ha): Search Buffer (m): 25.12 1000

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



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Specified Site
 Specified Buffer(s)

X Bearing Reference Point

Agency and Hydrological (Flood)

Extreme Flooding from Rivers or Sea without Defences (Zone 2)

Flooding from Rivers or Sea without Defences (Zone 3)

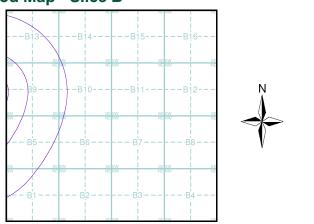
Area Benefiting from Flood Defence



Flood Water Storage Areas

--- Flood Defence

Flood Map - Slice B



Order Details

Order Number:196125587_1_1Customer Ref:14880National Grid Reference:327660, 310170Slice:BSite Area (Ha):25.12Search Buffer (m):1000

Site Details

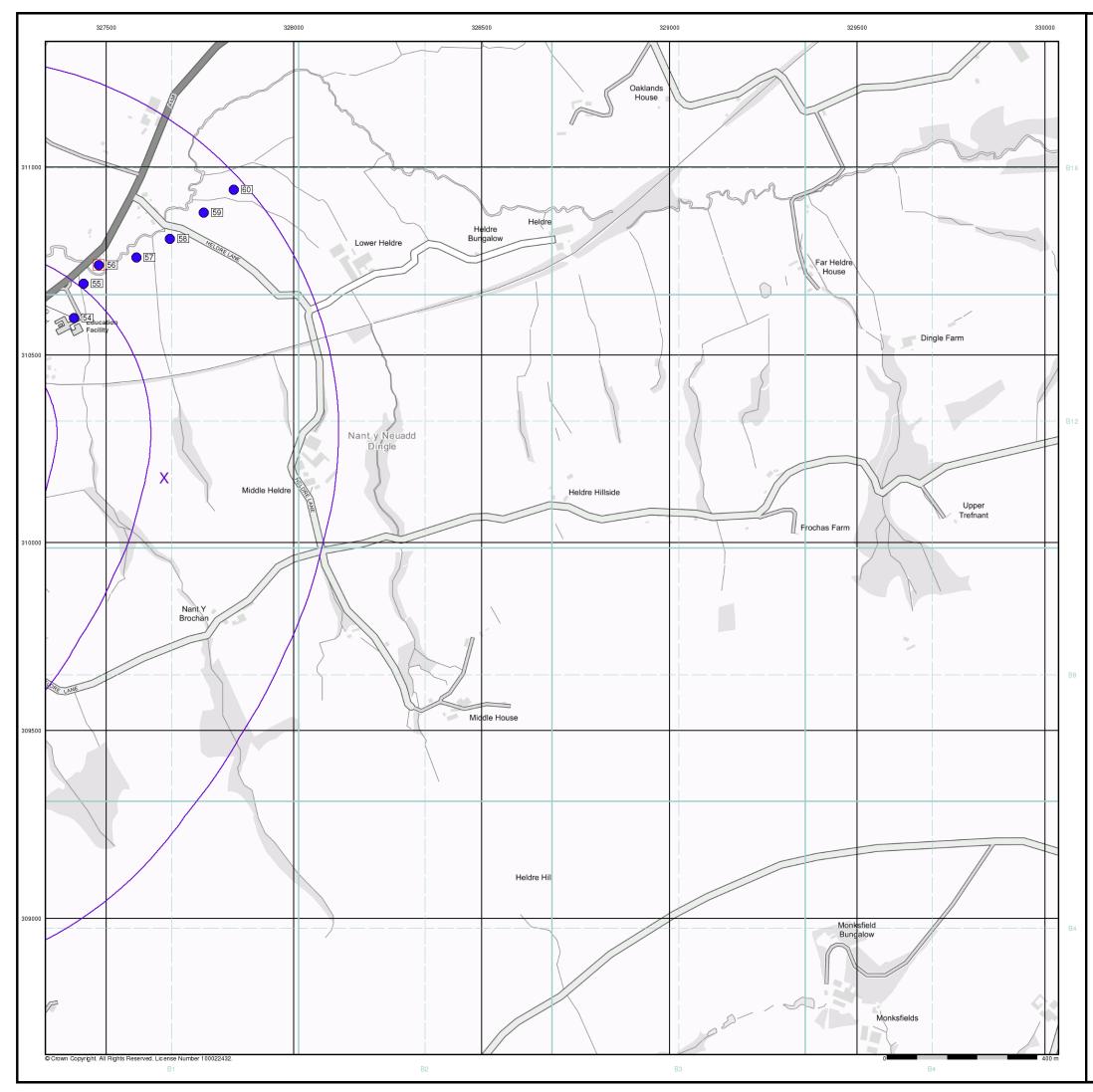
Quarry, Buttington, Welshpool, SY21 8SZ



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A Landmark Information Group Service v50.0 05-Mar-2019 Page 3 of 6





Specified Site
 Specified Buffer(s)
 Bearing Reference Point
 Map ID
 Several of Type at Location

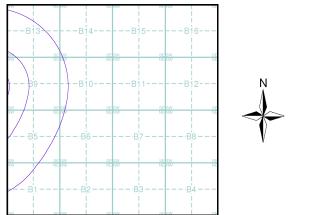
Agency and Hydrological (Boreholes)

- 😑 BGS Borehole Depth 0 10m
- BGS Borehole Depth 10 30m
- 🔴 BGS Borehole Depth 30m +
- Confidential
- ⊖ Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice B



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 327660, 310170

 Slice:
 B

 Site Area (Ha):
 25.12

 Search Buffer (m):
 1000

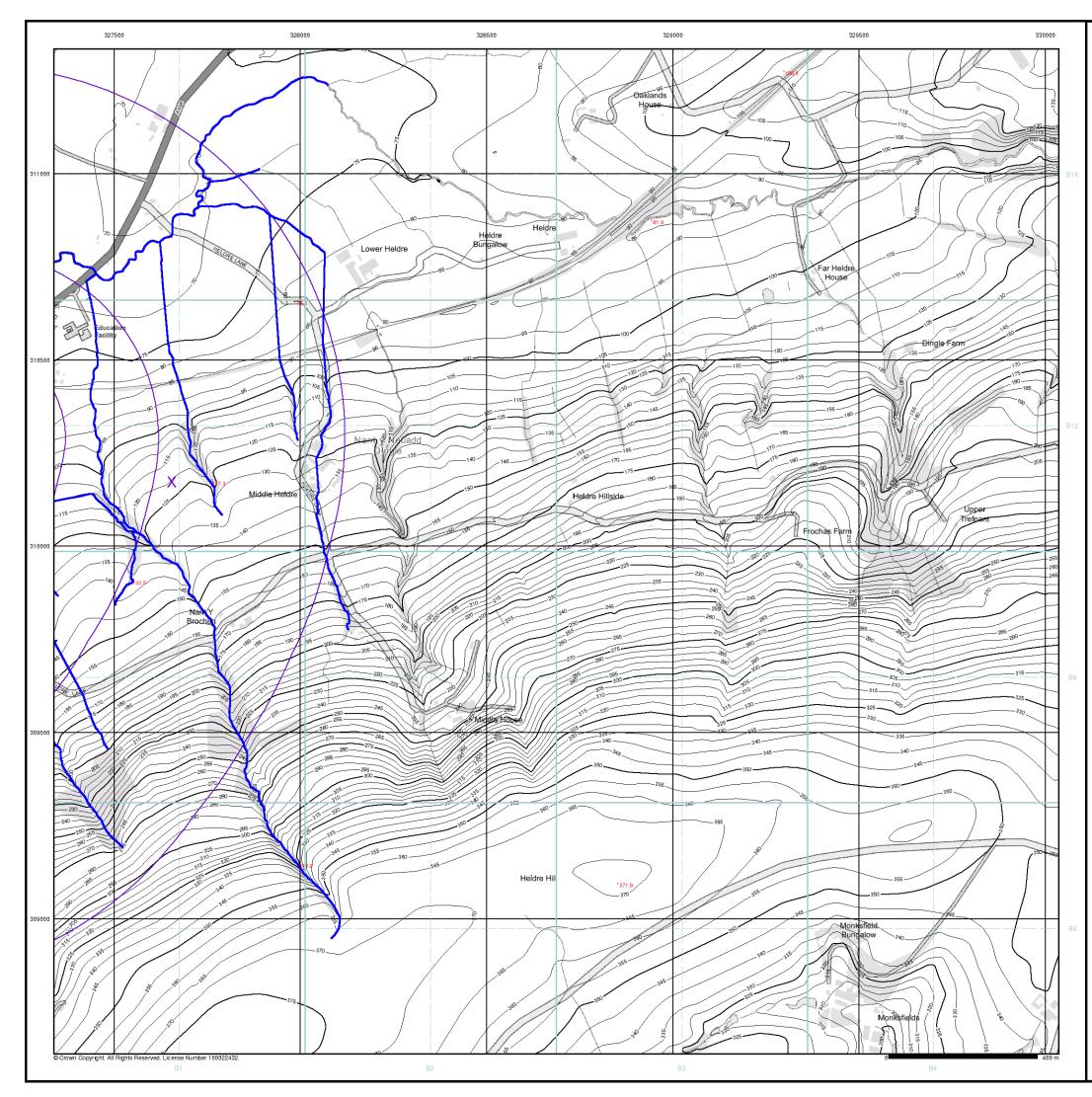
Site Details

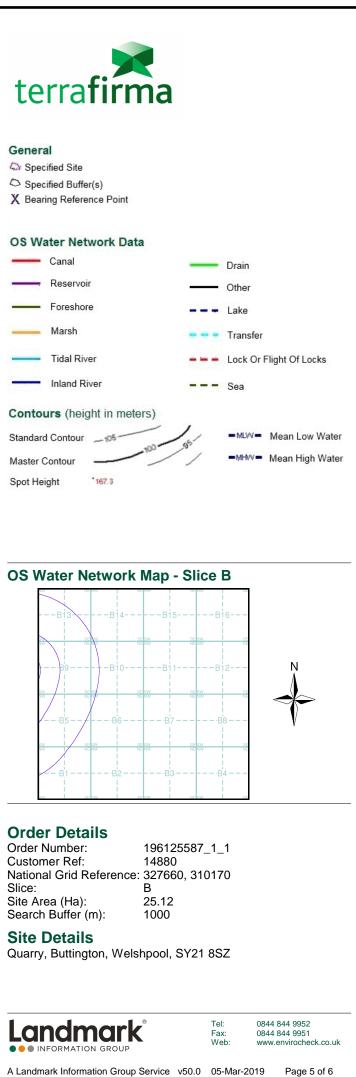
Quarry, Buttington, Welshpool, SY21 8SZ

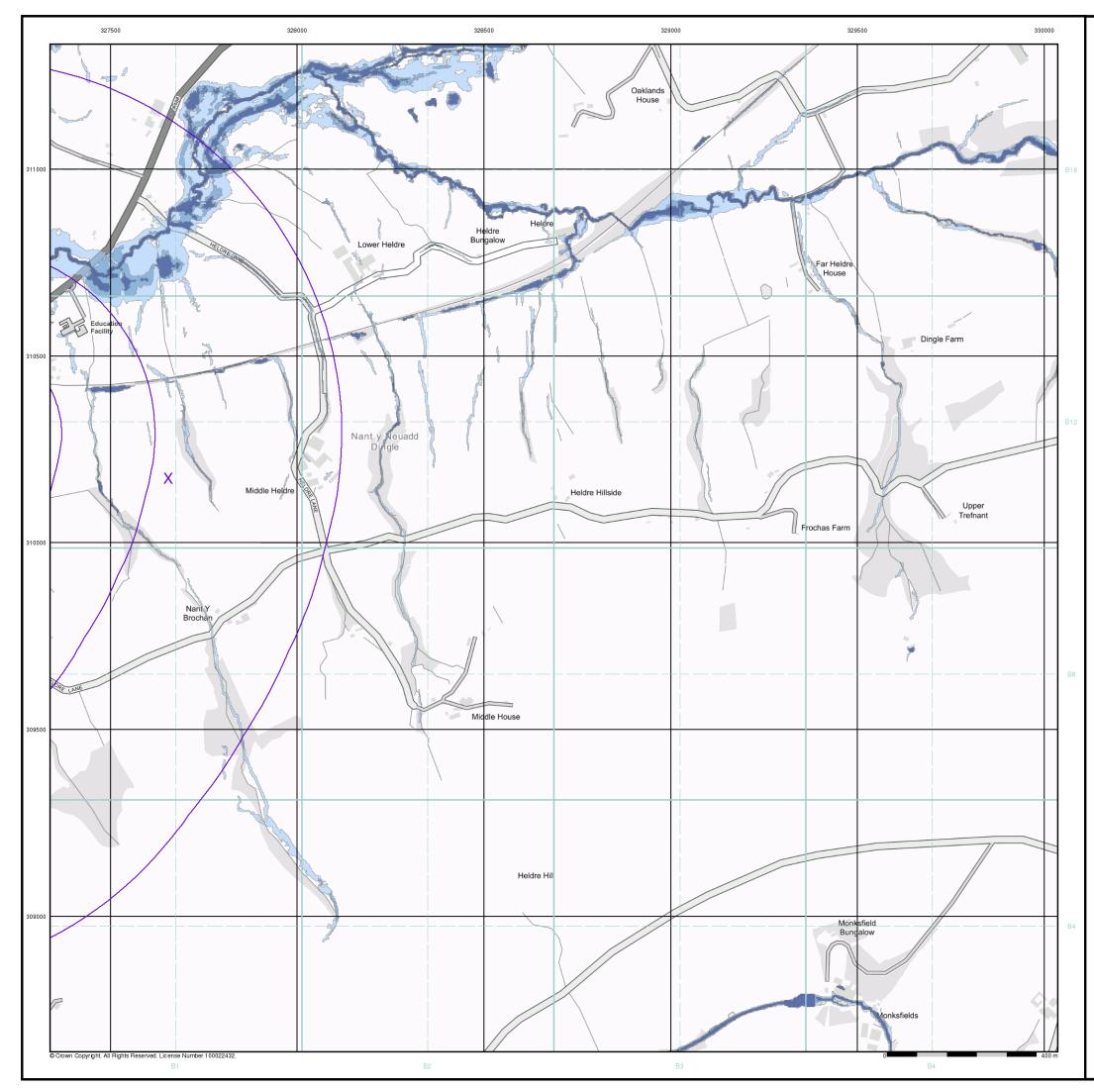




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- 🔼 Specified Site Specified Buffer(s)
- X Bearing Reference Point

Risk of Flooding from Surface Water



Low - 1000 Year Return

Suitability See the suitability map below

National to county

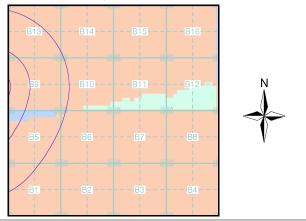
County to town

Town to street

Street to parcels of land

Property

EA/NRW Suitability Map - Slice B



Order Details

Order Number: 196125587_1_1 Customer Ref: 14880 National Grid Reference: 327660, 310170 Slice: В Site Area (Ha): Search Buffer (m): 25.12 1000

Site Details

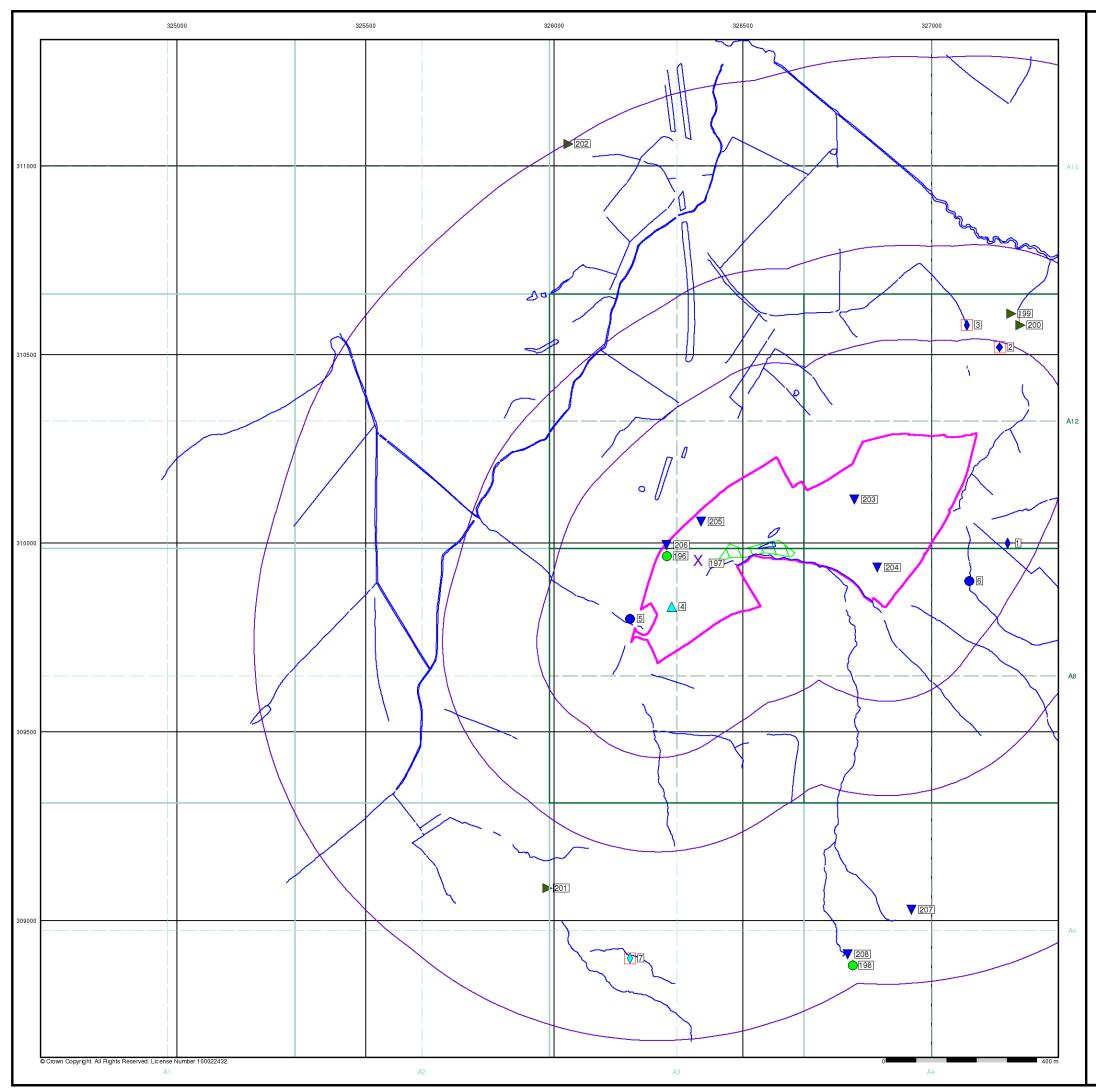
Quarry, Buttington, Welshpool, SY21 8SZ



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Tel: Fax: Web:

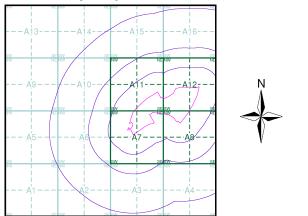
www.envirocheck.co.uk





General	Specified Buffer(s)	X Bearing Reference Point 🛛 🛽 Map ID
Several of Type a	at Location	
Agency and	Hydrological	Waste
Contaminated Lar (Location)	nd Register Entry or Notice	BGS Recorded Landfill Site (Location)
Contaminated Lar	nd Register Entry or Notice	🔀 BGS Recorded Landfill Site
🔶 Discharge Conse	nt	🛑 EA Historic Landfill (Buffered Point)
A Enforcement or P	rohibition Notice	EA Historic Landfill (Polygon)
🛕 Integrated Pollutic	on Control	Integrated Pollution Control Registered Waste Site
Integrated Pollutic	on Prevention Control	Licensed Waste Management Facility (Landfill Boundary)
Local Authority In and Control	tegrated Pollution Prevention	Licensed Waste Management Facility (Location)
🛕 Local Authority P	ollution Prevention and Control	l 📕 Local Authority Recorded Landfill Site (Location
Control Enforcem	ollution Prevention and ent	IIII Local Authority Recorded Landfill Site
Pollution Incident	to Controlled Waters	🔵 Potentially Infilled Land (Non-water)
V Prosecution Relat	ting to Authorised Processes	∽ Potentially Infilled Land (Non-water)
🔶 Prosecution Relat	ting to Controlled Waters	Non-water)
🛕 Registered Radio	active Substance	Potentially Infilled Land (Water)
🥆 River Network or	Water Feature	Yotentially Infilled Land (Water)
🕂 River Quality Sar	npling Point	Potentially Infilled Land (Water)
🔶 Substantiated Pol	llution Incident Register	🚫 Registered Landfill Site
🔶 Water Abstractio	n	Registered Landfill Site (Location)
🔶 Water Industry A	ct Referral	Registered Landfill Site (Point Buffered to 100m)
Hazardous S	Substances	Registered Landfill Site (Point Buffered to 250m)
🛃 COMAH Site 🧏	Explosive Site	👚 Registered Waste Transfer Site (Location)
NIHHS Site		🛄 Registered Waste Transfer Site
	us Substance Consent	Registered Waste Treatment or Disposal Site (Location)
··	us Substance Enforcement	Registered Waste Treatment or Disposal Site
Geological BGS Recorded M	lineral Site	
		O UL A

Site Sensitivity Map - Slice A



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950
 Slice: Site Area (Ha): Search Buffer (m):

A 25.12 1000

Tel: Fax: Web:

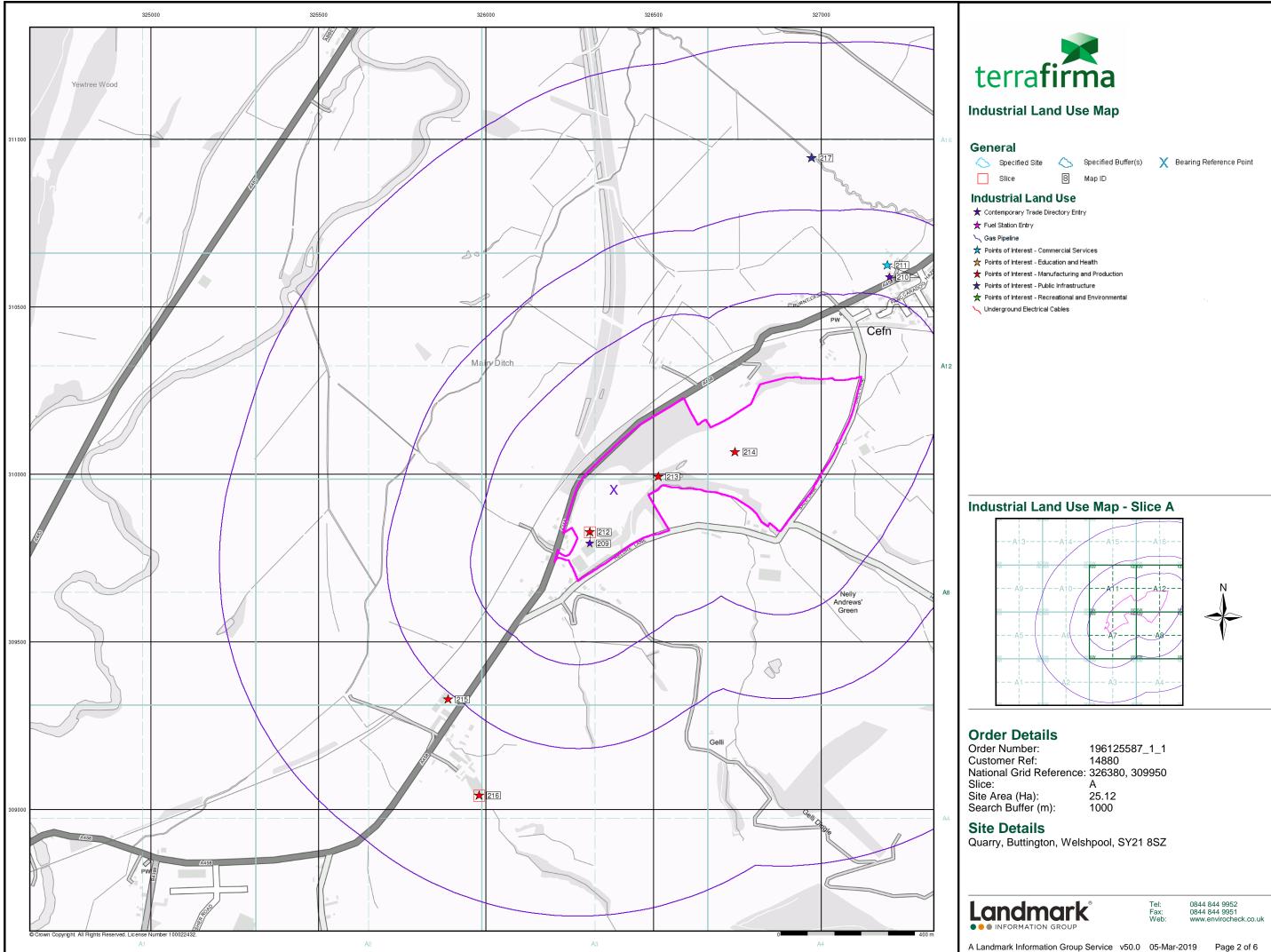
Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



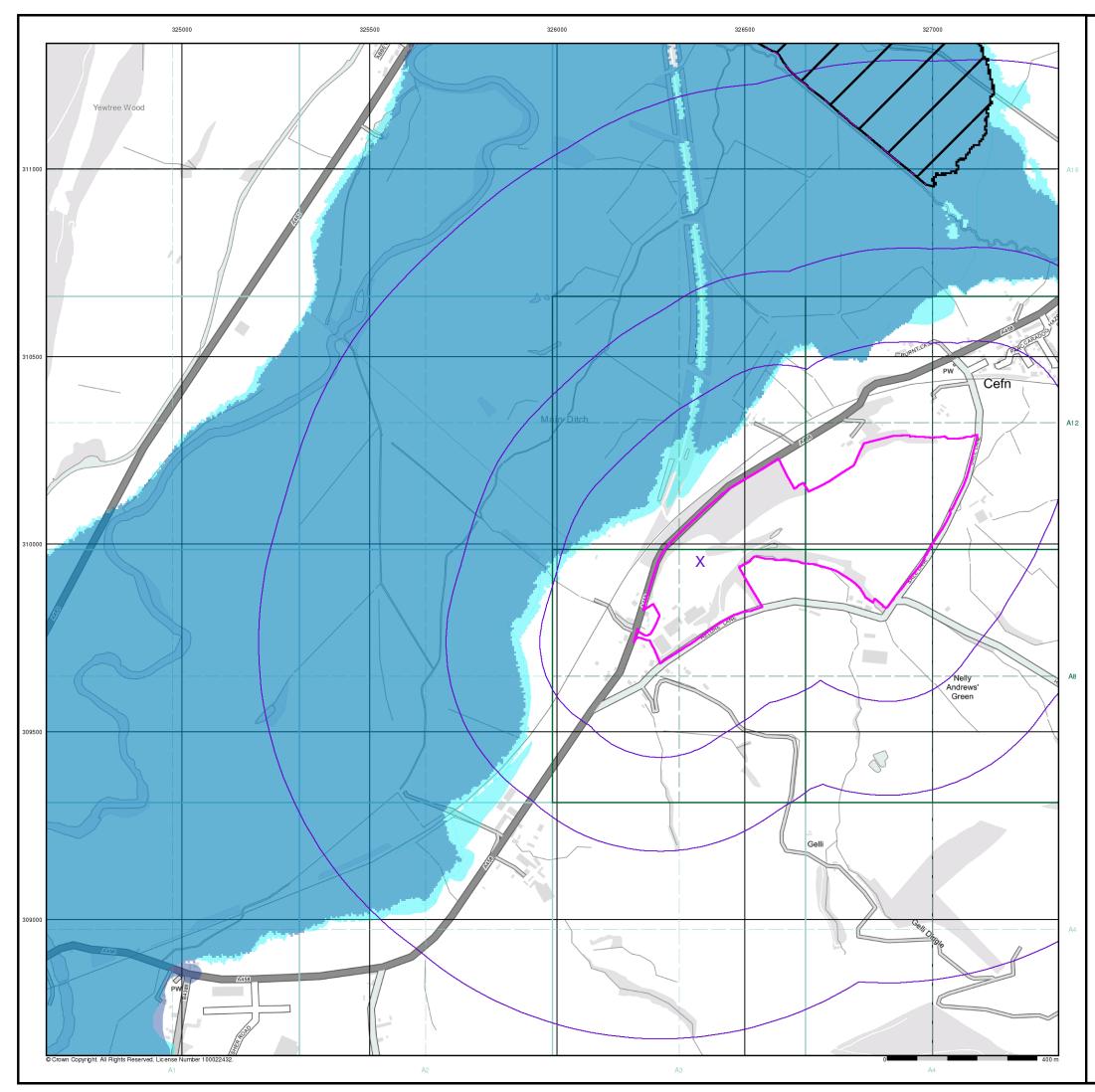
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🔼 Specified Site C Specified Buffer(s)

X Bearing Reference Point

Agency and Hydrological (Flood)

Extreme Flooding from Rivers or Sea without Defences (Zone 2)

Flooding from Rivers or Sea without Defences (Zone 3)

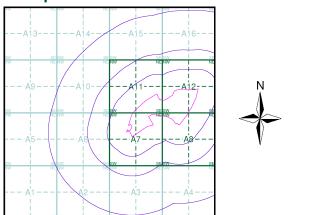
Area Benefiting from Flood Defence



Flood Water Storage Areas

--- Flood Defence

Flood Map - Slice A



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950
 Slice: Site Area (Ha): Search Buffer (m):

A 25.12 1000

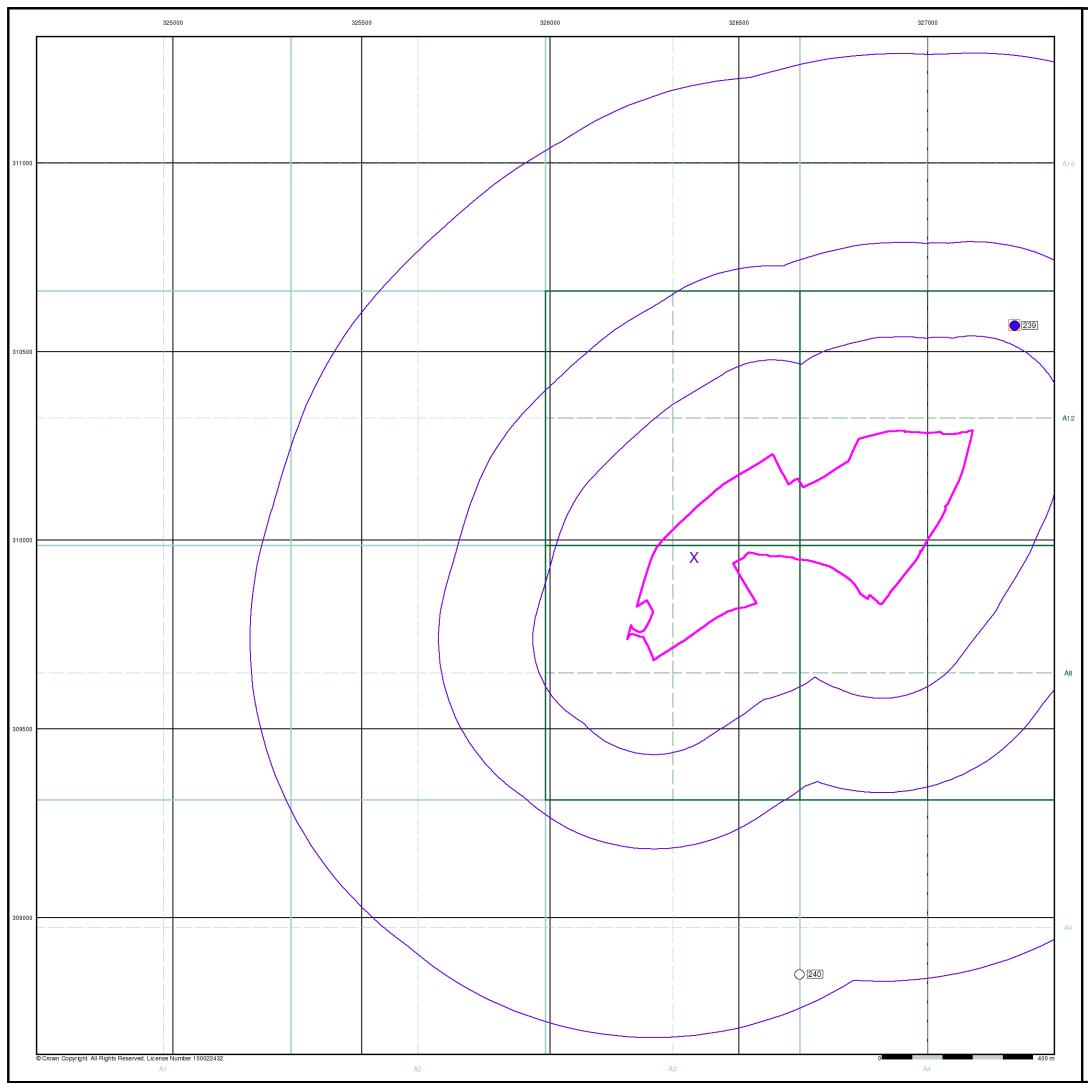
Site Details

Quarry, Buttington, Welshpool, SY21 8SZ











🔼 Specified Site C Specified Buffer(s) X Bearing Reference Point 8 Map ID Several of Type at Location

Agency and Hydrological (Boreholes)

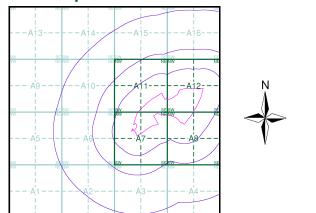
- 😑 BGS Borehole Depth 0 10m
- BGS Borehole Depth 10 30m
- 🔴 BGS Borehole Depth 30m +
- Confidential

⊖ Other

For Borehole information please refer to the Borehole .csv file which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: Site Area (Ha): Search Buffer (m):

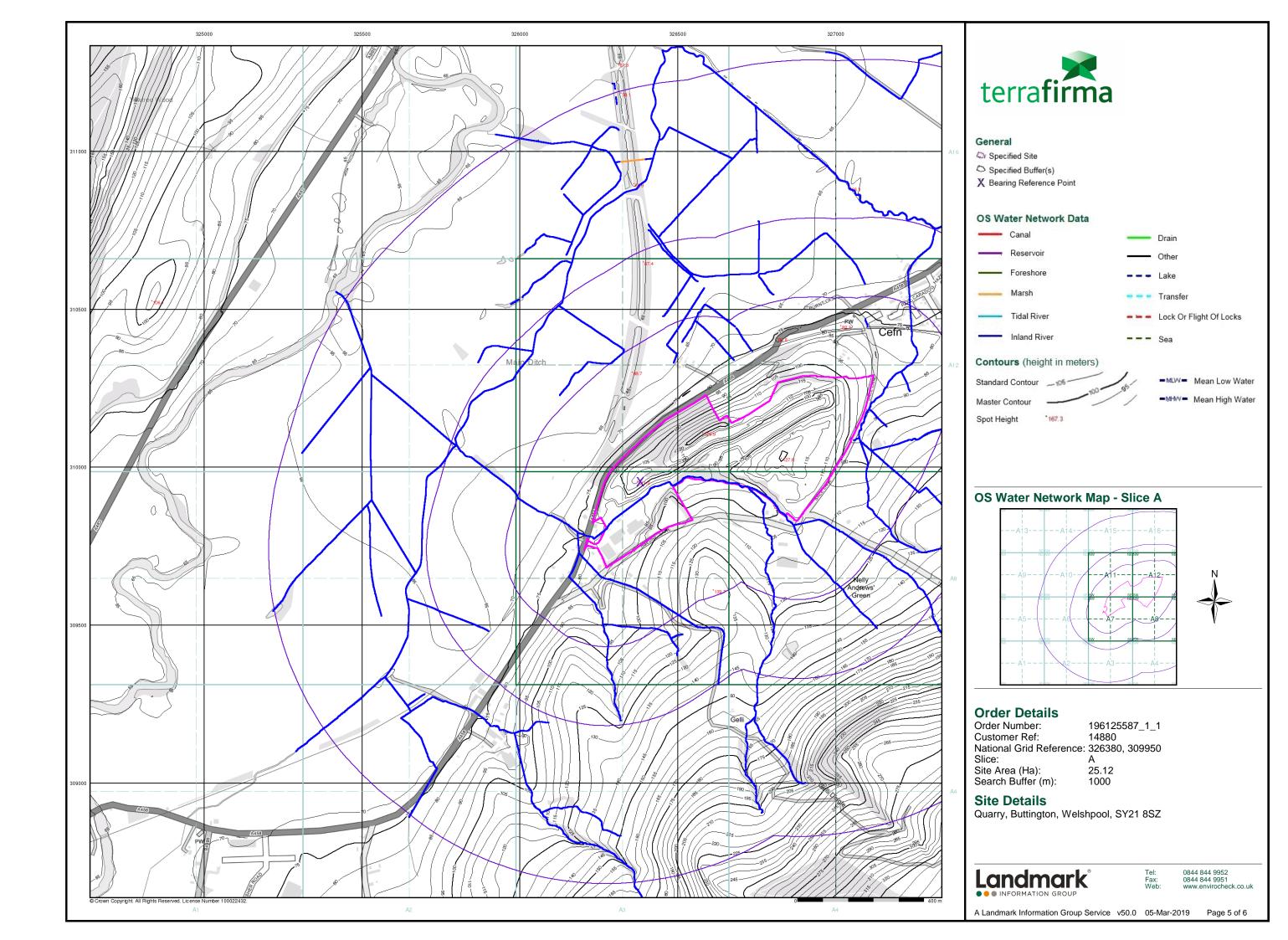
196125587_1_1 14880 А 25.12 1000

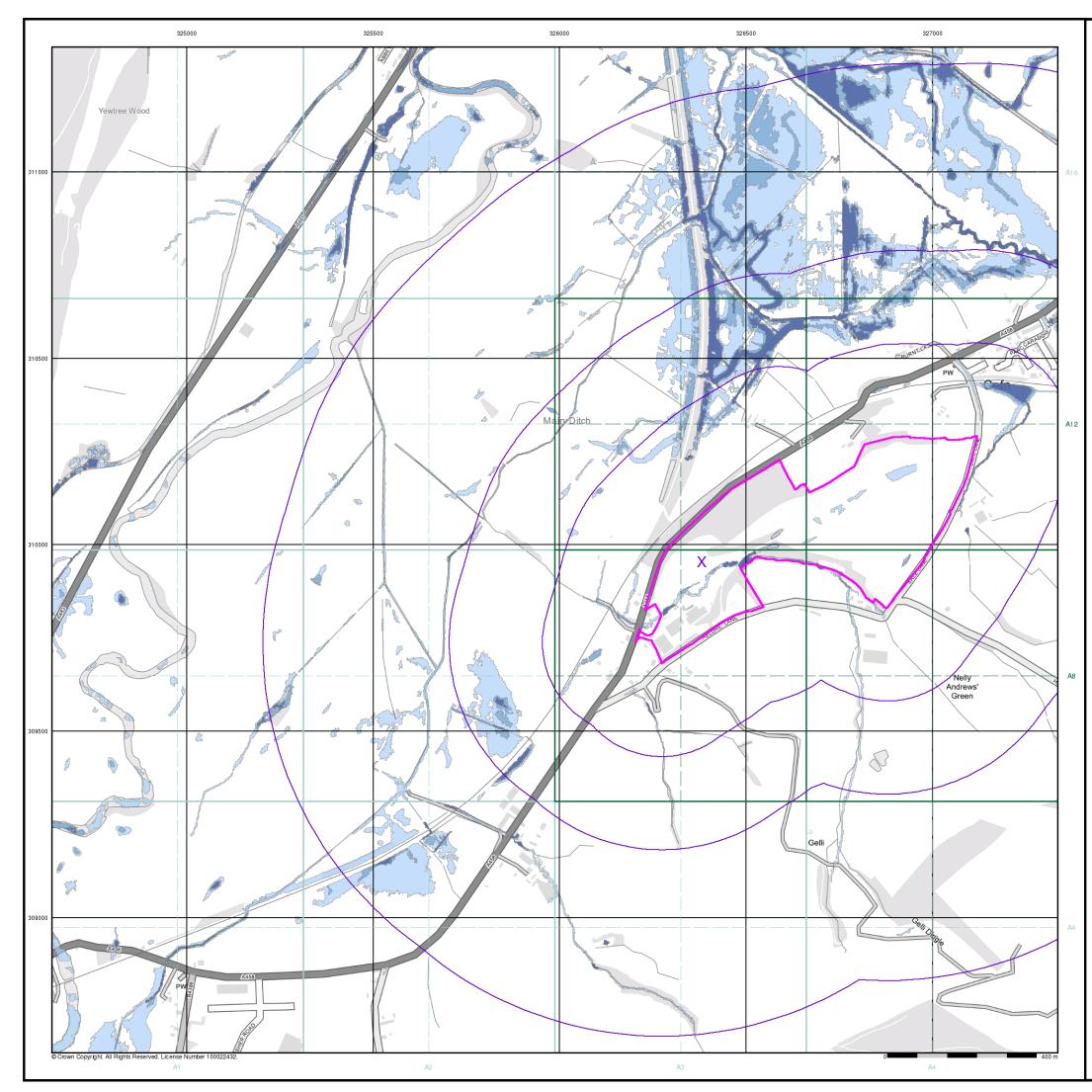
Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



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- 😂 Specified Site Specified Buffer(s)
- X Bearing Reference Point

Risk of Flooding from Surface Water



Low - 1000 Year Return

Suitability See the suitability map below

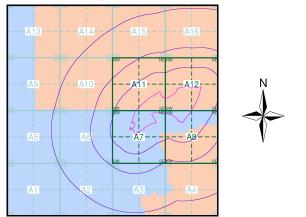
National to county

County to town Town to street

Street to parcels of land

Property

EA/NRW Suitability Map - Slice A



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: Site Area (Ha): Search Buffer (m):

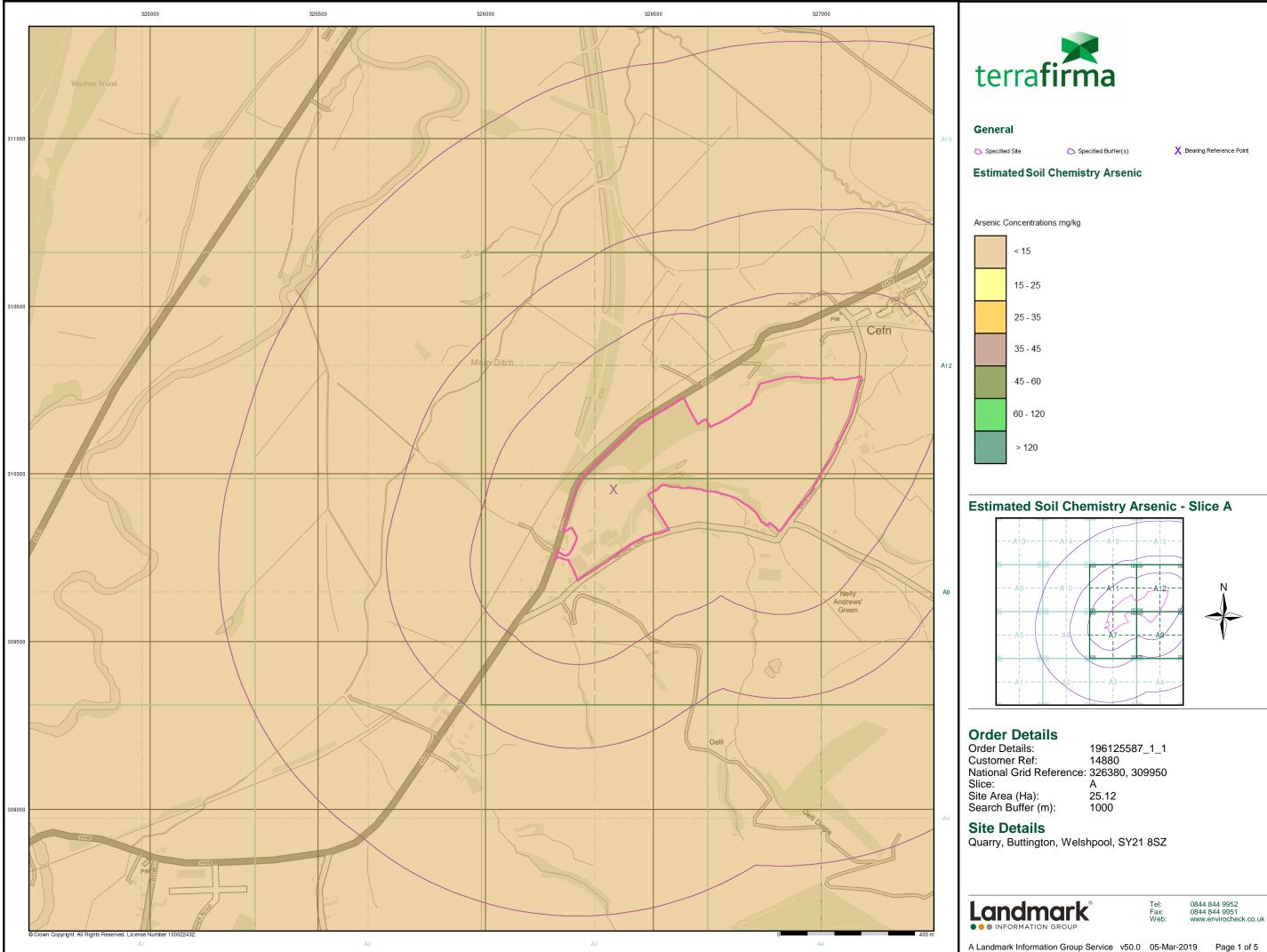
196125587_1_1 14880 А 25.12 1000

Site Details

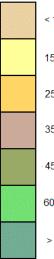
Quarry, Buttington, Welshpool, SY21 8SZ



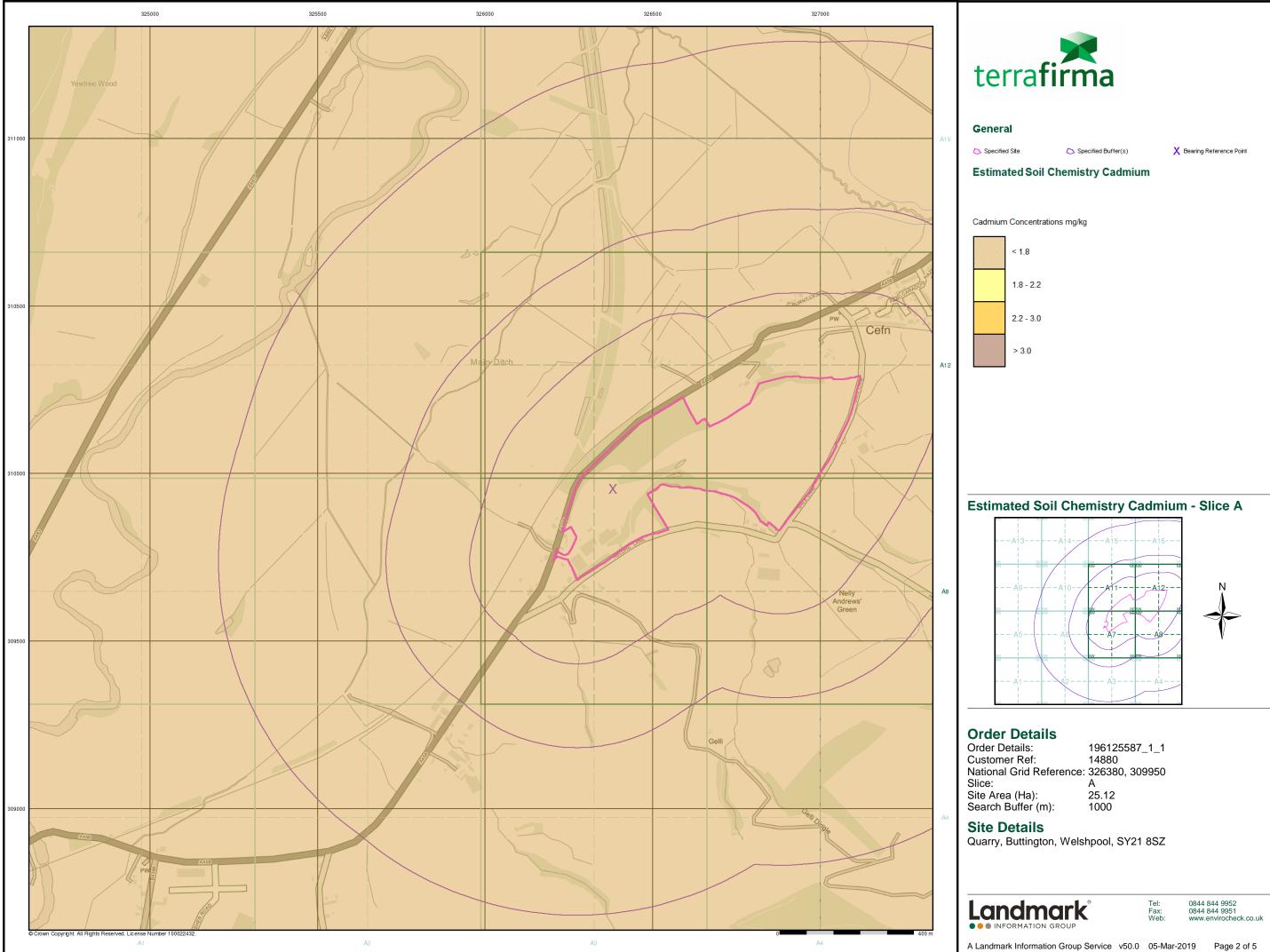
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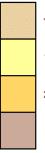


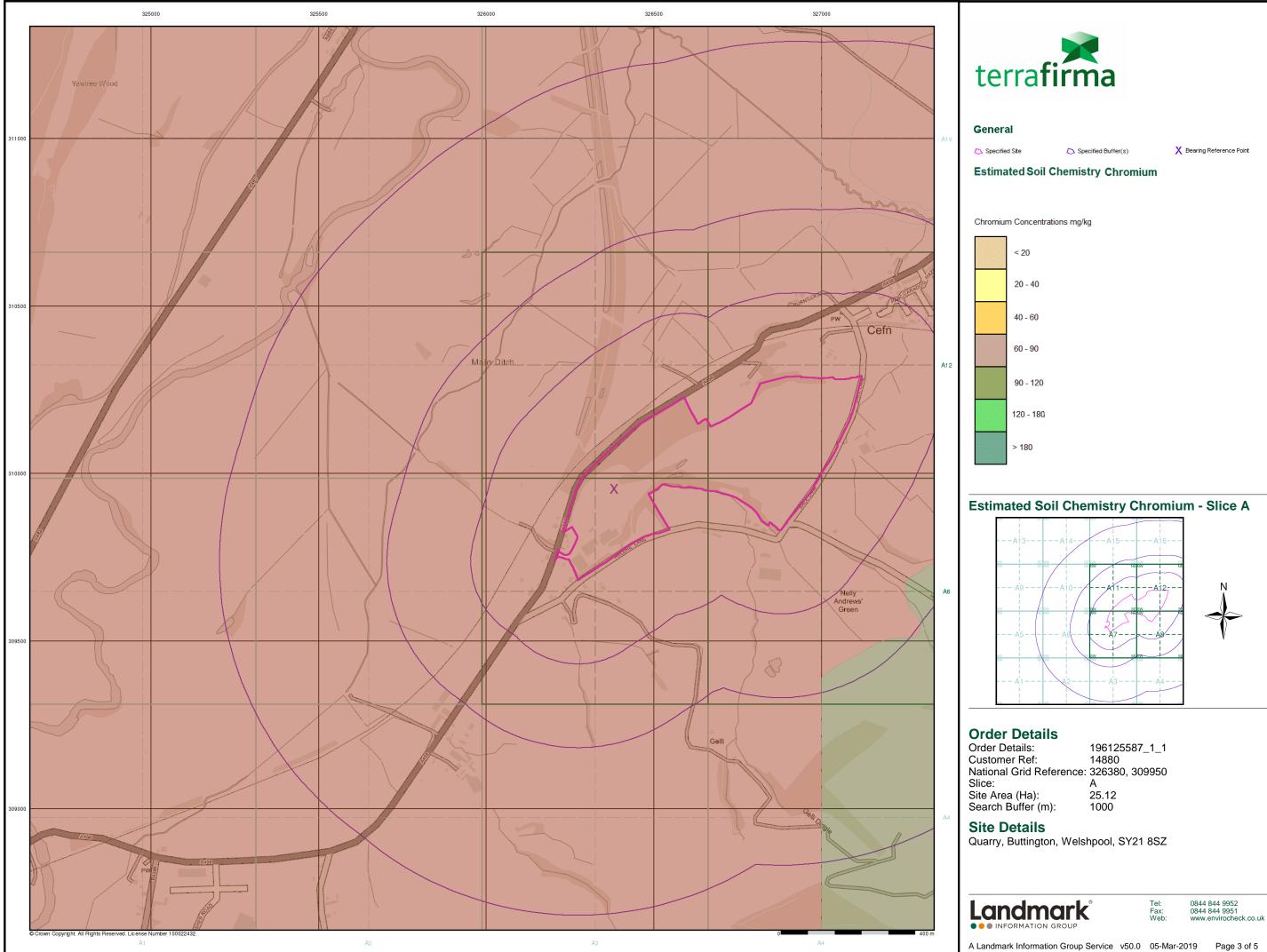








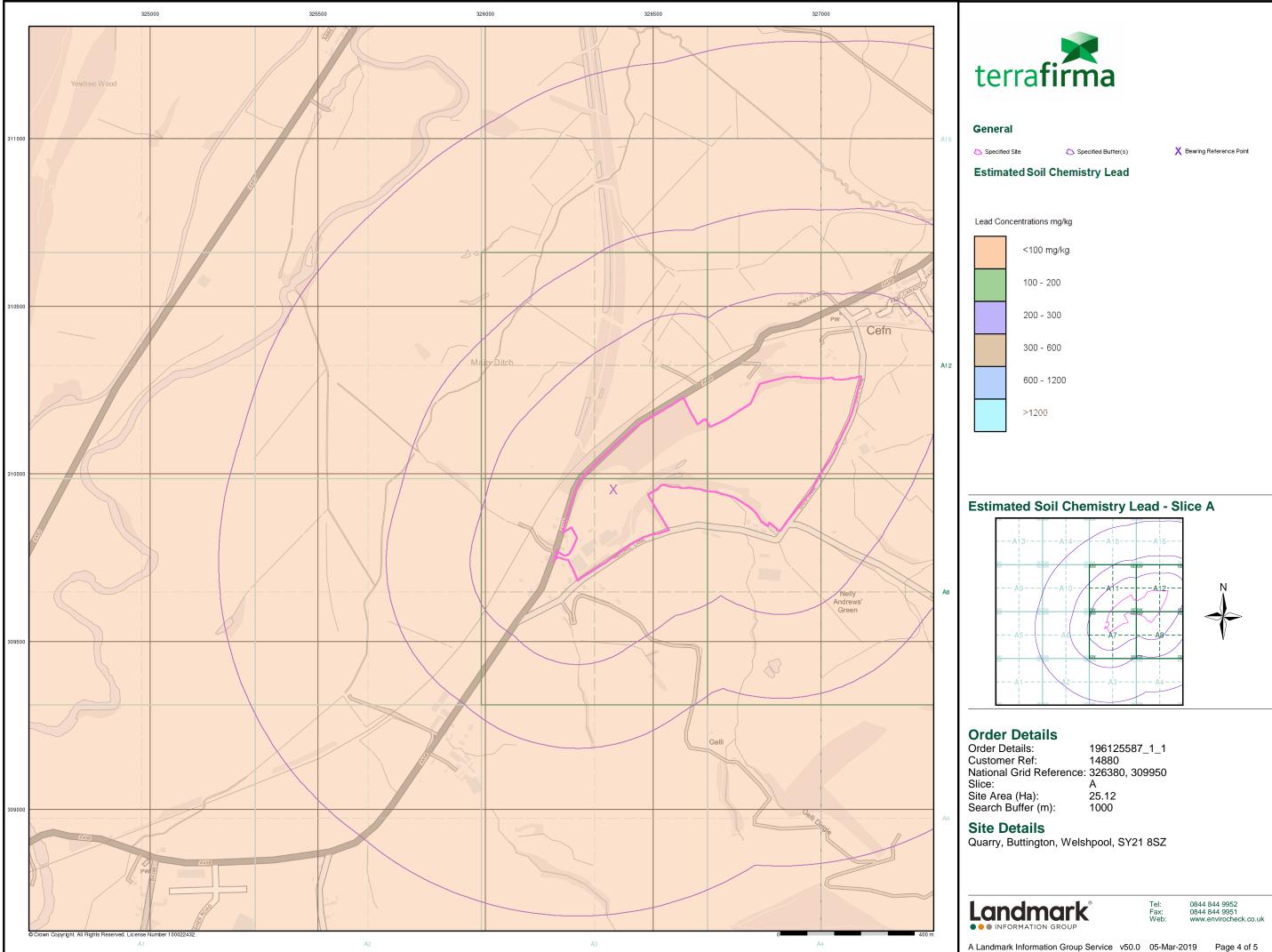






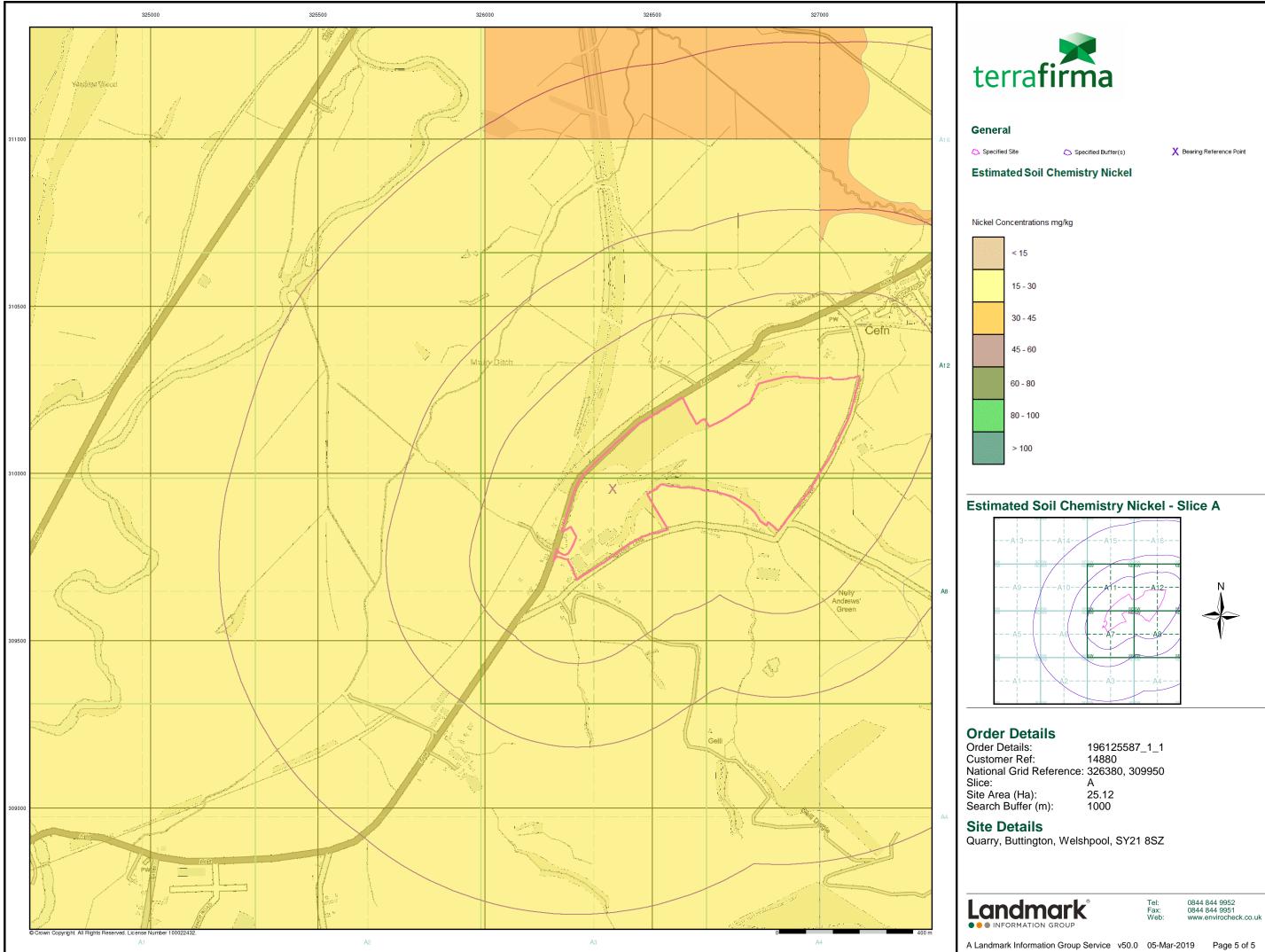








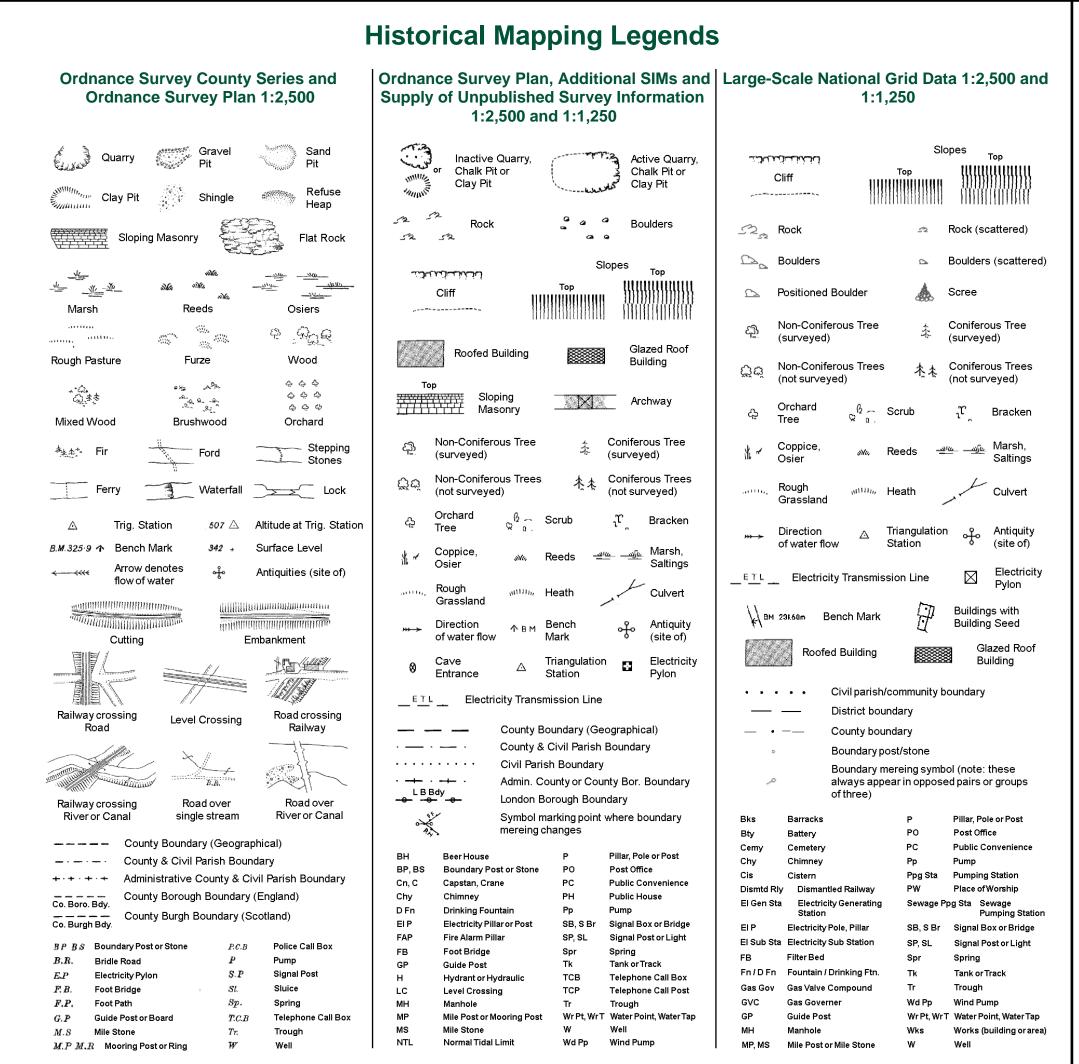










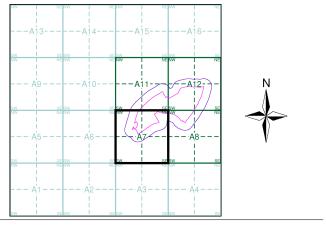




Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Montgomeryshire	1:2,500	1886	2
Montgomeryshire	1:2,500	1902	3
Ordnance Survey Plan	1:2,500	1972	4
Additional SIMs	1:2,500	1988 - 1993	5
Large-Scale National Grid Data	1:2,500	1994	6
Historical Aerial Photography	1:2,500	2000	7

Historical Map - Segment A7



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: Site Area (Ha): Search Buffer (m):

196125587_1_1 14880 Α 25.12 100

Tel

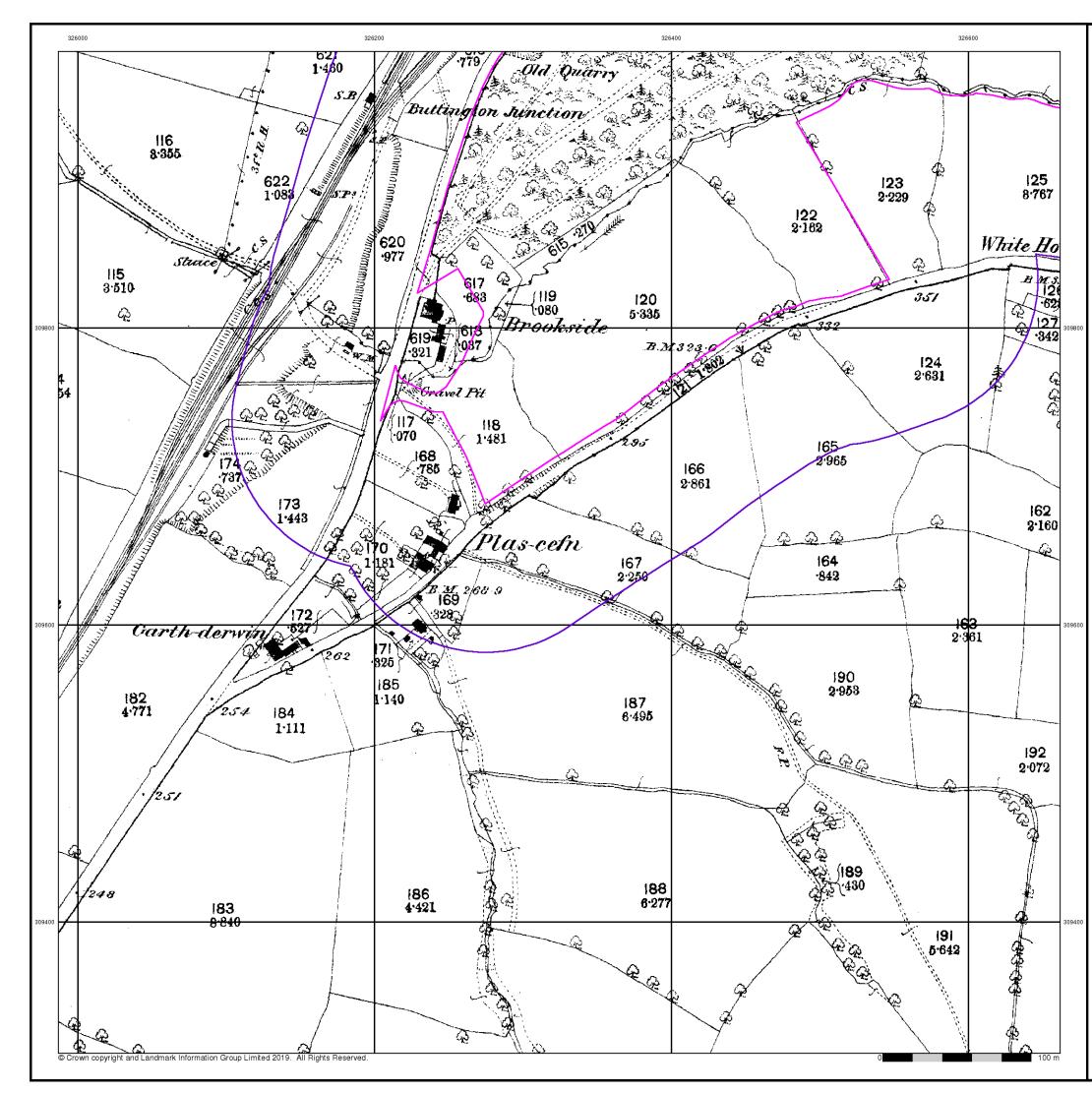
Fax: Web

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



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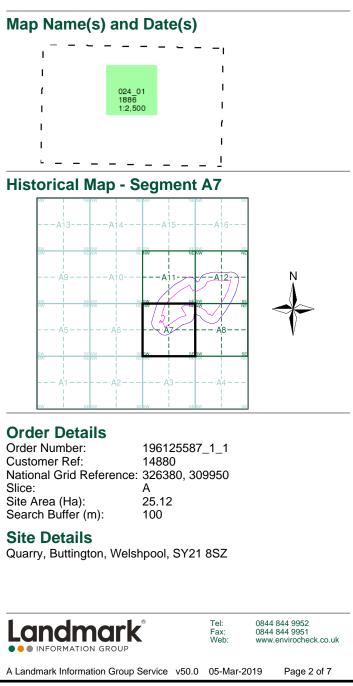


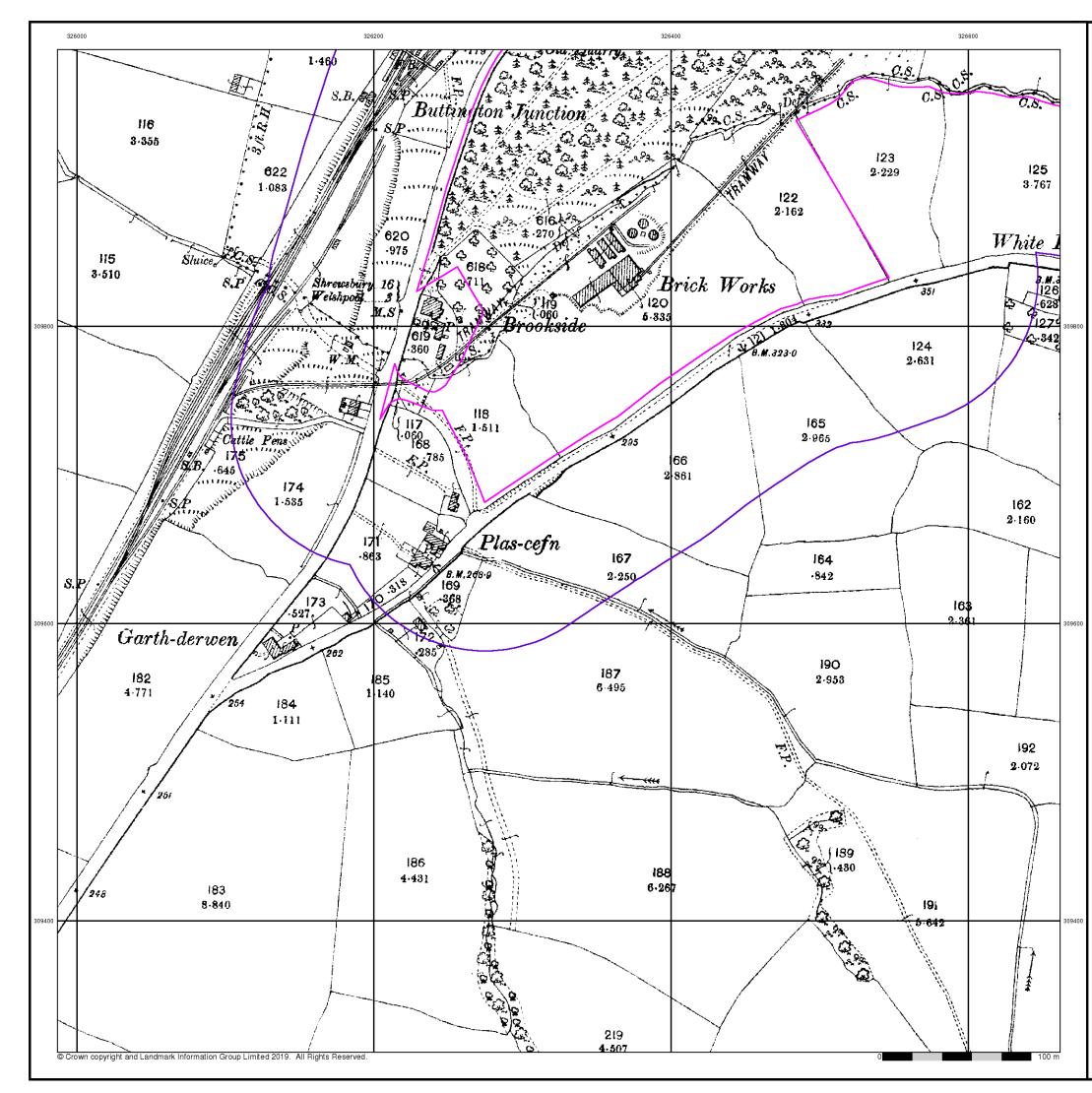
Montgomeryshire

Published 1886

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.





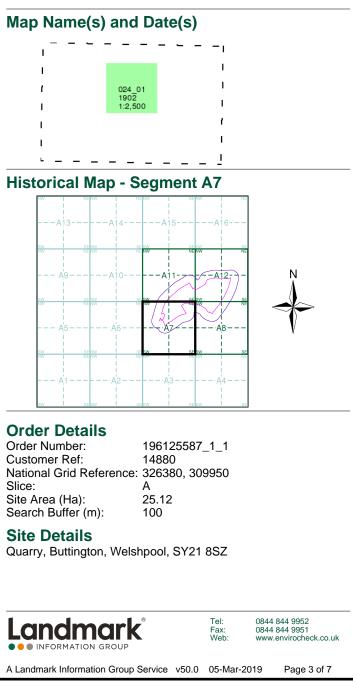


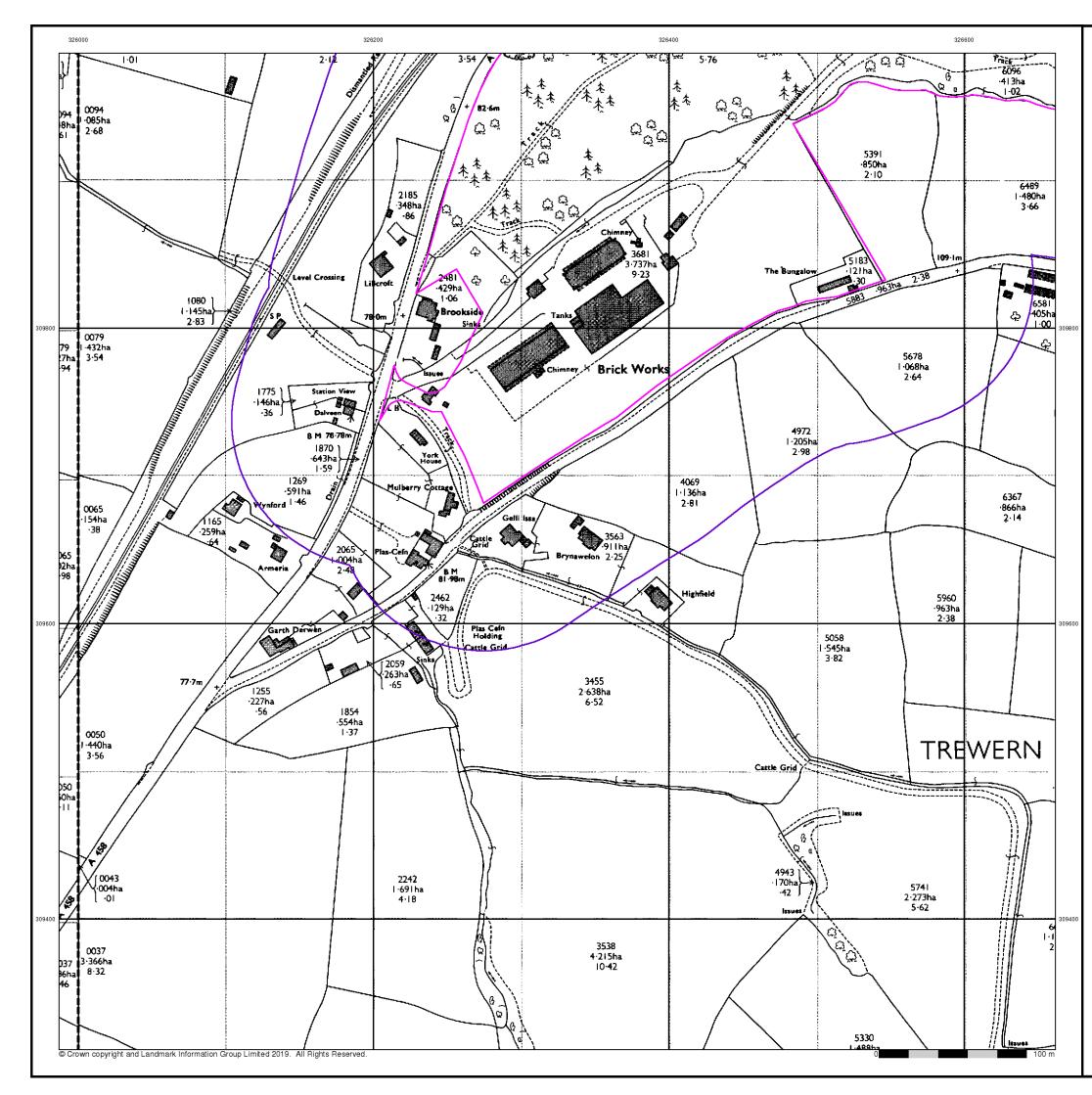
Montgomeryshire

Published 1902

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.





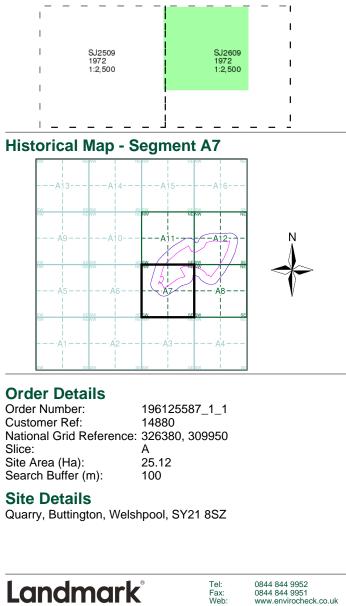


Ordnance Survey Plan Published 1972

Source map scale - 1:2,500

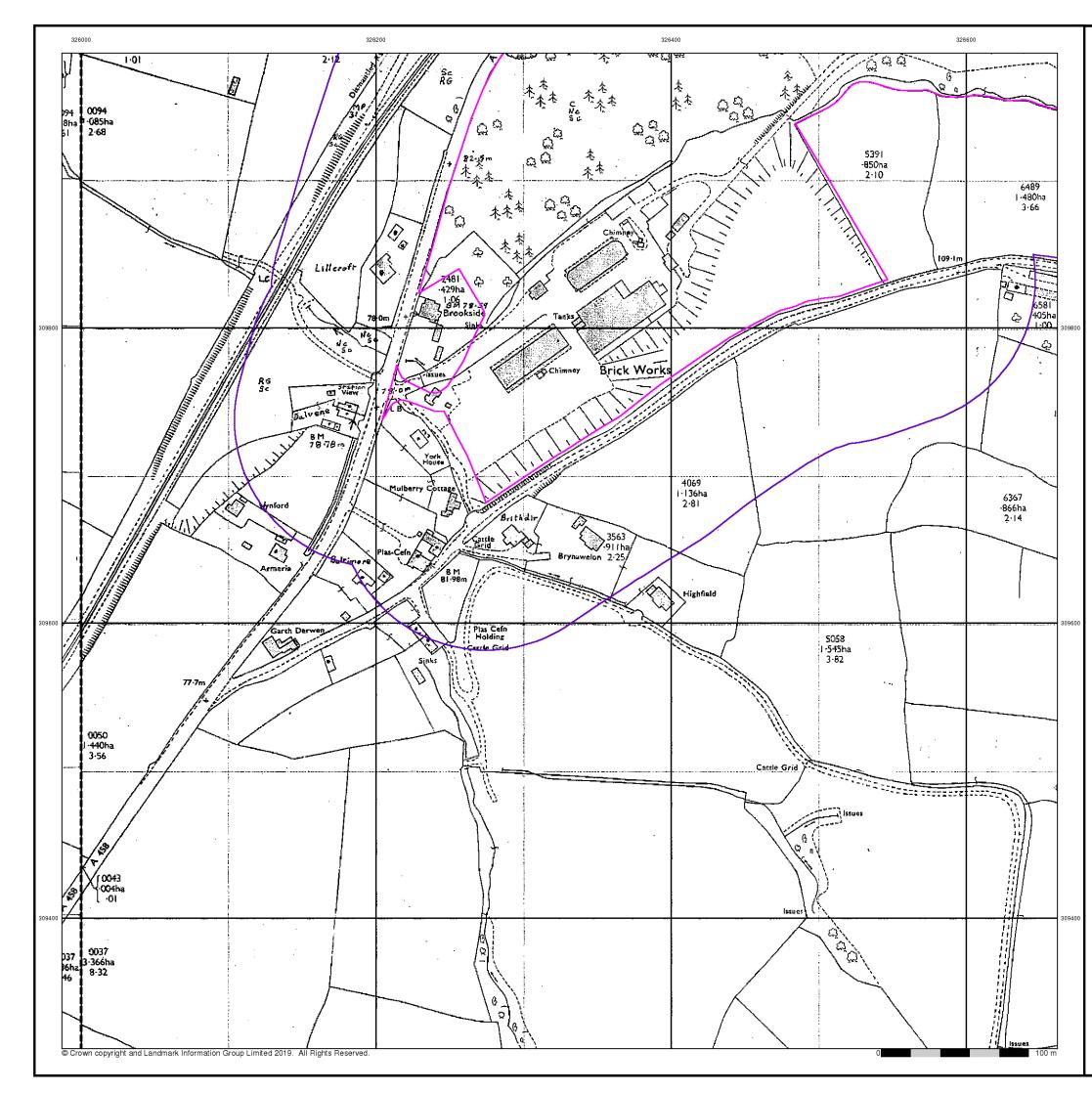
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)





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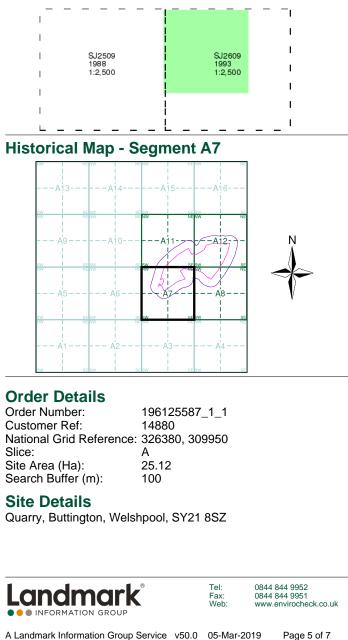
Additional SIMs

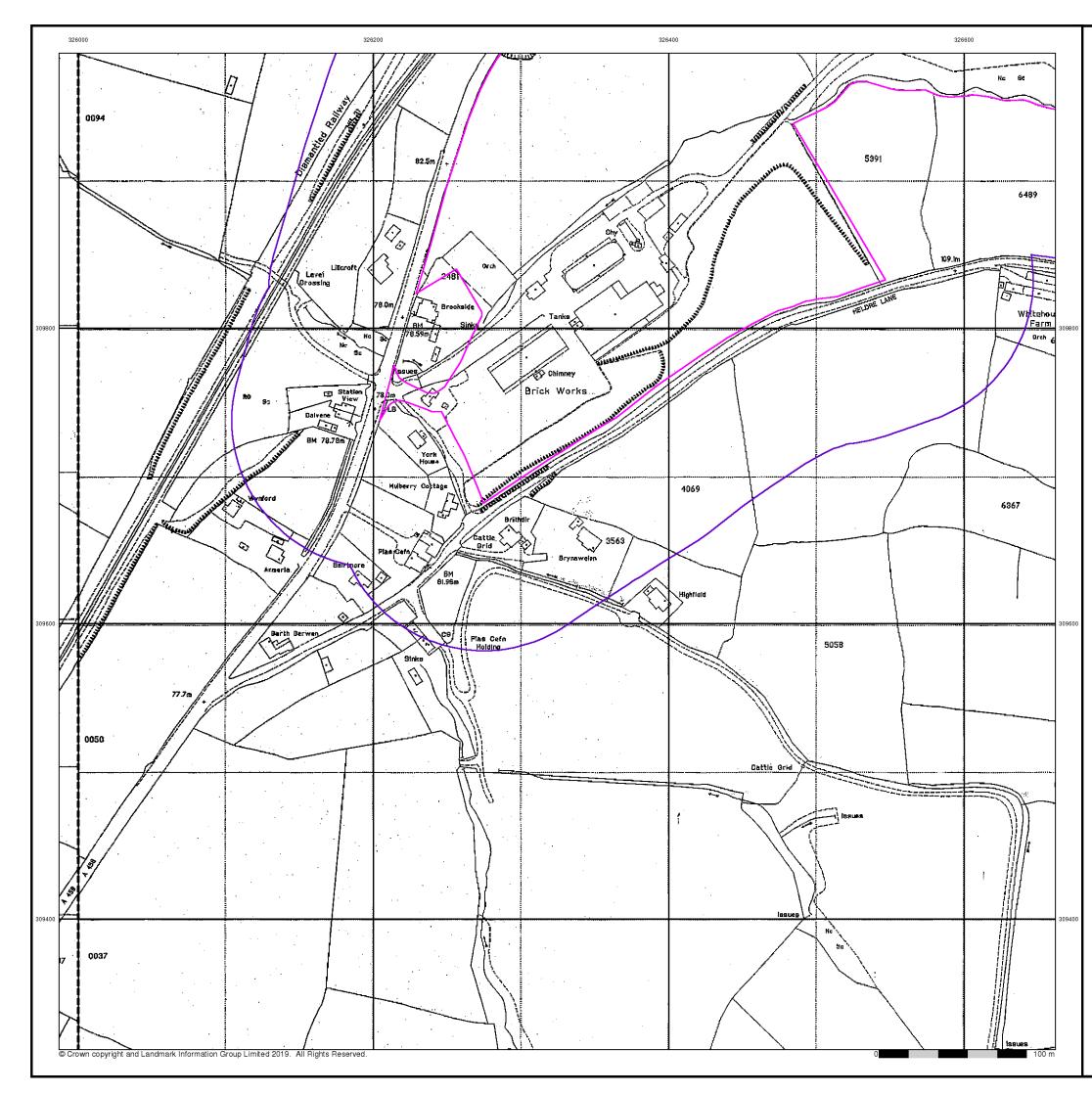
Published 1988 - 1993

Source map scale - 1:2,500

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)







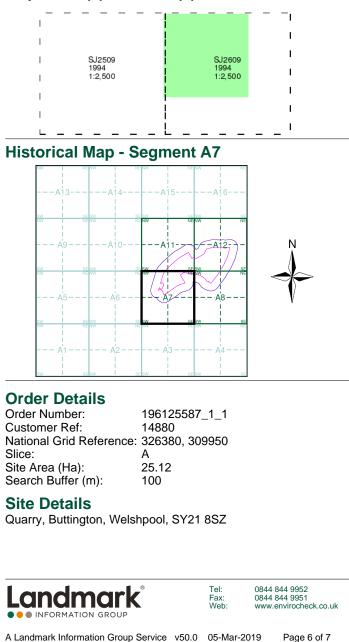
Large-Scale National Grid Data

Published 1994

Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)





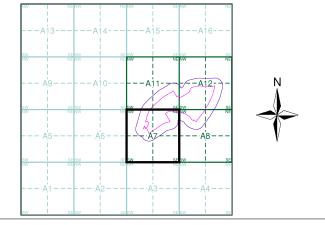




Historical Aerial Photography Published 2000

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A7



Order Details Order Number:

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950
 Slice: Site Area (Ha): Search Buffer (m): A 25.12 100

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



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Tel: Fax: Web:

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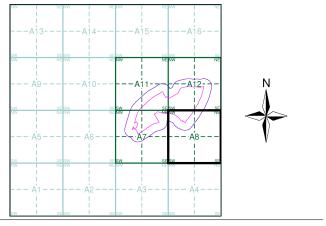




Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Montgomeryshire	1:2,500	1886	2
Montgomeryshire	1:2,500	1902	3
Ordnance Survey Plan	1:2,500	1972	4
Additional SIMs	1:2,500	1993	5
Large-Scale National Grid Data	1:2,500	1994	6
Historical Aerial Photography	1:2,500	2000	7

Historical Map - Segment A8



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: Site Area (Ha): Search Buffer (m):

196125587_1_1 14880 Α 25.12 100

Tel

Fax:

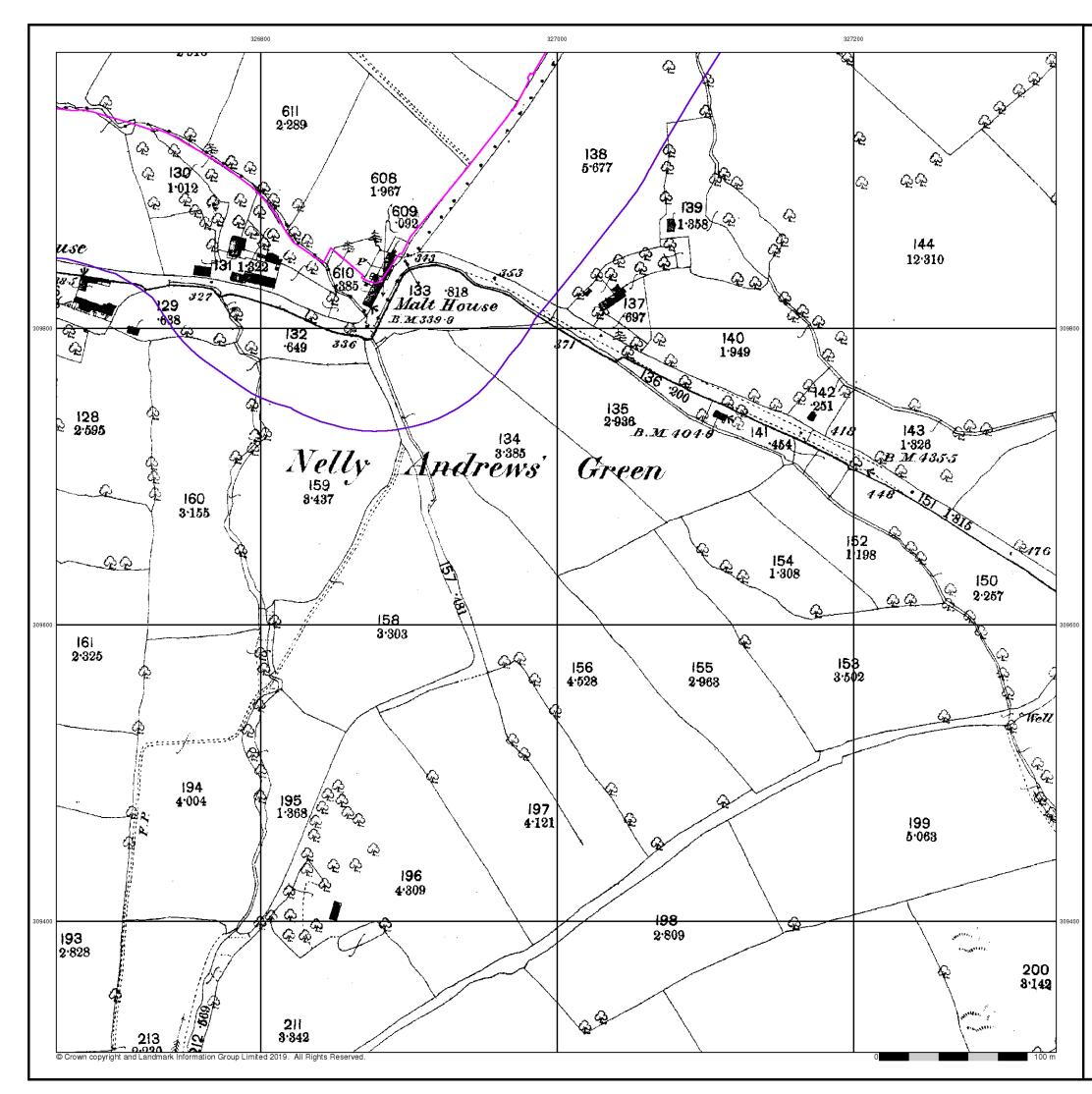
Web:

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



0844 844 9952 0844 844 9951 www.envirocheck.co.uk





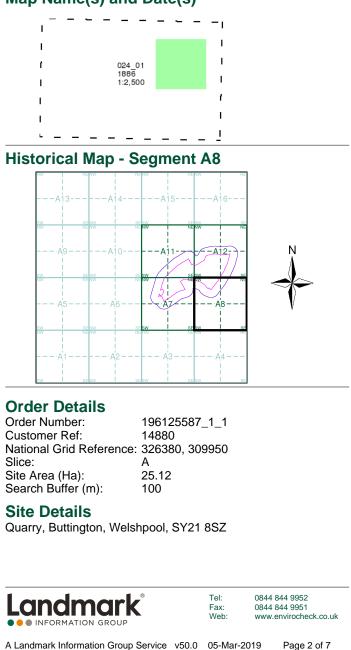
Montgomeryshire

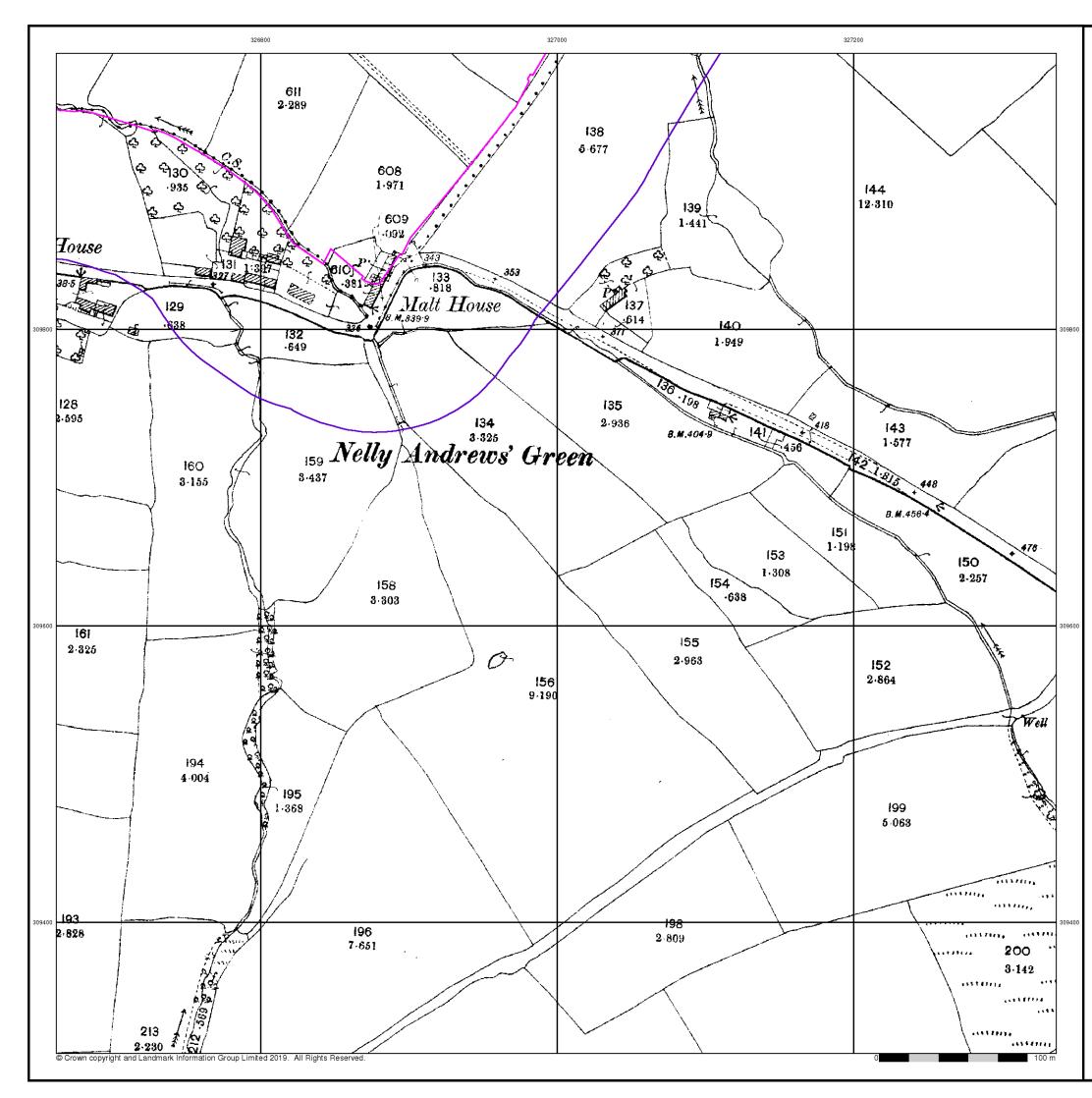
Published 1886

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)







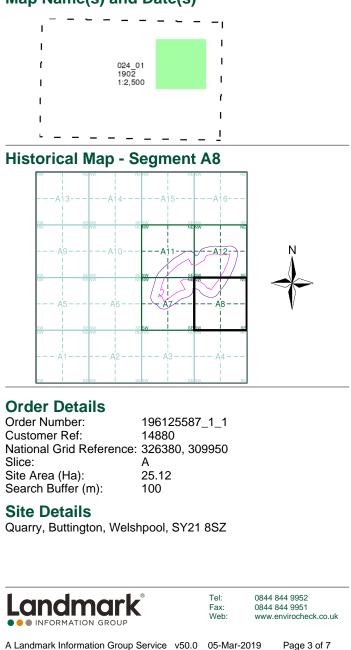
Montgomeryshire

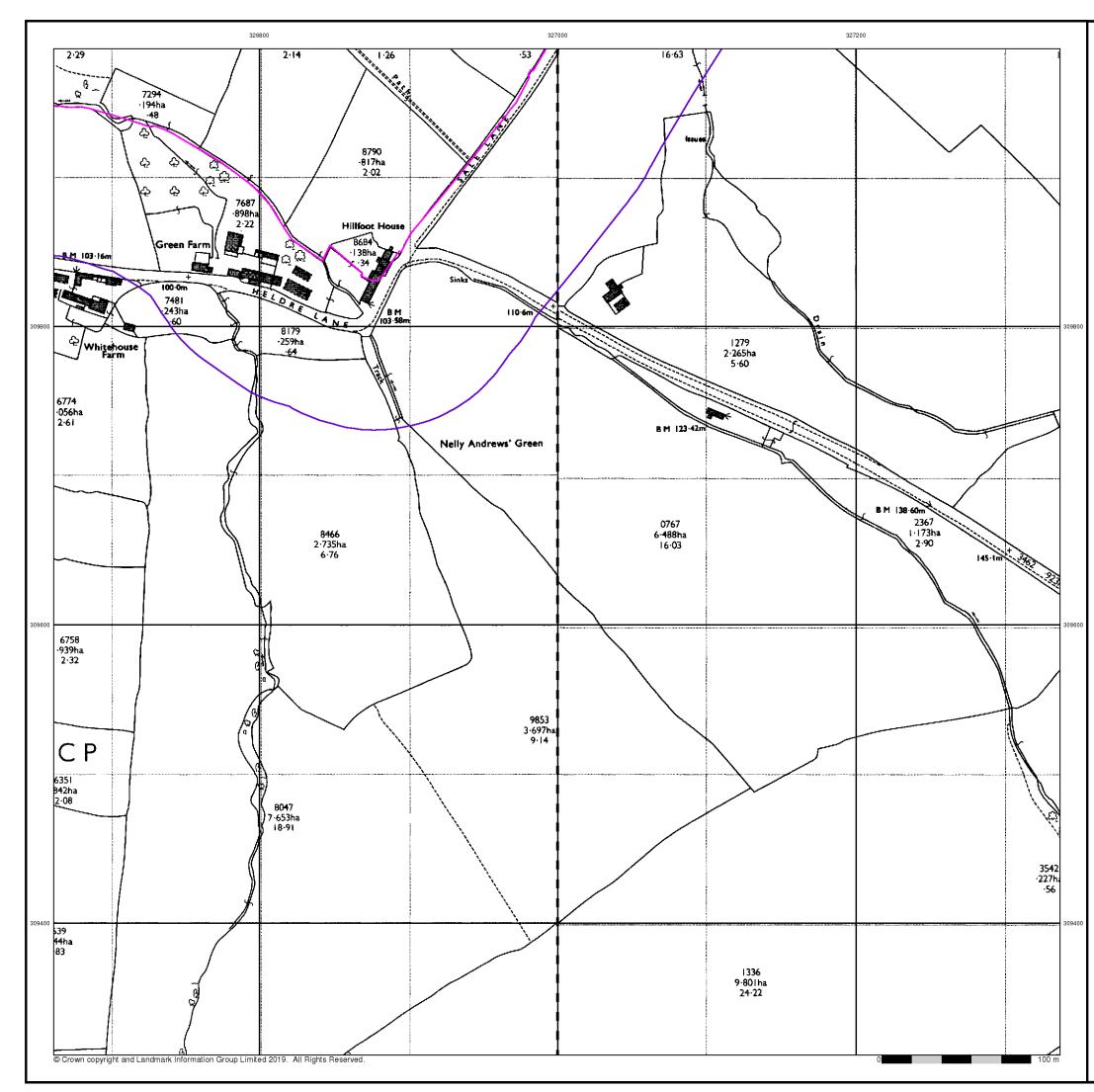
Published 1902

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



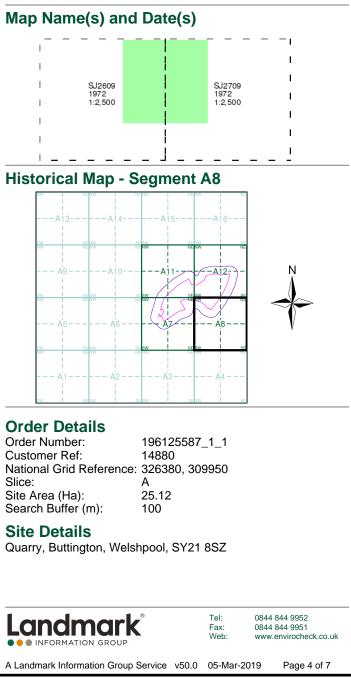


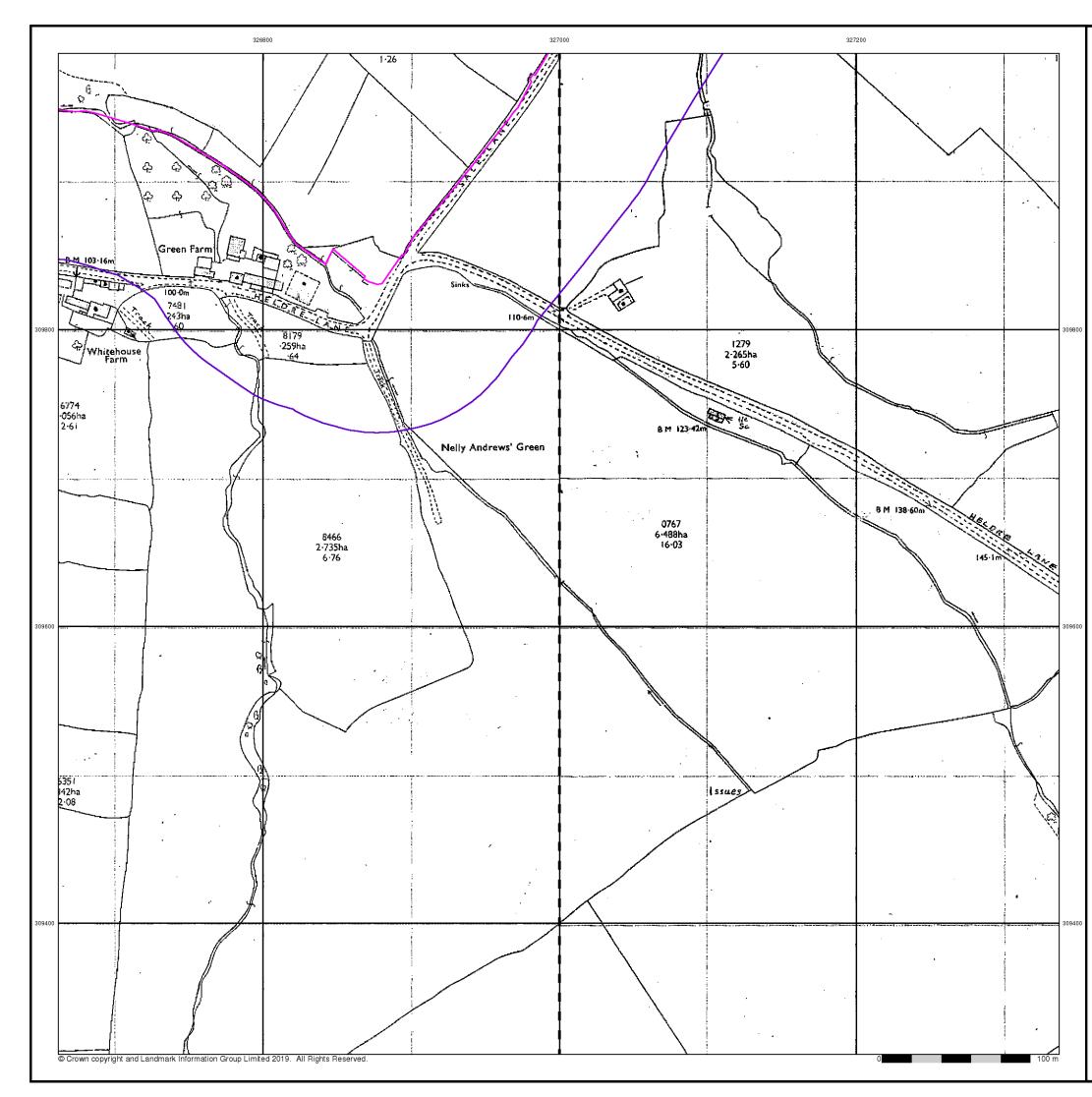


Ordnance Survey Plan Published 1972

Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.





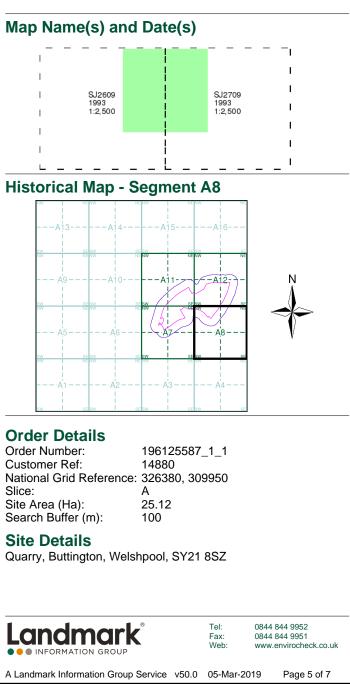


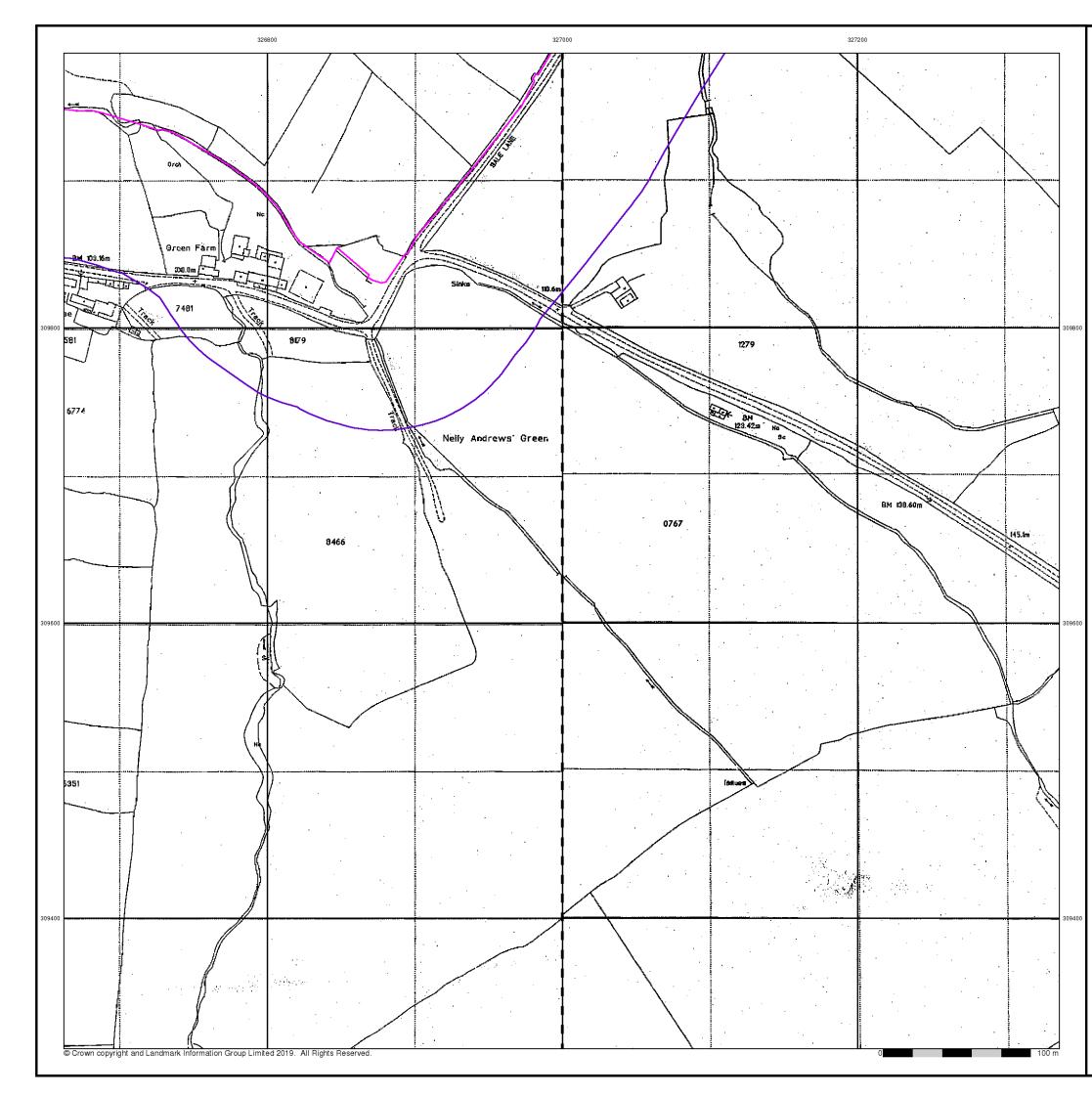
Additional SIMs

Published 1993

Source map scale - 1:2,500

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.



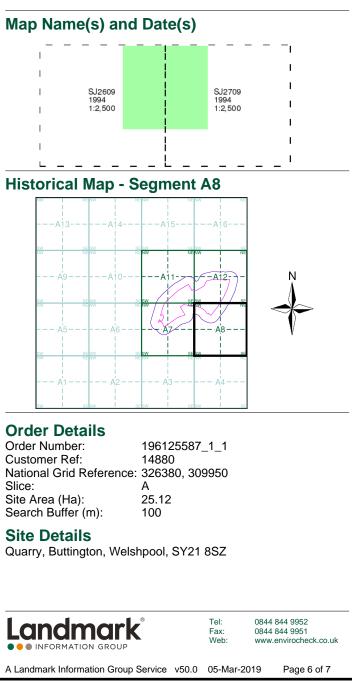




Large-Scale National Grid Data Published 1994

Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.



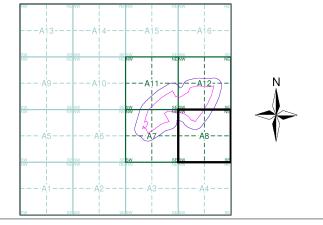




Historical Aerial Photography Published 2000

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A8



Order Details

Order Number:196125587_1_1Customer Ref:14880National Grid Reference:326380, 309950Slice:ASite Area (Ha):25.12Search Buffer (m):100

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



0844 844 9952 0844 844 9951 www.envirocheck.co.uk

Tel: Fax: Web:

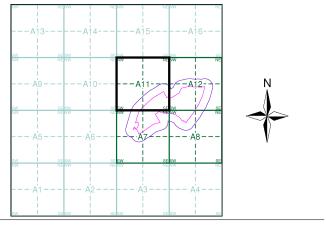




Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Montgomeryshire	1:2,500	1886	2
Montgomeryshire	1:2,500	1902	3
Ordnance Survey Plan	1:2,500	1972 - 1973	4
Additional SIMs	1:2,500	1988 - 1993	5
Large-Scale National Grid Data	1:2,500	1994 - 1995	6
Historical Aerial Photography	1:2,500	2000	7

Historical Map - Segment A11



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: Site Area (Ha): Search Buffer (m):

196125587_1_1 14880 Α 25.12 100

Tel

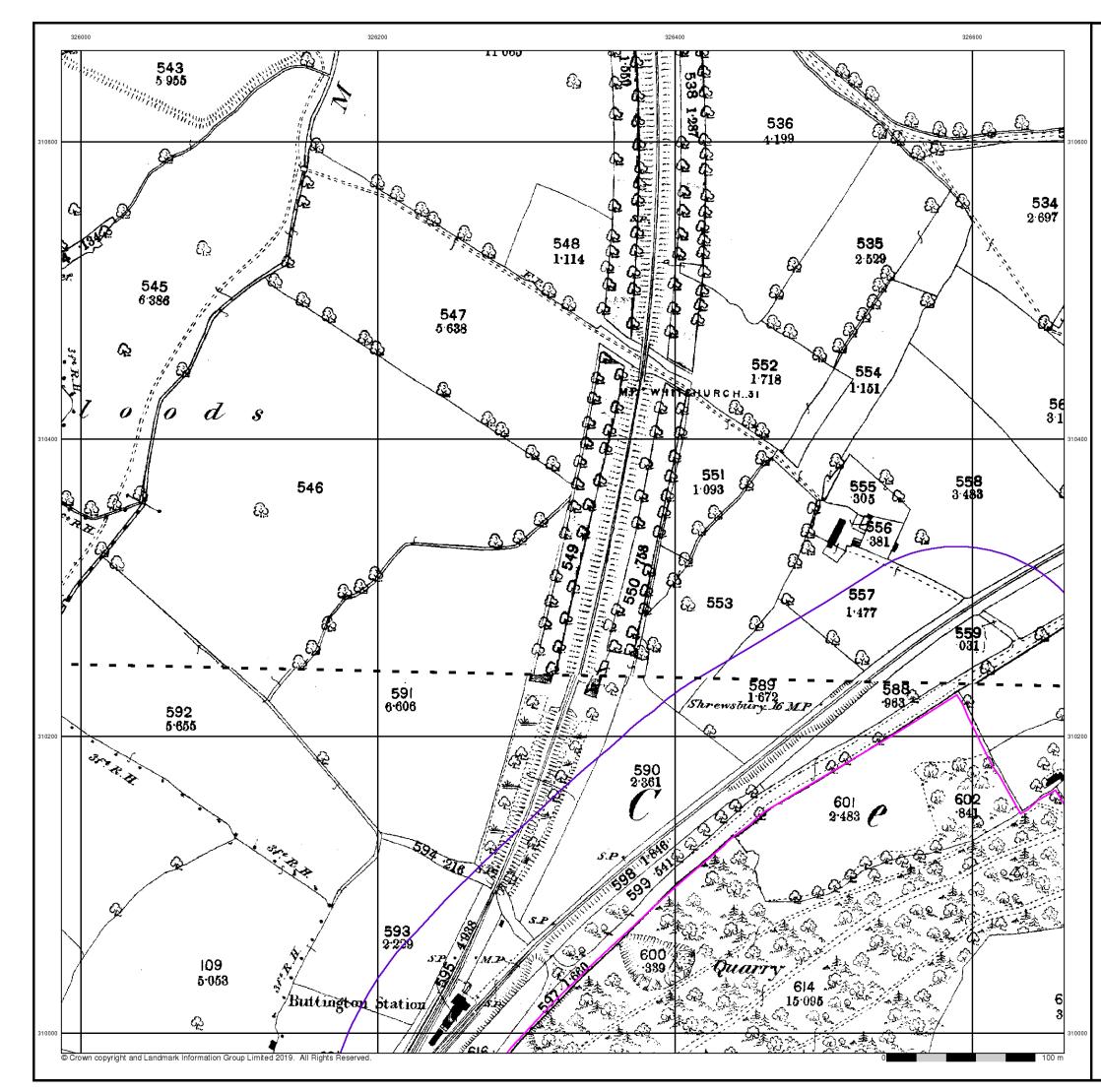
Fax:

Web:

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ





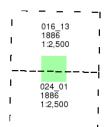


Published 1886

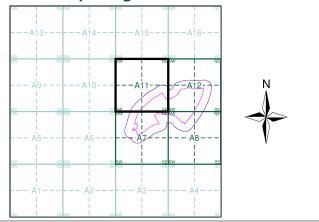
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A11



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950

 Slice:
 A

 Site Area (Ha):
 25.12

 Search Buffer (m):
 100

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



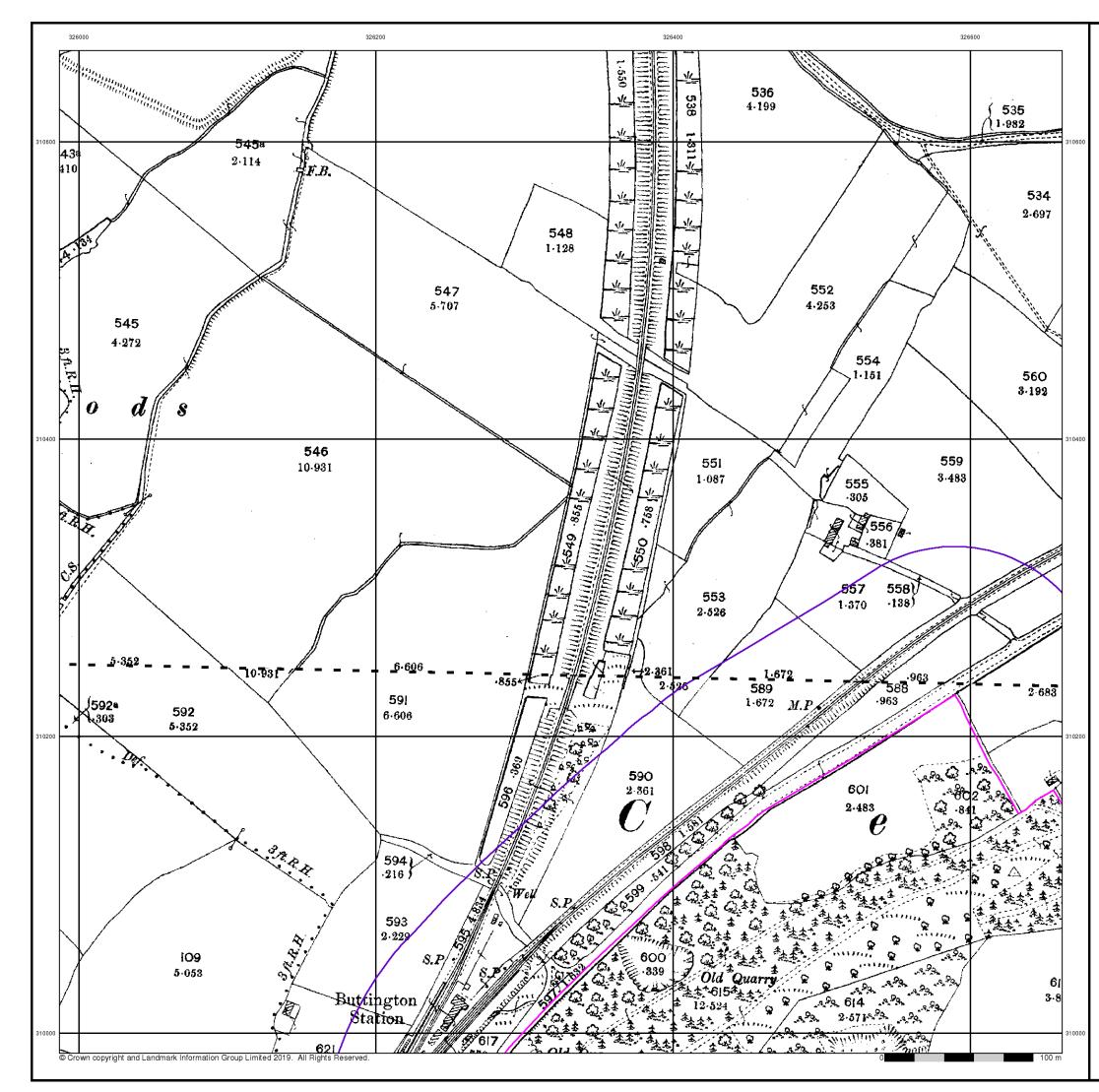
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Tel:

Fax:

Web:

A Landmark Information Group Service v50.0 05-Mar-2019 Page 2 of 7



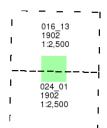


Published 1902

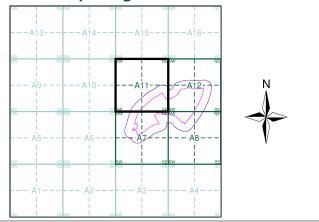
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A11



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950

 Slice:
 A

 Site Area (Ha):
 25.12

 Search Buffer (m):
 100

Site Details

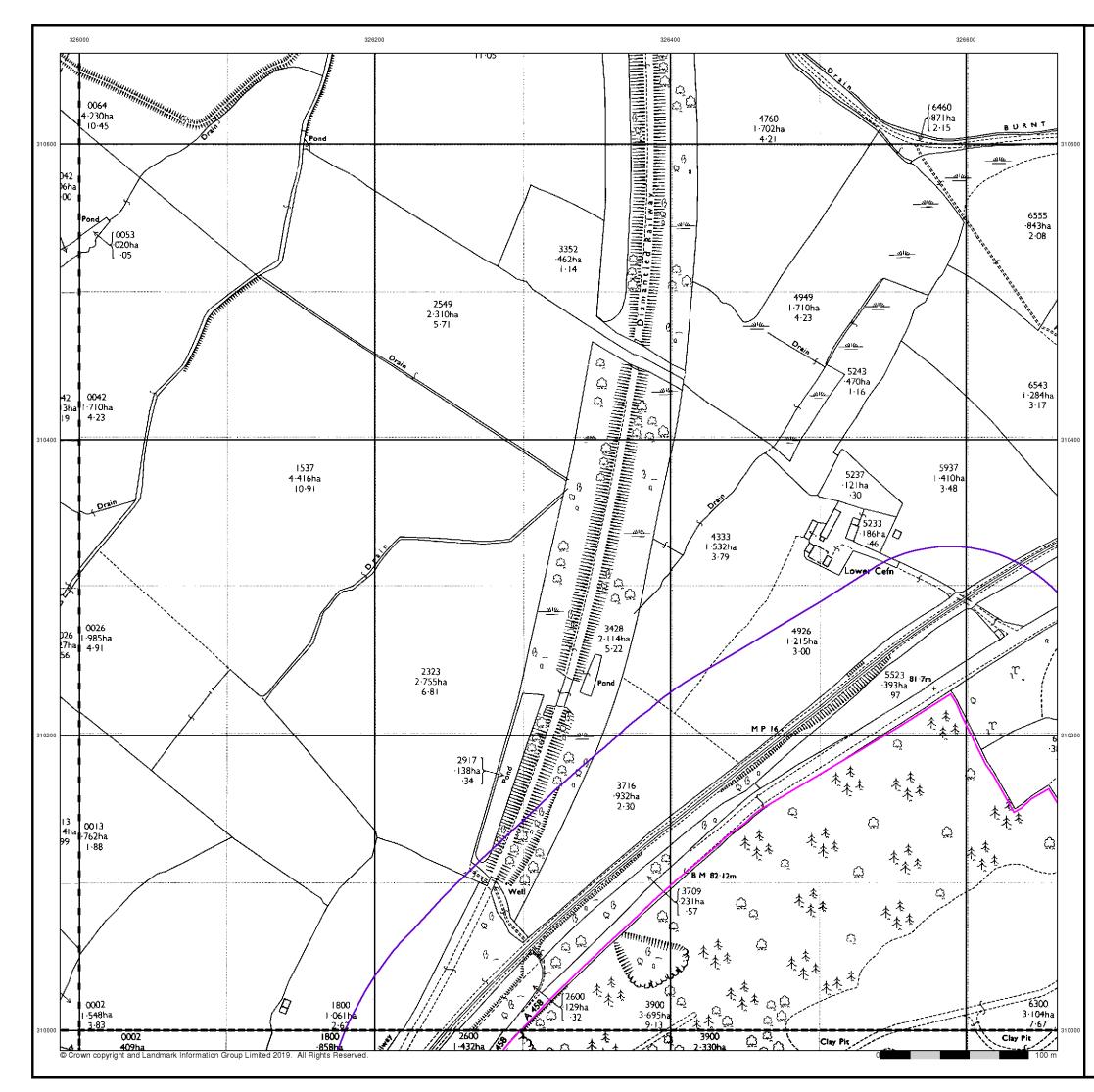
Quarry, Buttington, Welshpool, SY21 8SZ



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Tel:

Fax:

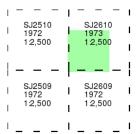




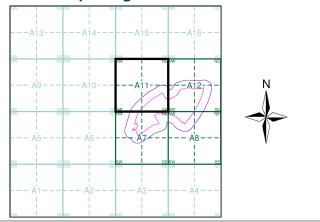
Ordnance Survey Plan Published 1972 - 1973 Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A11



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950

 Slice:
 A

 Site Area (Ha):
 25.12

 Search Buffer (m):
 100

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



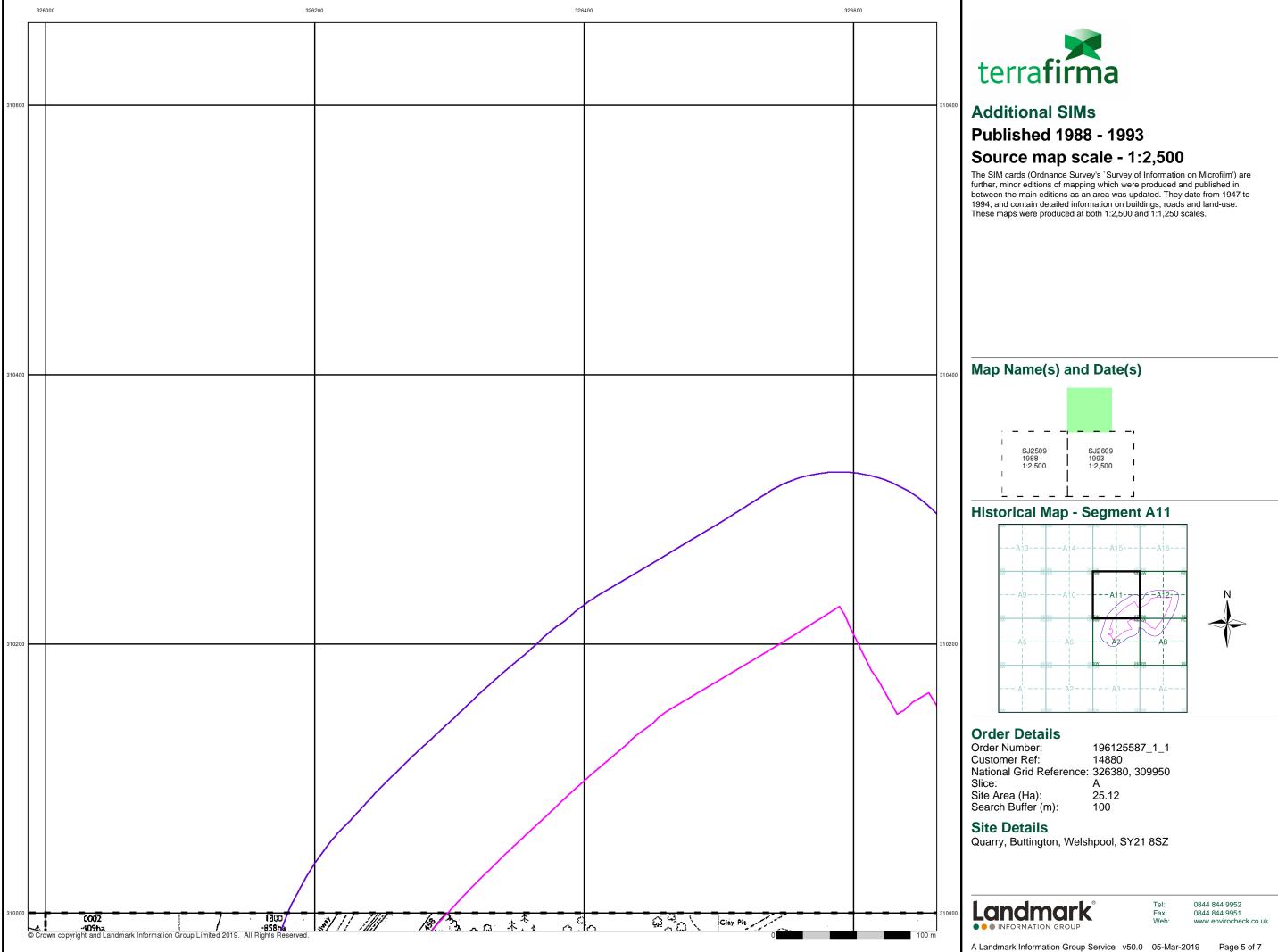
0844 844 9952 0844 844 9951 www.envirocheck.co.uk

Tel:

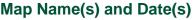
Fax:

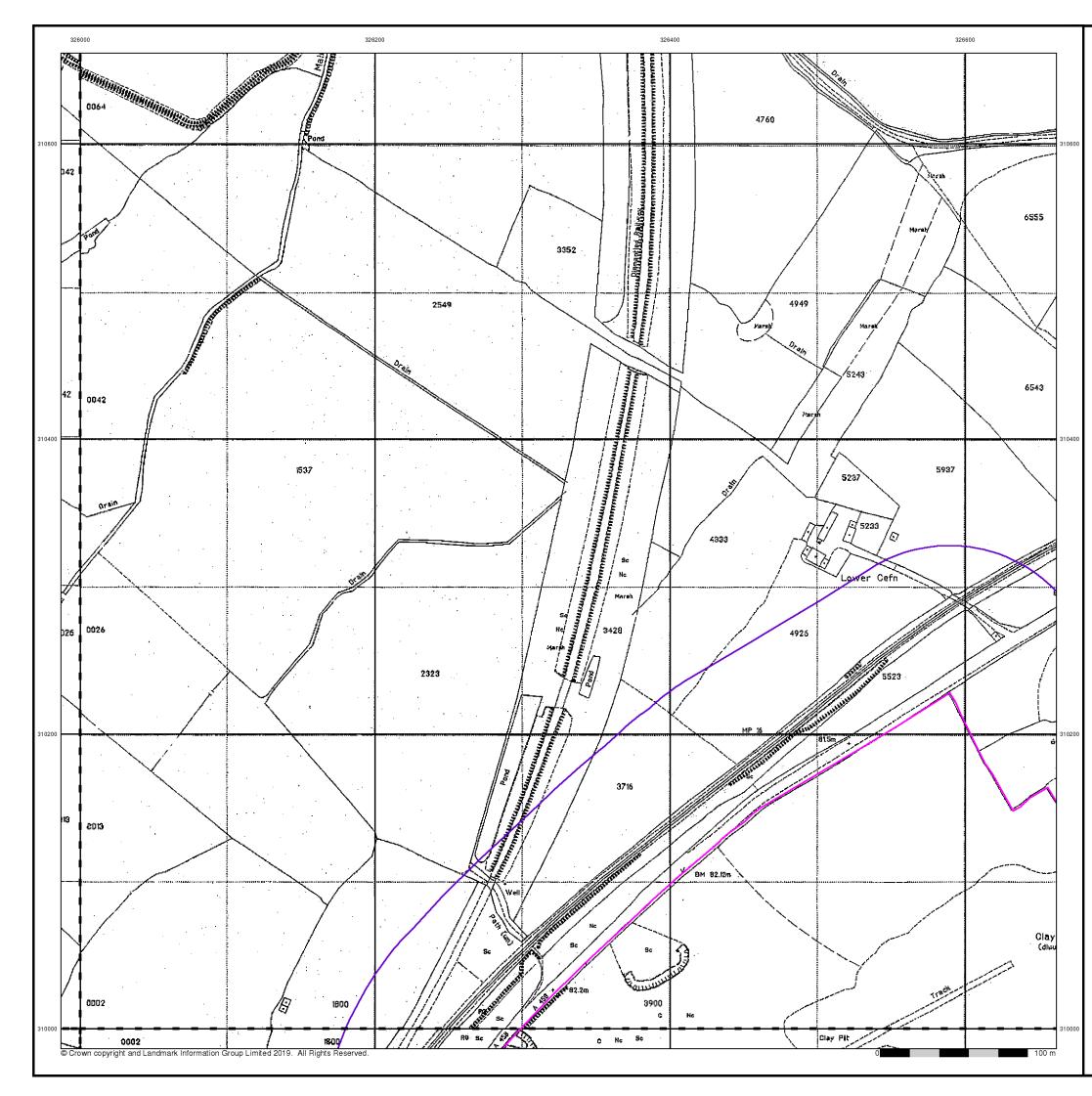
Web:

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Large-Scale National Grid Data Published 1994 - 1995

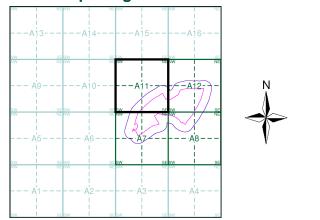
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

_				-
I	SJ2510	- I	SJ2610	I
Ι	1995 1:2,500		1995 1:2,500	I
I.		1		Т
_				_
Ι	SJ2509	I	SJ2609	I
I I	SJ2509 1994 1:2,500	l I	SJ2609 1994 1:2,500	I I
 	1994	 	1994	

Historical Map - Segment A11



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: А Site Area (Ha): Search Buffer (m): 100

196125587_1_1 14880 25.12

Tel: Fax: Web:

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ





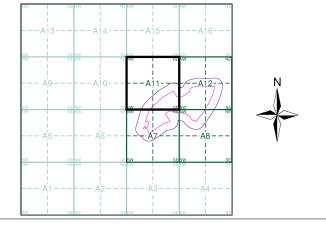




Historical Aerial Photography Published 2000

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A11



Order Details Order Number:

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950
 Slice: Site Area (Ha): Search Buffer (m): A 25.12 100

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



0844 844 9952 0844 844 9951 www.envirocheck.co.uk

Tel: Fax: Web:

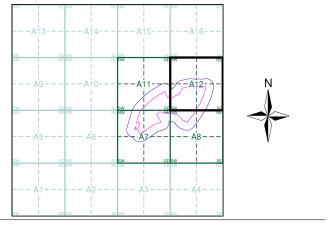




Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Montgomeryshire	1:2,500	1886	2
Montgomeryshire	1:2,500	1902	3
Ordnance Survey Plan	1:2,500	1972 - 1973	4
Additional SIMs	1:2,500	1993	5
Large-Scale National Grid Data	1:2,500	1994 - 1995	6
Historical Aerial Photography	1:2,500	2000	7

Historical Map - Segment A12



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: Site Area (Ha): Search Buffer (m):

196125587_1_1 14880 Α 25.12 100

Tel

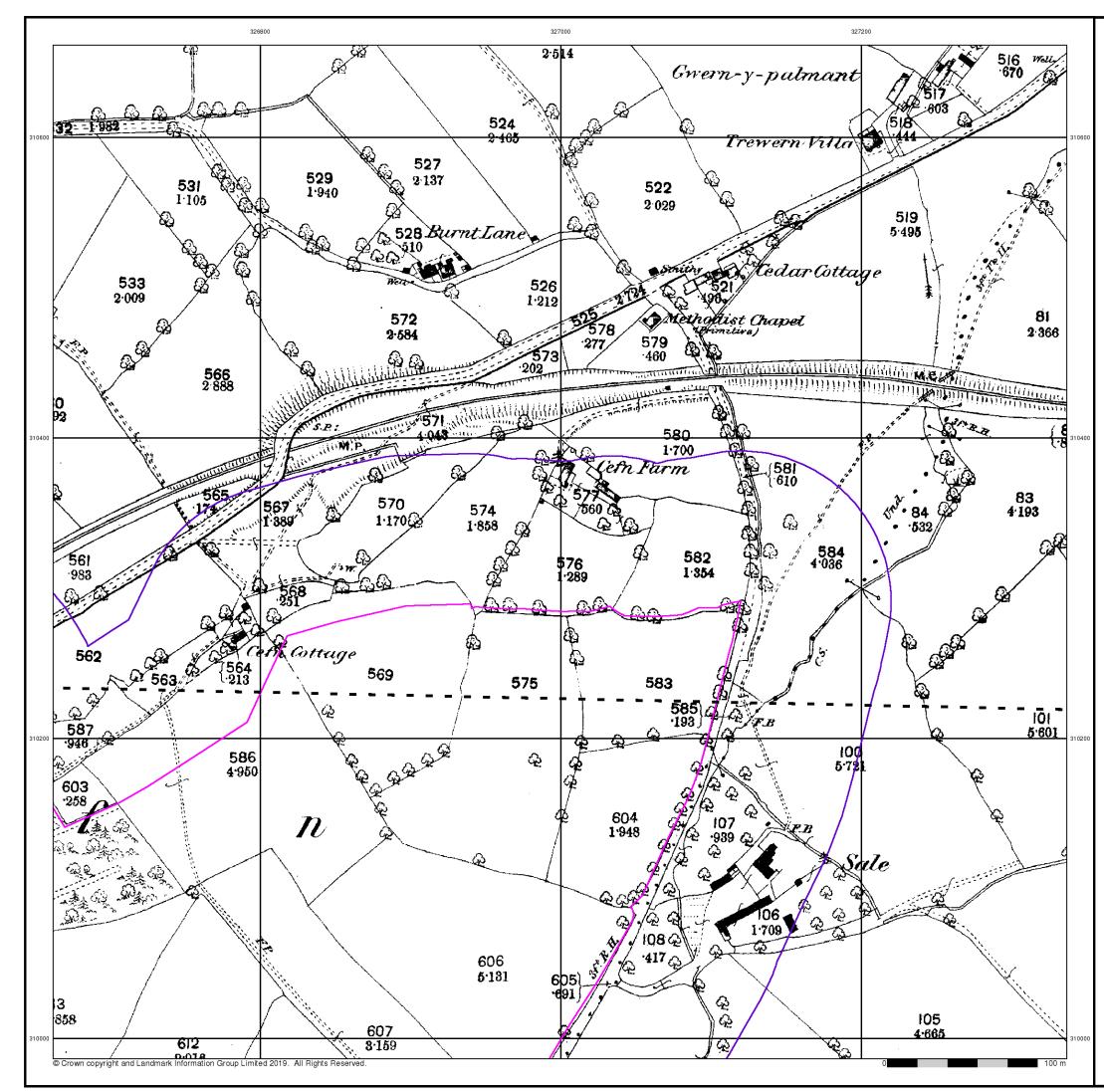
Fax:

Web:

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ





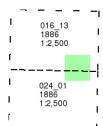


Published 1886

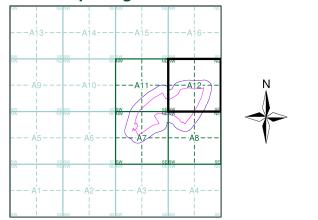
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.





Historical Map - Segment A12



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950

 Slice:
 A

 Site Area (Ha):
 25.12

 Search Buffer (m):
 100

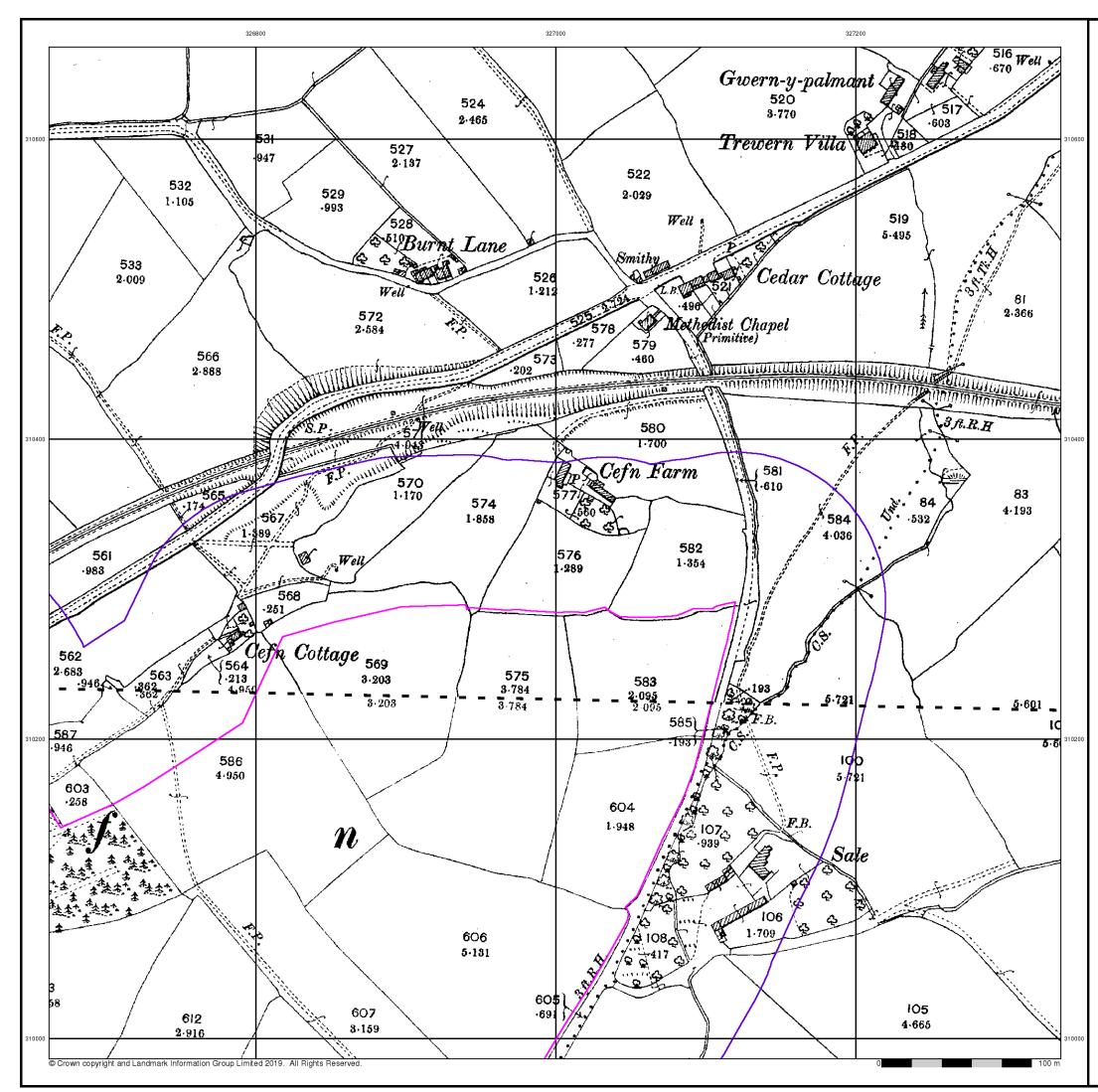
Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



0844 844 9952 0844 844 9951 www.envirocheck.co.uk

Tel: Fax:



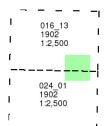


Published 1902

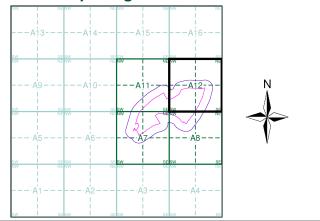
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.





Historical Map - Segment A12



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950

 Slice:
 A

 Site Area (Ha):
 25.12

 Search Buffer (m):
 100

Site Details

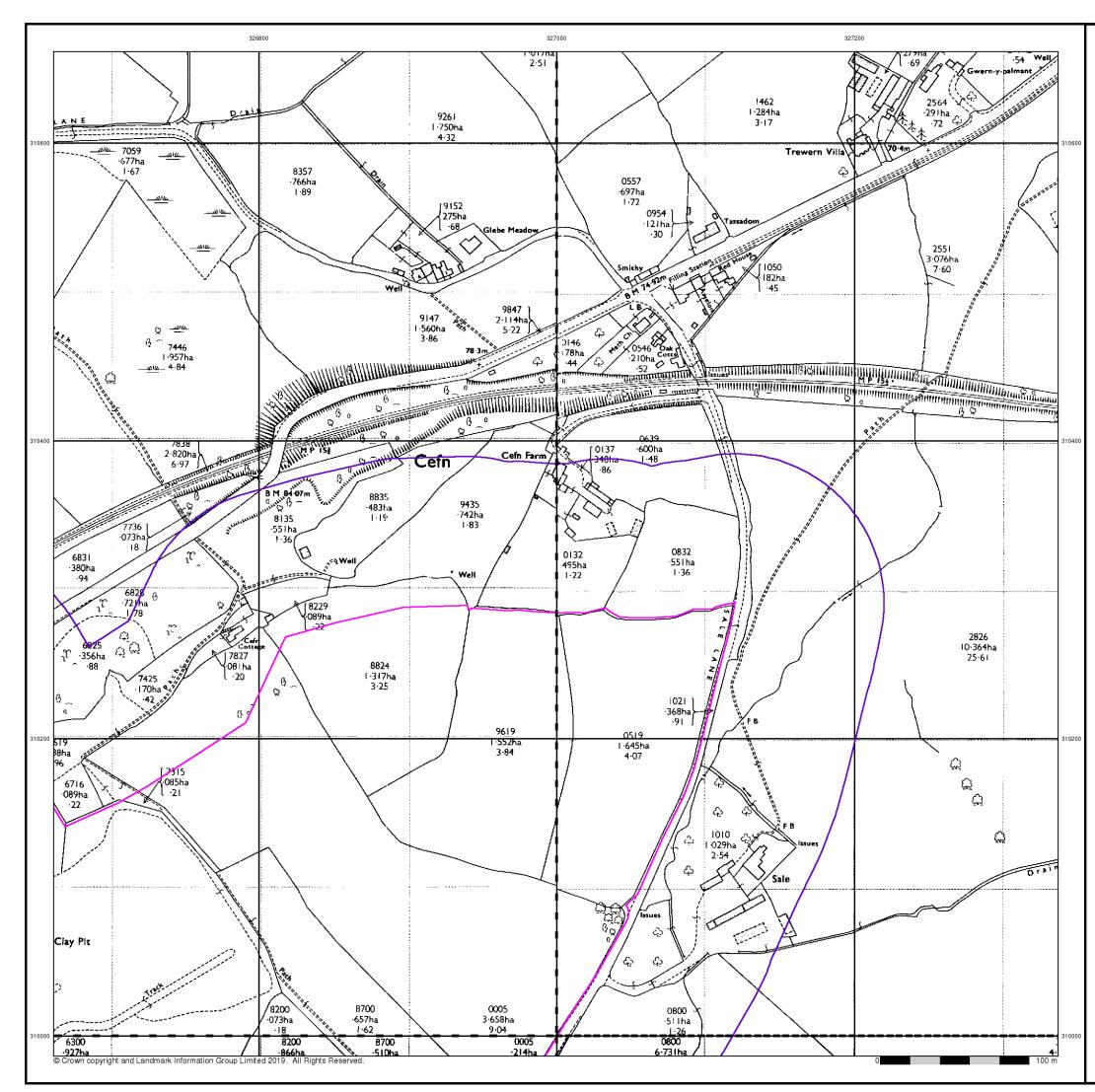
Quarry, Buttington, Welshpool, SY21 8SZ



0844 844 9952 0844 844 9951 www.envirocheck.co.uk

Tel:

Fax:

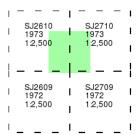




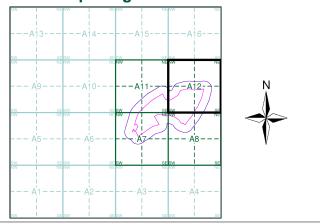
Ordnance Survey Plan Published 1972 - 1973 Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A12



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950

 Slice:
 A

 Site Area (Ha):
 25.12

 Search Buffer (m):
 100

Site Details

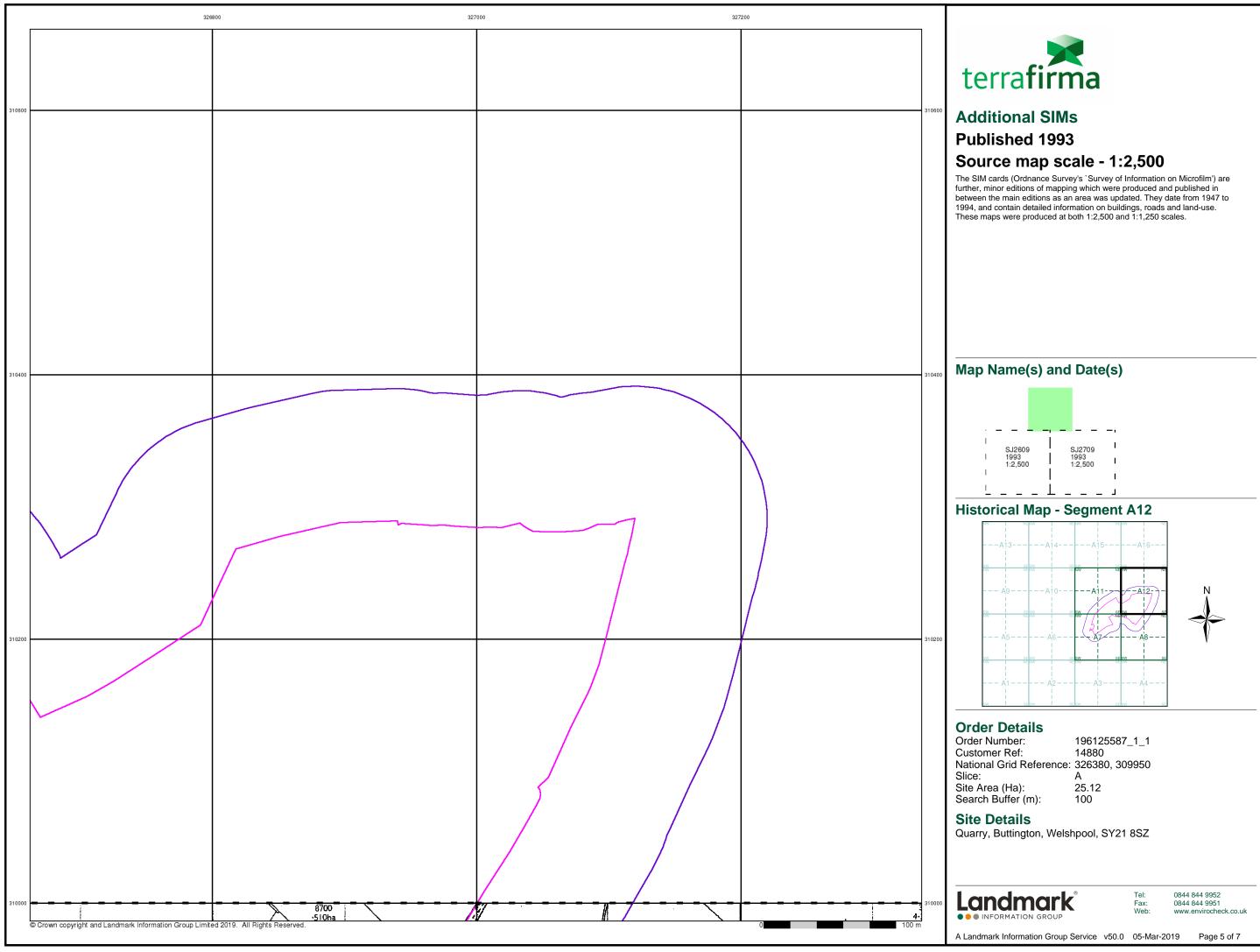
Quarry, Buttington, Welshpool, SY21 8SZ



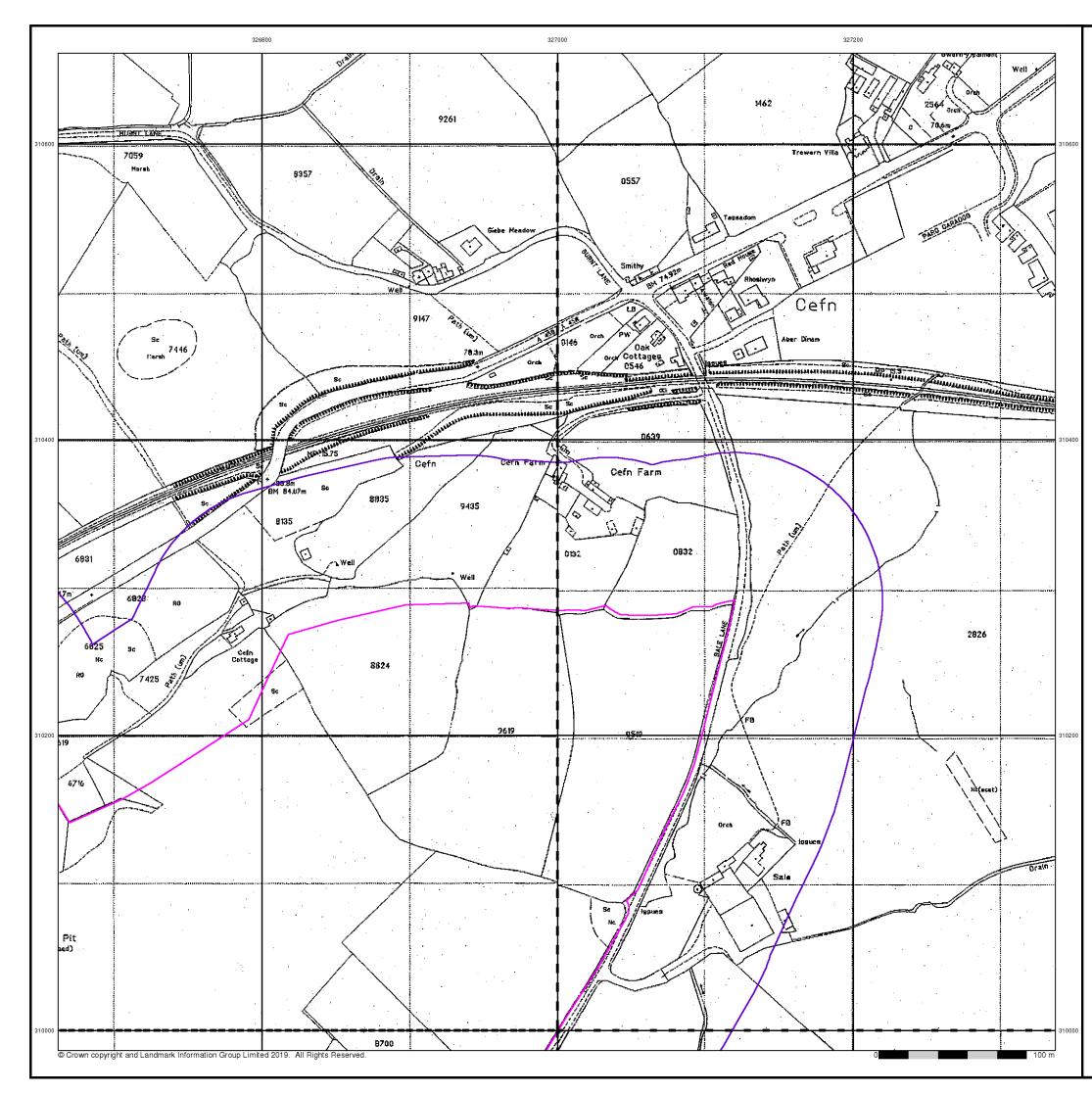
0844 844 9952 0844 844 9951 www.envirocheck.co.uk

Tel:

Fax:









Large-Scale National Grid Data Published 1994 - 1995

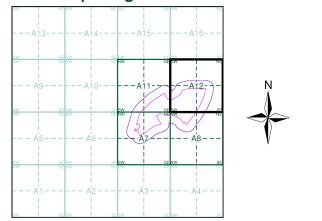
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

—	_	_		—	_	_
I.		610	I.	SJ2		I
T	199 1:2,	5 500	1	199 12,		I
1			1			Т
_	_	_			_	_
ī		609	1	SJ2		_,
 	199		 	SJ2 199 1:2,	4	-
 	199	4	 	199	4	-

Historical Map - Segment A12



Order Details

Order Number: 196125587_1_1 Customer Ref: National Grid Reference: 326380, 309950 Slice: Α Site Area (Ha): Search Buffer (m): 100

14880 25.12

> Tel: Fax:

> Web:

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



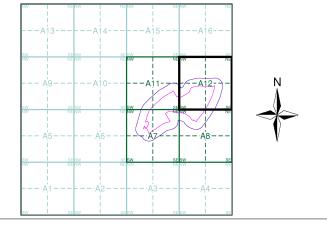




Historical Aerial Photography Published 2000

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A12



Order Details Order Number:

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 326380, 309950
 Slice: Site Area (Ha): Search Buffer (m): A 25.12 100

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



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Tel: Fax: Web:

Historical Mapping Legends

Ordnance Survey County Series 1:10,560	Ordnance Survey Plan 1:10,000	1:10,000 Raster Mapping
Gravel Sand Other Pit Pit Pits	رمینیک Chalk Pit, Clay Pit ورونیک Gravel Pit کرین or Quarry	Gravel Pit Gravel Pit or slag heap
Orchard Quarry	Sand Pit	Rock Cock (scattered)
A Reeds Marsh	Refuse or Lake, Loch	ົ້ໍ້ຈັ Boulders ໍ Boulders (scattered)
	Dunes 500 Boulders	Shingle Mud Mud
Mixed Wood Deciduous Brushwood	ネネ Coniferous ふ	Sand Sand Sand Pit
		Slopes Transmith Top of cliff
	ி ் Orchard இந்_ Scrub \Υ்னு Coppice	General detail Underground detail
Fir Furze Rough Pasture	יזר Bracken איזענעי Heath איז	— — — — Overhead detail ++++++++++ Narrow gauge railway
Arrow denotes Arrow denotes Trigonometrical flow of water Station	عنين Marsh ۲۷٬۰٬ Reeds <u>عن</u> Saltings	Multi-track Single track railway railway Civil, parish c
- → Site of Antiquities	Direction of Flow of Water Building	County boundary County, parising (England only) community District, Unitary,
Pump, Guide Post, Well, Spring, Signal Post Boundary Post • 285 Surface Level	Sand Glasshouse	Metropolitan, Constituency London Borough boundary boundary
Sketched Instrumental	Pylon —— □ — — Electricity Transmission Pole Line	Area of wooded ↓ ↑ Area of wooded ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓
Main Roads Fenced Minor Roads Fenced	·	
Un-Fenced Un-Fenced	Cutting Embankment Standard Gauge	
Sunken Road Raised Road	Road '''∏''' Road Level Foot Single Track Under Over Crossing Bridge	수 수 Orchard 《 Coppice 수 수
Road over Railway River	Siding, Tramway or Mineral Line Narrow Gauge	்பிட Rough பிட்சு Heath
Railway over Level Crossing	Geographical County	∩Scrub _⊻∠Marsh, Salt _⊻∠Marsh or Ree
Road over River or Canal Stream	— — — — Administrative County, County Borough or County of City Municipal Borough, Urban or Rural District,	Water feature Flow arrows
Road over Stream	Burgh or District Council Borough, Burgh or County Constituency Shown only when not coincident with other boundaries	MHW(S) Mean high water (springs) Mean low water (springs)
————— County Boundary (Geographical)	— — — — Civil Parish Shown alternately when coincidence of boundaries occurs	Telephone line Electricity (where shown) (with poles)
County & Civil Parish Boundary	BP, BS Boundary Post or Stone Pol Sta Police Station	(with poles) ← Bench mark _ Triangulation
+ · + · + · + · + Administrative County & Civil Parish Boundary County Borough Boundary (England)	Ch Church PO Post Office CH Club House PC Public Convenience	Point feature Pylon flare s
	F E Sta Fire Engine Station PH Public House FB Foot Bridge SB Signal Box – – – – –	 (e.g. Guide Post ⊠ or lighting tov or Mile Stone)
Co. Boro. Bdy.		
	Fn Fountain Spr Spring GP Guide Post TCB Telephone Call Box MP Mile Post TCP Telephone Call Post	•‡• Site of (antiquity) Glasshouse

ping

Underground detail Narrow gauge railway Single track railway Civil, parish or community boundary Constituency boundary

Non-coniferous

Marsh, Salt Marsh or Reeds

water (springs)

transmission line

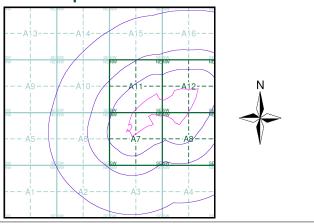
Pylon, flare stack or lighting tower



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Montgomeryshire	1:10,560	1884 - 1886	2
Montgomeryshire	1:10,560	1902 - 1903	3
Shropshire	1:10,560	1903	4
Montgomeryshire	1:10,560	1938 - 1953	5
Montgomeryshire	1:10,560	1953	6
Ordnance Survey Plan	1:10,000	1954	7
Ordnance Survey Plan	1:10,000	1963 - 1969	8
Ordnance Survey Plan	1:10,000	1976 - 1978	9
Ordnance Survey Plan	1:10,000	1980	10
10K Raster Mapping	1:10,000	2000	11
10K Raster Mapping	1:10,000	2006	12
VectorMap Local	1:10,000	2019	13

Historical Map - Slice A



Order Details

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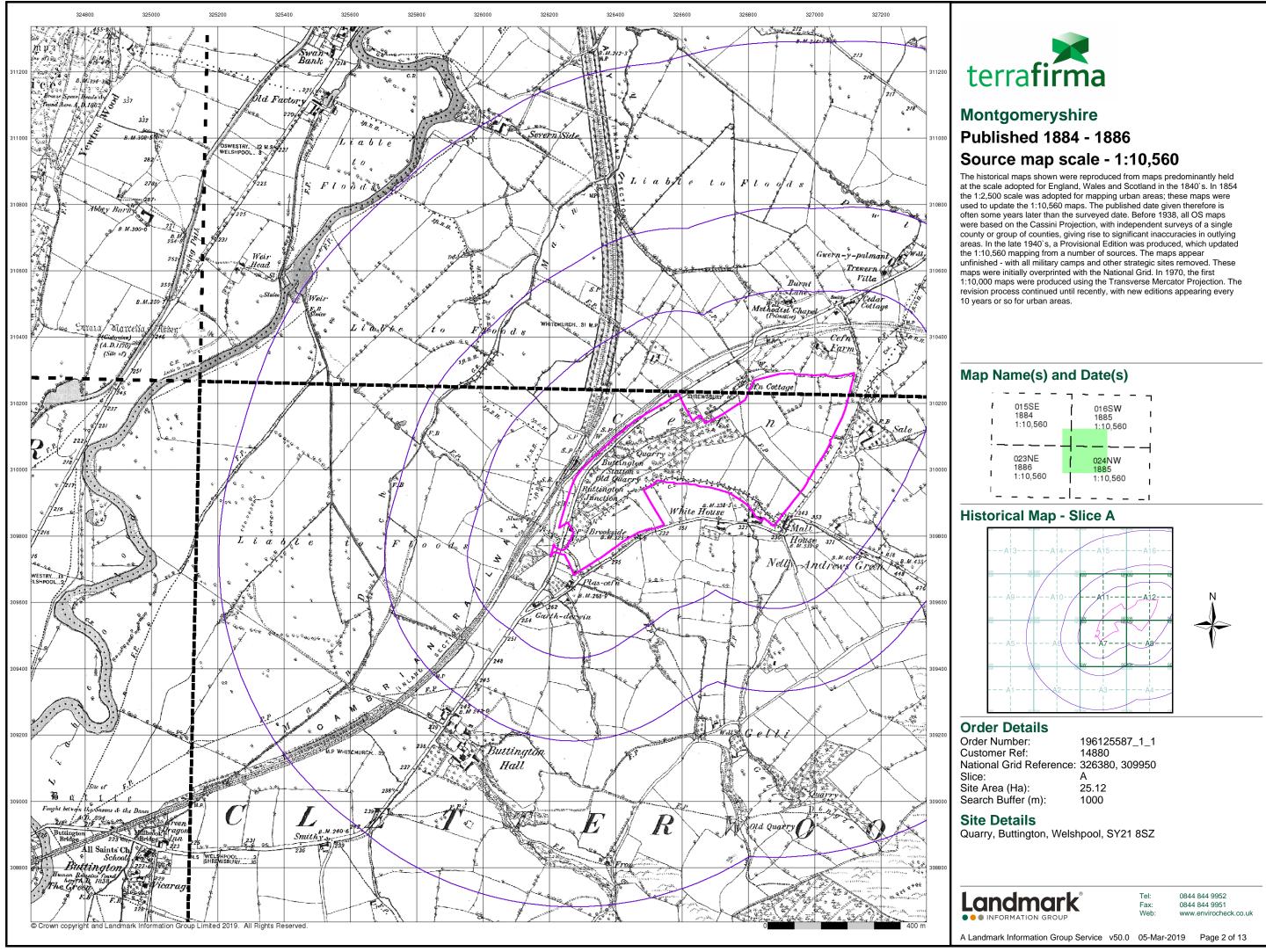
196125587_1_1 14880 А 25.12 1000

Site Details

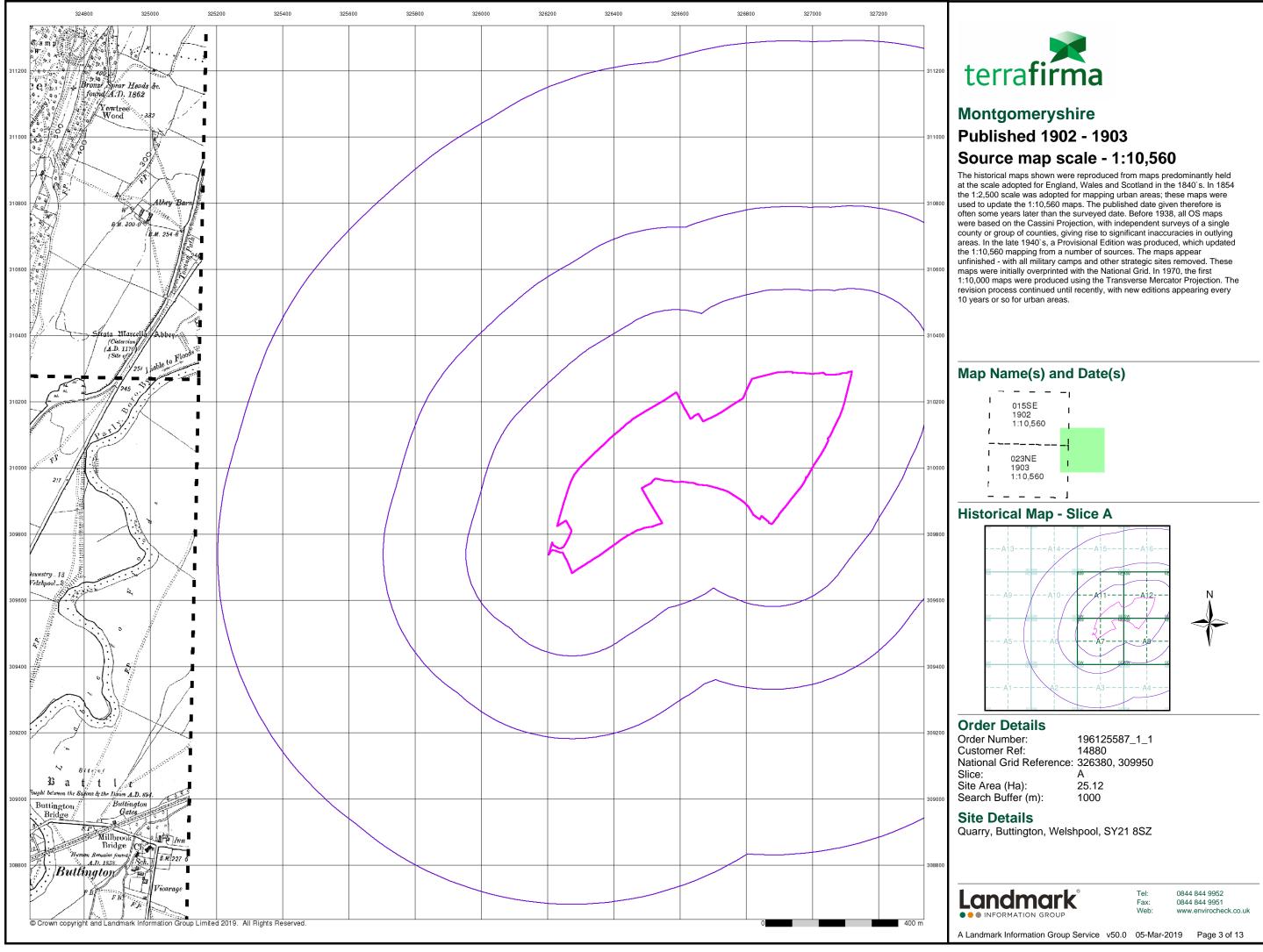
Quarry, Buttington, Welshpool, SY21 8SZ



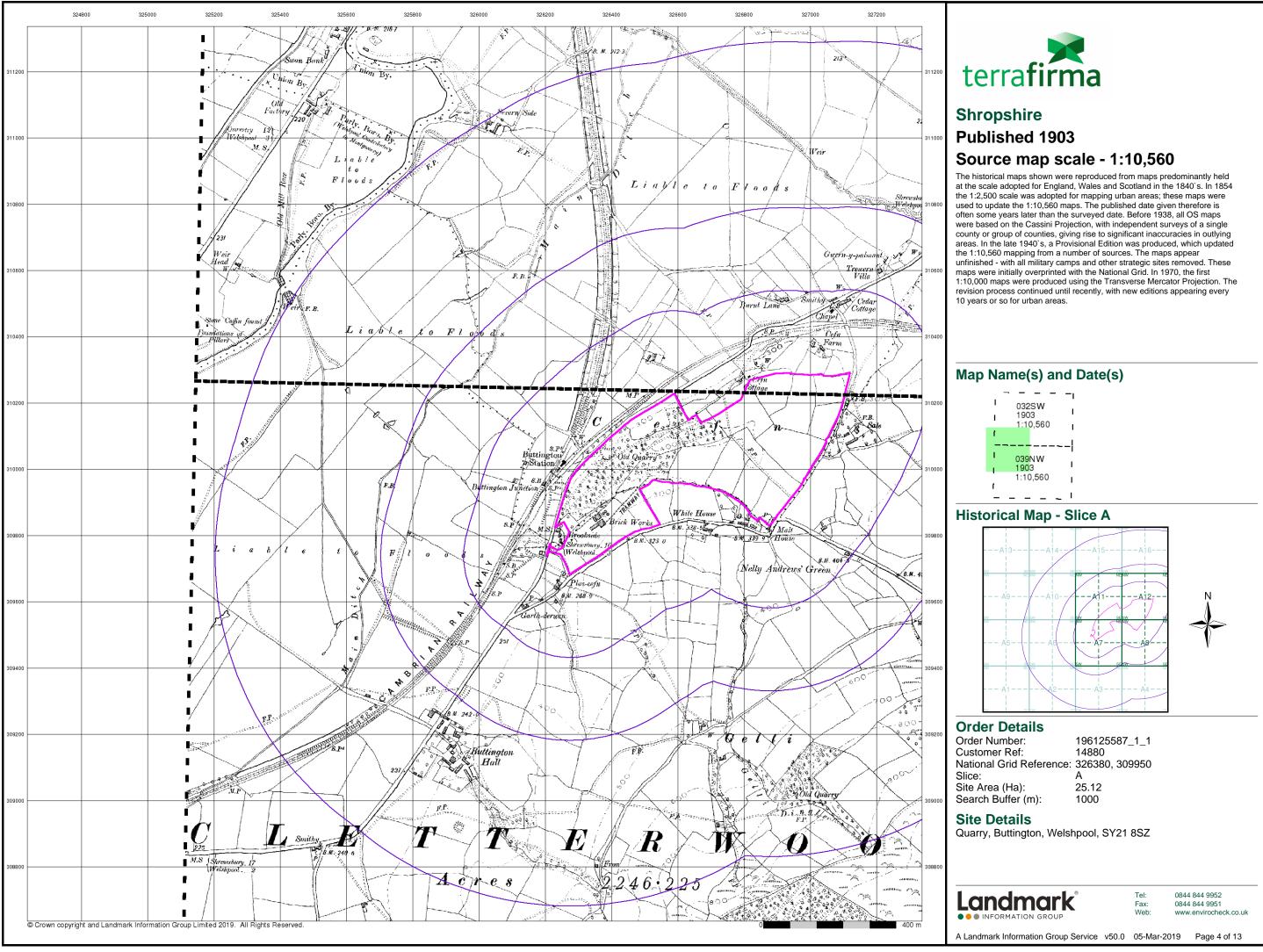
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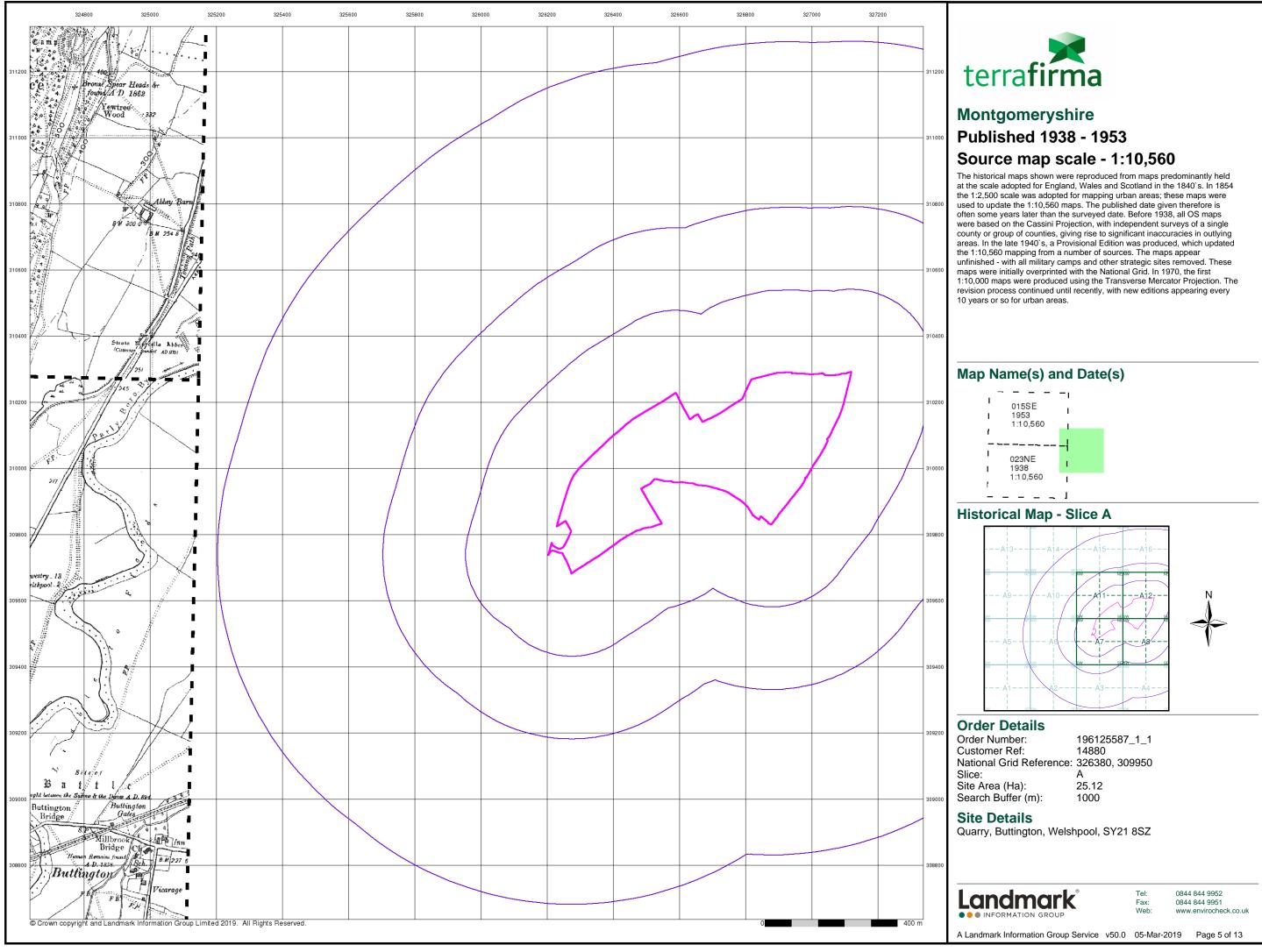




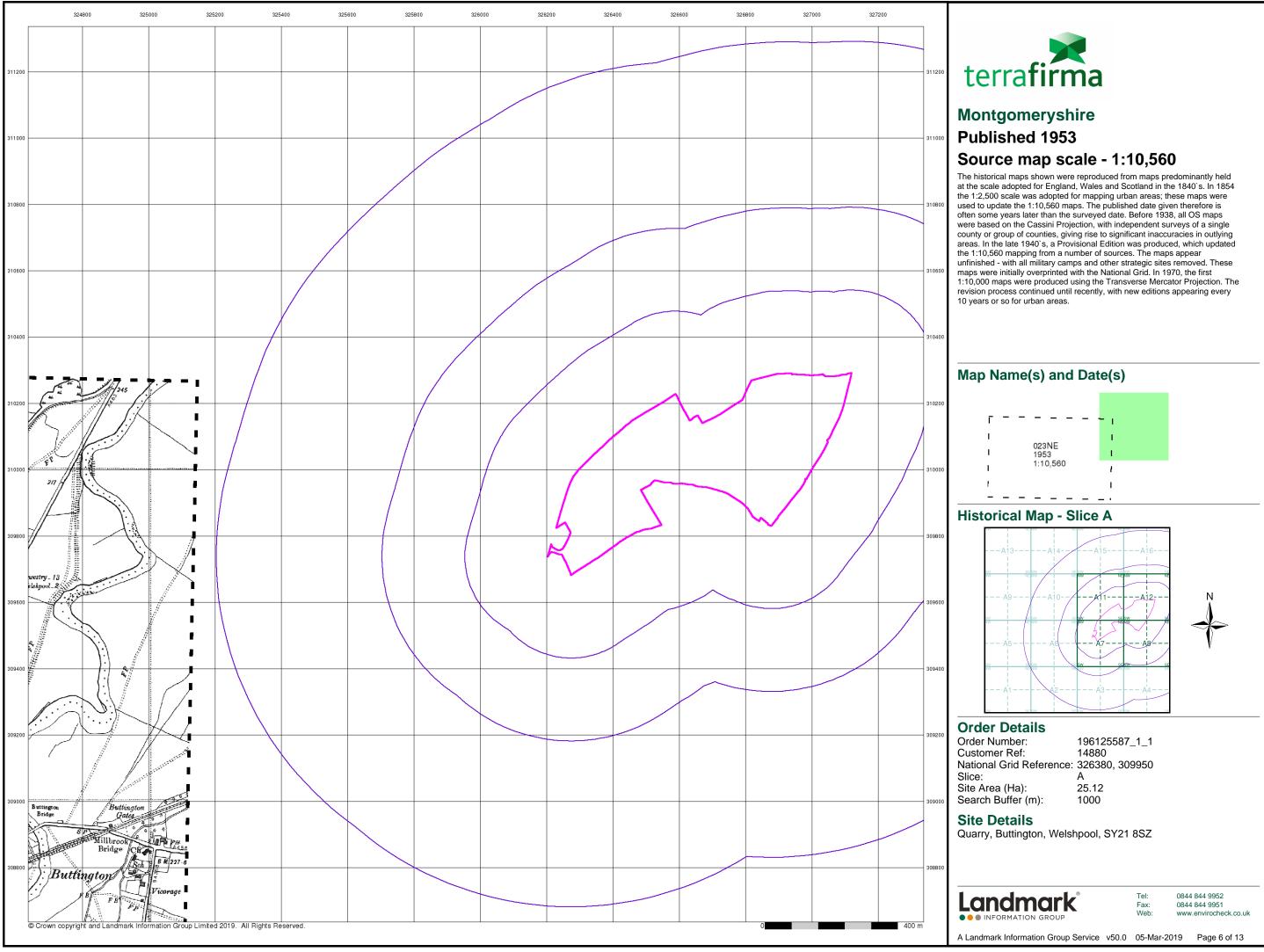




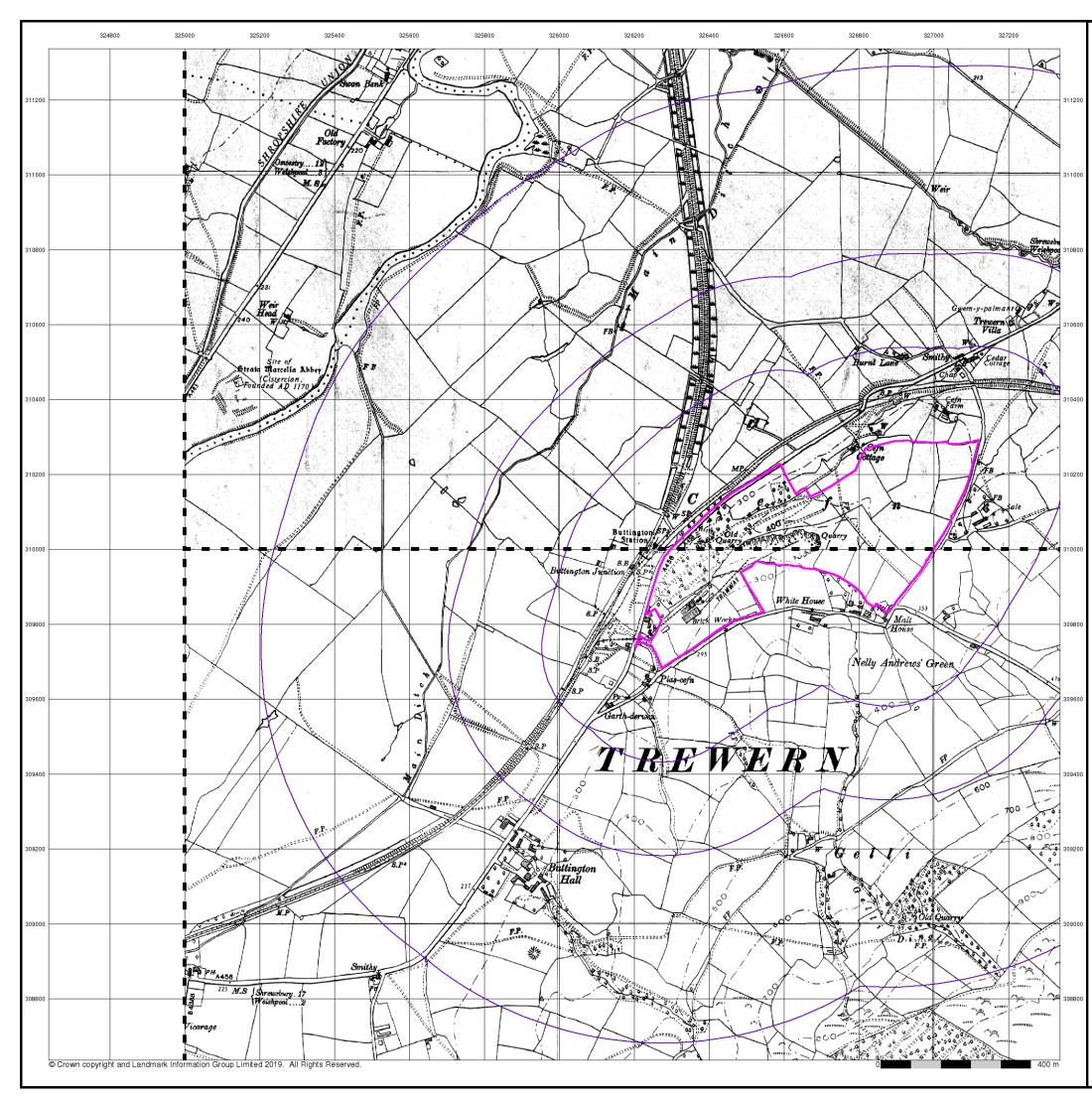










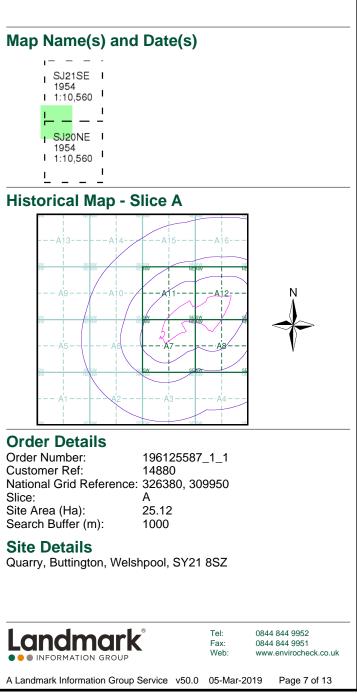


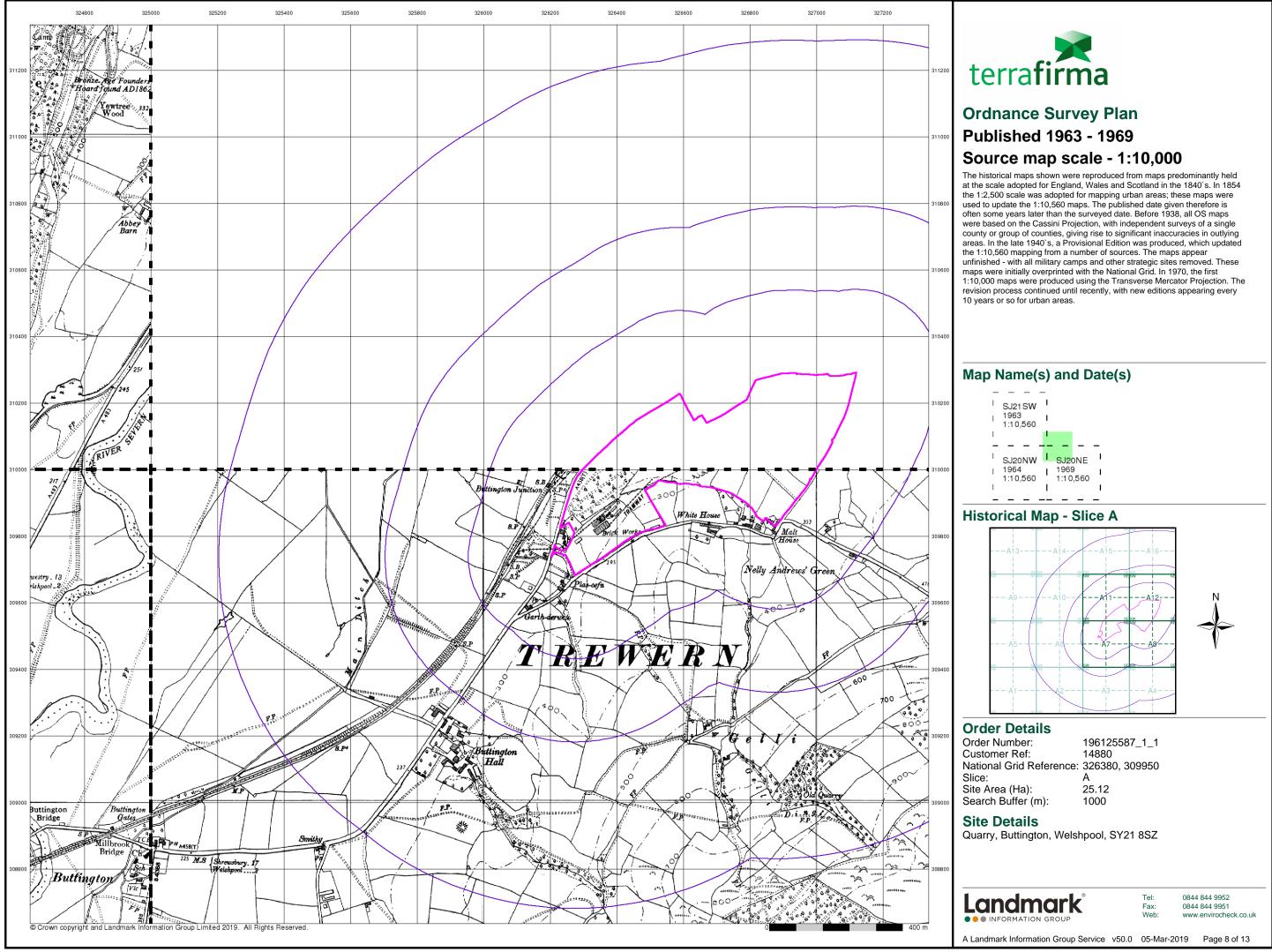


Ordnance Survey Plan Published 1954

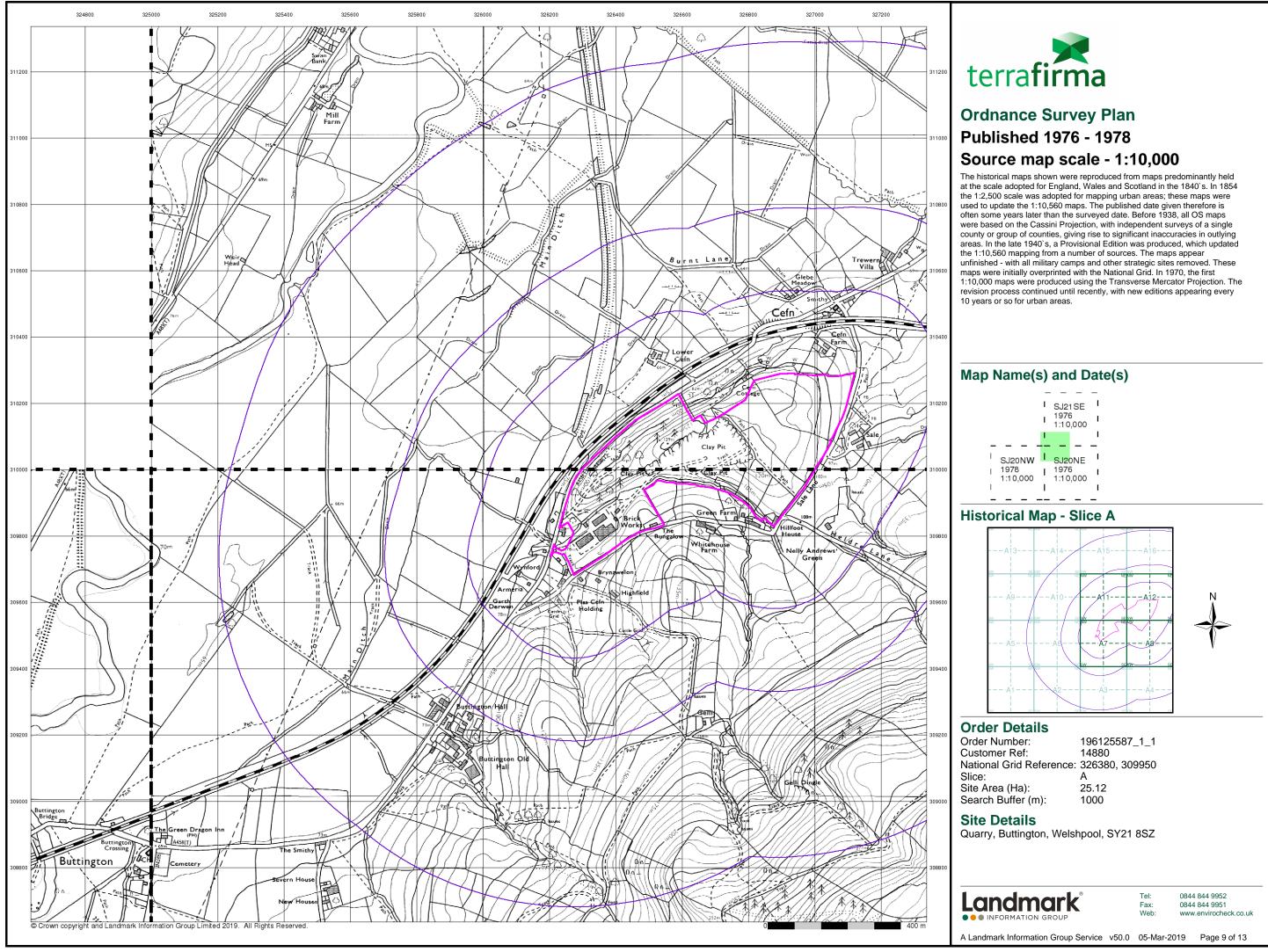
Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

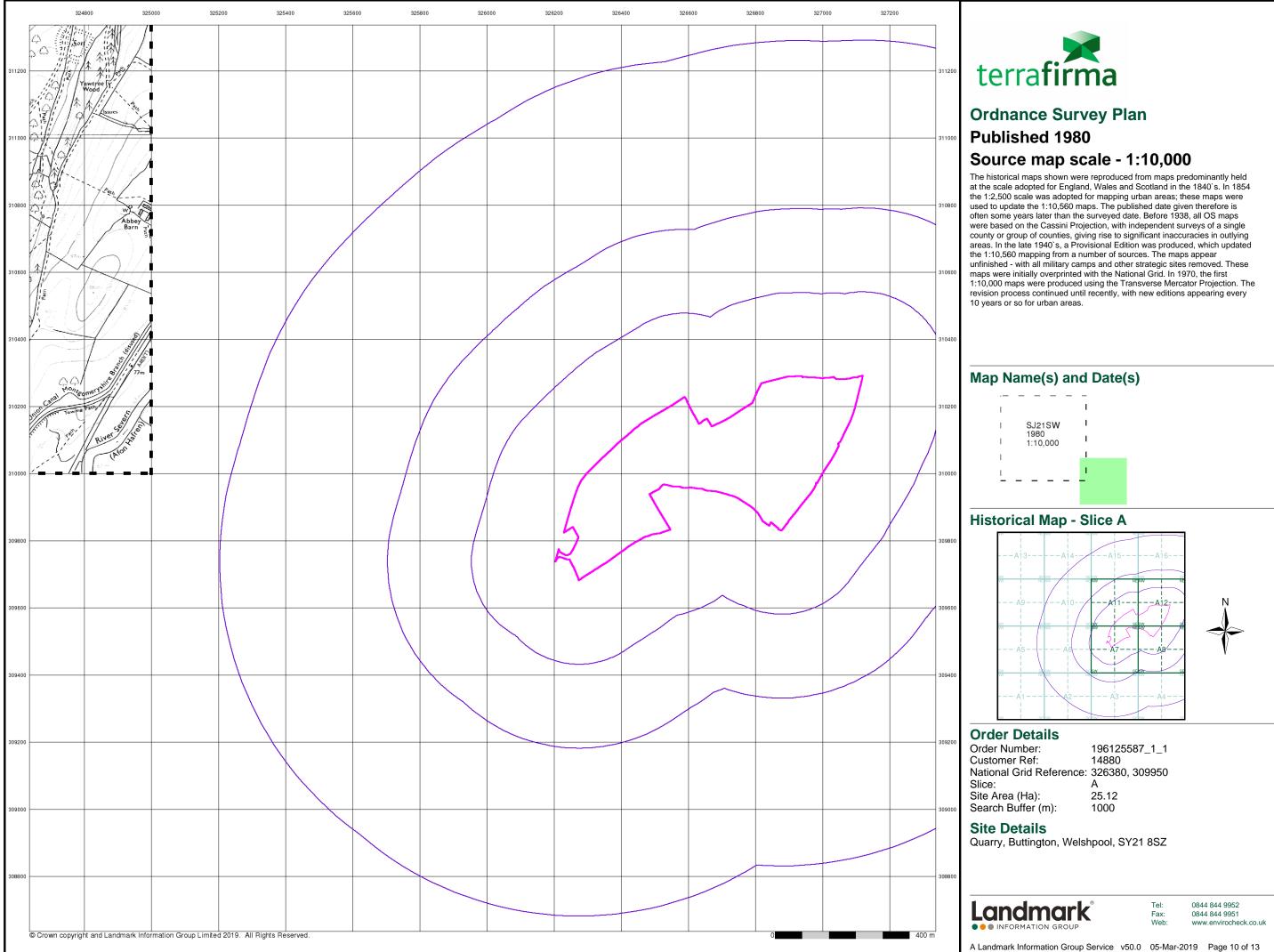




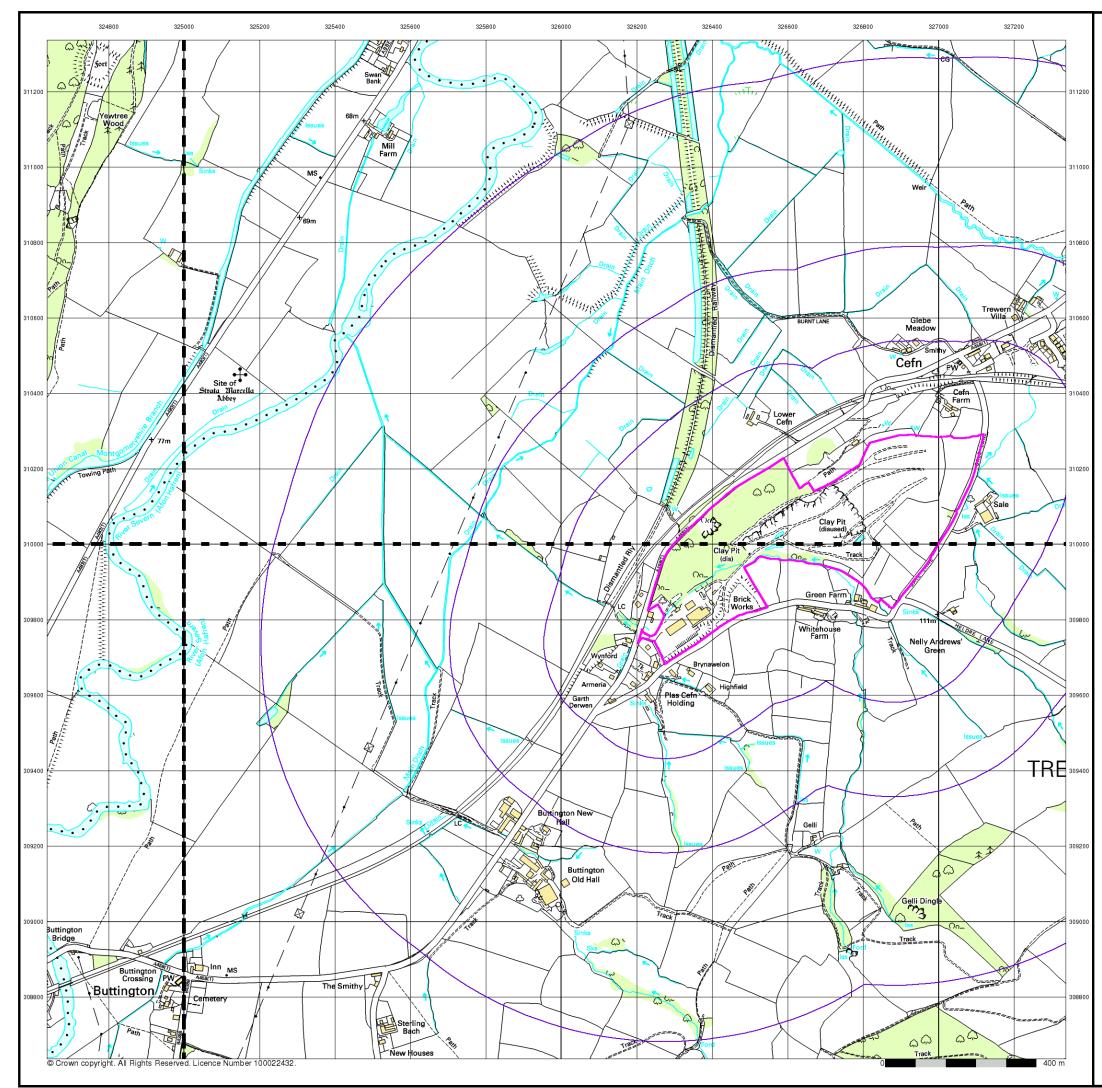














10k Raster Mapping Published 2000

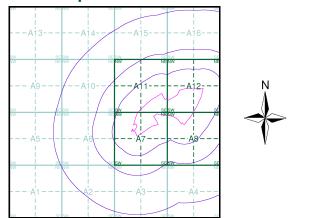
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

SJ21 SW	SJ21SE
2000 1:10,000	2000 1:10,000
1	I I
SJ20NW	I SJ20NE I
2000	
	2000 1:10.000
1:10,000	2000 1:10,000

Historical Map - Slice A



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: Α Site Area (Ha): Search Buffer (m):

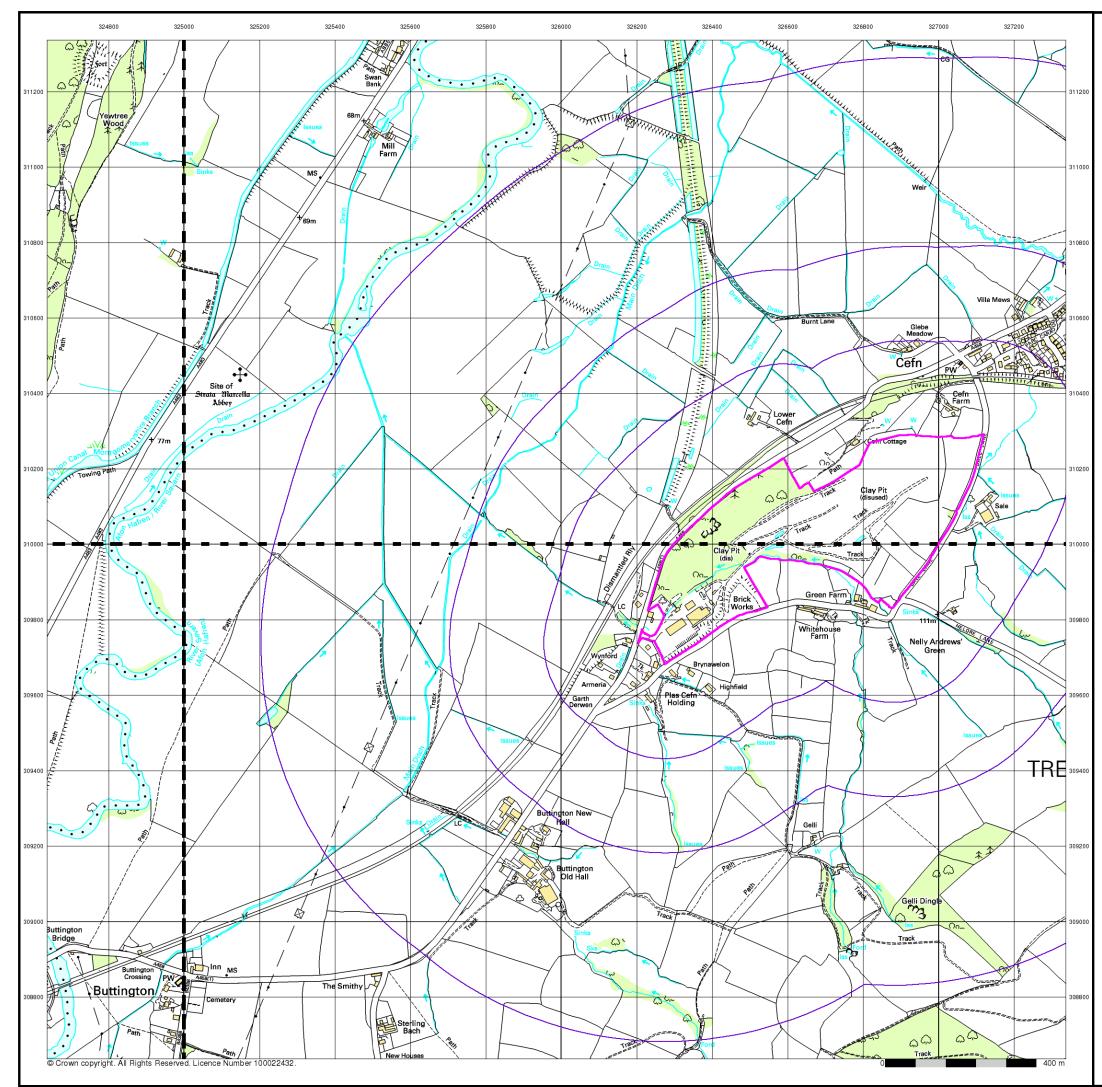
196125587_1_1 14880 25.12 1000

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



Tel: Fax: Web:





10k Raster Mapping Published 2006

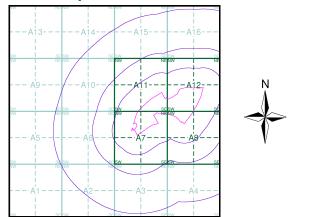
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)

·		—	-	—
SJ21 SW	Т	SJ2	ISE	Т
2006 1:10,000	Т	2006	6 .000	Т
1		1.10	,000	Т
		_	_	_
SJ20NW	ī	_ SJ20	- NE	- 1
2006	 	2006	5	- 1
	 	2006		- 1 1

Historical Map - Slice A



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: Α Site Area (Ha): Search Buffer (m):

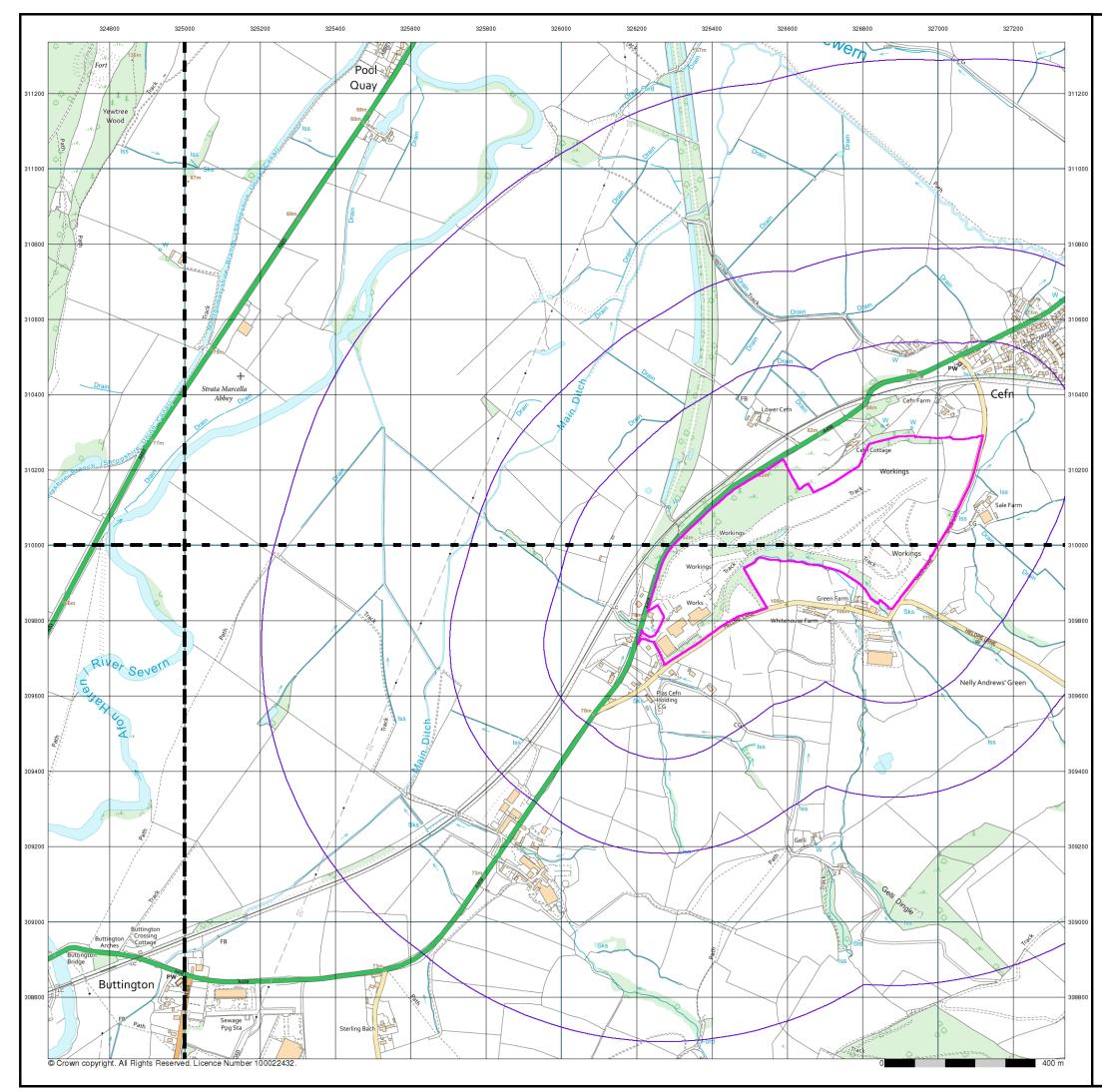
196125587_1_1 14880 25.12 1000

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



Tel: Fax: Web:





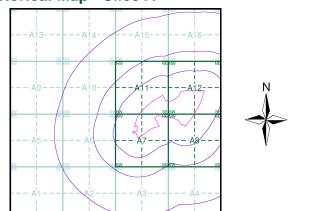
VectorMap Local Published 2019 Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

		-
SJ21 SW	SJ21 SE	I
l 2019 Variable	I 2019 Variable	I
		ı
		-
– – – –		- 1
SJ20NW 2019 Variable	I SJ20NE 2019 Variable	-

- - - - - - - -**Historical Map - Slice A**



Order Details

Order Number: Customer Ref: National Grid Reference: 326380, 309950 Slice: Site Area (Ha): Search Buffer (m):

196125587_1_1 14880 А 25.12 1000

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



Tel: Fax: Web:

Historical Mapping Legends

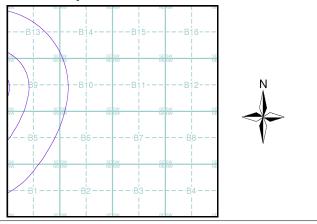
Ordnance	Survey County S	Series 1:10,560	0	rdnance Surve	ey Plan 1	:10,000		1:10,000 Ras	ster Mapp	bing
Grav Pit	vel Sand Pit	Other	Contraction of the second	Chalk Pit, Clay Pit	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	°₀ Gravel Pit		Gra∨el Pit		Refuse tip or slag heap
C Quar	rry Shingle	•••••• •••••••• Orchard		Sand Pit	,	 Disused Pit or Quarry 		Rock		Rock (scattered)
^{**} ***** ******** ********************	ers	Marsh	0.000	Refuse or Slag Heap		Lake, Loch or Pond		Boulders	00 000	Boulders (scattered)
		207 209 x07 227 207 209 x07 227		. Dunes	° 2 0 0 1 0 0 1	p Boulders		Shingle	Mud	Mud
Mixed Woo	d Deciduous	Brushwood	* * *	Coniferous Trees	4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4	Non-Coniferous Trees	Sand	Sand		Sand Pit
			φ	Orchard ∩ ₀_	Scrub	עזיע Coppice	1111111	Slopes	٢٢٢٢٢٢٢	Top of cliff Underground
Fir	Furze	Rough Pasture	ា ា ក	Bracken SMUU	Heath '	、,,,,Rough Grassland		General detail - O∨erhead detail		detail Narrow gauge railway
	rrow denotes 🔉 🔺	Trigonometrical Station	<u>، د</u>	Marsh	Reeds	<u>→_</u> Saltings		Multi-track railway		Single track railway
	ite of Antiquities 🔹 🛧	Bench Mark		Direc	tion of Flow of	Water	_•_•	County boundary (England only)	••••	Ci∨il, parish or community boundary
• Si	ump, Guide Post, ignal Post urface Level	Well, Spring, Boundary Post		Glasshouse	**	Sand		District, Unitary, Metropolitan, London Borough boundary		Constituency boundary
Sketched	Instrum Contou	200		Sloping Masonry	Pylon — — 🗆 — Pole	Electricity Transmission Line	۵ ^۵ **	Area of wooded vegetation	۵۵ ۵۵	Non-coniferous trees
Main Roads	Fenced Minor F	Roads Un-Fenced	Cutting	Embankm		— Standard Gauge	Ω	Non-coniferous trees (scattered) Coniferous	** **	Coniferous trees Positioned
	Sunken Road	Raised Road	 Road'''	J //	·····	Multiple Track ⊢ Standard Gauge Single Track	* 4 4	trees (scattered) Orchard		tree Coppice
and the state of t	Road over Railway	Railway over River	Under	Over Cross			் க வர் காட	Rough Grassland		or Osiers Heath
	Railway o∨er Road //	Level Crossing			unty		00_ 00_	Scrub	אַעַיג אַעַיג	Marsh, Salt Marsh or Reed
	Road over River or Canal	Road over		Administrative Co or County of City Municipal Boroug		_	S	Water feature	← ←	Flow arrows
	Road o∨er Stream			Burgh or District	Council or County Con	stituency	MHW(S)	Mean high water (springs)	MLW(S)	Mean low water (springs
	County Boundary (Geogra County & Ci∨il Parish Bou	• •		Civil Parish Shown alternately w	/hen coincidence	of boundaries occurs	+-	Telephone line (where shown)	- • • -	Electricity transmission li (with poles)
+· +· + · +	Administrati∨e County & 0	_	Ch	Boundary Post or Stone Church	PO	Police Station Post Office	← BM 123.45 m	Bench mark (where shown)	Δ	Triangulation station
Co. Boro. Bdy.	County Borough Boundary		F E Sta	Club House Fire Engine Station Foot Bridge	РН	Public Convenience Public House Signal Box		Point feature (e.g. Guide Post or Mile Stone)	\boxtimes	Pylon, flare st or lighting tow
Co. Burgh Bdy.	County Burgh Boundary (Scollanu)		Fountain Guide Post		Spring Telephone Call Box	•[•	Site of (antiquity)		Glasshouse
⊻	Rural District Boundary		MP	Mile Post	TCP	Telephone Call Post				



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Shropshire	1:10,560	1883 - 1886	2
Montgomeryshire	1:10,560	1885	3
Shropshire	1:10,560	1902 - 1903	4
Ordnance Survey Plan	1:10,000	1954	5
Ordnance Survey Plan	1:10,000	1969	6
Ordnance Survey Plan	1:10,000	1970 - 1976	7
Ordnance Survey Plan	1:10,000	1978	8
10K Raster Mapping	1:10,000	2000	9
10K Raster Mapping	1:10,000	2006	10
VectorMap Local	1:10,000	2019	11

Historical Map - Slice B



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 327660, 310170

 Slice:
 B

 Site Area (Ha):
 25.12

 Search Buffer (m):
 1000

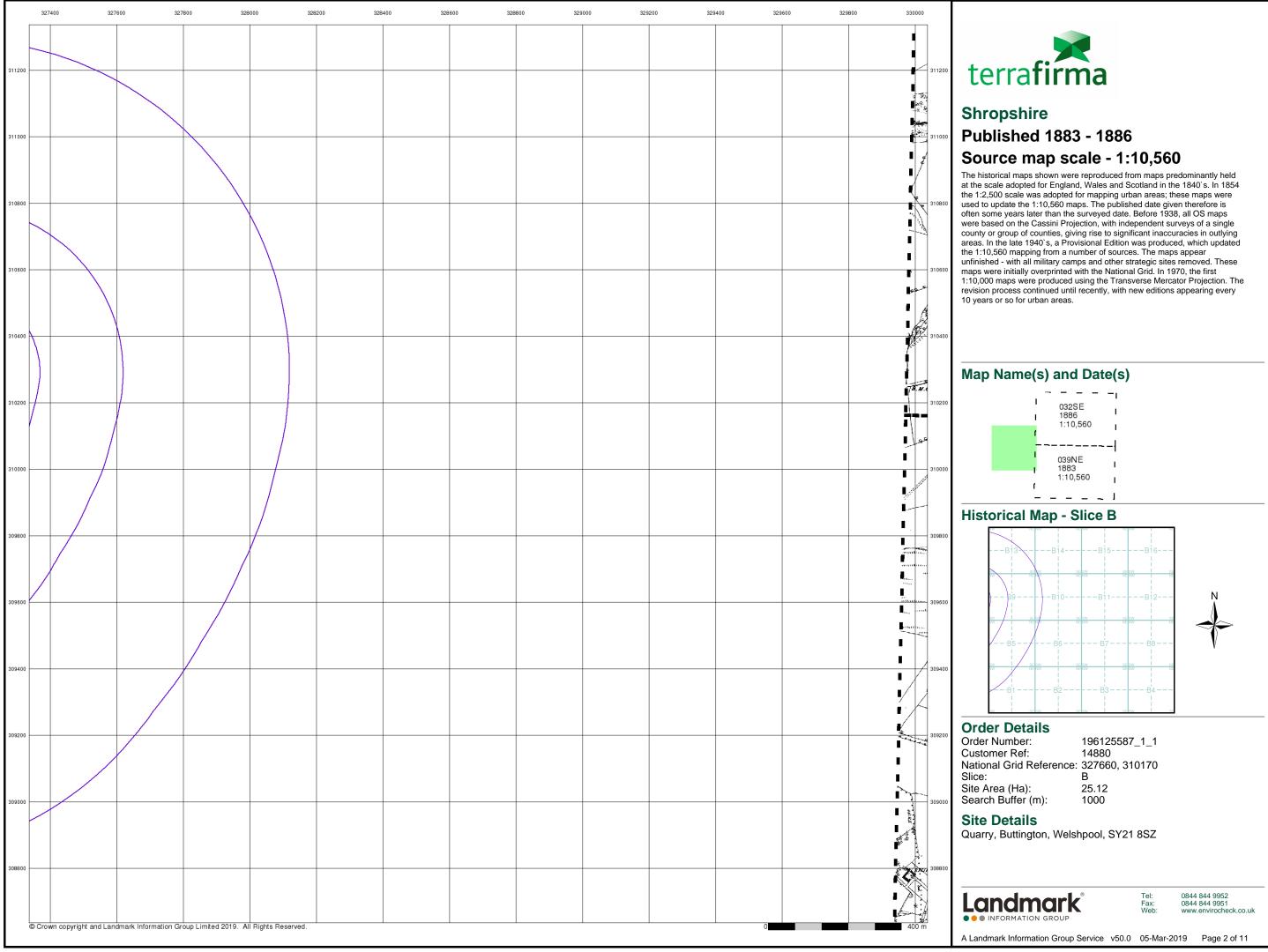
Site Details

Quarry, Buttington, Welshpool, SY21 8SZ

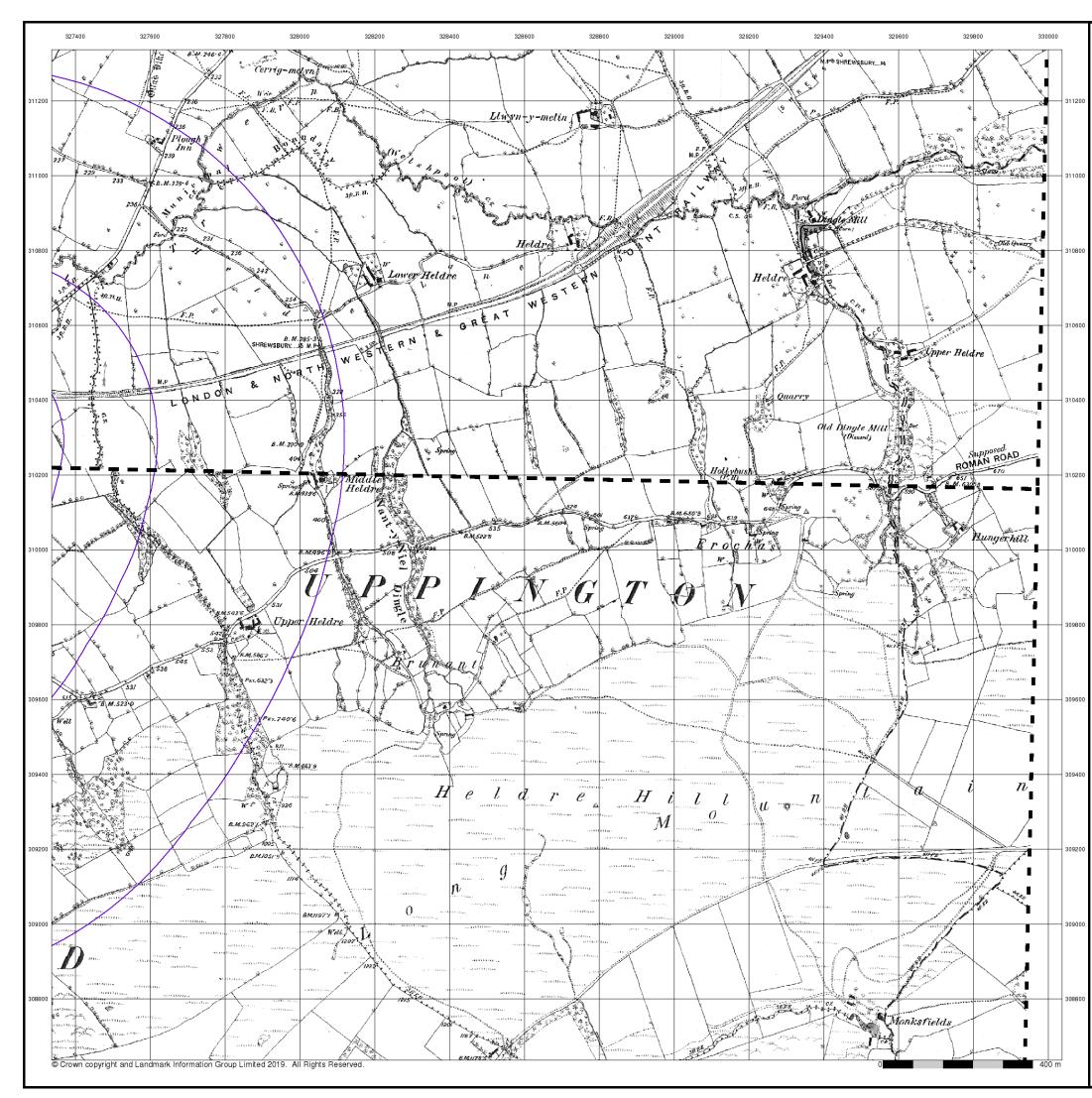


0844 844 9952 0844 844 9951 www.envirocheck.co.uk

Tel: Fax: Web:





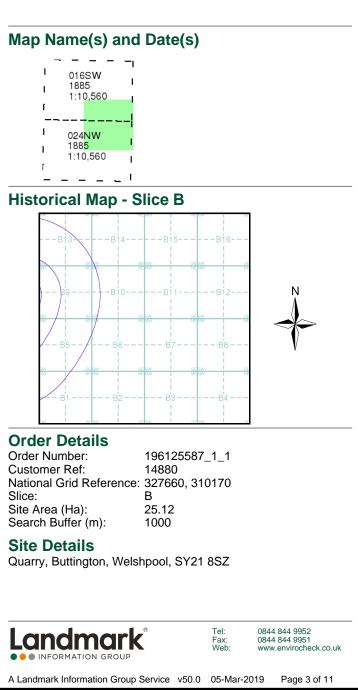


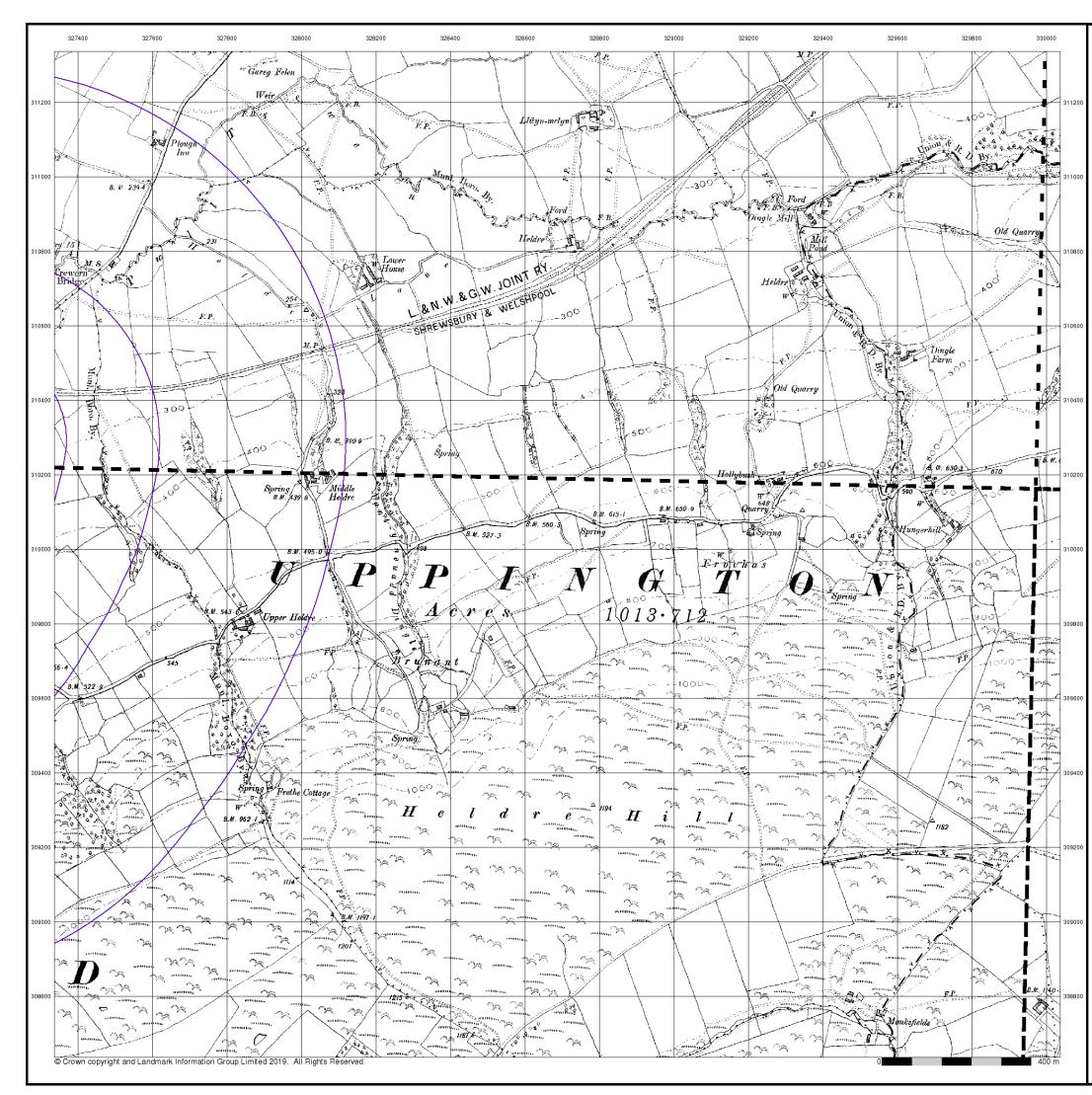


Published 1885

Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.



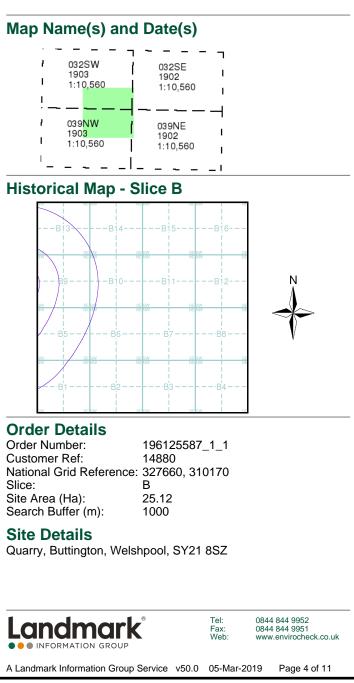


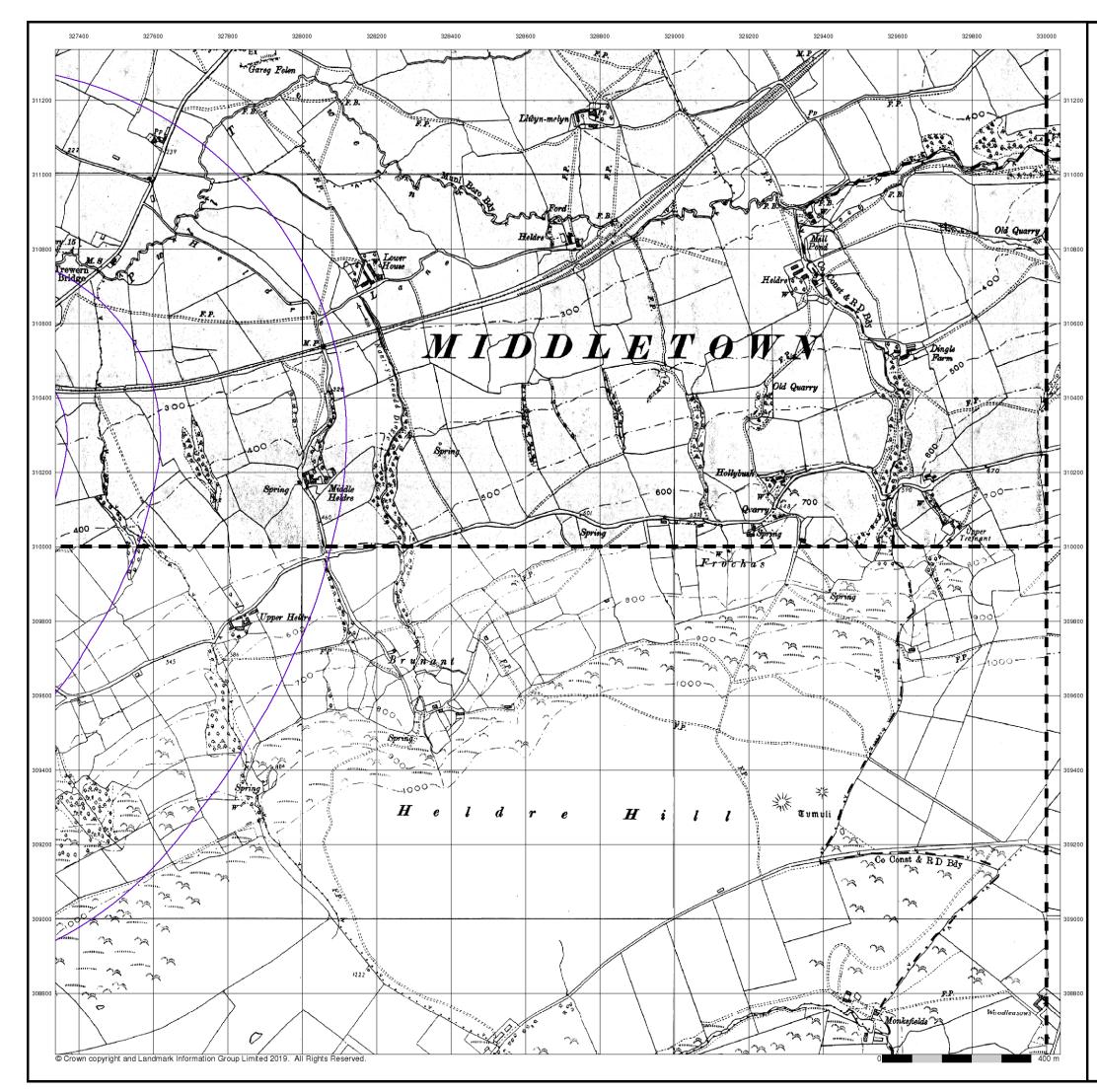


Shropshire

Published 1902 - 1903 Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.







Ordnance Survey Plan Published 1954

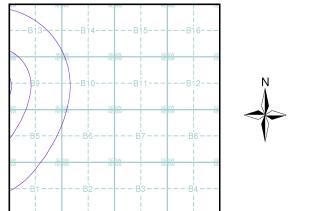
Source map scale - 1:10,000

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Map Name(s) and Date(s)

SJ21 SE	I _{SJ31 SW} I
1954 1:10,560	1954 1:10,560
1	I I
– – – – ^I SJ20NE	– – – – – I _{SJ30NW} I
– – – – – I SJ20NE I 1954 1:10,560	SJ30NW 1 1954 1:10,560

Historical Map - Slice B



Order Details

Order Number: 196125587_1_1 Customer Ref: 14880 National Grid Reference: 327660, 310170 Slice: В Site Area (Ha): Search Buffer (m): 25.12 1000

Site Details

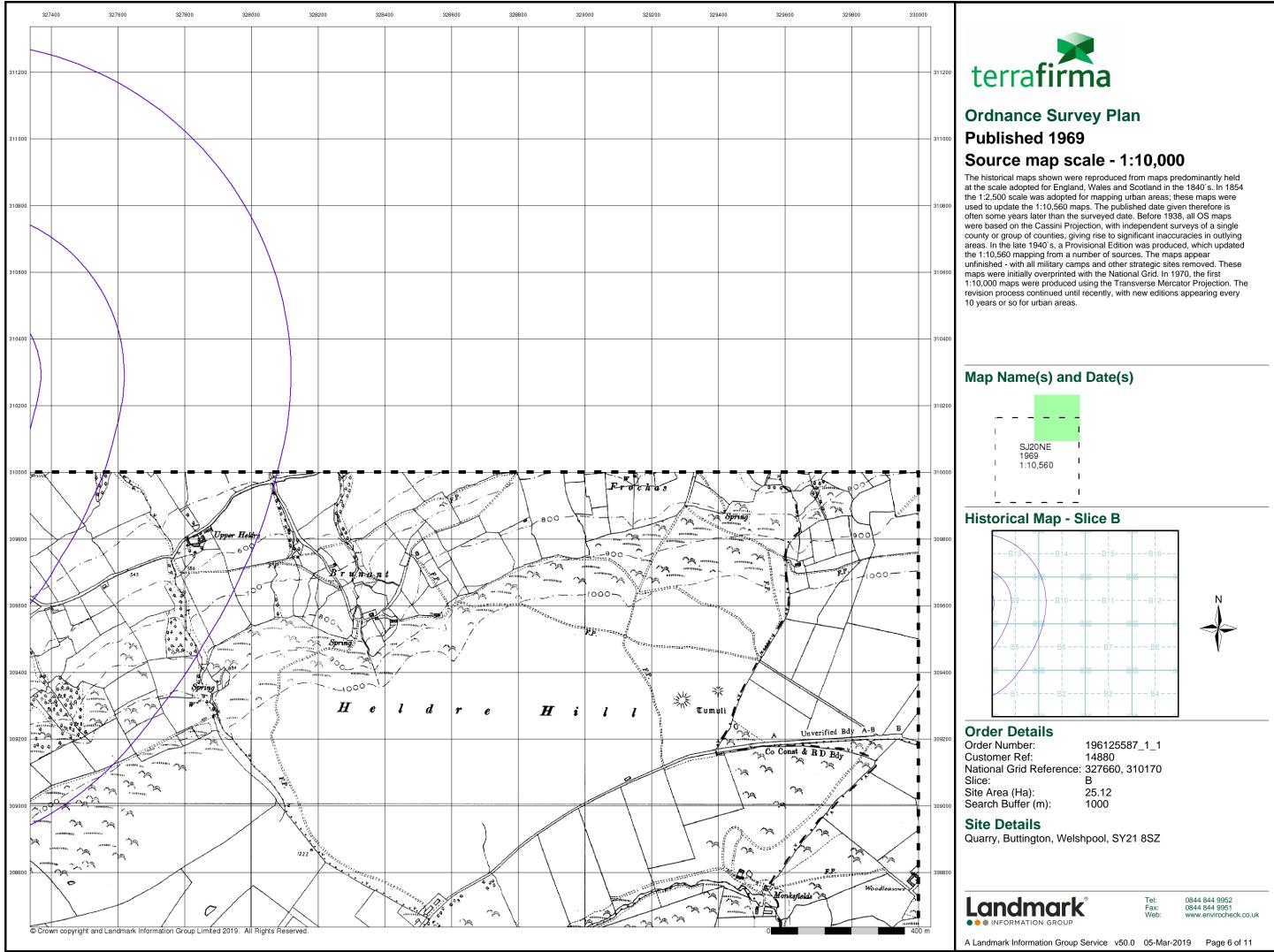
Quarry, Buttington, Welshpool, SY21 8SZ



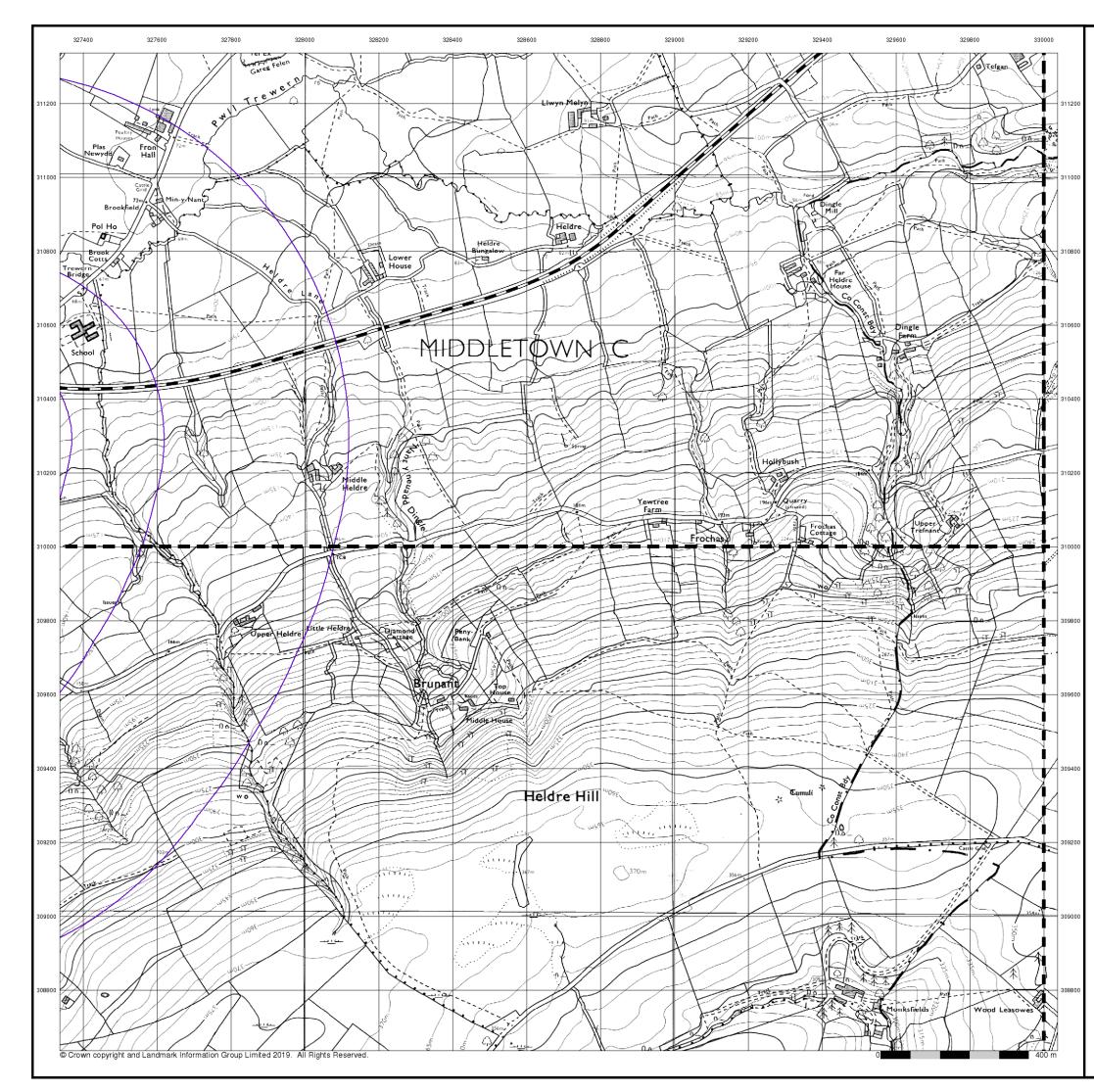
0844 844 9952

Tel: Fax: Web:

0844 844 9951 www.envirocheck.co.uk









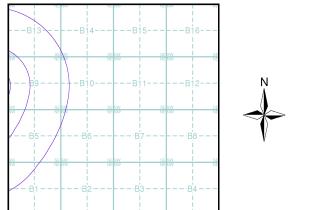
Ordnance Survey Plan Published 1970 - 1976 Source map scale - 1:10,000

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

SJ21 SE	SJ31 SW
1976 1:10,000	1970 1:10,560
1.10,000	I I
– – – – I _{SJ20NE}	
– – – – – I SJ20NE I 1976 1:10.000	SJ30NW 1 1971 1:10,560

Historical Map - Slice B



Order Details

Order Number: 196125587_1_1 Customer Ref: 14880 National Grid Reference: 327660, 310170 Slice: В Site Area (Ha): Search Buffer (m): 25.12 1000

Site Details

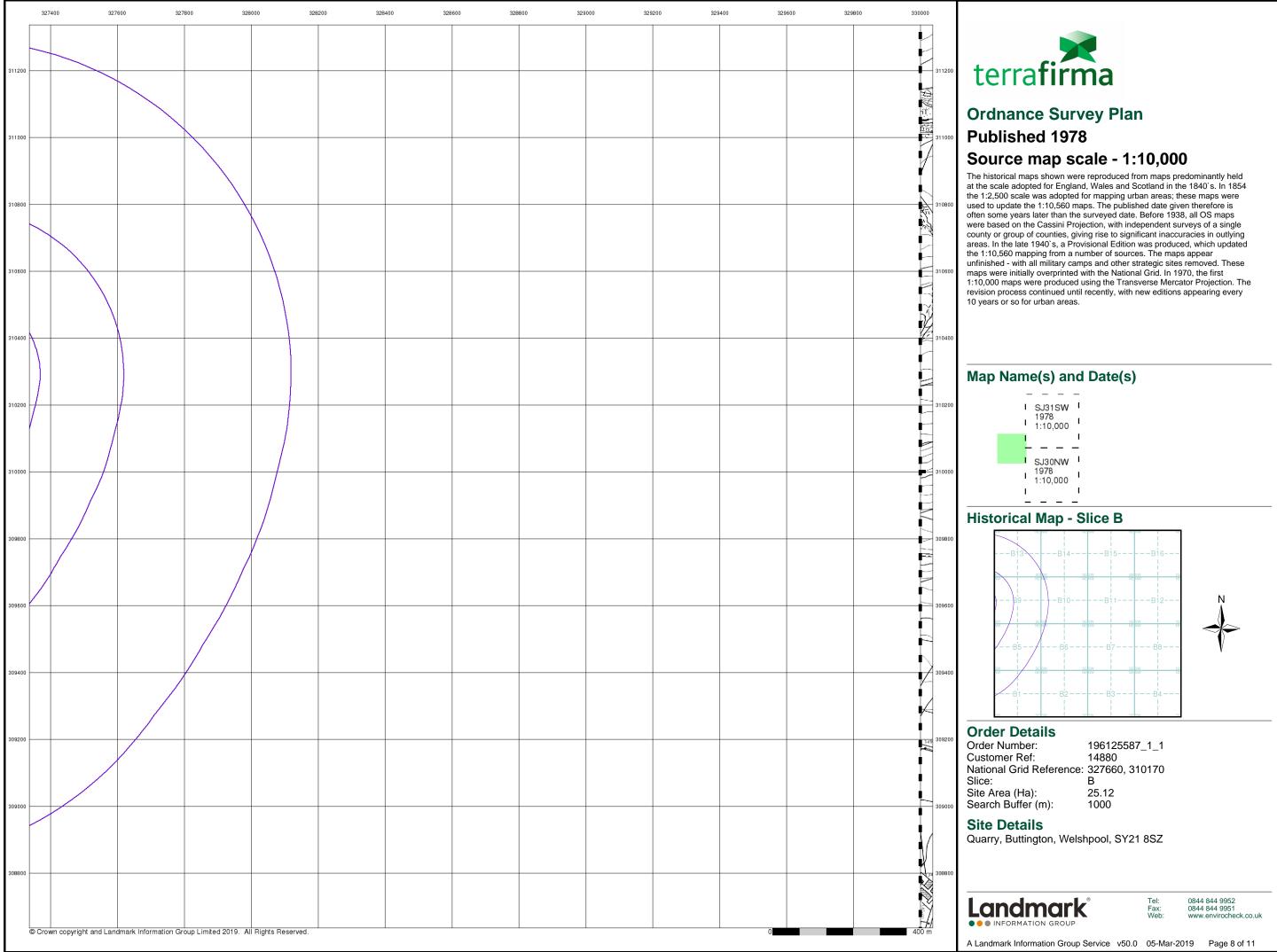
Quarry, Buttington, Welshpool, SY21 8SZ



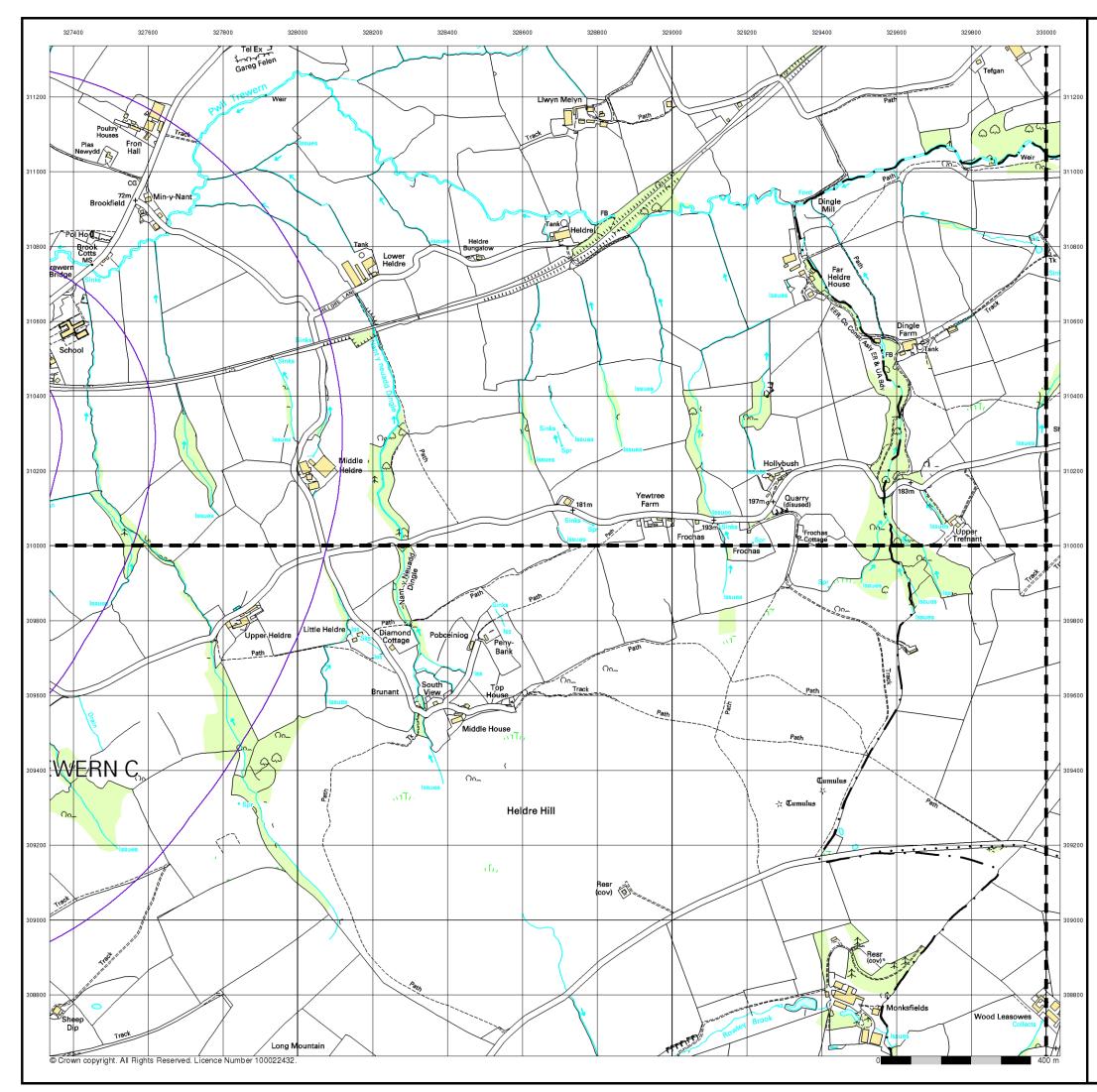
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Tel: Fax: Web:

0844 844 9951 www.envirocheck.co.uk







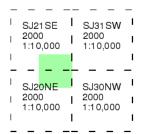


10k Raster Mapping Published 2000

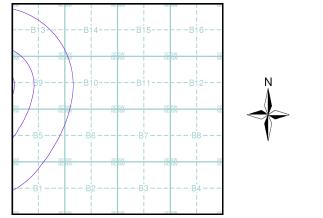
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice B



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 327660, 310170

 Slice:
 B

 Site Area (Ha):
 25.12

 Search Buffer (m):
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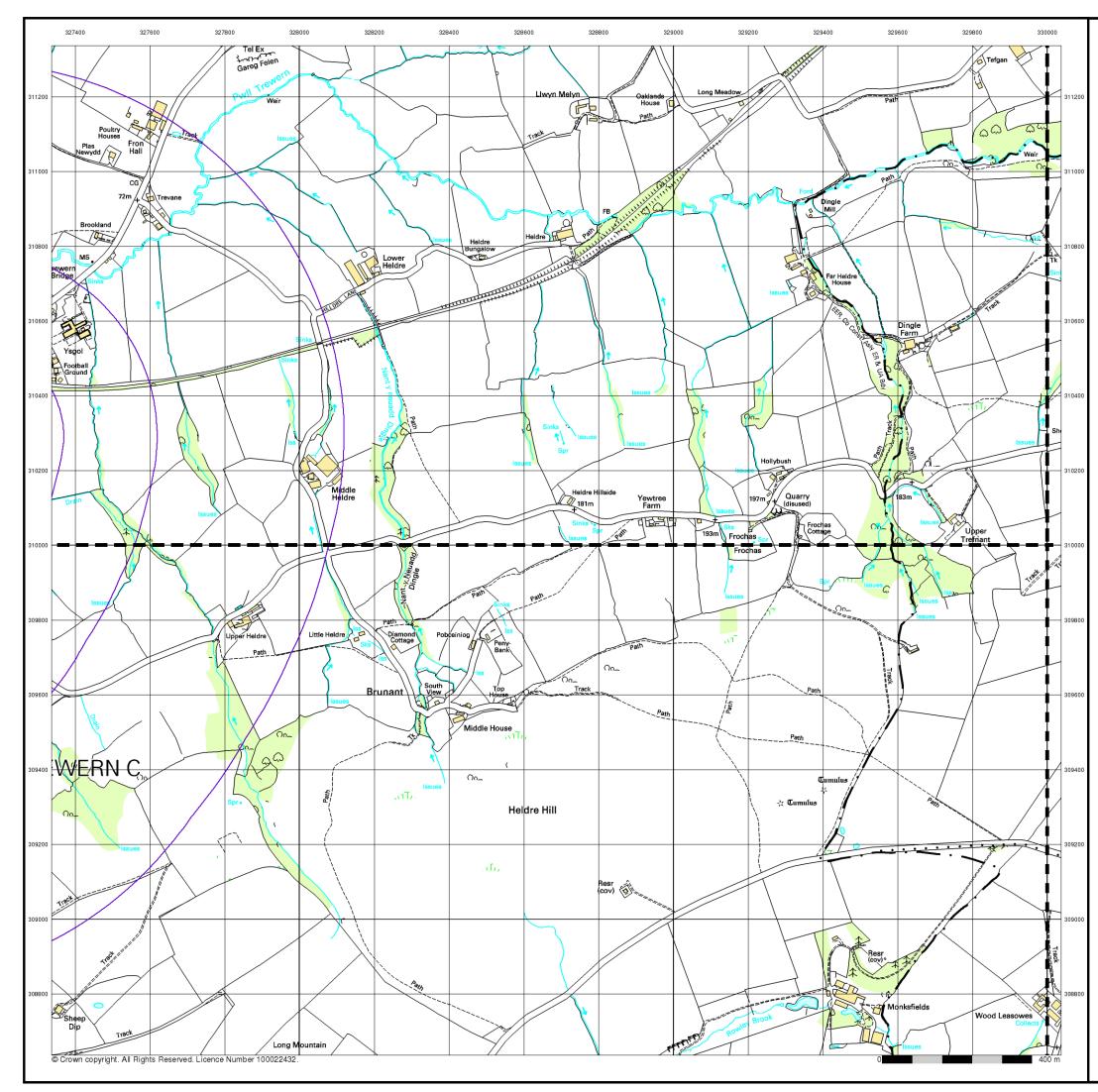
Site Details

Quarry, Buttington, Welshpool, SY21 8SZ





Tel: Fax: Web:



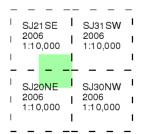


10k Raster Mapping Published 2006

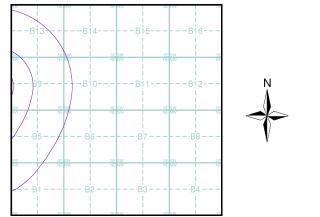
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice B



Order Details

 Order Number:
 196125587_1_1

 Customer Ref:
 14880

 National Grid Reference:
 327660, 310170

 Slice:
 B

 Site Area (Ha):
 25.12

 Search Buffer (m):
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Site Details

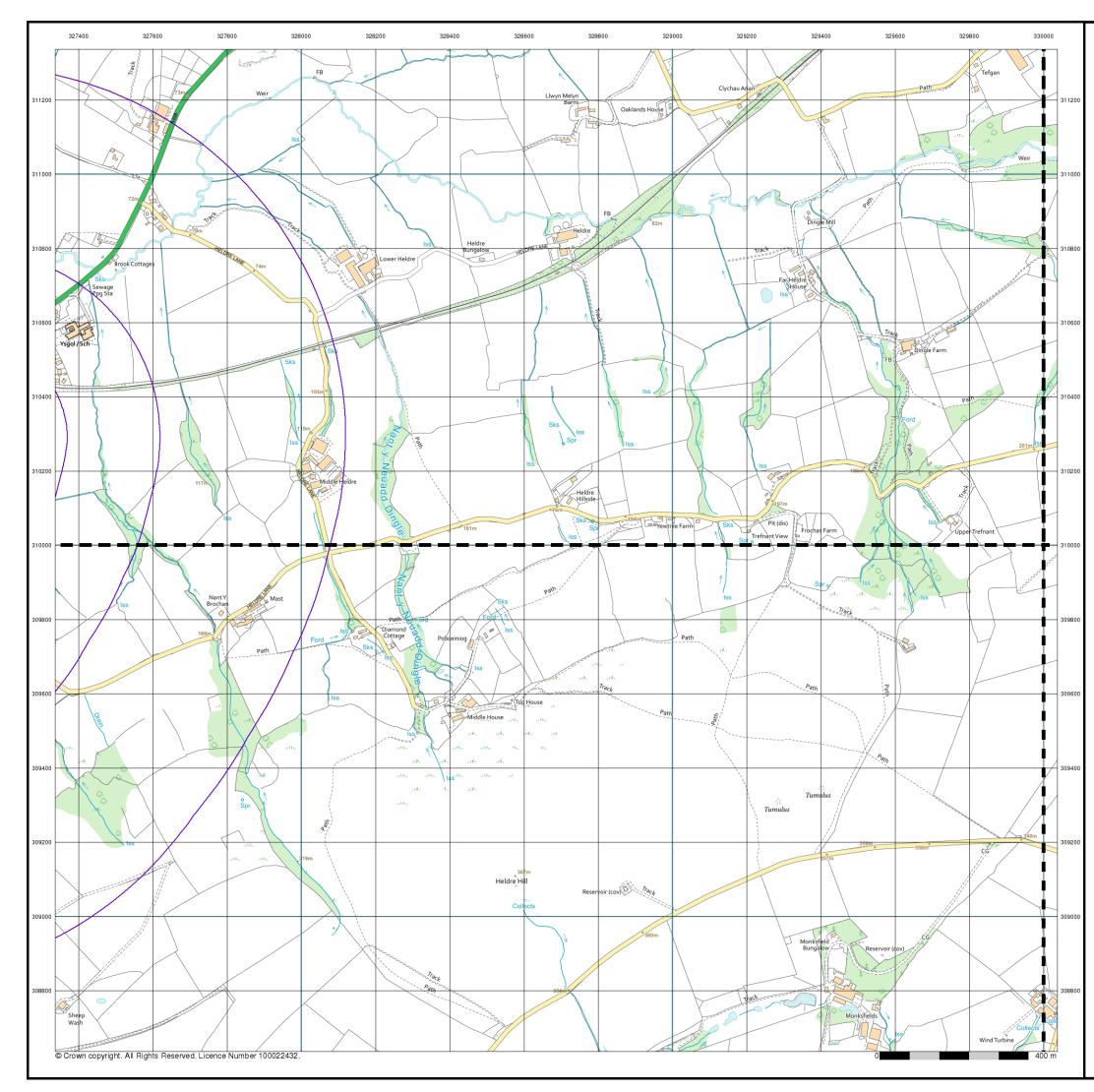
Quarry, Buttington, Welshpool, SY21 8SZ





A Landmark Information Group Service v50.0 05-Mar-2019 Page 10 of 11

Tel: Fax: Web:





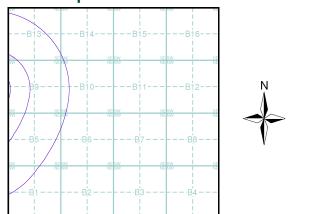
VectorMap Local Published 2019 Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities),1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)

-	_	_			—	—
I	SJ2	1SE	I.	SJ3	1SW	I
I	201 Var	9 iable	, T	2019 Vari	-	I
Т	va	abic		van	abic	Т
-	_	-			_	_
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- 	201		T	SJ30 2019 Varia	9	-

- - - -- - - -Historical Map - Slice B



Order Details

Order Number:	196125587_1_1
Customer Ref:	14880
National Grid Reference:	327660, 310170
Slice:	В
Site Area (Ha):	25.12
Search Buffer (m):	1000

Site Details

Quarry, Buttington, Welshpool, SY21 8SZ



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ANNEX B Risk Assessment Definitions

Risk Assessment Definitions

Environmental risk assessment evaluates the risk to receptors via an analysis of the 'source-pathway-receptor' linkage.

- (1) A **CONTAMINANT** (hazard) a substance that is in, on or under the land and has the potential to cause harm or to cause pollution of controlled waters
- (2) A **RECEPTOR** (target) something which could be adversely affected by a contaminant
- (3) A **PATHWAY** a route or means which either allows the contaminant to cause significant harm to that receptor, or that there is a significant possibility of such harm being caused to the receptor, or that pollution of controlled waters is being or likely to be caused.

The term 'Risk' is widely used in different contexts and situations, but a prescriptive definition is given by the Guidelines for Environmental Risk Assessment and Management (DEFRA *et al*, 2000):

'Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence'.

A 'Hazard' is defined as 'a property or situation that in particular circumstances could lead to harm'.

The classification of consequences and probability and determining the risk category are defined in the following sections.

Table 1	Classification of Consequence								
Classification	Definition								
Severe	 Short term (acute) risk to human health likely to result in significant harm Short term risk to controlled waters Catastrophic damage to buildings/structures Short term risk to an ecosystem or organism within the particular ecosystem 								
Medium	 Chronic damage to human health (long term risk) Pollution of a sensitive water resource A significant change in an ecosystem or organism within the ecosystem 								
Mild	 Pollution of non-sensitive water resources Significant damage to buildings/structures 								
Negligible	 Harm (not necessarily significant) which may result in financial loss Non permanent health effects to humans (easily prevented by PPE for example) Easily repairable effects of structural (building) damage 								

Та	able 2 Classification of Probability
Classification	Definition
High	 There is a complete pollution linkage and an event appears very likely to occur in the short term and is inevitable in the long term. Evidence of harm to the receptor
Medium	 There is a complete pollution linkage which means that is it probable that an event will occur The event is not inevitable but possible in short term and likely in the long term
Low	 There is a complete pollution linkage and circumstances are possible under which an event could occur It is not certain that an event will occur in the long term, and it is less likely to occur in the short term
Negligible	There is a complete pollution linkage but circumstances are such that it is improbable that an event would occur even in the long term

By comparing the consequences of a risk and the probability of the risk of a pollution linkage, the likely risk category can be determined as shown in **Table 3** below.

	Т	able 3 Risk A	ssessment N	latrix								
Increas	sing 🖯	Consequence										
accept	ability 📃 🔪	Severe	Medium	Mild	Negligible							
~	High	High	High	Medium / Low	Near zero							
ility	Medium	High	Medium	Low	Near zero							
ab	Low	High / medium	Medium / Low	Low	Near zero							
Probabil	Negligible	High / medium	Medium / Low	Low	Near zero							
P		/ Low										

High Risk

There is a high probability that severe harm could risk a receptor, or there is evidence that a receptor is being harmed. The risk if realised is likely to result in liability, and urgent investigation or remediation will be required.

Medium Risk

It is probable that harm will arise to a receptor. However it is relatively unlikely that such harm would be severe, or if harm does occur the harm is likely to be relatively mild. Investigation will be required to determine the liability, and some remedial works may be required in the long term.

Low Risk

It is possible that harm may arise to a receptor, but it is likely that the harm would be mild.

Near Zero Risk

There is a very low risk of harm to the receptor. In the event of harm being realised the harm is



ANNEX C Probehole Logs

	te	err	af	irı	ma	5 De Pent	ra Firma (Wa eryn Court, ' ntwyn, Cardi 23 7HA	Wharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	PH1 Sheet 1 of 2	
roject	Name:	Butting	jton Q	uarry		Project 14880			Co-ords:	: 326725.45 - 310068.78	Hole Typ RC	
ocatio	n:	Butting	jton, V	Velshp	ool				Level:	88.71	Scale 1:50	_
lient:		Broad B	Enviro	onment	tal					17/10/2018 - 18/10/2018	Logged E	Зу
Vater Strikes	Depth	Type		Corin	-	Depth	Level	Well	Legend	Stratum Descriptio	J on	Τ
trikes	(m)	/FI	TCR	R SCR	RQD	(m)	(m)			Weak thickly laminated to thinly l	bedded dark	+
	0.00 - 1.00	,	34	50	34					reddish brown locally greenish g MUDSTONE Fractures are 10°- 40° closely spac	ced undulating	-
ļ	ļ				ļ!					smooth. Locally stained orangish b	rown	-
ļ	1											-
ļ	1.00 - 2.50	ן ו	83	90	83							-
ļ	1.00 -									Fracture: 40° undulating smooth. S brown.	stained orangish	-
ļ	2.50 C									Fracture: 30° undulating smooth. S brown.	tained orangish	-
ļ	2.50							Fracture: 10° planar smooth		F		
ļ	2.50 - 4.00 93 93 93		93							-		
ļ	3.60	3.60 C						Fracture: 10° planar smooth		-		
ļ	3.75			ł				Fracture: 20° planar smooth. Staine brown.	ed orange	ŀ		
ļ	l											-
ļ	4.00 - 5.50)	88	93	88					Fracture: 10° planar smooth		-
ļ	1									Fracture: 30° undulating smooth		
ļ	ŀ	\neg		+	!	ł				Fracture: 30° undulating smooth		ŀ
ļ	1											-
ļ	5.50 - 7.00)	88	93	88					Bedding Fracture: 85° planar polish	hed with rare	-
ļ	l									pyrite mineralisation		-
ļ		\neg		+	!	1						-
ļ	l											-
ļ	7.00 - 8.50)	100	100	100							-
ļ	l									Fracture: 10° planar smooth Bedding Fracture: 85° planar polish	hed	
ļ	8.50 8.50	— c c		+	'	1				Fracture: 50° undulating rough		
ļ	9.00	c										
ļ	8.50 - 10.00		98	98	98					Fracture: 5°planar rough		
ļ	l									Fracture: 5°planar rough		
ļ		_		+	 '	1			 	Fracture: 5°planar rough		_

	X terra firma						a Firma (Wa eryn Court, twyn, Cardi	Wharfe	nited dale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole N PH1	lo.
		Butting				Projec	3 7HA t No.		Co-ords:		Sheet 2 of Hole Typ	
Locatio		Butting				14880			Level:	88.71	RC Scale	
											1:50 Logged B	By
Client:		Broad	1			5 //	<u> </u>		Dates:	17/10/2018 - 18/10/2018		
Water Strikes	Depth (m)	Type /FI		Corir SCR		Depth (m)	Level (m)	Well	Legend	Stratum Descriptio		
Strikes	(m) 10.00 - 10.85 10.85 - 12.35 12.35 - 13.85 13.50	-	TCR 87 100	SCR 94 100	RQD 87 100 90	(m) 13.85	(m) 74.86			Weak thickly laminated to thinly bredish brown locally greenish gredish brown locally greenish gre	bedded dark ey h	
												- 20
Rema	rks:	1	1	1	1		1	1	1	1		1

	te	erra	af	irı	ma	5 De Pent	a Firma (Wa eryn Court, ' wyn, Cardi 3 7HA	Wharfeo		e Road info@terrafirmawales.co.uk www.terrafirmawales.co.uk		
roject	Name:	Butting	ton Q	uarry		Projec 14880			Co-ords:	326754.17 - 310026.87	Sheet 1 of s Hole Type RC	
ocatio	n:	Butting	ton, W	/elshp	ool				Level: 111.92		Scale 1:50	
lient:		Broad E	Enviro	nment	al					30/10/2018 - 07/11/2018	Logged By	
Water Strikes	Depth (m)	Type /FI		Corin	-	Depth (m)	Level (m)	Well	Legend	d Stratum Description		
	()		ICR	SCR	RQD	()				Made ground over very weak mu	dstone	
	1.00 - 2.00		100	0	0	1.00	110.92			Weak brownish grey MUDSTON are very closely to closely and oc medium spaced 10° - 45° planar Stained orangish brown Fracture: 75° planar smooth Fracture: 70° planar smooth Fracture: 75° planar smooth	casionally	
	2.00 - 3.40 100 0		0					Fracture: 75° planar smooth Bedding Fracture: 80° planar rough Fracture: 70° planar smooth. Slight staining Bedding Fracture: 80° planar smoo orangish brown.	orangish brown			
3.40 - 4.80			100	9	9					Bedding Fracture: 80° planar smoo Fracture: 75° planar smooth	th	
	4.80 - 6.20 5.80	С	100	64	45	4.80	107.12			Weak grey MUDSTONE. Fractur closely to medium spaced 10° - smooth <u>Bedding Fracture: 80° pla</u> nar smoo	45° planar	
	6.20 - 7.60		100	43	43	6.20	105.72			Weak grey MUDSTONE. Grapto Bedding Fracture: 80° planar smoo	ite fossils th	
	7.60 - 9.00 8.50	С	100	78	78	7.30	104.62			Weak grey MUDSTONE. Fractur closely to medium spaced 10° - smooth Bedding Fracture: 85° planar infilled layer of light grey very stiff clay with lithorelics	45° planar d with 2cm thick	
	9.00 - 10.40)	100	100	100					Fracture: 55° planar smooth		

tington Quarry tington, Welshpool ad Environmental ype FI TCR SCR RQD 100 91 91 100 100 96	14880 Level: Depth (m) Level (m) Well Legend V Second Becond V Frame Frame V Frame Frame Frame V Frame V Frame V Frame V Frame	Sheet 2 of 4 326754.17 - 310026.87 Hole Type RC 111.92 Scale 1:50 30/10/2018 - 07/11/2018 Logged By Stratum Description Veak grey MUDSTONE. Fractures are very losely to medium spaced 10° - 45° planar mooth Iding Fracture: 85° planar smooth Iding Fracture: 85° planar smooth cture: 55° planar smooth cture: 45° planar smooth, stained orangish wn
ad Environmental ype TCR SCR RQD 100 91 91	Depth Level (m) Well Legend V C S Bec Bec Frame Frame Frame C S C S C S C S C S C S C S C S	111.92 1:50 30/10/2018 - 07/11/2018 Logged By Stratum Description Veak grey MUDSTONE. Fractures are very losely to medium spaced 10° - 45° planar mooth Iding Fracture: 85° planar smooth Iding Fracture: 85° planar smooth cture: 55° planar smooth cture: 45° planar smooth, stained orangish
ype FI TCR SCR RQD 100 91 91	Depth (m) Level (m) Well Legend	Stratum Description Veak grey MUDSTONE. Fractures are very losely to medium spaced 10° - 45° planar mooth Iding Fracture: 85° planar smooth Iding Fracture: 85° planar smooth Cture: 55° planar smooth
TCR SCR RQD 100 91 91	(m) (m) Vven Legend V c Beo Frau	Veak grey MUDSTONE. Fractures are very losely to medium spaced 10° - 45° planar mooth Iding Fracture: 85° planar smooth Iding Fracture: 85° planar smooth cture: 55° planar smooth
100 91 91	Frau Beo Frau brou	losely to medium spaced 10° - 45° planar mooth I <u>ding Fracture: 85° pla</u> nar smooth I <u>ding Fracture: 85° pla</u> nar smooth cture: 55° planar smooth
100 100 88		cture: 65° planar smooth cture: 65° planar smooth cture: 65° planar smooth
100 91 86		cture: sub-vertical planar smooth Iding Fracture: 80° planar to curved smooth
86 80 0	Bea	Iding Fracture: 85° planar smooth with thin eer of light grey clay infill y soft grey CLAY
93 93 93		
		lding Fracture: 85° planar smooth infilled with n stiff grey clay
	93 93 93 100 89 78	

	te	erra	af	irr	na	01201114					Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH2 Sheet 3 of 5	
Project	Name:	Butting	ton Q	Jarry		Projec 14880			(Co-ords:	326754.17 - 310026.87	Hole Typ RC	e
ocatio	n:	Buttingt	on, W	elshpo	loc				l	_evel:	111.92	Scale 1:50	
Client:		Broad E	Enviro	nment	al				[Dates:	30/10/2018 - 07/11/2018	Logged B	3y
Water Strikes	Depth (m)	Type /FI		Corin	g RQD	Depth (m)	Level (m)	We	ell	Legend	Stratum Descriptio	n	Τ
	20.20 - 21.6	0	100	84	83						Weak grey MUDSTONE. Fractur closely to medium spaced 10° - smooth	es are very 45° planar	
	21.60 - 23.0	0	73	71	52				· · · · · · · · · · · · · · · · · · ·		Fracture: 50° planar smooth		
23.00 - 23.8		0	100	84	65	23.70	88.22		······································		Very soft grey CLAY	g dark grey	
	23.00 - 23.8		100	64	53						MUDSTONE. Fractures are close closely and occasionally widely s 20° planar smooth. Many closed fill fractures. Bedding Fracture: 85° planar smoot veneer of light grey stiff clay Fracture: 5° planar smooth Fracture: sub-vertical curved smoot	ely to very paced 5° - but mineral th with 0.5cm	
	25.10 - 26.6	0	96	83	83						Fracture: 5° planar stepped Fracture: 10° planar smooth with pa mineralisation	ntial	
	26.60 - 28.1	0	95	95	84				· · · · · · · · · · · · · · · · · · ·				
	28.10 - 29.6	0	100	100	100				· · · · · · · · · · · · · · · · · · ·				
Remar	ko								····				-

	te	rr	af	irı	ma	5 De Pent	a Firma (Wa ryn Court, wyn, Cardi 3 7HA	Wha			Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH2 Sheet 4 of 5	
Project	Name: E	Butting	ton Q	uarry		Project 14880	t No.			Co-ords: 326754.17 - 310026.87		Hole Type RC	
ocation	n: B	Butting	ton, W	/elshp	ool		·			Level: 111.92		Scale 1:50	
Client:	В	Broad E	Enviro	nment	al					Dates:	30/10/2018 - 07/11/2018	Logged E	3y
Water Strikes	Depth	Type /FI		Corin	-	Depth (m)	Level (m)	w	/ell	Legend	Stratum Descriptio	n	
	(m) 29.60 - 30.40 30.40 - 31.60		100 87	SCR 71 71	RQD 64 71	(11)					Weak becoming medium strong of MUDSTONE. Fractures are close closely and occasionally widely s 20° planar smooth. Many closed fill fractures.	ely to very paced 5° - but mineral	
-	31.60 - 32.90		100	100	89						<u>clay</u>		
	32.90 - 34.40		100	86	76								
-	34.40 - 35.80		100	199	71	35.50	76.42				Medium strong to strong grey MU Fractures are close to medium sp		
-	35.80 - 37.25		100	199	26						35° planar smooth to occasional rough. Inconsistent and random mineralisation. Bedding Fracture: 80° planar polish mineralisation paralleling fracture p Bedding Fracture: 70° planar polish	undulating batches of <i>ed. Some</i> lane	
-	37.25 - 38.65		100	199	57						Bedding Fracture: 70° 1mm minera Fracture: 60° planar rough Fracture: 60° planar rough Fracture: 65° planar smooth Fracture: 65° planar smooth	l infill	
-	38.65 - 40.05		100	78	78						Bedding Fracture: 75° planar rough		

	e te	err	af	irı	ma	5 De Pent	a Firma (Wa ryn Court, wyn, Cardi 3 7HA	Wharfe		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH2 Short 5 of 5	
Project	Name [.]	Butting	nton O	uarry		Projec			Co-ords	: 326754.17 - 310026.87	Sheet 5 of Hole Typ	
						14880					RC Scale	
Locatio		Butting							Level:	111.92	1:50 Logged B	SV.
Client:		Broad	Enviro						Dates:	30/10/2018 - 07/11/2018		- J
Water Strikes	Depth (m)	Type /FI		Corin		Depth (m)	Level (m)	Well	Legend	Stratum Description	'n	
	40.05 - 41.50 96 96 78									Medium strong to strong grey MU Fractures are close to medium s 35° planar smooth to occasional rough. Inconsistent and random mineralisation. Bedding Fracture: 75° planar rough	paced 5° - undulating patches of	- - - - - - - - - - - - - - - - - - -
	41.50 - 43.00 100 37 37									Bedding Fracture: 85° planar smoo veneer of brown clay Bedding Fracture: 80° planar rough mineralised infill		42
	43.00 - 44.50 96 93				43.45	68.47			End of Borehole at 43.00	0m	43 	
	44.50 - 46.00	D	100	100	80							45
	46.00 - 47.0	0	47	47	39							- 47 - 47
												- - - - - - - - - - - - - - - - - - -
Remar	ks:											- 50

	te	err	af	irr	ma	5 De Pent	a Firma (Wa eryn Court, ^y twyn, Cardit 3 7HA	Wharfe		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH3 Sheet 1 of 2
Project	Name:	Butting	ton Q	uarry		Projec 14880			Co-ords:	326792.28 - 310009.40	Hole Type RC
_ocatio	n:	Butting	ton, W	/elshp	ool	<u> </u>			Level:	112.23	Scale 1:50
Client:		Broad E	Enviro	nment	al				Dates:	08/11/2018 - 09/11/2018	Logged By
Water Strikes	Depth (m)	Type /FI		Corin	-	Depth (m)	Level (m)	Well	Legend	Stratum Description	n
	,	_			RQD	1.00	111.23			Grey very gravelly CLAY Very weak brownish grey MUDST Recovered non-intact.	ONE.
-	1.00 - 2.50		60	0	0						
	2.50 - 4.00		30	0	0	9.30 102.93					
	4.00 - 5.00		80	0	0						
	5.00 - 6.30		92	0	0		106.53			Weak grey MUDSTONE. Fracture closely to closely spaced 35° - 50 rough. Some stained orangish bro	° planar Í
	6.30 - 7.80		86	7	0					Fracture: 70° planar rough	
-	7.80 - 9.20	_	88	0	0					Bedding Fracture: 70° - 85° undula Bedding Fracture: 85° 2cm wide infi orange brown clay and some partial	lled with stiff
-	9.20 - 10.70)	93	85	35				Weak grey MUDSTONE. Fracture closely to medium spaced. Fracture: 50° curved smooth. Staine brown.	es are	

	te	err	af	ir	ma	5 De Pent	a Firma (Wa eryn Court, ' twyn, Cardii	Wharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	PH3
						CF23 Project	23 7HA		T		Sheet 2 of Hole Type
roject	Name:	Buttinç	gton Q	uarry		14880			Co-ords:	326792.28 - 310009.40	RC
ocatio	n:	Butting	Jton, V	√elshp	ool				Level:	112.23	Scale 1:50
Client:		Broad	Envirc	onmen'	tal				Dates:	08/11/2018 - 09/11/2018	Logged B
Water	Depth	Туре		Corin	•	Depth	Level	Well	Legend	Stratum Descriptio	<u>ו</u> חי
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)	+		Weak grey MUDSTONE. Fracture	
	l									closely to medium spaced. Bedding Fracture: 80° planar smoo	
	l				'	1				orangish brown.	
		1				1				Fracture: 50° planar smooth. Staine brown.	-
	l					1				Fracture: 25° planar smooth. Staine brown.	ed orangish
	10.70 - 12.20		100	20	20	1				Fracture: 5° planar smooth. Stained	d orangish
	10.70 - 12.20)	100	20	20	1				brown. Fracture: 65° planar smooth. Staine	ed orangish
	l					1				brown.	
	L				<u> </u>					Fracture: 20° planar smooth. Staine brown.	
	 I]			۱ I	1				Fracture: 75° curved smooth. Staine brown.	ed orangish
	I					1				Fracture: 10° planar smooth. Staine	ed orangish
	12.20 - 13.70	0	90	21	21	1				brown. Bedding Fracture: 75° planar rough	h. Stained
	12.20	´				1				orangish brown. Fracture: 60° planar smooth. Staine	
	I					1				brown.	-
	Ļ			<u> </u>	' <u>ــــــــــــــــــــــــــــــــــــ</u>	1				Bedding Fracture: 80°planar smoo orangish brown.	
	l					-				Fracture: 75° planar smooth. Staine	ed orangish
	l					1				brown. Fracture:: Sub-vertical curved. Stair	ned orangish
	13.70 - 15.20	0	100	63	63	1				brown. Fracture: 20° planar rough. Stained	dorannish
	1	1				1				brown.	-
	l					1				Bedding Fracture: 80° undulating sr orangish brown.	
	J			_	' <u> </u> ا	4				Fracture: 60° planar smooth. Staine	ed orangish
	l					1				Bedding Fracture: 85° undulating s	mooth. Stained
	l					1				orangish brown. Fracture: 55° undulating rough. Sta	uned oranaish
	15.20 - 16.70	0	100	68	64	1				brown.	·
	-					1				Fracture: 25° planar smooth. Staine brown.	d orangisn
	l					1				Fracture: 15° planar smooth. Fracture: 75° planar smooth. Staine	od oronaish
	J	_		 	ļ'	4				brown.	-
	l					1				Fracture: 60° undulating rough. Stai	
	I					1				Fracture: 65° planar smooth. Staine brown.	ed orangish
	16.70 - 18.10	٥	100	100	100	1				Fracture: 25° planar smooth. Staine	ed orangish
	I					1				brown. Fracture: 55° planar smooth.	
	I									Fracture: 30° planar smooth.	
	l	1		-	 	18.10	94.13			Fracture: 40° planar smooth. Fracture: 45° planar smooth.	
	l					1				Fracture: 55° planar smooth. Fracture: 55° planar smooth.	
	l					1				Fracture: 70° planar smooth.	
	l					1				Fracture: 15° planar smooth. Fracture: 60° undulating rough.	
	l					1				Fracture: 40° undulating rough	
	l					1				Fracture: 35° planar smooth. Fracture: 55° planar smooth.	
	I				'	1				Fracture: 15° planar smooth. End of Borehole at 18.100	0
	I				'	1					Jm
	1				1 1	1					

	te	erra	af	irr	na	5 De Pent	a Firma (Wa eryn Court, V wyn, Cardif 3 7HA	Wharfe		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole N PH4 Sheet 1 of
Project	Name:	Butting	ton Qı	Jarry		Projec 14880			Co-ords:	326864.51 - 310105.86	Hole Typ RC
ocatio	n:	Buttingt	ton, W	/elshpo	bol				Level:	114.35	Scale 1:50
Client:		Broad E	Enviro	nment	al				Dates:	12/11/2018 - 15/11/2018	Logged B
Nater	Depth	Туре		Corin	g	Depth	Level	Well	Legend	Stratum Description	n
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)		÷ · · · · · · ·	Grey gravelly CLAY grading in to	
-		_				1.00	113.35			Weak grey MUDSTONE. Fracture closely spaced 5° - 40° planar rou smooth, often stained orangish br	es are ugh to planar
	1.00 - 2.50	_	24	0	0					vertical fracture planar smooth fro 2.6m depth.	
-	2.50 - 4.00	_	100	0	0					Bedding Fracture: 75° planar rough. orangish brown. Graptolite fossils vi bedding surface. Bedding Fracture: 85° planar smoot orangish brown.	sible on
	4.00 - 5.50		100	33	23	5.00	109.35			Fracture: 80° - 90° curved rough. sta brown. Weak grey MUDSTONE. Fracture to medium spaced 10° - 20° plana stained orangish brown.	es are close ar smooth,
-	5.50 - 6.80		100	77	38					Fracture: 60° planar smooth. Staine brown. Fracture: 60° planar rough. Stained brown. Fracture: 65° planar smooth. Fracture: 75° undulating smooth.	-
	6.80 - 8.30		100	70	62					Bedding Fracture: 85° undulating ro	ugh with slight
-	8.30 - 9.50		100	16	16				stiff light grey clay fill in places		
ŀ	9.50 - 10.00)	80	80	80						

X t	erra firn	Terra Firma (Wa 5 Deryn Court, Y Pentwyn, Cardii CF23 7HA	Nharfedale I	Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH4 Sheet 2 of 4
Project Name:	Buttington Quarry	Project No. 14880	Co	-ords:	326864.51 - 310105.86	Hole Type RC
Location:	Buttington, Welshpoo		Lev	vel:	114.35	Scale 1:50
Client:	Broad Environmental		Dat	tes:	12/11/2018 - 15/11/2018	Logged By
Water Depth Strikes (m)	Type Coring /FI TCR SCR F	Depth Level (m) (m)	Well Le	gend	Stratum Description	
Remarks:					MUDSTONE	

	te	erro	ar	ILL	na		ryn Court, ' wyn, Cardi 3 7HA	Wharted ff		info@terrafirmawales.co.uk www.terrafirmawales.co.uk	PH4 Sheet 3 of 4
Project	Name:	Butting	ton Q	uarry		Project 14880	t No.		Co-ords:	326864.51 - 310105.86	Hole Type RC
ocatio	n:	Butting	ton, W	elshpo	pol				Level:	114.35	Scale 1:50
Client:		Broad E	Enviro	nment	al				Dates:	12/11/2018 - 15/11/2018	Logged By
Water	Depth	Туре		Corin	g	Depth	Level	Wall	Legend	Stratum Description	_
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)		Legend	MUDSTONE	L
	25.00 - 26.5	_	24	23	21	25.00	89.35		Image: state s	Weak dark grey MUDSTONE. Fra widely but sometimes closely spa Graptolite fossils Fracture: 15° planar smooth.	actures are ced.

	roject Name: Buttington Quarry					5 De Pent	a Firma (Wa eryn Court, twyn, Cardi 3 7HA	Wharfeo	lale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH4 Sheet 4 of 4	
Project	Name:	Butting	ton Q	uarry		Projec 14880			Co-ords:	326864.51 - 310105.86	Hole Type RC	
ocatio	n:	Butting	ion, W	/elshpo	ool				Level:	114.35	Scale 1:50	
Client:		Broad E	Enviro	nment	al				Dates:	12/11/2018 - 15/11/2018	Logged By	
Nater Strikes	Depth (m)	Type /FI		Corin	g RQD	Depth (m)	Level (m)	Well	Legend	Stratum Description	ı	
	31.20 - 32.5 37.00 - 37.8 37.95 - 39.4	5	88 52 96	88 52 96	88 52 90	39.45	74.90			Weak dark grey MUDSTONE. Fra widely but sometimes closely space Graptolite fossils Fracture: 15° undulating rough Fracture: 10° planar smooth. Fracture: 10° planar smooth. Fracture: 10° planar smooth. Fracture: 10° planar smooth. End of Borehole at 39.4500	ced.	
Remai	rks:											_

	e te	err	af	irı	ma	5 De Pent	a Firma (Wa eryn Court, \ twyn, Cardif 23 7HA	Wharfee		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH5
Project	Name:	Butting	jton Q	uarry		Projec 14880			Co-ords:	326896.01 - 310052.91	Sheet 1 of 2 Hole Type
.ocatio		Butting	ton, V	Velshp	ool	14000			Level:	118.22	RC Scale 1:50
lient:		Broad E	Enviro	nmen	tal				Dates:	29/10/2018 - 29/11/2018	Logged By
Nater	Depth	Туре		Coring Depth Level CR SCR RQD (m) (m)			Well	Legend	Stratum Description		
Strikes	(m)	/FI		SCR	RQD	(m) - 1.00	117.22			Grey very gravelly CLAY grading into weak mudstone	
	1.00 - 2.10	·	91	0	0	-				retrieved mostly non-intact. Some pres very closely spaced fractures 5° - 15°. Fracture: 50° planar smooth infilled with of light grey clay	served
	2.10 - 3.30	1	96	0	0						
	3.30 - 4.60	J	100	0	0	4.00	114.22			Weak grey MUDSTONE. Fractures are closely to medium spaced 25° - 45° pl smooth to planar rough. Some fracture stained orangish brown.	lanar e planes
	4.60 - 5.80	,	100	0	0		114.22			Fracture: 35° planar smooth 1mm minera Fracture: 70° planar smooth	alised infill
	6.00 5.80 - 7.30	c	90	40	32					Three sub-vertical fractures planar smoo orangish brown	oth stained
	7.30 - 8.80)	93	0	0					Fracture: 70° - 85° curved to planar smoo Stained orangish brown. Three sub-vertical fractures planar smoo orangish brown Fracture: 80° planar smooth. Stained ora brown.	oth stained
	8.80 - 10.30 9.50	0 c	26	21	21	- 8.80	109.42			Fracture: 80° planar smooth. Stained ora brown. Weak grey MUDSTONE. Fractures are closely to medium spaced 15° - 30° pl smooth to occasionally undulating smo often stained orangish brown. 9.23 - 1 numerous 45° closed <1.5mm thick mineralised fractures	e lanar ooth,

	te	erra	af	irı	na	5 De Pent	a Firma (Wa eryn Court, \ wyn, Cardif 3 7HA	Wharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole M PH5 Sheet 2 o	
Project	Name:	Butting	ton Q	uarry		Projec 14880			Co-ords:	326896.01 - 310052.91	Hole Typ RC	
Locatio	n: E	Buttingt	ton, W	/elshp	ool				Level:	118.22	Scale 1:50	
Client:	E	Broad E	Enviro	nment	al				Dates:	29/10/2018 - 29/11/2018	Logged I	Зу
Water	Depth	Туре		Corin	g	Depth	Level	Well	Legend	Stratum Descriptio	n	
Strikes	(m) 10.30 - 11.80 11.80 - 13.30 13.30 ⁴ -094.80 14.80 - 16.30 16.30 - 17.80	с	TCR 93 93 100 96 100	SCR 333 45 44 45 66	RQD 333 45 40 26 66	(m) 17.80	(m)			Weak grey MUDSTONE. Fracture closely to medium spaced 15° - 3 smooth to occasionally undulating often stained orangish brown. 9.1 numerous 45° closed <1.5mm thi mineralised fractures Fracture: Sub-vertical curved to plan Stained orangish brown. Fracture: 65° planar rough Fracture: 45° closed <1mm thick mi	es are 0° planar g smooth, 23 - 17.6m ck nar smooth. neralised	
Remar	ks:											

	te	err	af	irı	ma	5 De Pent	a Firma (Wa eryn Court, twyn, Cardi 3 7HA	Whar			Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH6 Sheet 1 of 2
Project	Name:	Butting	ton Q	uarry		Projec 14880				Co-ords:	326901.08 - 310180.50	Hole Type RC
_ocatio	n:	Butting	ton, W	/elshp	ool					Level:	89.17	Scale 1:50
Client:		Broad I	Enviro	nment	tal					Dates:	16/10/2018 - 17/10/2018	Logged By
Water Strikes	Depth (m)	Type /FI		Corin	-	Depth (m)	Level (m)	We	ell	Legend	Stratum Description	n
	0.00 - 1.00		63	6	RQD 0	()					Weak dark reddish brown locally greenish grey MUDSTONE Fractures are closely spaced 30° - rough. Stained orangish brown.	Ē
	1.00 - 2.50		88	5	0							
	2.50 - 4.00 3.60	с	86	56	54						Fracture: 10° undulating rough Bedding Fracture: 85° planar smoot Fracture: 15° undulating rough Fracture: 65° undulating smooth	
	4.00 - 5.50 5.00	С	94	94	94						Fracture: 10° planar rough	
	5.50 - 7.00		92	92	92						<u>Fracture: 65° undulating s</u> mooth Fracture: 45° planar smooth	
	7.00 - 8.50	_	93	93	93						Fracture: 10° planar smooth Fracture: 60° undulating rough	
	8.50 9.00 8.50 - 10.00	- c	94	70	64						Fracture: 15° undulating smooth Fracture: sub-horizontal planar smo Fracture: 55° undulating smooth Bedding Fracture: 85° planar smoot	E
											Fracture: 20° planar smooth	-

	te	err	af	irr	na	5 De Pent	a Firma (Wa eryn Court, wyn, Cardi 3 7HA	Wharfeo	nited dale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH6 Sheet 2 of 2	
Project	Name:	Butting	ton Q	uarry		Projec 14880			Co-ords:	326901.08 - 310180.50	Hole Type RC	
Locatio	on:	Butting	ton, W	/elshpo	ool				Level:	89.17	Scale 1:50	
Client:		Broad B	Enviro	nment	al				Dates:	16/10/2018 - 17/10/2018	Logged By	
Water Strikes	Depth (m)	Type /FI		Corin	-	Depth	Level (m)	Well	Legend	Stratum Descriptio	n	
	(III) 10.00 - 11.50 11.50 - 13.00 13.008-504.00)	92 93 97	SCR 78 93 74	RQD 78 84 74	(m) 14.00	75.17			Weak dark reddish brown locally greenish grey MUDSTONE Fracture: 45° undulating rough Fracture: 75° undulating smooth Fracture: 65° undulating smooth Bedding Fracture: 80° undulating ro Fracture: 35° undulating smooth Fracture: 40° undulating rough Fracture: 65° undulating rough Fracture: 65° undulating rough End of Borehole at 14.000	ugh	- 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1
												- 2

	te	err	af	irı	ma	5 De Pent	a Firma (Wa eryn Court, \ twyn, Cardif 23 7HA	Wharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH7 Sheet 1 of 3
Project Na	ame:	Butting	iton Q	uarry		Projec 14880			Co-ords:	326691.47 - 310125.99	Hole Type RC
ocation:		Buttingt	ton, N	/elshp	ool				Level:	110.52	Scale 1:50
Client:		Broad E	Enviro	nment	al				Dates:	15/11/2018 - 19/11/2018	Logged By
Water Strikes	Depth (m)	Type /FI		Corin	ig RQD	Depth (m)	Level (m)	Well	Legend	Stratum Descriptio	n
	4.00 1.75	_				1.00	109.52			Grey gravelly CLAY grading in to mudstone Extremely weak dark grey MUDS Fractures are very closely to clos	STONE.
	1.00 - 1.75		93	93	58					25° - 45° undulating smooth and stained orangish brown Fracture: 65° planar rough. Stained brown. Fracture: 60° planar rough. Stained brown.	orangish
	3.00 - 3.25 3.25 - 4.25		100 90	100	29					"Bedding Fracture: 85° planar rough	
	4.25 - 5.75		99	99	0	3.85	106.67			orangish brown. Non Intact: Weak laminated MUE SILTSTONE retrieved as fine to c angular gravel	OSTONE and
	+.20 - 0.70	_			0	5.05	105.47			Extremely weak grey MUDSTON are very closely to closely spaced undulating striated and polished s orangish brown Fracture: 70° undulating polished an	d 25° - 45° stained
5	5.75 - 7.15		68	0	0	6.45	104.07			Non Intact: Weak laminated MUE SILTSTONE retrieved as fine to c angular gravel	coarse
7	7.15 - 8.15		83	15	15	- 7.15	103.57			Extremely weak grey MUDSTON are close to medium spaced 15° undulating striated and polished Fracture: 80° undulating rough Fracture: 70° undulating polished and	- 45°
8	8.15 - 9.65		95	0	0					Bedding Fracture: 80° planar rough	
			<u> </u>	'	<u> </u>	9.65	100.87			Non Intact: Weak laminated MUE	STONE and

Strikes (m 9.65 -	B epth m)	Buttingt Broad E Type /FI	on, W Enviro	/elshpo nment Corin SCR	al g	Project 14880 Depth	t No.		Co-ords: Level:		Sheet 2 of Hole Type RC Scale	-
Client: Water Dep Strikes (m 9.65 -	B epth m) - 10.75	Broad E	Enviro TCR	nment Corin SCR	al g	Depth			Level:	110.52	Scale	
Water Deg Strikes (m 9.65 -	epth m) - 10.75	Туре	TCR	Corin SCR	g						1:50	
Strikes (m 9.65 -	m) - 10.75		TCR	SCR	-	Depth Level (m) (m)			Dates:	15/11/2018 - 19/11/2018		}y
9.65 -	- 10.75	-			RQD	(m)		Well	Legend	Stratum Description		
10.75 -	- 12.25	-		40	27					Non Intact: Weak laminated MUDSTON SILTSTONE retrieved as fine to coarse angular gravel	E and	
		-	66	23	0	10.75	99.77			Extremely weak grey MUDSTONE. Fra are very close to medium spaced 35° - 6 <u>undulating striated and</u> polished <u>1cm wide band of dark grey mudstone 75°</u> <u>Bedding Fracture: 85° un</u> dulating rough st	60° ,	
12.25 -	- 13.75		90	60	14					Fracture: 50° Planar polished Fracture: 60° planar rough Band of dark grey mudstone 70° undulatin Tstriated	ng rough	
13.75 -	- 15.25		100	100	17					Fracture: 60° planar rough Bedding Fracture: 80° - 90° undulating sm striated	ooth	
15.25 -	- 16.75		100	75	0					-Bedding Fracture: 80° planar smooth stria	ted	
16.75 -	- 18.25			19	19					Fracture: 65° planar smooth Fracture: 65° undulating polished Bedding Fracture: 85° planar to undulating striated 3cm thick band of dark grey laminated mu 80° 4cm band of light grey mudstone with thin of soft light grey clay 80° Fracture: 65° undulating smooth striated	g smooth dstone	
18.25 -	- 19.75		93	55	12					Fracture: 65° undulating smooth striated Fracture: 65° undulating smooth striated Fracture: 65° undulating rough striated		
												E

X terra firma						5 De Pent	a Firma (Wa eryn Court, twyn, Cardi 3 7HA	Wharfe		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole N PH7	
Proiect	Name:	Butting	iton Q	uarrv		Projec	t No.		Co-ords	326691.47 - 310125.99	Sheet 3 of Hole Type	
, Locatio		Butting		-	ool	14880			Level:	110.52	RC Scale	
Client:		Broad I	Enviro	nment	tal				Dates:	15/11/2018 - 19/11/2018	1:50 Logged B	y
Water	Depth	Туре		Corin	g	Depth	Level	Well	Legend	Stratum Descriptio	 on	
Strikes	19.75 - 21.24 21.25 - 22.74 22.75 - 24.24	5	93 95 95	SCR 11 0	RQD 11 0	(m) 24.25	(m)			Extremely weak grey MUDSTOI are very close to medium spaced undulating striated and polished Sub-vertical Fracture : undulating p Fracture: 65° undulating polished Fracture: 65° planar polished Fracture: 80° undulating rough Sub-vertical Fracture undulation sm 1cm wide laminated band of dark m Bedding Fracture: 80° planar rough End of Borehole at 24.25	NE. Fractures d 35° - 60° wurved polished olished striated nooth nudstone 80°	21 22 23 23 24 24 25 26 26 27 28 28 29 29 29
Remarks:												

	te	err	af	irr	ma	5 De Pent	a Firma (Wa eryn Court, \ twyn, Cardif 3 7HA	Nharfe		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH8 Sheet 1 of 5
Project	Name:	Butting	ton Q	Jarry		Projec 14880			Co-ords:	326934.10 - 310105.50	Hole Type RC
Locatio	n:	Butting	ton, W	/elshpo	ool				Level:	117.23	Scale 1:50
Client:		Broad E	Enviro	nment	al				Dates:	22/10/2018 - 26/10/2018	Logged By
Water	Depth	Туре		Corin	g	Depth	Level	Well	Legend	Stratum Descriptio	n
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)	VVOI	<u></u>	Grey very gravelly CLAY grading	
-		_				1.00	116.23			weak mudstone Very weak greenish brown MUD Recovered non-intact.	
	1.00 - 2.40	_	96	0	0						
-	2.40 - 3.70		100	0	0	3.70	113.53			Weak dark brownish grey MUDS	TONE
_	3.70 - 5.20		96	0	0					Fractures are 20° - 45° very closs spaced planar smooth. Locally st orangish brown. Fracture: Sub-vertical 3.7 - 8m plan very thin infill of light grey clay. Fracture: 50° undulating smooth Fracture: 45° undulating smooth Fracture: 80° undulating smooth. St brown	ely to closely ained ar smooth with
	5.20 - 6.60		98	0	0					Fracture: 60° curved smooth. Stain brown.	ed orangish
	6.60 - 8.00		97	0	0					Fracture: 80° - 90° curved smooth. orangish brown.	Stained
-	8.00 - 9.40		92	92	80	8.00	109.23			Weak dark grey MUDSTONE. Fr 45° very closely to medium space smooth to undulating rough. Loca orangish brown. Fracture: 75° undulating rough	ed planar
											- - - - - -

	t e	err	af	irı	ma	5 De Pen	a Firma (Wa eryn Court, twyn, Cardi 3 7HA	Wh				Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole N PH8 Sheet 2 o	
Project	Name:	Butting	ton Q	uarry		Projec 14880				С	o-ords:	326934.10 - 310105.50	Hole Typ RC	e
Locatio	n:	Butting	ton, W	/elshp	ool					L	evel:	117.23	Scale 1:50	
Client:		Broad	Enviro	nment	al					D	ates:	22/10/2018 - 26/10/2018	Logged E	Зу
Water	Depth	Туре		Corin	-	Depth	Level	v	Vell	IL	.egend	Stratum Descriptior	1	
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)		E.			Weak dark grey MUDSTONE. Fra	ctures 20° -	-
	9.40 - 10.65	5	93	76	63							45° very closely to medium space smooth to undulating rough. Loca orangish brown.	d planar lly stained	
	10.70	C										Fracture: 55° undulating smooth. Slightown staining	ght orangish	
												Fracture: 5° planar smooth Fracture: 5° planar smooth		
	10.65 - 12.1	5	96	74	87									E
														F
		_												
														F
	12.15 - 13.6	5	96	88	80									
														Ē
	14.00	с												
	13.65 - 15.0	0	98	92	81									
														F
	15.00	- c												-1
	15.00 - 16.4	0	91	85	85							Fracture: 60° undulating rough. Stair	ned orangish	Ē
												brown. Fracture: 60° undulating rough		- 1
		_												E
														F
	16.40 - 17.7	0	100	80	69									
												Fracture: 60° undulating smooth		F
		_										- - - - - - - - - -		Ē
												Fracture: 80° - 90° curved smooth		
	17.70 - 19.10	0	100	76	76									E
												Fracture: 20° - 60° curved smooth		Ē
		-										r. autoro. 20 - 00 Curvey Should		
	19.10 - 20.4	0	100	93	73				H					F
						19.80	97.43					Weak dark grey MUDSTONE. Sul	b-vertical	
Remar	ks:													

	te	err	af	irı	na	5 De Pent	a Firma (Wa ryn Court, wyn, Cardi 3 7HA	Wharfe	mited dale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH8 Sheet 3 of 5
Project	Name:	Butting	ton Q	uarry		Projec 14880			Co-ords:	326934.10 - 310105.50	Hole Type RC
_ocatio	n:	Butting	ton, W	/elshp	ool				Level:	117.23	Scale 1:50
Client:		Broad E	Enviro	nment	al				Dates:	22/10/2018 - 26/10/2018	Logged By
Water Strikes	Depth (m)	Type /FI		Corin		Depth (m)	Level (m)	Well	Legend	Stratum Descriptio	n
	20.40 - 21.8		96	0	RQD 0	()				Weak dark grey MUDSTONE. Su Fracture infilled with thin veneer of clay. Fractures 15° - 30° very clo medium spaced undulating rough Fracture: Sub-vertical planar smoot Fracture: 65° undulating smooth	of light grey sely to
	21.85 - 23.3	0	96	0	0						
	23.30 - 24.7 24.50	5 C	100	0	0	24.70	92.53			Weak dark grey MUDSTONE. Fra	actures 10° -
	24.75 - 26.1	5	100	89	89					30° very closely to medium space smooth	ad planar
	26.50 26.15 - 27.3	5 5	89	89	86						
	27.35 - 28.8 28.60	0 C	100	95	95						
	28.80 - 30.2	0	94	94	94						

	te	err	af	irı	ma	5 De Pent	a Firma (Wa ryn Court, wyn, Cardi 3 7HA	Wha			Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole N PH8 Sheet 4 of	
Project	Name:	Butting	gton Q	uarry		Project 14880	t No.			Co-ords:	326934.10 - 310105.50	Hole Typ RC	
ocatio	n:	Butting	jton, W	/elshp	ool					Level:	117.23	Scale 1:50	
Client:		Broad	Enviro	nment	tal					Dates:	22/10/2018 - 26/10/2018	Logged E	Зу
Water	Depth	Туре		Corin		Depth	Level	w	/ell	Legend	Stratum Descriptio	'n	
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)	•••			Weak dark grey MUDSTONE. Fr 30° very closely to medium spac	actures 10° -	
											smooth		E
	30.20 - 31.50	D	100	92	92								
											Fracture: 85° planar smooth		
		-							- ·.		Fracture: Sub-vertical planar smoot	n	-
											Bedding Fracture: 85° undulating s	mooth	
									- •. •.				
	31.50 - 34.00	b	100	0	0								F
													F
	33.50	с											
													-
													F
	34.00 - 35.40		100	66	66								
		-									Fracture: 50° planar smooth		E
													-
													E
	35.40 - 36.8	5	100	91	91						1		
											Fracture: 40° planar smooth		-
		_											F
										-			
	36.85 - 38.3	5	93	90	70						Fracture: 70° planar smooth		
													E
											Fracture: 75° 1mm thick mineralise fracture	d infilled	
											Fracture: 45° planar smooth		E
	38.35 - 39.8	5	96	96	72								F
											Fracture: 45° planar rough		E
		_								-	Presenter to planar todyn		
Remar									1.°				\pm

	te	erra	af	irr	ma	5 De Pent CF23	i Firma (Wa ryn Court, ' wyn, Cardi 3 7HA	Wharfeo	nited dale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH8 Sheet 5 of 5	
Project	Name:	Butting	ton Q	uarry		Project 14880	No.		Co-ords:	326934.10 - 310105.50	Hole Type RC	;
Locatio	n:	Butting	ton, W	/elshpo	loc				Level:	117.23	Scale 1:50	
Client:		Broad E	Enviro	nment	al				Dates:	22/10/2018 - 26/10/2018	Logged By	Ý
Water Strikes	Depth (m)	Type /FI		Corin	-	Depth (m)	Level (m)	Well	Legend	Stratum Descriptio	n	
	40.30 39.85 - 41.3	с	92	57	43					Weak dark grey MUDSTONE. Fr 30° very closely to medium space smooth Fracture: 45° planar smooth	actures 10° - ed planar	 4
	41.35 - 42.8	5	93	93	93	41.35	75.88			Medium strong dark grey MUDS Fractures 10° - 30° very closely to spaced planar smooth	ONE. o widely	
	43.00 42.85 - 44.09	C 5	100 100 100							- - - - - - - - - - - - - - - - - -		
	44.05 - 45.4	5	100	100	93							
	45.4 46.01 6.4	5 C	57	57	53	46.45	70 78					4
Remar						10.10	6.45 70.78			End of Borehole at 46.450		4

	X te	err	af	irı	ma	5 De Pent	ra Firma (Wa eryn Court, ' atwyn, Cardii 23 7HA	Wharfed		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk Sheet 1 o)
roject	t Name:	Butting	Iton Q	uarry		Projec 14880			Co-ords:	RC	-
ocatio	ın:	Butting	ton, V	√elshp	ool				Level:	115.26 Scale 1:50	
Client:		Broad E	Enviro	nment	tal				Dates:	18/10/2018 - 19/10/2018	
Nater Strikes		Type /FI		Corin	ng RQD	Depth (m)	Level (m)	Well	Legend	Stratum Description	T
		_				- 1.00	114.26			Grey brown very gravelly CLAY grading into very weak mudstone	
	1.00 - 2.30)	100	0	0	-				Recovered non-intact.	
	2.30 - 3.80	,	86	15	15	2.50	112.76			Very weak to weak dark greenish grey MUDSTONE. Fractures are 10°- 40° very closely to closely spaced, undulating rough tending to planar smooth. Fracture surfaces rarely stained orangish brown.	
3.80 5.25 6.70	3.80 - 5.25	;	89	0	0	-				Very thin bed of very stiff light orangish brown and light grey CLAY	
	5.25 - 6.70					Bedding Fracture: 70°-85° undulating smooth. Stained orangish brown.					
	6.70 - 7.85		95	42	42					Bedding Fracture: 85° planar smooth. Stained orangish brown. Fracture: 65° planar smooth . Stained orangish brown Fracture: 60° planar smooth. Stained orangish	
	7.85 - 9.35	5	94	20	9					brown. Bedding Fracture: 85° - 90° undulating smooth. Stained orangish brown.	
	9.00 9.35 - 10.50	0 C	96	37	37					Bedding Fracture: 85° - 90° undulating rough. Stained orangish brown. Bedding Fracture: 85° - 90° undulating rough. Stained orangish brown. Fracture: 55° planar smooth. 1mm calcite mineralisation Fracture: 75 - 90° undulating smooth locally planar	r

	Project Name: Buttington Quarry					5 De Pent	a Firma (Wa eryn Court, wyn, Cardi 3 7HA	Wh				Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole N PH9	0.
						Projec 14880	t No.			C	o-ords:	326945.35 - 310072.94	Sheet 2 of Hole Type RC	
Locatio	on: E	Butting	ton, W	/elshp	ool	1.000				Le	evel:	115.26	Scale 1:50	
Client:	E	Broad I	Enviro	nment	al					Da	ates:	18/10/2018 - 19/10/2018	Logged B	у
Water Strikes		Type /FI		Corin	g RQD	Depth (m)	Level (m)	v	Vell	II L.	egend	Stratum Descriptio	n	
Rema	11.00 10.50 - 12.00 <u>12.00</u> 12.00 - 13.50 <u>13.50</u> 13.50 - 14.00	- c c	78 95 30	78 95 23	78 95 23	10.50	104.76					Very weak to weak dark greenish MUDSTONE. Fractures are 10°- closely to closely spaced, undula tending to planar smooth. Fracture <i>rarely stained orangish brown.</i> <i>Fracture: 55° planar smooth. 1mm of</i> <i>mineralisation</i> Weak dark grey MUDSTONE. Fr 5°- 25° very closely to medium sp smooth. Fracture surfaces staine brown. <i>Fracture: 55° planar smooth.</i> <i>Fracture: 55° planar smooth.</i> <i>Fracture: 55° planar smooth.</i> <i>Fracture: 55° planar smooth.</i> <i>Fracture: 50° planar smooth.</i> <i>Fracture: 50° planar smooth.</i> <i>Fracture: 50° planar smooth.</i> <i>Fracture: 50° planar smooth.</i> <i>Staine</i> <i>brown.</i> <i>End of Borehole at 14.000</i>	40° very ting rough re surfaces th locally planar. calcite actures are baced, planar d orangish	

	X te	err	af	irı	ma	5 De Pent	ra Firma (Wa eryn Court, N ntwyn, Cardif 23 7HA	Wharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH10 Sheet 1 of 2
roject	Name:	Butting	iton Q	uarry		Projec 14880			Co-ords:	: 326833.57 - 310220.90	Hole Type RC
ocatio	n:	Buttingt	ton, N	/elshp	ool				Level:	114.16	Scale 1:50
lient:		Broad E	Enviro	nment	tal				Dates:	01/11/2018 - 02/11/2018	Logged By
Vater trikes	Depth (m)	Type /FI		Corin	-	Depth (m)	Level (m)	Well	Legend	Stratum Description	'n
	1.00 - 2.50		16	0	0 RQD	- 1.00	113.16			Grey gravelly CLAY grading into mudstone Non-Intact greenish grey MUDST retrieved as fine to coarse angula	FONE
	2.50 - 4.00)	93	0	0	3.00	111.16			Very weak grey MUDSTONE. Fra very close to closely spaced, occ medium spaced 5° - 35° stained o brown and/or dark grey/black Bedding Fracture: 80° curved rough orangish brown/brown.	asionally orangish
	4.00 - 5.50)	96	13	13					Fracture: sub-vertical planar rough. orangish brown. Fracture: 45° planar rough. Stained brown. Bedding Fracture: 80°planar rough. orangish brown. Curved undulating rough. Bedding Fracture: 85° Curved to pla	l orangish Stained orangish brown.
	5.50 - 7.00)	90	0	0					Stained orangish brown. Fracture: 70° to sub-vertical curved orangish brown. Fracture: 70° planar rough. Stained brown.	l orangish
	7.00 - 8.50)	93	0	0					Bedding Fracture: 80° planar rough. brown. Fracture: 65° planar to curved rough orange.	
	8.50 - 10.00	0	96	0	0					Bedding Fracture: 80° planar rough. orange. Bedding Fracture: 80° planar rough. orangish brown.	-

	X terra firm					Terra 5 De	ı Firma (Wa ryn Court, V	ales) Lir Wharfeo	nited dale Road	Tel: 02920 735354	Borehole N	
			dI			Pent CF23	wyn, Cardif 3 7HA	f		info@terrafirmawales.co.uk www.terrafirmawales.co.uk	PH10	
Project	Name:	Butting	ton Q	uarry		Project 14880	No.		Co-ords:	326833.57 - 310220.90	Sheet 2 of Hole Typ RC	
Locatio	n: E	Butting	ton, N	/elshp	ool	11000			Level:	114.16	Scale 1:50	
Client:	E	Broad I	Enviro	nmen	tal				Dates:	01/11/2018 - 02/11/2018	Logged B	By
Water Strikes	Depth (m)	Type /FI		Corin	ig RQD	Depth (m)	Level (m)	Well	Legend	Stratum Description	n	
Remai	10.00 - 11.50		76	10	10	11.50	102.66			Very weak grey MUDSTONE. Fra very close to closely spaced, occ medium spaced 5° - 35° stained of brown and/or dark grey/black Fracture: 65° to sub-vertical curved. orange. End of Borehole at 11.500	asionally orangish <i>Stained</i>	



ANNEX D Rock Core Photographs









































































































































PROBEHOLE 9











PROBEHOLE 10











ANNEX E Rock Core Geotechnical Test Results

TEST REPORT POINT LOAD INDEX TEST

ISRM: 1985

Project No:

D8336-18 Project Name: Buttington Quarry Client:

Address: Deryn Court 5 Wharfdale Road Cardiff

Terra Firma Wales Ltd

CF23 7HA

	Peer Ref Appendix Type					see	Type ISRM and 8	(N/A) P	Di	mensic	ons	LOAD P	liameter,	М	ad Index pa /50) ^{0.45}		
Borehole	Depth m	Sample Ref	Sample Type	Specimen Ref	Speciment Depth	Rock Type	Type (D, A, I, B)	Direction (L, P or U)	Failure Valid (Υ/N)	Lne mm	Dps' mm	W mm	kN	De equivalent diameter, mm	۱ _s	I _{s(50)}	Remarks
BH8	10.70		С			MUDSTONE/ SILTSTONE	D	U	Y	50	72	72	8.91	72.00	1.72	2.02	
BH8	10.70		С			MUDSTONE/ SILTSTONE	А	U	Y		52	72	2.24	69.04	0.47	0.54	
BH8	15.00		С			MUDSTONE/ SILTSTONE	D	U	Υ	100	72	72	7.45	72.00	1.44	1.69	
BH8	15.00		С			MUDSTONE/ SILTSTONE	А	U	Y		35	72	4.79	56.64	1.49	1.58	
BH8	33.50		С			MUDSTONE/ SILTSTONE	D	U	Y	55	72	72	15.36	72.00	2.96	3.49	
BH8	33.50		С			MUDSTONE/ SILTSTONE	А	U	Y		66	72	8.71	77.78	1.44	1.76	
BH8	28.60		С			MUDSTONE/ SILTSTONE	D	U	Y	50	72	72	8.75	72.00	1.69	1.99	
BH8	28.60		С			MUDSTONE/ SILTSTONE	А	U	Y		105	72	5.14	98.11	0.53	0.72	
BH9	9.00		С			MUDSTONE/	D	U	Y	40	72	72	5.72	72.00	1.10	1.30	
BH9	9.00		С			SILTSTONE MUDSTONE/	А	U	Y		98	72	5.25	94.78	0.58	0.78	
BH9	12.00		С			SILTSTONE MUDSTONE/	D	U	Y	60	72	72	10.02	72.00	1.93	2.28	
BH9	12.00		с			SILTSTONE MUDSTONE/ SILTSTONE	A	U	Y		53	72	1.81	69.70	0.37	0.43	
All specimens Test Type D - Diametr						less shown otherwise llock	e	Dia	metra				Axia		Blo	ck / Irreg	ular Lump
Direction U - Unknow L - Parallel P - Perpend Dimensions Dps' - Dista Lne - Lengt W - Width c	to planes dicular to p nce betwe h from pla	of wea blanes een pla tens to	of wea itens a o neare	akness at failur est free	e e end		Dps	<	P ↓ →	w)		Dps			Lne	w	P Dps
QA Ref.	М	Pa		-		sting Solutio		I CE33			Appro		R Figgis		Date 08/11	/2018	Fig.
ISRM Rev 2.0	A	()		6BZ		2 Fax: 01656 749096	, bridgend	i, UF33						boratory S			PLT 2

SUMMARY OF RESULTS UNIAXIAL COMPRESSIVE STRENGTH OF ROCK ISRM 2007

Project N	o :	C	8336-18		Project Name:					But	tington	Quarry			
		Sam	ple			Specin	nen Dime	nsions ²	Bulk	Water	l	Jniaxial C	ompressiv	e ³	
Borehole	No.	Dept	h (m)	Туре	Rock Type	Dia	Height	H/D	Density ²	Content ¹	Load Rate	Time to failure	Mode of failure	UCS	Remarks
		from	to	71 -		mm	mm		Mg/m ³	%	kN/min	secs		Мра	
3H2		12.90	13.10	С	Shale	72	200	2.8	2.67	1.9	0.7	144	A	17.1	
3H2		22.30	22.50	С	Shale	72	200	2.8	2.67	2.0	0.7	84	A	18.1	
BH2		32.40	32.58	С	Shale	72	148	2.1	2.69	1.2	0.7	241	А	43.2	
BH2		44.00	44.20	С	Shale	72	200	2.8	2.69	1.4	0.7	157	S	35.6	Slickensid
BH3		9.40	9.55	С	Shale	72	150	2.1	2.66	2.3	0.7	75	А	11.0	
BH3		14.00	14.20	С	Shale	72	200	2.8	2.67	1.9	0.7	128	А	21.2	
BH3		18.00	18.20	С	Shale	72	200	2.8	2.67	1.9	0.7	181	А	27.8	
BH5		9.50	9.70	С	Shale	72	200	2.8	2.67	1.6	0.7	145	А	25.9	
BH5		15.40	15.55	С	Shale	72	150	2.1	2.68	1.7	0.7	161	А	28.0	
BH8		40.30	40.50	С	Shale	72	200	2.8	2.70	1.2	0.7	253	А	50.2	
BH8		46.00	46.20	С	Shale	72	200	2.8	2.70	1.0	0.7	215	А	42.6	
Notes:	Test Spe	cification ·	Internatio	nal Soc	iety for Rock Mechani	cs. The	complete	ISRM st	agested m	ethods for	Rock Cha	racterizat	ion Testing	and Mon	itorina. 2007
101001					05 ± 3°C, specimen a		-							,	
					nod used for determin				-	bulk densi	ty				
					Uniaxial Compressive						-				
	Mode of t	·	S - Single						- Axial Cleavage F - Fragmented						
QA Ref.	<u> </u>	0	Apex	Testi	ng Solutions				Approver				Date		Fig.
ISRM Rev 1.0	A	S	-	Village Fa	rm Industrial Est, Pyle,					A Gru	ngan		21/11	/2018	UCS 1
		く て	-		ax: 01656 749096					A Groga	an Labo	ratory M	lanager		1

SUMMARY OF RESULTS UNIAXIAL COMPRESSIVE STRENGTH OF ROCK ISRM 2007

Project N	o :	D	8336-18		Project Name:					But	tington	Quarry			
		Sam	ple			Specir	nen Dime	nsions ²	Bulk	Water	ι	Jniaxial C	ompressiv	e ³	
Borehole	No.	Dept	h (m)	Туре	Rock Type	Dia	Height	H/D	Density ²	Content ¹	Load Rate	Time to failure	Mode of failure	UCS	Remarks
		from	to	51 -		mm	mm		Mg/m ³	%	kN/min	secs		Мра	
H4		25.30	25.45	С	Shale	72	150	2.1	2.90	1.6	0.7	147	А	28.0	
BH4		37.30	37.50	С	Shale	72	200	2.8	2.68	1.7	0.7	172	А	34.2	
BH4		N/A	N/A	С	Shale	72	200	2.8	2.69	1.7	0.7	218	А	35.8	
3H7		11.80	11.95	С	Shale	72	150	2.1	2.63	3.8	0.7	98	А	9.2	
BH7		16.80	17.00	С	Shale	72	200	2.8	2.62	3.4	0.7	68	А	5.7	
3H7		21.00	21.10	С	Shale	72	100	1.4	2.65	3.3	0.7	55	А	5.7	
otes:					ety for Rock Mechani 05 ± 3°C, specimen a					ethods for	Rock Cha	racterizat	ion Testing	g and Mon	itoring, 2007
					od used for determin Uniaxial Compressive					bulk densi	ty				
	Mode of f	ailure:	S - Single	Shear	MS - Multi	ple Shea	ar	AC - Axi	al Cleavag	e	F - Fragi	mented			
QA Ref. ISRM	<u> </u>	P	Apex	Testi	ng Solutions	_	_	_	Approver			_	Date		Fig.
Rev 1.0	A	AUS Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ Tel: 01656 746762 Fax: 01656 749096								A Gro				/2018	UCS 1

SUMMARY OF RESULTS UNIAXIAL COMPRESSIVE STRENGTH OF ROCK ISRM 2007

Project N	o :	D	8336-18		Project Name:					Butt	tington	Quarry			
		Sam	ple			Specin	nen Dime	nsions ²	Bulk	Water	ι	Jniaxial C	ompressiv	e ³	
Borehole	No.	Dept	h (m)	Туре	Rock Type	Dia	Height	H/D	Density ²	Content ¹	Load Rate	Time to failure	Mode of failure	UCS	Remarks
		from	to			mm	mm		Mg/m ³	%	kN/min	secs		Мра	
BH1	N/A	2.50	2.70	С	Mudstone/Siltstone	72	200	2.8	2.71	2.9	0.7	154	AC	23.5	
3H1	N/A	8.50	8.70	С	Mudstone/Siltstone	72	200	2.8	2.69	2.5	0.7	165	AC	14.3	
3H6	N/A	5.00	5.20	С	Mudstone/Siltstone	72	200	2.8	2.69	2.8	0.7	85	AC	5.0	
3H6	N/A	9.00	9.20	С	Mudstone/Siltstone	72	200	2.8	2.67	3.0	0.7	150	A/C	6.3	
3H8	N/A	14.00	14.12	С	Mudstone/Siltstone	72	120	1.7	2.68	1.5	0.7	152	AC	18.4	
BH8	N/A	36.50	36.70	С	Mudstone/Siltstone	72	200	2.8	2.69	1.4	0.7	127	AC	21.3	
SH9	N/A	11.00	11.20	С	Limestone	72	200	2.8	2.68	1.6	0.7	177	AC	34.0	
3H9	N/A	13.50	13.70	С	Limestone	72	200	2.8	2.68	1.6	0.7	81	AC	14.2	
otes:	Test Specification : International Society for F					cs, The	complete	ISRM su	iggested m	ethods for	Rock Cha	racterizat	ion Testing	g and Mon	itoring, 2007
	1 ISRM p	87 test 1,	water con	tent at 1	05 ± 3°C, specimen a	as receiv	ed at the	laborato	ту.						
	2 ISRM p	86 clause	(vii), Calip	oer meth	nod used for determin	ation of I	bulk volur	ne and c	erivation of	bulk densi	ty				
	3 ISRM p	153 part 1	determin	ation of	Uniaxial Compressive	e Strengt	th (UCS) o	of Rock I	Materials						
	Mode of f	ailure:	S - Single	e Shear	MS - Multij	ole Shea	ır	AC - Ax	al Cleavag	e	F - Fragr	mented	1		1
QA Ref. ISRM		P	Арех	Testi	ng Solutions				Approver				Date		Fig.
Rev 1.0	A	Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33 6BZ								A Gro	ngan		09/11	/2018	UCS 1
		V	-		ax: 01656 749096					A Groga	an Labo	ratory M	anager		

TEST REPORT POINT LOAD INDEX TEST

ISRM: 1985

Project No:

: D8336-18

Client: Terra Firma Wales Ltd

Project Name:

Buttington Quarry

Address: Deryn Court 5 Wharfdale Road Cardiff CF23 7HA

	e Sock Type				Test see I Fig 5		(N/N)	Di	mensio	ons	LOAD P	iameter,	М	ad Index pa /50) ^{0.45}			
Borehole	Depth m	Sample Ref	Sample Type	Specimen Ref	Speciment Depth	Rock Type	Type (D, A, I, B)		Failure Valid (Y/N)	Lne mm	Dps' mm	W mm	kN	De equivalent diameter, mm	I _s	I _{s(50)}	Remarks
BH1	3.75		С			MUDSTONE/ SILTSTONE	D	U	Y	62	72	72	2.49	72.00	0.48	0.57	
BH1	3.75		С			MUDSTONE/ SILTSTONE	А	U	Υ		75	72	2.52	82.92	0.37	0.46	
BH1	9.00		С			MUDSTONE/ SILTSTONE	D	U	Υ	55	72	72	4.35	72.00	0.84	0.99	
BH1	9.00		С			MUDSTONE/ SILTSTONE	А	U	Y		34	72	1.25	55.83	0.40	0.42	
BH1	13.00		С			MUDSTONE/ SILTSTONE	D	U	Y	45	72	72	4.61	72.00	0.89	1.05	
BH1	13.00		С			MUDSTONE/ SILTSTONE	A	U	Y		30	72	2.54	52.44	0.92	0.94	
BH6	3.60		С			MUDSTONE/ SILTSTONE	D	U	Y	62	72	72	2.49	72.00	0.48	0.57	No axial test as core split vertically
BH6	8.50		С			MUDSTONE/ SILTSTONE	D	U	Y	45	72	72	7.80	72.00	1.51	1.77	
BH6	8.50		С			MUDSTONE/ SILTSTONE	А	U	Y		55	72	0.41	71.01	0.08	0.09	
BH6	13.50		С			MUDSTONE/ SILTSTONE	D	U	Y	70	72	72	3.28	72.00	0.63	0.74	
BH6	13.50 C MUDSTONE				MUDSTONE/ SILTSTONE	А	U	Y		90	72	1.90	90.83	0.23	0.30		
All specimen	s tested as	s receiv	ved wa	ater co	ntent un	less shown otherwise	e	1			1						
Test Type D - Diamet	ral. A - Axi	al. -	rreaula	ar Lum	סו. B - E	llock		Dia	metra	I			Axia	I	Bloc	ck / Irreg	ular Lump
Test Type Diametral Axial Block / Irregular Lump Direction U - Unknown or Random P P P L - Parallel to planes of weakness P - Perpendicular to planes of weakness P P P Dimensions Dps' - Distance between platens at failure Dps V V V V L - Length from platens to nearest free end W - Width of shortest dimension perpendicular to load, P V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V V																	
	Г							← Lne			Appro	ver			Date		Fig.
QA Ref.	$\mathbf{\lambda}$	Pc	,	-						<i>R Figgis</i> 08/11/2018							
ISRM Rev 2.0	A	()		6BZ		ge Farm Industrial Est, Pyle	, Briagend	i, UF33						boratory S			PLT 1
1.67 2.0						1000 1 10000				R Figgis, Laboratory Supervisor							

TEST REPORT POINT LOAD INDEX TEST

ISRM: 1985

Project No:

Rev 2.0

Tel: 01656 746762 Fax: 01656 749096

D8336-18

Client: Terra Firma Wales Ltd

Project Name: Buttington Quarry

Address: Deryn Court 5 Wharfdale Cardiff CF23 7HA

					pth		see	Type ISRM	۲/N)	Di	mensio	ons	LOAD P	meter,	М	ad Index pa	
٥	Ę	e Ref	: Type	en Ref	ent De	Rock Type		and 8	Valid (De ent dia mm	F=(De	/50) ^{0.45}	Remarks
Borehole	Depth m	Sample Ref	Sample Type	Specimen Ref	Speciment Depth		Type (D, A, I, B)	Direction (L, P or U)	Failure Valid (Y/N)	Lne mm	Dps' mm	W mm	kN	De equivalent diameter, mm	١ _s	I _{s(50)}	
BH2	8.50		С			MUDSTONE/ SILTSTONE	D	U	Υ	100	72	72	5.50	72.00	1.06	1.25	No axial test as core split vertically
BH2	16.10		С			MUDSTONE/ SILTSTONE	D	U	Υ	150	72	72	2.95	72.00	0.57	0.67	No axial test as core split vertically
BH2	39.00		С			MUDSTONE/ SILTSTONE	D	U	Υ	290	72	72	6.31	72.00	1.22	1.43	No axial test as core split vertically
BH3	16.00		С			MUDSTONE/ SILTSTONE	D	U	Υ	170	72	72	6.86	72.00	1.32	1.56	
BH3	16.00		С			MUDSTONE/ SILTSTONE	А	U	Υ		105	72	3.62	98.11	0.38	0.51	
BH5	6.00		С			MUDSTONE/ SILTSTONE	D	U	Y	135	72	72	5.36	72.00	1.03	1.22	
BH5	6.00		С			MUDSTONE/ SILTSTONE	А	U	Y		110	72	3.17	100.42	0.31	0.43	
BH5	14.00		С			MUDSTONE/ SILTSTONE	D	U	Y	125	72	72	7.97	72.00	1.54	1.81	
BH5	14.00		С			MUDSTONE/ SILTSTONE	А	U	Y		100	72	6.38	95.75	0.70	0.93	
BH8	43.00		С			MUDSTONE/ SILTSTONE	I	U	Y	125	50	72	3.59	67.70	0.78	0.90	
All specimen	s tested as	s recei	ved wa	ater co	ntent un	lless shown otherwise	e										
Test Type D - Diamet	ral, A - Axi	al, I - I	rregula	ar Lun	пр, В - Е	3lock		Dia	metra	I			Axia	d	Blo	ck / Irreg	ular Lump
Direction U - Unknow	vn or Ranc	lom							P				F	> 			Р
L - Parallel P - Perpen	to planes	of wea					^ /	_	<u> </u>	\frown	\		\uparrow		Lne N		Dps
Dimension Dps' - Dista		oon nir	atons	t failur	•	C	Dps ($\langle \cdots \rangle$)	Dps	<u> </u>	>	ki-(>
Lne - Leng W - Width	th from pla	itens to	o neare	est free	e end	o load, P	٧V	< Lne	>	\smile			\bigvee		Ľ	W	V
QA Ref.		0		Δnr		sting Solution	ne				Approv	ver			Date		Fig.
QA Ref. Apex Testing Solutions ISRM Sturmi Way, Village Farm Industrial Est, Pyle, Bridgend, CF33									R Figgis 19/11/2018 PLT 3			PLT 3					

R Figgis, Laboratory Supervisor



ANNEX F Groundwater Test Results



Certificate Number 18-27827

Client Terra Firma (Wales) Ltd 5 Deryn Court Wharfdale Road Pentwyn Cardiff CF23 7HB

- Our Reference 18-27827
- Client Reference 14880 RH
 - Order No 14880 RH
 - Contract Title B.Q-Buttington Quarry
 - Description 6 Water samples.
 - Date Received 23-Nov-18
 - Date Started 23-Nov-18
- Date Completed 03-Dec-18
- Test Procedures Identified by prefix DETSn (details on request).
 - *Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Jun

Adam Fenwick Contracts Manager



03-Dec-18



Summary of Chemical Analysis Water Samples

Contract nite B.Q-Buttington Qua	11 y				1				
			Lab No		1425214	1425215	1425216	1425217	1425218
		Sa	ample ID	BH2	BH4	BH7	BH8	BH9	LAGOON
			Depth						
		(Other ID						
		Sam	ple Type	WATER	WATER	WATER	WATER	WATER	WATER
		Sampl	ing Date	21/11/18	21/11/18	21/11/18	21/11/18	21/11/18	21/11/18
		Sampli	ing Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Metals									
Aluminium, Dissolved	DETSC 2306	10	ug/l	88	140	790	92	140	540
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	45	26	12	0.73	1.2	1.2
Boron, Dissolved	DETSC 2306*	12	ug/l	260	180	330	150	45	140
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	< 0.03	0.04	< 0.03	< 0.03	< 0.03
Calcium, Dissolved	DETSC 2306	0.09	mg/l	130	240	7.7	74	54	12
Chromium, Dissolved	DETSC 2306	0.25	ug/l	< 0.25	< 0.25	1.2	< 0.25	0.35	0.47
Chromium III, Dissolved	DETSC 2306*	1	ug/l	< 1.0	< 1.0	1.2	< 1.0	< 1.0	< 1.0
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	0.4	< 0.4	7.6	0.4	5.1	2.2
Iron, Dissolved	DETSC 2306	5.5	ug/l	7.5	5.5	660	38	32	130
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.13	0.10	14	0.22	0.34	0.29
Magnesium, Dissolved	DETSC 2306	0.02	mg/l	39	75	1.9	27	18	3.9
Manganese, Dissolved	DETSC 2306	0.22	ug/l	97	270	34	41	16	3.9
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	6.9	12	2.5	0.7	5.7	< 0.5
Selenium, Dissolved	DETSC 2306	0.25	ug/l	0.83	0.92	7.4	1.2	5.3	2.2
Sodium, Dissolved	DETSC 2306	0.07	mg/l	110	45	130	30	24	56
Tin, Dissolved	DETSC 2306*	0.4	ug/l	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4
Zinc, Dissolved	DETSC 2306	1.3	ug/l	61	22	110	2.1	11	60
Inorganics	1	ι – Ι			4				
Conductivity	DETSC 2009	1	uS/cm	1260	1630	639	734	551	451
рН	DETSC 2008			6.6	6.8	8.3	7.3	7.4	7.7
Biochemical Oxygen Demand, Total	DETSC 2031	1	mg/l	8.5	19	< 1.0	5.4	3.2	4.3
Chemical Oxygen Demand, Total	DETSC 2032	10	mg/l	< 10	10	26	< 10	34	< 10
Cyanide, Total	DETSC 2130	0.04	mg/l	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04	< 0.04
Hardness	DETSC 2303	0.1	mg/l	487	898	26.7	296	206	45.8
Suspended Solids	DETSC 2034	5	mg/l	150	880	960	62	640	130
Ammoniacal Nitrogen as N	DETSC 2207	0.015	mg/l	0.41	0.85	0.23	0.13	0.079	0.14
Chloride	DETSC 2055	0.1	mg/l	18	13	17	13	11	8.8
Nitrite as N	DETSC 2201	0.035	mg/l	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035	< 0.035
Ortho Phosphate as PO4	DETSC 2205	0.01	mg/l	0.07	0.04	0.20	< 0.01	0.02	0.10
Sulphate as SO4	DETSC 2055	0.1	mg/l	330	300	110	58	50	60
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	- 1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	48	< 1.0	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	48	< 10	< 10	< 10



Summary of Chemical Analysis Water Samples

			Lab No	1425213	1425214	1425215	1425216	1425217	1425218
		Sa	mple ID	BH2	BH4	BH7	BH8	BH9	LAGOON
			Depth						
		(Other ID						
		Sam	ple Type	WATER	WATER	WATER	WATER	WATER	WATER
		Sampl	ing Date	21/11/18	21/11/18	21/11/18	21/11/18	21/11/18	21/11/18
		Sampli	ing Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10	< 10	48	< 10	< 10	< 10
C10-C24 Diesel Range Organics (DRO)	DETSC 3311	10	ug/l	< 10	< 10	140	< 10	< 10	43
EPH (C10-C40)	DETSC 3311	10	ug/l	< 10	< 10	770	< 10	< 10	55
PAHs									
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	< 0.05	0.09	< 0.05	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	0.01	< 0.01	0.02	< 0.01	< 0.01	0.03
Phenanthrene	DETSC 3304	0.01	ug/l	0.01	< 0.01	0.06	< 0.01	< 0.01	0.11
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.02
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	< 0.20	0.20	< 0.20	< 0.20	0.25
Phenols									
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100	< 100	< 100	< 100	< 100



Information in Support of the Analytical Results

Our Ref 18-27827 Client Ref 14880 RH Contract B.Q-Buttington Quarry

Containers Received & Deviating Samples

		Date		Holding time exceeded for	Inappropriate container for
Lab No	Sample ID	Sampled	Containers Received	tests	tests
1425213	BH2 WATER	21/11/18	GB 1L x2, GV, PB 1L x2		
1425214	BH4 WATER	21/11/18	GB 1L x2, GV, PB 1L x2		
1425215	BH7 WATER	21/11/18	GB 1L x2, GV, PB 1L x2		
1425216	BH8 WATER	21/11/18	GB 1L x2, GV, PB 1L x2		
1425217	BH9 WATER	21/11/18	GB 1L x2, GV, PB 1L x2		
1425218	LAGOON WATER	21/11/18	GB 1L x2, GV, PB 1L x2		

Key: G-Glass P-Plastic B-Bottle V-Vial

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



Certificate Number 18-26412

Client Terra Firma (Wales) Ltd 5 Deryn Court Wharfdale Road Pentwyn Cardiff CF23 7HB

- *Our Reference* 18-26412
- Client Reference 14880 RH
 - Order No 14880 RH
 - Contract Title Buttington Quarry
 - Description 2 Water samples.
 - Date Received 06-Nov-18
 - Date Started 06-Nov-18
- Date Completed 14-Nov-18

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Jun

Adam Fenwick Contracts Manager



14-Nov-18



Summary of Chemical Analysis Water Samples

Contract Intie Buttington Quarry			Lab No	1417080	4 4 4 7 0 0 4
		6-			1417081
		29	imple ID	BH1	BH6
			Depth		
			Other ID		
		-	ple Type	WATER	WATER
		-	ing Date	02/11/18	02/11/18
		Sampli	ng Time	n/s	n/s
Test	Method	LOD	Units		
Metals	1				
Aluminium, Dissolved	DETSC 2306	10	ug/l	220	58
Arsenic, Dissolved	DETSC 2306	0.16	ug/l	0.89	12
Boron, Dissolved	DETSC 2306*	12	ug/l	310	240
Cadmium, Dissolved	DETSC 2306	0.03	ug/l	< 0.03	0.17
Calcium, Dissolved	DETSC 2306	0.09	mg/l	9.0	7.9
Chromium, Dissolved	DETSC 2306	0.25	ug/l	0.88	75
Chromium III, Dissolved	DETSC 2306*	1	ug/l	< 1.0	75
Chromium, Hexavalent	DETSC 2203	7	ug/l	< 7.0	< 7.0
Copper, Dissolved	DETSC 2306	0.4	ug/l	1.5	100
Iron, Dissolved	DETSC 2306	5.5	ug/l	220	1600
Lead, Dissolved	DETSC 2306	0.09	ug/l	0.52	0.59
Magnesium, Dissolved	DETSC 2306	0.02	mg/l	0.82	0.87
Manganese, Dissolved	DETSC 2306	0.22	ug/l	55	54
Mercury, Dissolved	DETSC 2306	0.01	ug/l	< 0.01	< 0.01
Nickel, Dissolved	DETSC 2306	0.5	ug/l	0.9	150
Selenium, Dissolved	DETSC 2306	0.25	ug/l	1.7	1.0
Sodium, Dissolved	DETSC 2306	0.07	mg/l	180	200
Tin, Dissolved	DETSC 2306*	0.4	ug/l	< 0.4	2.5
Zinc, Dissolved	DETSC 2306	1.3	ug/l	37	340
Inorganics	021002000	1.0	<u>48</u> /1	37	010
Conductivity	DETSC 2009	1	uS/cm	722	939
pH	DETSC 2009	-	us/ cm	8.2	8.1
Biochemical Oxygen Demand, Total	DETSC 2000	1	mg/l	26	13
Chemical Oxygen Demand, Total	DETSC 2031	10	mg/l	11	< 10
Cyanide, Total	DETSC 2032	0.04	mg/l	< 0.04	< 0.04
Hardness	DETSC 2303	0.04	mg/l	25.8	23.3
Suspended Solids	DETSC 2303	5	mg/l	1200	330
Ammoniacal Nitrogen as N					0.46
Chloride	DETSC 2207	0.015	mg/l	0.039	0.40
Nitrite as N	DETSC 2055	0.1	mg/l	1.5	
	DETSC 2201		mg/l	0.079	< 0.035
Ortho Phosphate as PO4	DETSC 2205	0.01	mg/l	0.05	0.05
Sulphate as SO4	DETSC 2055	0.1	mg/l	7.1	2.1
Petroleum Hydrocarbons			4		
Aliphatic C5-C6	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C6-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aliphatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10



Summary of Chemical Analysis Water Samples

			Lab No	1417080	1417081
		Sa	mple ID	BH1	BH6
			Depth		
		(Other ID		
		Sam	ple Type	WATER	WATER
		Sampl	ing Date	02/11/18	02/11/18
		Sampli	ing Time	n/s	n/s
Test	Method	LOD	Units		
Aromatic C5-C7	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C10-C12	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C12-C16	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C16-C21	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C21-C35	DETSC 3072*	1	ug/l	< 1.0	< 1.0
Aromatic C5-C35	DETSC 3072*	10	ug/l	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	ug/l	< 10	< 10
C10-C24 Diesel Range Organics (DRO)	DETSC 3311	10	ug/l	< 10	< 10
EPH (C10-C40)	DETSC 3311	10	ug/l	< 10	< 10
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	< 0.05	< 0.05
Acenaphthylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Fluorene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Phenanthrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Pyrene	DETSC 3304	0.01	ug/l	< 0.01	0.01
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Chrysene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	< 0.01	< 0.01
PAH Total	DETSC 3304	0.2	ug/l	< 0.20	< 0.20
Phenols					
Phenol - Monohydric	DETSC 2130	100	ug/l	< 100	< 100



Information in Support of the Analytical Results

Our Ref 18-26412 Client Ref 14880 RH Contract Buttington Quarry

Containers Received & Deviating Samples

		Date			Inappropriate container for
Lab No	Sample ID	Sampled	Containers Received	Holding time exceeded for tests	tests
1417080	BH1 WATER	02/11/18	GB 1L x2, GV, PB 1L x2	pH/Cond/TDS (2 days), Nitrite as N (2 days)	
1417081	BH6 WATER	02/11/18	GB 1L x2, GV, PB 1L x2	pH/Cond/TDS (2 days), Nitrite as N (2 days)	
Key: G-Glas	s P-Plastic B-Bottle V-Vial	÷			· · ·
DETS canno	ot be held responsible for	the integrity of san	nples received whereby the labo	ratory did not undertake the sampling. In this instance	e samples received may
be deviating	g. Deviating Sample criter	ia are based on Bri	tish and International standards	and laboratory trials in conjunction with the UKAS no	te 'Guidance on
Deviating Sa	amples'. All samples recei	ved are listed abov	e. However, those samples that	have additional comments in relation to hold time, in	appropriate containers
etc are devi	iating due to the reasons :	stated. This means	that the analysis is accredited w	here applicable, but results may be compromised due	to sample deviations. If

etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



ANNEX G Soil Test Results



Certificate Number 18-26250

07-Dec-18

- Client Terra Firma (Wales) Ltd 5 Deryn Court Wharfdale Road Pentwyn Cardiff CF23 7HB
- Our Reference 18-26250
- Client Reference 14880RH
 - Order No 14880RH
 - Contract Title B.Q. Buttington Quarry
 - Description 25 Soil samples.
 - Date Received 05-Nov-18
 - Date Started 05-Nov-18
- Date Completed 07-Dec-18
- Test Procedures Identified by prefix DETSn (details on request).
 - *Notes* Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Your

Adam Fenwick Contracts Manager





Contract Inte B.Q Buttington	n Quarry							l.	
			Lab No	1416278	1416279	1416280	1416281	1416282	1416283
		Sa	mple ID	S1	S2	S3	S4	S6	S7
			Depth						
			Other ID						
			ple Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		-	ing Date	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18
		-	ing Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Preparation									
Moisture Content	DETSC 1004	0.1	%	8.4	8.4	6.3	11	6.7	5.1
Metals			. 1						
Aluminium	DETSC 2301*	1	mg/kg	20000	15000	15000	15000	15000	17000
Arsenic	DETSC 2301#	0.2	mg/kg	6.2	2.5	2.4	13	2.4	11
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.5	0.8	0.8	0.9	0.9	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Calcium	DETSC 2301*	1	mg/kg	3700	4300	10000	3800	2300	8000
Chromium	DETSC 2301#	0.15	mg/kg	26	21	21	21	25	22
Chromium III	DETSC 2301*	0.15	mg/kg	26	21	21	21	25	22
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	33	37	33	18	29	45
Iron	DETSC 2301	25	mg/kg	43000	35000	35000	32000	41000	35000
Lead	DETSC 2301#	0.3	mg/kg	7.9	5.4	18	17	6.3	20
Manganese	DETSC 2301#	20	mg/kg	680	650	830	450	260	430
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	36	34	33	27	35	28
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sodium	DETSC 2301*	0.1	mg/kg	210	200	180	330	290	210
Tin	DETSC 2301	1	mg/kg	1.1	1.2	< 1.0	< 1.0	1.1	< 1.0
Zinc	DETSC 2301#	1	mg/kg	84	80	72	64	76	63
Inorganics			<u> </u>			70		60	
Conductivity	DETSC 2009	1	uS/cm	56	46	79	110	68	99
pH Guanida Tatal	DETSC 2008#	0.1		8.3	8.4	8.4	8.7	8.5	8.5
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	0.3	< 0.1	0.2	< 0.1
Organic matter	DETSC 2002#	0.1	%	0.4	< 0.1	0.2	0.1	0.1	0.2
Ammoniacal Nitrogen as N Chloride	DETSC 2119#	0.5	mg/kg	1.4	1.1	1.0	1.5	< 0.50	1.1
	DETSC 2055	1	mg/kg	10.9	< 1.0	< 1.0	2.3	1.4	3.5
Nitrite as NO2 Ortho Phosphate as P	DETSC 2055	1	mg/kg	1.2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Sulphate as SO4, Total	DETSC 2205*	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Petroleum Hydrocarbons	DETSC 2321#	0.01	%	0.01	< 0.01	0.01	0.02	< 0.01	< 0.01
	DETCC 2224*	0.01		10.01	10.01	10.01	10.01	10.01	10.01
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8 Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10 Aliphatic C10-C12	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12 Aliphatic C12-C16	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
· · ·	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35 Aliphatic C5-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7 Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-Co	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01



			Lab No	1416278	1416279	1416280	1416281	1416282	1416283
		Sa	ample ID	S1	S2	S3	S4	S6	S7
			Depth						
			Other ID						
		Sam	ple Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampl	ing Date	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18
		Sampl	ing Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	13	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	29	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	6.9	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	49	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	49	< 10	< 10	< 10
C10-C24 Diesel Range Organics (DRO)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Fuel Identification	*			Ν	Ν	N	Ν	Ν	Ν
ЕРН (С10-С40)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3



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		6	Lab No	1416284	1416285	1416286	1416287	1416288	1416289
		58	ample ID	S8	S9	S11	S12	S13	S14
			Depth						
			Other ID						
			ple Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		-	ing Date	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18
Test	Method	LOD	ing Time Units	n/s	n/s	n/s	n/s	n/s	n/s
Preparation	Ivietiiou	LOD	Units						
Moisture Content	DETSC 1004	0.1	%	6.3	6.7	7.5	5.1	7.2	7.1
Metals	DL13C 1004	0.1	70	0.5	0.7	7.5	5.1	1.2	/.1
Aluminium	DETSC 2301*	1	mg/kg	17000	18000	17000	16000	5900	8400
Arsenic	DETSC 2301#	0.2	mg/kg	1,000	18000	8.6	5.7	5.6	14
Boron, Water Soluble	DETSC 2301#	0.2	mg/kg	1.0	0.8	0.7	0.9	1.0	0.8
Cadmium	DETSC 2301#	0.2	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	0.4	< 0.1
Calcium	DETSC 2301*	0.1	mg/kg	2500	9300	2000	4900	20000	44000
Chromium	DETSC 2301#	0.15	mg/kg	2500	25	2000	26	110	24
Chromium III	DETSC 2301*	0.15	mg/kg	25	25	24	26	110	24
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	23	51	17	34	10	21
Iron	DETSC 2301	25	mg/kg	43000	37000	38000	40000	11000	28000
Lead	DETSC 2301#	0.3	mg/kg	6.4	31	15	16	34	15
Manganese	DETSC 2301#	20	mg/kg	320	950	300	670	430	380
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	36	36	30	36	56	28
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Sodium	DETSC 2301*	0.1	mg/kg	210	200	330	340	210	370
Tin	DETSC 2301	1	mg/kg	1.8	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	DETSC 2301#	1	mg/kg	80	72	67	76	130	74
Inorganics	1	1	0, 0,						
Conductivity	DETSC 2009	1	uS/cm	35	110	110	120	89	150
pH	DETSC 2008#			7.1	8.0	8.4	8.5	8.7	8.3
Cyanide, Total	DETSC 2130#	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2002#	0.1	%	0.1	0.4	0.2	< 0.1	0.2	0.5
Ammoniacal Nitrogen as N	DETSC 2119#	0.5	mg/kg	1.1	1.1	1.5	1.6	0.84	1.9
Chloride	DETSC 2055	1	mg/kg	1.5	4.8	2.6	1.8	5.3	19.8
Nitrite as NO2	DETSC 2055	1	mg/kg	< 1.0	1.6	< 1.0	< 1.0	< 1.0	1.3
Ortho Phosphate as P	DETSC 2205*	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Sulphate as SO4, Total	DETSC 2321#	0.01	%	< 0.01	0.02	< 0.01	0.02	< 0.01	0.06
Petroleum Hydrocarbons									
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C16	DETSC 3072#	1.2	mg/kg	2.8	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C16-C21	DETSC 3072#	1.5	mg/kg	9.9	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C21-C35	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072*	10	mg/kg	14	< 10	< 10	< 10	< 10	< 10
Aromatic C5-C7	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01



			Lab No	1416284	1416285	1416286	1416287	1416288	1416289
		Sa	ample ID	S8	S9	S11	S12	S13	S14
			Depth						
			Other ID						
		Sam	ple Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampl	ing Date	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18
		Sampl	ing Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	4.4	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	18	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	2.5	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	25	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	40	< 10	< 10	< 10	< 10	< 10
C10-C24 Diesel Range Organics (DRO)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Fuel Identification	*			N	N	N	N	Ν	N
EPH (C10-C40)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3



Method DETSC 1004	Sam Sampl Sampli LOD	Lab No Imple ID Depth Other ID ple Type ing Date ing Time Units	1416290 S15 SOIL 02/11/18 n/s	1416291 S16 S0IL 02/11/18	1416292 S17 SOIL 02/11/18	1416293 \$18 SOIL	1416294 S20 SOIL	1416295 S21 SOIL
DETSC 1004	Sam Sampl Sampli LOD	Depth Other ID ple Type ing Date ing Time	SOIL 02/11/18	SOIL	SOIL	SOIL		
DETSC 1004	Sam Sampl Sampli LOD	Other ID ple Type ing Date ing Time	02/11/18				SOIL	SOIL
DETSC 1004	Sam Sampl Sampli LOD	ple Type ing Date ing Time	02/11/18				SOIL	SOIL
DETSC 1004	Sampl Sampli LOD	ing Date ing Time	02/11/18				SOIL	SOIL
DETSC 1004	Sampli LOD	ing Time		02/11/18	02/11/18			
DETSC 1004	LOD		n/s		02, 11, 10	02/11/18	02/11/18	02/11/18
DETSC 1004		Units		n/s	n/s	n/s	n/s	n/s
	0.1							
					[
	0.1	%	8.6	7.5	18	18	19	7.0
								22000
								12
								1.1
								0.3
								3300
								38
								38
								< 1.0
								34
								41000
								37
								590 < 0.05
								44 < 0.5
								160 2.1
								100
DE13C 2301#	T	IIIg/ Kg	02	65	130	90	/4	100
	1	us/cm	100	72	100	75	65	230
	1	us/cm						6.7
	0.1	ma/ka						0.7
								3.2
	-							3.3
								3.3
								< 1.0
								< 0.10
								0.05
DE13C 23211	0.01	70	0.10	0.01	0.01	0.04	0.02	0.05
DFTSC 3321*	0.01	mø/kø	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
								< 0.01
								< 0.01
								< 1.5
								< 1.2
								< 1.5
								< 3.4
								< 10
								< 0.01
								< 0.01
	DETSC 2301# DETSC 2009 DETSC 2002# DETSC 2002# DETSC 2002# DETSC 3321* DETSC 3072# DETSC 3072#	DETSC 2301* 1 DETSC 2301# 0.2 DETSC 2123# 0.2 DETSC 2123# 0.2 DETSC 2301# 0.1 DETSC 2301# 0.15 DETSC 2301# 0.15 DETSC 2301# 0.2 DETSC 2301# 0.2 DETSC 2301# 0.3 DETSC 2301# 0.3 DETSC 2301# 0.3 DETSC 2301# 0.3 DETSC 2301# 0.3 DETSC 2301# 0.5 DETSC 2301# 0.5 DETSC 2301# 1 DETSC 2301# 0.5 DETSC 2301# 1 DETSC 2301# 0.5 DETSC 2009 1 DETSC 2008# 0.1 DETSC 2008# 0.1 DETSC 2002# 0.1 DETSC 2055 1 DETSC 2055 1 DETSC 2055 1 DETSC 2055 1 DETSC 2321# 0.01 DETSC 3321* 0.01 DETSC 3321* 0.01 DETSC 3072# 1.5 DETSC 3072#	DETSC 2301* 1 mg/kg DETSC 2301# 0.2 mg/kg DETSC 2123# 0.2 mg/kg DETSC 2301# 0.1 mg/kg DETSC 2301# 0.1 mg/kg DETSC 2301# 0.15 mg/kg DETSC 2301# 0.15 mg/kg DETSC 2301# 0.15 mg/kg DETSC 2301# 0.2 mg/kg DETSC 2301# 0.2 mg/kg DETSC 2301# 0.2 mg/kg DETSC 2301# 0.3 mg/kg DETSC 2301# 0.3 mg/kg DETSC 2301# 0.5 mg/kg DETSC 2301# 0.5 mg/kg DETSC 2301# 0.1 mg/kg DETSC 2301# 1 mg/kg DETSC 2301# 1 mg/kg DETSC 2301# 1 mg/kg DETSC 2009 1 uS/cm DETSC 2009 1 uS/cm DETSC 2002# 0.1 mg/kg DETSC 2005	DETSC 2301* 1 mg/kg 15000 DETSC 2301# 0.2 mg/kg 47 DETSC 2123# 0.2 mg/kg 0.6 DETSC 2301# 0.1 mg/kg <0.1	DETSC 2301* 1 mg/kg 15000 17000 DETSC 2301# 0.2 mg/kg 47 33 DETSC 2123# 0.2 mg/kg 0.6 0.7 DETSC 2301# 0.1 mg/kg 41000 22000 DETSC 2301# 0.15 mg/kg 24 27 DETSC 2301# 0.15 mg/kg 24 27 DETSC 2301# 0.15 mg/kg 24 27 DETSC 2301# 0.2 mg/kg 40000 37000 DETSC 2301# 0.2 mg/kg 40000 37000 DETSC 2301# 0.3 mg/kg 470 340 DETSC 2301# 0.5 mg/kg 470 340 DETSC 2301# 1 mg/kg 20.5 <0.5	DETSC 2301* 1 mg/kg 15000 17000 17000 DETSC 2301# 0.2 mg/kg 47 33 11 DETSC 2301# 0.2 mg/kg 0.6 0.7 0.7 DETSC 2301# 0.1 mg/kg 41000 22000 3200 DETSC 2301# 0.15 mg/kg 24 27 31 DETSC 2301# 0.12 mg/kg 37 31 48 DETSC 2301# 0.2 mg/kg 470 340 350 DETSC 2301# 0.3 mg/kg 470 340 350 DETSC 2301# 0.3 mg/kg 470 340 350 DETSC 2301# 1 mg/kg 37 41 58 DETSC 2301#	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	DETSC 2301* 1 mg/kg 15000 17000 17000 22000 21000 DETSC 2301# 0.2 mg/kg 47 33 11 12 6.4 DETSC 2301# 0.2 mg/kg 0.6 0.7 0.7 0.8 0.7 DETSC 2301# 0.1 mg/kg <0.1



			Lab No	1416290	1416291	1416292	1416293	1416294	1416295
		Sa	ample ID	S15	S16	S17	S18	S20	S21
			Depth						
			Other ID						
		Sam	ple Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampl	ing Date	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18	02/11/18
		Sampl	ing Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
C10-C24 Diesel Range Organics (DRO)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Fuel Identification	*			N	N	N	Ν	Ν	Ν
EPH (C10-C40)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
PAHs	-								
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3



Contract Title B.Q Buttington Qt	lany								
			Lab No	1416296	1416297	1416298	1416299	1420940	1425219
		Sa	mple ID	S22	S23	S24	S25	S10	S5
			Depth						
			Other ID						
			ple Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		-	ing Date	02/11/18	02/11/18	02/11/18	02/11/18	n/s	20/11/18
		-	ing Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Preparation	I				0.5	6.0			10
Moisture Content	DETSC 1004	0.1	%	6.1	9.5	6.0	6.3	11	10
Metals			4	12000	40000	4 6 9 9 9	40000	24.000	10000
Aluminium	DETSC 2301*	1	mg/kg	13000	19000	16000	18000	21000	18000
Arsenic	DETSC 2301#	0.2	mg/kg	5.8	6.8	12	10	6.5	14
Boron, Water Soluble	DETSC 2123#	0.2	mg/kg	0.5	0.7	0.5	0.4	0.4	0.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	< 0.1	< 0.1	< 0.1	13	< 0.1
Calcium	DETSC 2301*	1	mg/kg	100000	2200	7000	2100	2200	4000
Chromium	DETSC 2301#	0.15	mg/kg	23 23	25 25	20 20	23 23	27 27	23 23
Chromium III	DETSC 2301*	0.15	mg/kg						
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Copper	DETSC 2301#	0.2	mg/kg	23	38	17	23	260	27
Iron	DETSC 2301	25	mg/kg	21000	40000	34000	39000	39000	36000
Lead	DETSC 2301#	0.3	mg/kg	18	24	18	17	32	21
Manganese	DETSC 2301#	20	mg/kg	410	270	310	240	27000	330
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel	DETSC 2301#	1	mg/kg	22	30	23	30	170	30
Selenium Codium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	9.7	< 0.5
Sodium	DETSC 2301*	0.1	mg/kg	190	200	150	160	2300	210
Tin	DETSC 2301	1	mg/kg	< 1.0 68	< 1.0 74	< 1.0	< 1.0	< 1.0	< 1.0
Zinc	DETSC 2301#	1	mg/kg	68	74	64	71	690	76
Inorganics Conductivity	DETSC 2009	1	uS/cm	120	58	88	74	3700	160
pH		1	us/cm	130 8.5	7.6	8.4	74	7.1	160 8.4
Cyanide, Total	DETSC 2008#	0.1	ma/ka	8.5 < 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Organic matter	DETSC 2130#	0.1	mg/kg %	0.6	< 0.1 0.4	0.1	0.1	0.1	1.0
Ammoniacal Nitrogen as N	DETSC 2002# DETSC 2119#	0.1		1.5	2.7	1.7	1.1	6.1	1.0
Chloride		0.5	mg/kg mg/kg	3.5	2.7	7.9	3.3	17.4	19
Nitrite as NO2	DETSC 2055 DETSC 2055	1	mg/kg	5.5 1.9	< 1.0	< 1.0	< 1.0	9.2	12.8
Ortho Phosphate as P	DETSC 2055 DETSC 2205*	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Sulphate as SO4, Total	DETSC 2203	0.01	111g/ Kg %	0.10	< 0.10	0.01	< 0.10	0.10	< 0.10
Petroleum Hydrocarbons	DE13C 2521#	0.01	/0	0.04	< 0.01	0.01	< 0.01	0.27	< 0.01
Aliphatic C5-C6	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C5-C6	DETSC 3321* DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10	DETSC 3321* DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12	DETSC 3321* DETSC 3072#	1.5	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C12-C12	DETSC 3072# DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5	< 1.5
Aliphatic C12-C18	DETSC 3072# DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2	< 1.2
Aliphatic C21-C35	DETSC 3072# DETSC 3072#	3.4	mg/kg	< 1.5	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aliphatic C5-C35	DETSC 3072# DETSC 3072*	3.4 10	mg/kg	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4	< 3.4
Aromatic C5-C7	DETSC 3072* DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8	DETSC 3321* DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
	DE13C 3321	0.01	1118/ Kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01



			Lab No	1416296	1416297	1416298	1416299	1420940	1425219
		Sa	ample ID	S22	S23	S24	S25	S10	S5
			Depth						
			Other ID						
		Sam	ple Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampl	ing Date	02/11/18	02/11/18	02/11/18	02/11/18	n/s	20/11/18
		Sampl	ing Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	Method	LOD	Units						
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
C10-C24 Diesel Range Organics (DRO)	DETSC 3311#	10	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10
Fuel Identification	*			N	Ν	N	N	Ν	N
EPH (C10-C40)	DETSC 3311#	10	mg/kg	45	< 10	< 10	< 10	< 10	< 10
PAHs									
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3



ni Quarry		_	
		Lab No	1425220
	Sa	· · ·	S19
		Depth	
	(Other ID	
	Sam	ole Type	SOIL
	Sampli	ing Date	20/11/18
	Sampli	ng Time	n/s
Method	LOD	Units	
DETSC 1004	0.1	%	9.0
DETSC 2301*	1	mg/kg	19000
DETSC 2301#	0.2	mg/kg	8.2
DETSC 2123#	0.2	mg/kg	0.6
DETSC 2301#	0.1	mg/kg	0.2
DETSC 2301*	1		8700
DETSC 2301#	0.15		30
DETSC 2301*	0.15		30
DETSC 2204*	1		< 1.0
DETSC 2301#	0.2		42
DETSC 2301	25		40000
DETSC 2301#	0.3		19
	20		380
DETSC 2325#	0.05		< 0.05
DETSC 2301#	1		50
	0.5		< 0.5
	0.1		170
DETSC 2301	1		< 1.0
DETSC 2301#	1		89
	I	0, 0,	
DETSC 2009	1	uS/cm	220
DETSC 2008#			9.9
	0.1	mg/kg	0.1
	0.1	%	0.9
	0.5	mg/kg	16
	1		35.1
	1		< 1.0
			0.11
			0.02
	I		
DETSC 3321*	0.01	mg/kg	< 0.01
			< 0.01
			< 0.01
			< 1.5
			< 1.2
			< 1.5
			< 3.4
			< 10
			< 0.01
			< 0.01
	Method DETSC 1004 DETSC 2301* DETSC 2301# DETSC 2301#	Sample Sample Sample Sample Method LOD DETSC 1004 0.1 DETSC 2301# 0.2 DETSC 2301# 0.2 DETSC 2301# 0.2 DETSC 2301# 0.1 DETSC 2301# 0.15 DETSC 2301# 0.11 DETSC 2301# 10 DETSC 2301# 0.15 DETSC 2301# 0.11 DETSC 2301# 0.11 DETSC 2301# 0.11 DETSC 2009# 1 DETSC 2009# 1 DETSC 2005# 1 <	Lab No Sample ID Other ID Sampling Tame Sampling Time Method LOD Units DETSC 1004 0.1 % DETSC 2301* 1 mg/kg DETSC 2301# 0.2 mg/kg DETSC 2301# 0.1 mg/kg DETSC 2301# 0.1 mg/kg DETSC 2301# 0.15 mg/kg DETSC 2301# 0.2 mg/kg DETSC 2301# 0.3 mg/kg DETSC 2301# 0.3 mg/kg DETSC 2301# 0.3 mg/kg DETSC 2301# 0.3 mg/kg DETSC 2301# 0.1 mg/kg DETSC 2301# 0.1 mg/kg DETSC 2301# 0.1 mg/kg DETSC 2301# 0.1 <t< td=""></t<>



			Lab No	1425220
		Sa	mple ID	S19
			Depth	
			Other ID	
		Sam	ple Type	SOIL
		Sampl	ing Date	20/11/18
		Sampli	ng Time	n/s
Test	Method	LOD	Units	
Aromatic C8-C10	DETSC 3321*	0.01	mg/kg	< 0.01
Aromatic C10-C12	DETSC 3072#	0.9	mg/kg	< 0.9
Aromatic C12-C16	DETSC 3072#	0.5	mg/kg	< 0.5
Aromatic C16-C21	DETSC 3072#	0.6	mg/kg	< 0.6
Aromatic C21-C35	DETSC 3072#	1.4	mg/kg	< 1.4
Aromatic C5-C35	DETSC 3072*	10	mg/kg	< 10
TPH Ali/Aro Total	DETSC 3072*	10	mg/kg	< 10
C10-C24 Diesel Range Organics (DRO)	DETSC 3311#	10	mg/kg	< 10
Fuel Identification	*			N
EPH (C10-C40)	DETSC 3311#	10	mg/kg	< 10
PAHs				
Naphthalene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthylene	DETSC 3303#	0.03	mg/kg	< 0.03
Acenaphthene	DETSC 3303#	0.03	mg/kg	< 0.03
Fluorene	DETSC 3303	0.03	mg/kg	< 0.03
Phenanthrene	DETSC 3303#	0.03	mg/kg	< 0.03
Anthracene	DETSC 3303	0.03	mg/kg	< 0.03
Fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Chrysene	DETSC 3303	0.03	mg/kg	< 0.03
Benzo(b)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(k)fluoranthene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(a)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Indeno(1,2,3-c,d)pyrene	DETSC 3303#	0.03	mg/kg	< 0.03
Dibenzo(a,h)anthracene	DETSC 3303#	0.03	mg/kg	< 0.03
Benzo(g,h,i)perylene	DETSC 3303#	0.03	mg/kg	< 0.03
PAH - USEPA 16, Total	DETSC 3303	0.1	mg/kg	< 0.10
Phenols	-	. I		
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3

I DETS

Summary of Asbestos Analysis Soil Samples

Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1416278	S1	SOIL	NAD	none	A Christodoulou
1416279	S2	SOIL	NAD	none	A Christodoulou
1416280	S3	SOIL	NAD	none	A Christodoulou
1416281	S4	SOIL	NAD	none	A Christodoulou
1416282	S6	SOIL	NAD	none	A Christodoulou
1416283	S7	SOIL	NAD	none	A Christodoulou
1416284	S8	SOIL	NAD	none	A Christodoulou
1416285	S9	SOIL	NAD	none	A Christodoulou
1416286	S11	SOIL	NAD	none	A Christodoulou
1416287	S12	SOIL	NAD	none	A Christodoulou
1416288	S13	SOIL	NAD	none	A Christodoulou
1416289	S14	SOIL	NAD	none	A Christodoulou
1416290	S15	SOIL	NAD	none	A Christodoulou
1416291	S16	SOIL	NAD	none	A Christodoulou
1416292	S17	SOIL	NAD	none	A Christodoulou
1416293	S18	SOIL	NAD	none	A Christodoulou
1416294	S20	SOIL	NAD	none	A Christodoulou
1416295	S21	SOIL	NAD	none	A Christodoulou
1416296	S22	SOIL	NAD	none	A Christodoulou
1416297	S23	SOIL	NAD	none	A Christodoulou
1416298	S24	SOIL	NAD	none	A Christodoulou
1416299	S25	SOIL	NAD	none	A Christodoulou
1420940	S10	SOIL	NAD	none	Keith Wilson
1425219	S5	SOIL	NAD	none	Colin Patrick
1425220	S19	SOIL	NAD	none	Colin Patrick

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * not included in laboratory scope of accreditation.



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Depth				
		Other ID				
		Sample Type	SOIL			
		Sampling Date	11/02/2018			
		Sampling Time				
est	Method	LOD Units	<u>.</u>			
etroleum Hydrocarbons						
romatogram: Aliphatics	*					
*FID1 A, Front Signal (D:VALI-ARC Norm. 40- 30- 20- 10-	DIDATA(2018)(11NOV)9-NC	VV-NIGHT 2018-11-09 14-10	3-08\08 28250-1410	3278.D - D:\ALI-AR(DIDATA)	Ę
4						
0						
0	· · · · · · · · · · · · · · · · · · ·			1	1	min
romatogram: Aromatics controllar intro : reak(s) mar *FID3 B, Back Signal (D:VALI-AR) Norm. 40- 40- 10- 10- 10- 10-	* 14 * 10 00DATA/2018/11NOV/9-N	OV-NIGHT 2018-11-09 14-	16-08\B08 26250-1	416278.D - D:\ALI-4		
romatogram: Aromatics duittional filto : Peak(S) mar *FID3 B, Back Signal (D:ALI-AR(Norm. 40- 	maily integrated	DV-NIGHT 2018-11-09 14-	18-09\B06 26250-1	416278.D - D:ALI-		

Lab No

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Sample ID

1416278



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Depth				
		Other ID				
		Sample Type	SOIL			
		Sampling Date	11/02/2018			
		Sampling Time				
Test	Method	LOD Units				
Petroleum Hydrocarbons						
Chromatogram: Aliphatics	*					e
*FID1 A, Front Signal (D:\ALI-ARO\D Norm. 40- 30- 20- 10- 10- 20- 30- 30- 30- 30- 30- 30- 30- 30- 30- 3		V-NIGHT 2018-11-09 14-1	8-08\07 28250-1416	1279.D - D:IALI-AROIC	DATAI	
Chromatogram: Aromatics	*					
*FID3 B, Back Signal (D:\ALI-ARO\E Norm.	ATA\2018\11NOV\9-NC	VV-NIGHT 2018-11-09 14-1	6-08\807 26250-14	16279.D - D:\ALI-ARO	NDATA)	
40 - -						
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	And and a second second					
			<u>,</u>		1 1 1 1 8 min	
2 3	4	5				

Lab No

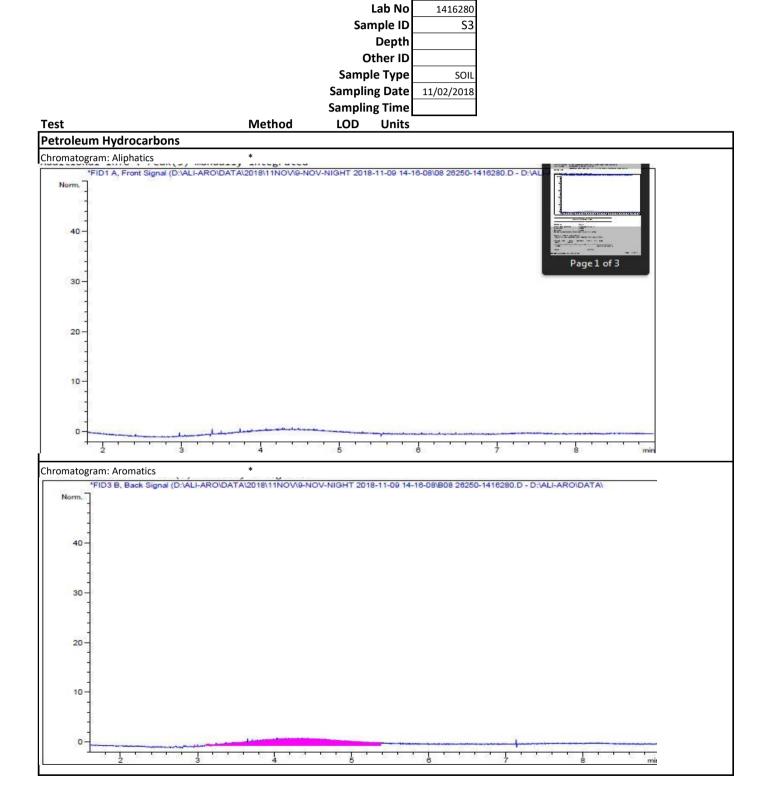
...

Sample ID

1416279



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry





Our Ref 18-26250 Client Ref 14880RH *Contract Title* B.Q. - Buttington Quarry

		Sample II) S4			
		Dept				
		Other II				
		Sample Type	e SOIL			
		Sampling Date	e 11/02/2018			
		Sampling Time				
st	Method	LOD Unit	S			
troleum Hydrocarbons	6					
Tomatogram. Aliphatics	*					
	D:VALI-ARO/DATA/2018/11NOV/9-N	OV-NIGHT 2018-11-09 1	4-16-08\09 26250-14162	81.D - D:VALI-AROVE	ATA\	
Norm.						
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				7		-
			6	1 7		
romatogram: Aromatics	(5) manually integrated D:ALI-ARO/DATA/2018/11/NOV/9-N		4-18-08\B09 26250-1416	17 7 1281.D - D:\ALI-ARO		
			4-16-08\B09 26250-1416	7 7 1281.D - D:\ALI-ARO\		
omatogram: Aromatics bottonal Into : Peak 'FID3 B, Back Signal (I			4-16-08\B09 28250-1416	281.D - D:VALI-ARO		
omatogram: Aromatics bottonal Into : Peak 'FID3 B, Back Signal (I			4-16-08\B09 28250-1416	1281.D - D:\ALI-ARO		
omatogram: Aromatics bolitional into : Peak "FID3 B, Back Signal (I Norm.			4-18-08\B09 28250-1416	17 7 1281.D - D:\ALI-ARO\		
omatogram: Aromatics additional Into : Peak 'FID3 B, Back Signal (I			4-16-D8\B09 28250-1416	7 7 1281.D - D:\ALI-ARO\		
omatogram: Aromatics bolitional into : Peak "FID3 B, Back Signal (I Norm.			4-16-08\B09 28250-1416	7 7 1281.D - D:VALI-ARO1		
omatogram: Aromatics bolitional into : Peak "FID3 B, Back Signal (I Norm.			4-16-08\B09 26250-1416	7 7 1281.D - D:VALI-ARO		
omatogram: Aromatics bottional into : Peak 'FID3 B, Back Signal (I Norm.			4-16-09\B09 26250-1416	1281.D - D:\ALI-ARO		
omatogram: Aromatics bolitional into : Peak "FID3 B, Back Signal (I Norm.			4-16-09\B09 26250-1416	281.D - D:VALI-ARO		
omatogram: Aromatics iditional into : Peak *FID3 B, Back Signal (I Norm.			4-18-08\B09 26250-1416	281.D - D:VALI-ARO		
omatogram: Aromatics iditional into : Peak *FID3 B, Back Signal (I Norm.			4-18-08\B09 28250-1416	281.D - D:VALI-ARO		
omatogram: Aromatics autional into : reak 'FID3 B, Back Signal (I Norm. 40 40			4-16-08\B09 28250-1416	17 1281.D - D:\ALI-ARO\		
omatogram: Aromatics bottional into : Peak 'FID3 B, Back Signal (I Norm.			4-18-D8\B09 28250-1416	1 7 1281.D - D:\ALI-ARO\		
romatogram: Aromatics portional Into : Peak 'FID3 B, Back Signal (I Norm. 40			4-16-08\B09 28250-1416	1 7 1281.D - D:\ALI-ARO\		
omatogram: Aromatics partitional Into : Peak 'FID3 B, Back Signal (I Norm. 40			4-16-08\B09 26250-1416	17 7 1281.D - D:VALI-ARO		
omatogram: Aromatics bolitional into : Peak 'FID3 B, Baok Signal (I Norm. 40 40 40			4-16-09\B09 26250-1416	1281.D - D:VALI-ARO		
omatogram: Aromatics partitional Into : Peak 'FID3 B, Back Signal (I Norm. 40			4-16-09\B09 26250-1416	281.D - D:VALI-ARO		
omatogram: Aromatics bolitional into : Peak 'FID3 B, Baok Signal (I Norm. 40 40 40			4-18-08\B09 28250-1416	281.D - D:\ALI-ARO		
romatogram: Aromatics boltional into : Peak 'FID3 B, Back Signal (I Norm. 40 40 40			4-18-08\B09 28250-1416	1 281.D - D:\ALI-ARO		
omatogram: Aromatics bolitional into : Peak 'FID3 B, Baok Signal (I Norm. 40 40 40			4-18-D8\B09 28250-1416	1281.D - D:\ALI-ARO\		
omatogram: Aromatics Iditional Into : Peak 'FID3 B, Baok Signal (I Norm 40 40 			4-18-D8/B09 28250-1416	1281.D - D:\ALI-ARO\		

Lab No

1416281



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Sample				
			pth			
		Othe	r ID			
		Sample Ty	ype SOIL			
		Sampling D				
		Sampling Ti				
st	Method		nits			
troleum Hydrocarbons						
	*					
*FID1 A, Front Signal (D:VALI-	ADOIDATA 2018/11NO/40 A	A NOV NIGHT 2019 11 0	0 14 18 00 41 28250 141	BOOD DUALLAR	DATA	
Norm.	AROIDATAI2018111100VIB-I	NOV-NIGHT 2018-11-0	9 14-10-08 41 20200-141	0202.0 - D. MLI-ARC	ADATA	
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2 3	4	5	6	7	8 mi	
omatogram: Aromatics	*					
*FID3 B, Back Signal (D:VALI-/	ARO\DATA\2018\11NO\A9-N	NOV-NIGHT 2018-11-0	9 14-16-08\B41 26250-14	16282.D - D:VALI-AP	ROIDATAI	1
Norm.						
83 - 2						
1						
40 -						
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104						
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Lab No

Sample ID

1416282



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

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			Depth				
		Ot	ther ID				
			е Туре	SOIL			
		Samplin					
				11/02/2018			
		Samplin					
Test	Method	LOD	Units				
Petroleum Hydrocarbons							
Chromatogram: Aliphatics	*						
*FID1 A, Front Signal (D:VALI-ARC		NUCHT 2018	11 00 14 1	8 00110 28250 141	8292 D D-1411	AROUDATA	
Norm.	0.00017620101111001001	574101112010	11100 1411	0-00110 20200-141	0203.0 - 0.0420	AIGODATAI	
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	· · · · · · · · ·						
2 3	4	5		6	7	8	min
Chromatogram: Aromatics	*						
*FID3 B, Back Signal (D:VALI-ARC	0\DATA\2018\11NOV/9-NO	DV-NIGHT 2018	-11-09 14-1	8-08\B10 26250-14	16283.D - D:\AL		
Norm.							
4							
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40							
40-							
40 - - -							
40-							
40 - - - 							
30-							
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30-20-							
30-							
30-20-							
30-20-							
30-20-							
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Lab No

Sample ID

1416283



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

			Depth					
			ther ID					
		Samp	le Type	SOIL				
		Samplir		11/02/2018				
		Samplin		, - ,				
est	Method	LOD	Units					
	Wethou	LOD	Units					
etroleum Hydrocarbons								
hromatogram: Aliphatics	*							
*FID1 A, Front Signal (D:\ALI-ARC Norm.] 40- 30- 20-	DIDATA\2018\11NOV\9-N	OV-NIGHT 2016	3-11-09 14-1	8-08\11 28250-14	16284.D - D:\	ALI-ARO\DAT	A	
		· · · · · · · · · · · · · · · · · · ·		1 · · ·		· · · 1		min
	*	7 1 1 5		1	7	I 8		min
romatogram: Aromatics	*		8-11-09 14-1		1418284 D - D			min
	*		8-11-09 14-1		' <u>1</u> ' ' 7		TA\	min
romatogram: Aromatics *FID3 B, Back Signal (D:VALI-ARG	*		8-11-09 14-1		' <u>1</u> ' ' 7 '		TA\	min
romatogram: Aromatics *FID3 B, Back Signal (D:VALI-ARG	*		8-11-09 14-1		' <u>1</u> ' '		ATA\	min
romatogram: Aromatics *FID3 B, Back Signal (D:VALI-ARC	*		8-11-09 14-1		' <u>1</u> ' '		ATA\	min
romatogram: Aromatics "FID3 B, Back Signal (D:VALI-ARG	*		8-11-09-14-1		' <u>1</u> ' '		ATA\	min
romatogram: Aromatics *FID3 B, Back Signal (D:VALI-ARC	*		8-11-09-14-1		' <u>1</u> ' '		ATA\	min
romatogram: Aromatics *FID3 B, Back Signal (D:VALI-ARC	*		8-11-09 14-1		' <u>1</u> ' '		ATAI	min
romatogram: Aromatics *FID3 B, Back Signal (D:VALI-ARC	*		8-11-09.14-1		' <u>1</u> ' '		ATAI	min
romatogram: Aromatics *FID3 B, Back Signal (D:VALI-AR(*		8-11-09.14-1		' <u>1</u> ' '		ATA\	min
romatogram: Aromatics 'FID3 B, Back Signal (D:VALI-AR(*		8-11-09 14-1		' <u>1</u> ' '		ATA)	min
romatogram: Aromatics 'FID3 B, Back Signal (D:\ALI-ARO Norm. 40- 30- 1	*		8-11-09 14-1		1416284.D - D		ATA)	min
romatogram: Aromatics *FID3 B, Back Signal (D:VALI-AR(*		8-11-09 14-1		1416294.D - D		ATA)	min
romatogram: Aromatics 'FID3 B, Back Signal (D:\ALI-ARC	*		8-11-09-14-1		1416284.D - D			min
nromatogram: Aromatics *FID3 B, Back Signal (D:ALI-ARC	*		8-11-09-14-1		1416284.D - D		1 1 1 1 1 1 1 1	min
nromatogram: Aromatics *FID3 B, Back Signal (D:\ALI-AR(Norm 40 20 20	*		8-11-09.14-1		1416284.D - D		ATA\	min
nromatogram: Aromatics *FID3 B, Back Signal (D:ALI-ARC	*		8-11-09-14-1		1416284.D - D		ATA\	min
romatogram: Aromatics *FID3 B, Back Signal (D:\ALI-AR(Norm. 40 	*		8-11-09.14-1		1416284.D - D		ATAL	min
romatogram: Aromatics *FID3 B, Back Signal (D:\ALI-AR(Norm. 40 	*		8-11-09 14-1		1416284.D - D		ATAL	' min
Promatogram: Aromatics *FID3 B, Back Signal (D:ALI-ARO Norm. 40 30 10 10	*		8-11-09 14-1		<u>,</u> 1416284.D - D		ATAL	min
romatogram: Aromatics *FID3 B, Back Signal (D:\ALI-AR(Norm. 40 - - - - - - - - - - - - -	*		8-11-09 14-1		1416284.D - D		ATAI	min

Lab No

Sample ID

1416284



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Depth				
		Other ID				
		Sample Type	SOIL			
		Sampling Date				
		Sampling Time				
Test	Method	LOD Units				
Petroleum Hydrocarbons						
Chromatogram: Aliphatics	*					
*FID1 A, Front Signal (D:\ALI-ARO\DA' Norm. 40 20 20	TA/2018/11NOV/9-N	OV-NIGHT 2018-11-09 14-	16-08\12 26250-14	16285.D - D:\ALI-ARO\(DATAI	
		<u>.</u>	<u> </u>	. <u></u>		
2 3	4	5	6	7	8 min	
	*					
*FID3 B, Back Signal (D:\ALI-ARO\DAT Norm.] 40- 30- 10- 10- 10-	A\2018\11NOV\8-NC	DV-NIGHT 2018-11-09 14-1	8-08\B 12 28250-14	416285.D - D:\ALI-ARO\	DATA	

Lab No

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Sample ID

1416285



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

Ot Sample Sampling Sampling lethod LOD	g Date 11/02/2018	DATAI
Sample Sampling Sampling lethod LOD	e Type SOIL g Date 11/02/2018 g Time Units	DATAI
Sample Sampling Sampling lethod LOD	e Type SOIL g Date 11/02/2018 g Time Units	DATA
Sampling Sampling lethod LOD	g Date 11/02/2018 g Time Units	DATAI
Sampling lethod LOD	g Time Units	DATA
lethod LOD	Units	DATA
		DATA
18/11NOV/9-NOV-NIGHT 2018-	11-09 14-18-08\42 28250-1418288.D - D:\ALI-ARO\D	DATA
18/11NOV/9-NOV-NIGHT 2018-	11-09 14-18-08'42 28250-1418286.D - D:\ALI-ARO\D	DATA
18/11NOV/9-NOV-NIGHT 2018-	11-09 14-18-08'42 28250-1418288.D - D:\ALI-ARO\D	DATA
4 5	6 7	8 min
18\11NOV\9-NOV-NIGHT 2018-1	11-09 14-16-08\B42 26250-1416286.D - D:\ALI-ARO	DATA
·······		
4 5		8 min
	an Thank and Andrea	
		8/11NOV/9-NOV-NIGHT 2018-11-09 14-16-09/B42 26250-1416286.D - D:\ALI-ARO

1416286

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Lab No Sample ID



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

				512			
			Depth				
		Ot	her ID				
		Sample		SOIL			
		Sampling		2/2018			
				2/2018			
		Sampling					
est	Method	LOD	Units				
etroleum Hydrocarbons							
nromatogram: Aliphatics	*						
*FID1 A, Front Signal (D:\ALI-ARO\D	ATA\2018\11NOV\9-N	OV-NIGHT 2018-	-11-09 14-16-08\4	3 26250-1416287.	D - D:\ALI-ARO\DA	ATA\	
Norm.							
8.7							
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romatogram: Aromatics	*	- <u>1</u>	· · · ·				in
romatogram: Aromatics	*	V-NIGHT 2018-1	11-09 14-16-08\B4				
romatogram: Aromatics	*	V-NIGHT 2018-1	11-09 14-16-08\B4				iii
romatogram: Aromatics	*	V-NIGHT 2018-1	11-09 14-18-08\B4				virs
*FID3 B, Back Signal (D:\ALI-ARO\DA	* * * * * * * * * * * * * * * * * * *	V-NIGHT 2018-1	11-09 14-16-08\B4				
romatogram: Aromatics	* * * * * * * * * * * * * * * * * * *	V-NIGHT 2018-1	11-09 14-16-08\B4				
*FID3 B, Back Signal (D:\ALI-ARO\DA	* * TA\2018\11NOVA-NO	V-NIGHT 2018-1	11-09 14-16-08\B4				
romatogram: Aromatics *FID3 B, Back Signal (D:\ALI-ARO\DA Norm. 40	* * TA\2018\11NOVA-NO	V-NIGHT 2018-1	11-09 14-16-08\B4				
*FID3 B. Back Signal (D:\ALI-ARO\DA	* * TA/2018/11NOV/8-NO	V-NIGHT 2018-1	11-09 14-16-08\B4				
romatogram: Aromatics	* * * * * * * * * * * * * * * * * * *	V-NIGHT 2018-1	11-09 14-18-08\B4				
romatogram: Aromatics *FID3 B, Back Signal (D:\ALI-ARO\DA Norm. 40	* * * * * * * * * * * * * * * * * * *	V-NIGHT 2018-1	11-09 14-18-08\B4				
*FID3 B, Back Signal (D:\ALI-ARO\DA	* * TAI2018/11NOV/9-NO	- <u>1</u>	11-09 14-18-08\B4				
*FID3 B, Back Signal (D:VALI-ARO/DA	* * TA/2018/11NOV/8-NO	- <u>1</u>	11-09 14-18-08'B4				
*FID3 B, Back Signal (D:\ALI-ARO\DA	* * TA/2018/11NOV/8-NO	- <u>1</u>	11-09 14-18-08\B4				
*FID3 B, Back Signal (D:\ALL-ARO\DA	* * TAI2018/11NOVIG-NO	- <u>1</u>	11-09 14-18-08\B4				
FID3 B, Back Signal (D:VALI-ARO\DA	* * TAI2018/11NOV/8-NO	- <u>j</u>	11-09 14-18-08\B4				
FID3 B. Back Signal (D: ALI-ARO'DA	*	- <u>1</u>	11-09 14-18-08\B4				
FID3 B, Back Signal (D:VALI-ARO/DA	*	- <u>1</u>	11-09 14-18-08\B4				
*FID3 B. Back Signal (D:\ALI-ARO\DA	*	- <u>1</u>	11-09 14-18-08\B4				

Lab No

Sample ID

1416287



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Sample IL			
		Depth	1		
		Other ID			
		Sample Type			
		Sampling Date			
		Sampling Time			
est	Method	LOD Units	5		
etroleum Hydrocarbons					
hromatogram: Aliphatics	*				
*FID1 A, Front Signal (D:\ALI-Al Norm. 40 30 20 10	RO\DATA\2018\11NOV\9-N	OV-NIGHT 2018-11-09 14	-16-08\13 28250-14162	88.D - D:\ALI-ARO\DATA\	
	* 10027 * 10027 * 10027	5 5 DV-NIGHT 2018-11-09 14	-18-08\B13 26250-14162	288.D - D:\ALI-ARO\DATA	, , , , , , , , , , , , , , , , , , ,
hromatogram: Aromatics	* ROIDATA/2018/11NOV/8-NC	DV-NIGHT 2018-11-09 14	-18-08\B13 26250-14162	288.D - D:VALI-ARO/DATA	
*FID3 B, Back Signal (D:VALI-AF	* * * * * * * * * * * * * * * * * * *	DV-NIGHT 2018-11-09 14	-18-08\B13 26250-14162	288.D - D:\ALI-ARO\DATA	

Lab No

Sample ID

1416288



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

			Sample ID	514			
Other ID Sampling Date Sampling Date Sampling Date Sampling Time Terroleum Hydrocarbons Information ************************************			Depth				
Inconstogram: Aromatics • Through the Server Start and the Server Start							
Sampling Date LOD test Method LOD Units							
iest Method LOD Units teroteum Hydrocarbons hromatogram: Alphalis * Mem 400 400 400 400 400 400 400 40							
est Method LOD Units terroleum Hydrocarbons Ihomatogram: Alphatics * TOTA. Free Bignar (D.VLLAROUDATACOTE) TNOVIE-NOV-NIGHT 2018-11-60 14-16-0826 28280-1418280.DD.VLLAROUDATAL Mem 40 40 40 40 40 40 40 40 40 40							
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hromatogram: According to the second	*FID1 A, Front Signal (D:VALI-/	ARO/DATA/2018/11NOV/9-N	OV-NIGHT 2018-11-09 14	16-08\29 28250-1416	289.D - D:\ALI-ARO\DATA	A.9	
hromatogram: Aromatics * FIO3 BL Back Signal (D:ALL-AROIDATA:201BI TINOVA-NOV-NIGHT 2018-11-00 14-16-08:20 2020-1416289.D - D:ALL-AROIDATA: Nem 40 40 40 40 40 40 40 40 40 40	Norm.						
hromatogram: Aromatics * FIO3 BL Back Signal (D:ALL-AROIDATA:201BI TINOVA-NOV-NIGHT 2018-11-00 14-16-08:20 2020-1416289.D - D:ALL-AROIDATA: Nem 40 40 40 40 40 40 40 40 40 40	-						
hromatogram: Aromatics * FIO3 BL Back Signal (D:ALL-AROIDATA:201BI TINOVA-NOV-NIGHT 2018-11-00 14-16-08:20 2020-1416289.D - D:ALL-AROIDATA: Nem 40 40 40 40 40 40 40 40 40 40	_						
hromatogram: Aromatics * ¹⁷¹ D3 B. Back Signal (D-VALL-ARO/DATAI2D1811NOV/6-NOV-NIGHT 2018-11-00 14-16-09B29 2020C-1410290 D - D-VALL-ARO/DATAI Normal of the second se	40 -						
hromatogram: Aromatics * ¹⁷¹ D3 B. Back Signal (D-VALL-ARO/DATAI2D1811NOV/6-NOV-NIGHT 2018-11-00 14-16-09B29 2020C-1410290 D - D-VALL-ARO/DATAI Normal of the second se	-						
hromatogram: Aromatics * ¹⁷¹ D3 B. Back Signal (D-VALL-ARO/DATAI2D1811NOV/6-NOV-NIGHT 2018-11-00 14-16-09B29 2020C-1410290 D - D-VALL-ARO/DATAI Normal of the second se	-						
hromatogram: Aromatics * ¹⁷¹ D3 B. Back Signal (D-VALL-ARO/DATAI2D1811NOV/6-NOV-NIGHT 2018-11-00 14-16-09B29 2020C-1410290 D - D-VALL-ARO/DATAI Normal of the second se							
hromatogram: Aromatics * FID3 B, Back Signal (D:ALI-AROIDATA2019)11NOV/9-NOV-NIGHT 2018-11-09 14-16-09/B20 20250-1410299 D - D:ALI-AROIDATA) Mom 0 0 0 0 0 0 0 0 0 0 0 0 0	30-						
hromatogram: Aromatics * FID3 B, Back Signal (D:ALI-AROIDATA2019)11NOV/9-NOV-NIGHT 2018-11-09 14-16-09/B20 20250-1410299 D - D:ALI-AROIDATA) Mom 0 0 0 0 0 0 0 0 0 0 0 0 0]						
hromatogram: Aromatics * FID3 B, Back Signal (D:ALI-AROIDATA2019)11NOV/9-NOV-NIGHT 2018-11-09 14-16-09/B20 20250-1410299 D - D:ALI-AROIDATA) Mom 0 0 0 0 0 0 0 0 0 0 0 0 0							
hromatogram: Aromatics * FID3 B, Back Signal (D:ALI-AROIDATA2019)11NOV/9-NOV-NIGHT 2018-11-09 14-16-09/B20 20250-1410299 D - D:ALI-AROIDATA) Mom 0 0 0 0 0 0 0 0 0 0 0 0 0	201						
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hromatogram: Aromatics * "FID3 B, Back Signal (D:IALI-AROIDATA:2018:11NOV/B-NOV-NIGHT 2018-11-09 14-16-09/829 20250-1410289.D - D:IALI-AROIDATA): Normal of the second s	23 - 5						
hromatogram: Aromatics * "FID3 B, Back Signal (D:IALI-AROIDATA:2018:11NOV/B-NOV-NIGHT 2018-11-09 14-16-09/829 20250-1410289.D - D:IALI-AROIDATA): Normal of the second s	1						
hromatogram: Aromatics * * Norm. 40 0 0 0 0 0 0 0 0 0 0 0 0 0	10-						
hromatogram: Aromatics * * Norm. 40 0 0 0 0 0 0 0 0 0 0 0 0 0	12						
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hromatogram: Aromatics * * Norm. 40 0 0 0 0 0 0 0 0 0 0 0 0 0		1. 1. 1. 1. here and the second					
hromatogram: Aromatics * FID3 B, Back Signal (D'ÁLI-ARO'DATÁI2018\11NOV\9-NOV-NIGHT 2018-11-00 14-16-08\820 20250-1410289.D - D:\ALI-ARO\DATA\ Norm 40 40 40 0 20 0 4 4 0 4 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 0 4 1 1 1 1 1 1 1 1 1					<u> </u>	1 1 1 1	
*FID3 B. Back Signal (D:ALI-ARO)DATA\2018\11NOV\0-NOV-NIGHT 2018-11-00 14-16-08/B29 20250-1416289.D - D:ALI-ARO)DATA\ Nom 40 40 40 40 40 40 40 40 40 40 40 40 40	2 3	4	5	6	7 8	min	
*FID3 B, Back Signal (D:\ALI-ARO\DATA\2D18\11NOV\9-NOV-NIGHT 2018-11-00 14-16-09\B29 26250-1416289.D - D:\ALI-ARO\DATA\ Norm	Chromatogram: Aromatics	*					
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Lab No

Sample ID

1416289



Our Ref 18-26250 Client Ref 14880RH *Contract Title* B.Q. - Buttington Quarry

		Lo				
		Sam	ple ID S15	5		
			Depth	1		
			ner ID	1		
				_		
		Sample	Type SOIL	-		
		Sampling	Date 11/02/2018	3		
		Sampling				
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lest	Method	LOD	Units			
Petroleum Hydrocarbons						
Chromatogram: Aliphatics	*	4				
I The edge of the second s	LI-ARO\DATA\2018\11NOV\9-N	NOV-NIGHT 2018-	11-09 14-16-08\44 28250-	-1416290.D - D:VALI-	ARO\DATA\	
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hromatogram: Aromatics	* 1 - 4 - 4 * 1	DV-NIGHT 2018-11				min
10- 	manually incegrated	DV-NIGHT 2018-11				- min
10- 10- 2 3 hromatogram: Aromatics "FID3 B, Back Signal (D:VALI-	manually incegrated	DV-NIGHT 2018-11-		1416290.D - D:\ALI-A		
10- 10- 2 3 hromatogram: Aromatics "FID3 B, Back Signal (D:VALI-	manually incegrated	DV-NIGHT 2018-11-		1416290.D - D:VALI-A		
10- 10- 2 3 hromatogram: Aromatics "FID3 B, Back Signal (D:VALI-	manually incegrated	5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5		1418290.D - D:\ALI-A		min
hromatogram: Aromatics *FID3 B, Back Signal (D:VALI-	manually incegrated	DV-NIGHT 2018-11-				mire
10- 10- 2 3 romatogram: Aromatics *FID3 B, Back Signal (D:VALI- Norm.	manually incegrated	DV-NIGHT 2018-11-		1418290.D - D:ALI-A		min
hromatogram: Aromatics *FID3 B, Back Signal (D:VALI-	manually incegrated	DV-NIGHT 2018-11		1418290.D - D:\ALI-A		min
hromatogram: Aromatics *FID3 B, Back Signal (D:VALI-	manually incegrated	оv-NIGHT 2018-11		1418290.D - D:\ALI-A		min
10- 10- 2 3 rromatogram: Aromatics 'FID3 B, Back Signal (D:VALI- Norm. 40- 40-	manually incegrated	DV-NIGHT 2018-11		1418290.D - D:\ALI-A		min
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romatogram: Aromatics *FID3 B, Back Signal (D:VALI- Norm. 40- 30- 1	manually incegrated	DV-NIGHT 2018-11-				
10- 10- 2 3 hromatogram: Aromatics 'FID3 B, Back Signal (D:VALI- Norm. 40-	manually incegrated	DV-NIGHT 2018-11-				min
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hromatogram: Aromatics *FID3 B, Back Signal (D:ALI- Norm.] 40 40 	manually incegrated	DV-NIGHT 2018-11		1418290.D - D:\ALI-A		min
Chromatogram: Aromatics FID3 B. Back Signal (D:VALI- Norm. 40	manually incegrated	DV-NIGHT 2018-11		1418290.D - D:\ALI-A		min
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hromatogram: Aromatics *FID3 B, Back Signal (D:ALI- Norm.] 40 40 	manually incegrated	DV-NIGHT 2018-11				
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1416290

Lab No



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Samp	e ID 516		
		De	epth		
		Othe			
		Sample 1			
		Sampling I			
		Sampling T	ime		
Fest	Method		Inits		
Petroleum Hydrocarbons					
Chromatogram: Aliphatics	*				
*FID1 A, Front Signal (D:\ALI-ARO\DAT	TA\2018\11NOV/9-NC	OV-NIGHT 2018-11-	09 14-16-08\45 26250-14	416291.D - D:\ALI-ARO\DATA\	
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hromatogram: Aromatics	*				
*FID3 B, Back Signal (D:\ALI-ARO\DA	TA\2018\11NOV\9-NO	OV-NIGHT 2018-11-	09 14-16-08\B45 26250-	1416291.D - D:\ALI-ARO\DATA\	
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Lab No

Sample ID

1416291



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Lad NO	1416292		
		Sample ID	S17		
		Depth			
		Other ID			
		Sample Type	SOIL		
		Sampling Date	11/02/2018		
		Sampling Time			
est	Method	LOD Units			
etroleum Hydrocarbons					
hromatogram: Aliphatics	s) manually integrated	1			
"FID1 A, Front Signal (L	XALI-ARO/DATA/2018/11NOV/9-N	NOV-NIGHT 2018-11-09 14-	16-08\46 26250-1416292.D -	D:VALI-ARONDATAN	
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nromatogram: Aromatics	*		6 7		min
romatogram: Aromatics			6 7 7 8-08/846 26250-1416292.D		min
romatogram: Aromatics 	*		6-08\B46 26250-1416292.D		min
romatogram: Aromatics *FID3 B, Back Signal (D	*		6-08\B46 26250-1416292.D		
romatogram: Aromatics *FID3 B, Back Signal (D	*		6-09\B46 26250-1416292.D		
romatogram: Aromatics 	*		6-09\B46 26250-1416292.D		min
romatogram: Aromatics *FID3 B, Back Signal (D	*		6-09\B46 26250-1416292.D		min
romatogram: Aromatics *FID3 B, Back Signal (D	*		8-09\B46 26250-1416292.D		min
romatogram: Aromatics *FID3 B, Back Signal (D	*		6-09\B46 26250-1416292.D		min
romatogram: Aromatics *FID3 B, Baok Signal (D	*		6-09\B46 26250-1416292.D		min
romatogram: Aromatics *FID3 B, Baok Signal (D	*		8-08\B46 26250-1416292.D		min
romatogram: Aromatics *FID3 B, Baok Signal (D	*		8-08\B46 26250-1416292.D		min
rromatogram: Aromatics *FID3 B, Back Signal (D	*		8-08/B46 26250-1416292.D		min
romatogram: Aromatics *FID3 B, Back Signal (D	*		8-08/846 26250-1416292.D		min
romatogram: Aromatics *FID3 B, Back Signal (D	*		6-08/B46 26250-1416292.D		min
rromatogram: Aromatics *FID3 B, Back Signal (D Norm 40 30	*		8-08\B46 26250-1416292.D		min
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rromatogram: Aromatics *FID3 B, Back Signal (D Norm. 40 30	*		8-08/846 26250-1416292.D		min
rromatogram: Aromatics *FID3 B, Back Signal (D Norm 40 30	*		6-08'B46 26250-1416292.D		min
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romatogram: Aromatics *FID3 B, Back Signal (D Norm. 40 20	*		6-08/B46 26250-1416292.D		

Lab No

1416292



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Depth				
		Other ID				
		Sample Type	SOIL			
		Sampling Date	11/02/2018			
		Sampling Time				
Test	Method	LOD Units				
Petroleum Hydrocarbons						
Chromatogram: Aliphatics	*					
*FID1 A, Front Signal (D:\ALI-ARO\DAT	AI201811NOV9-NC	W-NIGHT 2018-11-09-14-	16-08/47 20200-14	10293.0 - D: ALI-AKUID		
	L J					
2 3	4	5	6	7	8 min	
Chromatogram: Aromatics	*					
*FID3 B, Back Signal (D:\ALI-ARO\DAT	A12018(11NOV.9-NO	V-NIGHT 2018-11-09 14-1	6-08(B47 26250-1	418293.D - D:\ALI-ARO\	DATAL	
	4	· · · · · · · ·	6	· · · · · ·	8 min	

Lab No

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Sample ID

1416293



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

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		Other I			
		Sample Typ			
		Sampling Dat	te 11/02/2018		
		Sampling Tim			
est	Method	LOD Unit	ts		
etroleum Hydrocarbons					
hromatogram: Aliphatics	*				
*FID1 A, Front Signal (D:\ALI-ARC	DATA 2018 11 NOV 9-NO	OV-NIGHT 2018-11-09 1	4-16-08\48 26250-1416294.D -	D:\ALI-ARO\DATA\	
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nromatogram: Aromatics	*				
*FID3 B, Back Signal (D:\ALI-ARC	DIDATA12018111NOV/9-N	OV-NIGHT 2018-11-09	14-16-08\B48 26250-1416294.C	- D:\ALI-ARO\DATA\	
Norm.					
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Lab No

Sample ID

1416294



Our Ref 18-26250 Client Ref 14880RH *Contract Title* B.Q. - Buttington Quarry

Contract Inte B.Q Bull	ington Quarry						
		I	Lab No	1416295			
		San	nple ID	S21			
			Depth				
			ther ID				
			le Type	SOIL			
		Samplin		1/02/2018			
		Samplin					
Test	Method	LOD	Units				
Petroleum Hydrocarbons							
Chromatogram: Aliphatics	*						_
*FID1 A, Front Signal (D:VA	LI-ARO\DATA\2018\11NOV\9-N	OV-NIGHT 2018	8-11-09 14-16-0	8\49 26250-14162	95.D - D:VALI-ARO		
Norm.							
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x 11.69 in 2 3	4	5	6		7	8 min	
Chromatogram: Aromatics	*						
	LI-ARO\DATA\2018\11NOV\9-NO	DV-NIGHT 2018-	-11-09 14-16-0	8\B49 26250-141	3295.D - D:\ALI-AR	O\DATA\	
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Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

Other ID Sample Type SOIL Sampling Date 11/02/2018 Sampling Time Test Method LOD Petroleum Hydrocarbons Units			Depth			
Sampling Time						
Sampling Time				SOIL		
Sampling Time Test Method LOD Units Petroleum Hydrocarbons • • • Thema of the second second contract of the second		(
Test Method LOD Units Petroleum Hydrocarbons • Chromatogram: Aliphatics • Image: Segme (D.ALLARODATACIDIET INOVE-NOV-NIGHT 2016-11-09 14-16-0000 2020-1410258.D - D.ALLARODATACIDIET INOVE-NOV-NIGHT 2016-11-09 14-16-0000 2020-1410258.D - D.ALLARODATACIDIET Image: Segme (D.ALLARODATACIDIET INOVE-NOV-NIGHT 2016-11-09 14-16-0000 2020-1410258.D - D.ALLARODATACIDIET Image: Segme (D.ALLARODATACIDIET INOVE-NOV-NIGHT 2016-11-09 14-16-0000 2020-1410258.D - D.ALLARODATACIDIET Image: Segme (D.ALLARODATACIDIET INOVE-NOV-NIGHT 2016-11-09 14-16-0000 2020-1410258.D - D.ALLARODATACIDIET Image: Segme (D.ALLARODATACIDIET INOVE-NOV-NIGHT 2016-11-09 14-16-0000 2020-1410258.D - D.ALLARODATACIDIET Mem: 1 1 Image: Segme (D.ALLARODATACIDIET INOVE-NOV-NIGHT 2016-11-09 14-16-0000 2020-1410258.D - D.ALLARODATACIDIET Mem: 1 1 Image: Segme (D.ALLARODATACIDIET INOVE-NOV-NIGHT 2016-11-09 14-16-0000 2020-1410258.D - D.ALLARODATACIDIET Mem: 1 1 Image: Segme (D.ALLARODATACIDIET INOVE-NOV-NIGHT 2016-11-09 14-16-0000 - D.ALLARODATACIDIET						
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Chromatogram: Aromatics * Chromatogram: Aromatics * FID3 B, Back Signal (D:ALI-ARO)DATAI2018111NOVI9-NOV-NIGHT 2018-11-08 14-16-08/850 28250-1416296.D - D:ALI-ARO)DATAI Norm 40 40 40 40 40 40 40 40 40 40 40 40 40	*FID1 A, Front Signal (D:ALI-AR Norm.] 40- 30- 20-	DIDATÁ(2018(11ŇOV/8-NOV-N	IGHT 2018-11-09 14-16	-08\50 28250-1416296.	D - D:\ALI-ARO\DATA\	
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Lab No

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Sample ID

1416296



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Depth			
		Other ID			
		Sample Type			
		Sampling Date			
		Sampling Time			
Test	Method	LOD Units			
Petroleum Hydrocarbons					
Chromatogram: Aliphatics	*				
*FID1 A, Front Signal (D:\ALI-ARO\	DATA\2018\11NOV/9-N	OV-NIGHT 2018-11-09 14-	16-08\51 26250-141	6297.D - D:\ALI-ARO\DA	TAV
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*FID3 B, Back Signal (D:\ALI-ARO\	DATA\2018\11NOV\9-N	OV-NIGHT 2018-11-09 14-	16-08\B51 26250-14	16297.D - D:\ALI-ARO\0	ATA(
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30-					
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Lab No

Sample ID

1416297



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Sample ID	524		
		Depth			
		Other ID			
		Sample Type			
		Sampling Date			
		Sampling Time			
ſest	Method	LOD Units			
	Mictilou				
etroleum Hydrocarbons					
hromatogram: Aliphatics	*				
*FID1 A, Front Signal (D:\ALI-AR	RO\DATA\2018\11NOV\9-N	OV-NIGHT 2018-11-09 14	-16-08\52 26250-1416	298.D - D:\ALI-ARO\DATA\	
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*FID3 B, Back Signal (D:\ALI-AF		0 DV-NIGHT 2018-11-09 14-	18-08\B53 26250-1416	296.D - D.'ALI-ARO\DATA\.	
*FID3 B, Back Signal (D:\ALI-AF		0 DV-NIGHT 2018-11-09 14-	18-08\B53 26250-1416	298.D - D.'ALI-ARO'DATA\.	
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*FID3 B, Back Signal (D:\ALI-AF		0 DV-NIGHT 2018-11-09 14-	18-08\B53 26250-1416	298.D - D:\ALI-ARO\DATA\.	
*FID3 B, Back Signal (D:\ALI-AF		0 DV-NIGHT 2018-11-09-14-	18-08\B53 26250-1416	298.D - D:\ALI-ARO\DATA\.	
*FID3 B, Back Signal (D:\ALI-AF		0 DV-NIGHT 2018-11-09 14-	18-08\B53 26250-1416	298.D - D:\ALI-ARO\DATA\.	
*FID3 B, Back Signal (D:\ALI-AF		0 DV-NIGHT 2018-11-09 14-	16-08\B53 26250-1416	298.D - D:\ALI-ARO\DATA\.	
*FID3 B, Back Signal (D:\ALI-AF		0 DV-NIGHT 2018-11-09 14-	16-08\B53 26250-1416	298.D - D:\ALI-ARO\DATA\.	
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Norm. 40- 30- 20-		DV-NIGHT 2018-11-09 14-	18-08\B53 26250-1416	1298.D - D:\ALI-ARO\DATA\	
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*FID3 B, Back Signal (D:\ALI-AF		0 DV-NIGHT 2018-11-09 14-	18-08\B53 26250-1416	296.D - D.'ALI-ARO'IDATA\.	
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*FID3 B, Back Signal (D:\ALI-AF		DV-NIGHT 2018-11-09 14-	18-08\B53 26250-1416	298.D - D.'ALI-ARO'DATA\	

Lab No

Sample ID

1416298



Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

		Sa	mple ID	S25			
			Depth				
		C	Other ID				
			le Type	SOIL			
			ng Date				
			ng Time				
est	Method	LOD	Units				
Petroleum Hydrocarbons	method	100	Onits				
	*						
hromatogram: Aliphatics *FID1 A, Front Signal (D:VALI-ARC	DATA 2018 11NOVAD N	OV NIGHT 201	0 11 00 14	8 00152 28250 14	18200 D. D.M.L.	ROUDATAL	
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Lab No

1416299



Method

Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

Test

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Lab No	1420940
Sample ID	S10
Depth	
Other ID	
Sample Type	SOIL
Sampling Date	
Sampling Time	
LOD Units	

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Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

Contract The B.Q But	tington Quarry				
		Lab No	1425219		
		Sample ID	S5		
		Depth			
		Other ID			
		Sample Type			
		Sampling Date			
		Sampling Time			
Test	Method	LOD Units			
Petroleum Hydrocarbons		101 01110			
Chromatogram:	*				
	NOV-NIGHT 2018-11-29 17-28-49\14.D - D:\DATA\2018\11N	IOV/29-NOV-NIGHT 2018-			
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Our Ref 18-26250 Client Ref 14880RH Contract Title B.Q. - Buttington Quarry

Petroleum Hydrocarbons Chromatogram: * TID1 A. Front Signal (D: DATA2018:11NOV/28-NOV 2018-11-28 16-55-54:09: D - D: DATA2018:11NOV/28-NOV 2018-11-28 16-55- 0 0 0 0 0 0 0 0 0 0 0 0 0	Sample ID S19 Depth Other ID Sample Type SOIL Sampling Date 20/11/2018 Test Method LOD Units Petroleum Hydrocarbons Chromatogram: * TOTA Peer Sense Di Data 2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/02/84/07 2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/11/2018/1000/1000		ington Quarry		_			
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Sampling Date 20/11/2018 Sampling Time Test Method LOD Units Petroleum Hydrocarbons Chromatogram: * *IDI A. Front Signs (D:DATA2018) 11 NOV/28-NOV 2018-11-28 16-856-4 498 D - D:DATA2018) 11 NOV/28-NOV 2018-11-28 16-856-4 498 D - D:DATA2018	Sampling Date 20/11/2018 Sampling Time Test Method LOD Units Petroleum Hydrocarbons Chromatogram: * *IDI A. Front Signs (D:DATA2018) 11 NOV/28-NOV 2018-11-28 16-856-4 498 D - D:DATA2018) 11 NOV/28-NOV 2018-11-28 16-856-4 498 D - D:DATA2018					SOIL		
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Information in Support of the Analytical Results

Our Ref 18-26250 Client Ref 14880RH Contract B.Q. - Buttington Quarry

Containers Received & Deviating Samples

		Date		Holding time exceeded for	Inappropriate container for
Lab No	Sample ID	Sampled	Containers Received	tests	tests
1416278	S1 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416279	S2 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416280	S3 SOIL	02/11/18	GJ 250ml x2, PT 1L x2		
1416281	S4 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L		
1416282	S6 SOIL	02/11/18	GJ 250ml		
1416283	S7 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416284	S8 SOIL	02/11/18	GJ 250ml x2, PT 1L x2		
1416285	S9 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416286	S11 SOIL	02/11/18	PT 1L x2		Aliphatics/Aromatics, BTEX, Chromium, Naphthalene, PAH MS, EPH/TPH
1416287	S12 SOIL	02/11/18	PT 1L		Aliphatics/Aromatics, BTEX, Chromium, Naphthalene, PAH MS, EPH/TPH
1416288	S13 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416289	S14 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416290	S15 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416291	S16 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416292	S17 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416293	S18 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416294	S20 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416295	S21 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416296	S22 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416297	S23 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416298	S24 SOIL	02/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1416299	S25 SOIL	02/11/18	GJ 250ml x2, PT 1L x2		
1420940	S10 SOIL		GJ 250ml x2, GJ 60ml x2, PT 1L x2	Sample date not supplied, Aliphatics/Aromatics (14 days), Ammonia (1095 days), Boron (365 days), BTEX (14 days), Chromium (14 days), Chromium, Hexavalent (365 days), Fuel Id (14 days), Mercury (365 days), Total Sulphate ICP (730 days), Metals ICP (365 days), Metals ICP Prep (365 days), Anions (365 days), Kone Cr6 (1095 days), Kone PO4 (1095 days), Naphthalene (14 days), Ammoniacal Nitrogen as N (365 days), Organic Matter (Manual) (28 days), PAH MS (14 days), PH + Conductivity (7 days), Cyanide/Mono pHoh (14 days), EPH/TPH (14 days)	
1425219	S5 SOIL	20/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		
1425220	S19 SOIL	20/11/18	GJ 250ml x2, GJ 60ml, PT 1L x2		



Information in Support of the Analytical Results

Our Ref 18-26250 Client Ref 14880RH Contract B.Q. - Buttington Quarry

Key: G-Glass P-Plastic J-Jar T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377. Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis. The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months



ANNEX H Bulk Sample Geotechnical Test Results





Qty

1

Contract Number: 41501

Client Ref: Client PO: **14880RH**

Laboratory Report

Report Date: 20-11-2018

Client Terrafirma Wales Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HB

Contract Title: Buttington Quarry (B.Quarry) For the attention of: Ruth Howells

Date Received: 06-11-2018 Date Commenced: 06-11-2018 Date Completed: 20-11-2018

Test Description

 Particle size Distribution (Aggregate)
 6

 BS EN 933-1 - * UKAS
 6

 Determination of the slake durability index, two cycles.
 6

 ISRM Suggested Method For Determining Slake Durability - @ Non Accredited Test
 6

 Large Shear Box 300mm Peak with 3 confining pressures includes remoulding
 6

 BS 1377:1990 - Part 7 : 5 and Specification for Highway Works Vol.1 Clause 636 Part 2 - @ Non Accredited Test
 6

Disposal of samples for job

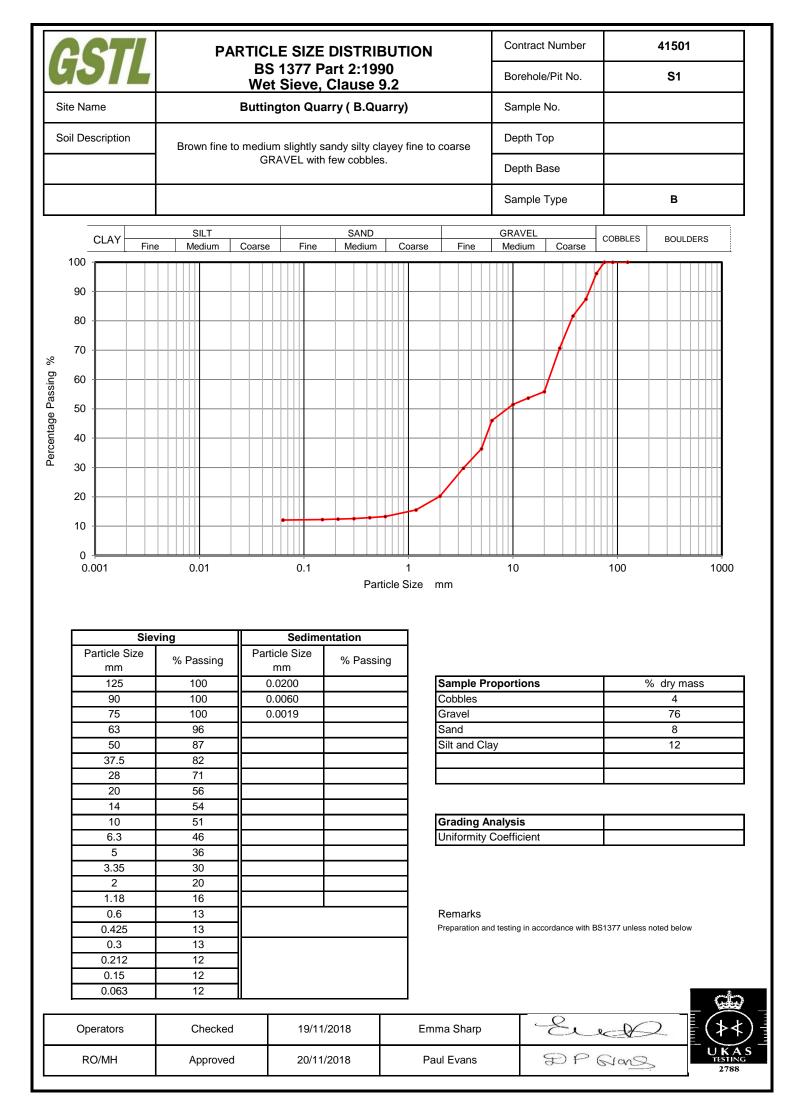
Notes: Observations and Interpretations are outside the UKAS Accreditation

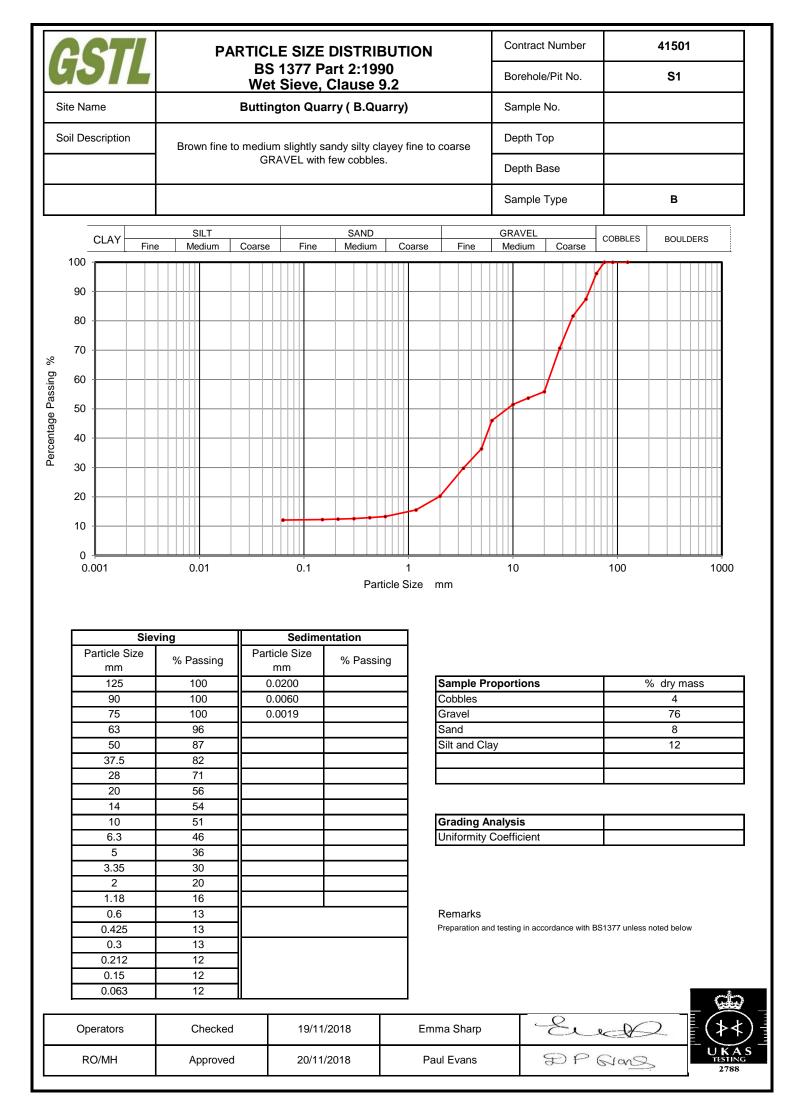
- * denotes test included in laboratory scope of accreditation
- # denotes test carried out by approved contractor
- @ denotes non accredited tests

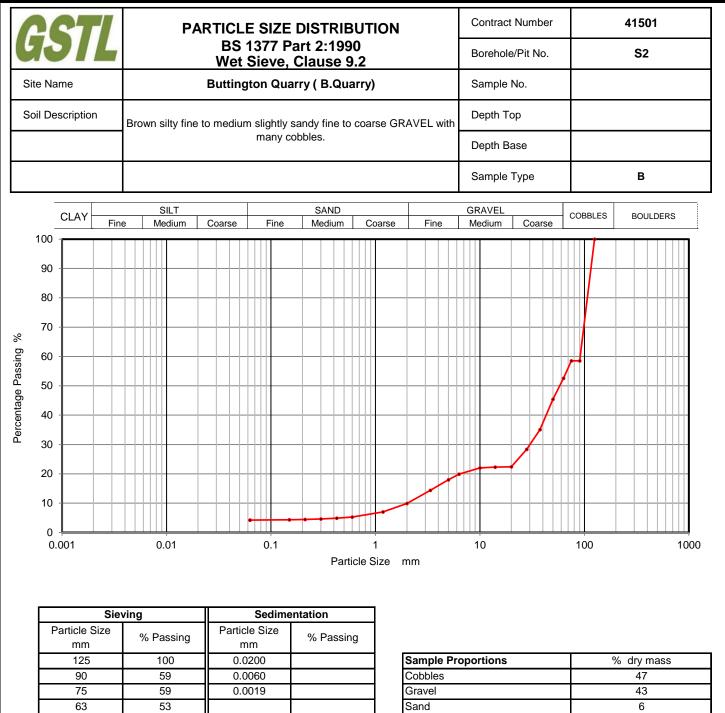
This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory. **Approved Signatories:**

Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager) Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative/Accounts Assistant) Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk







Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	59	0.0060	
75	59	0.0019	
63	53		
50	45		
37.5	35		
28	28		
20	22		
14	22		
10	22		
6.3	20		
5	18		
3.35	14		
2	10		
1.18	7		
0.6	5		
0.425	5		
0.3	5		
0.212	4		
0.15	4		
0.063	4		

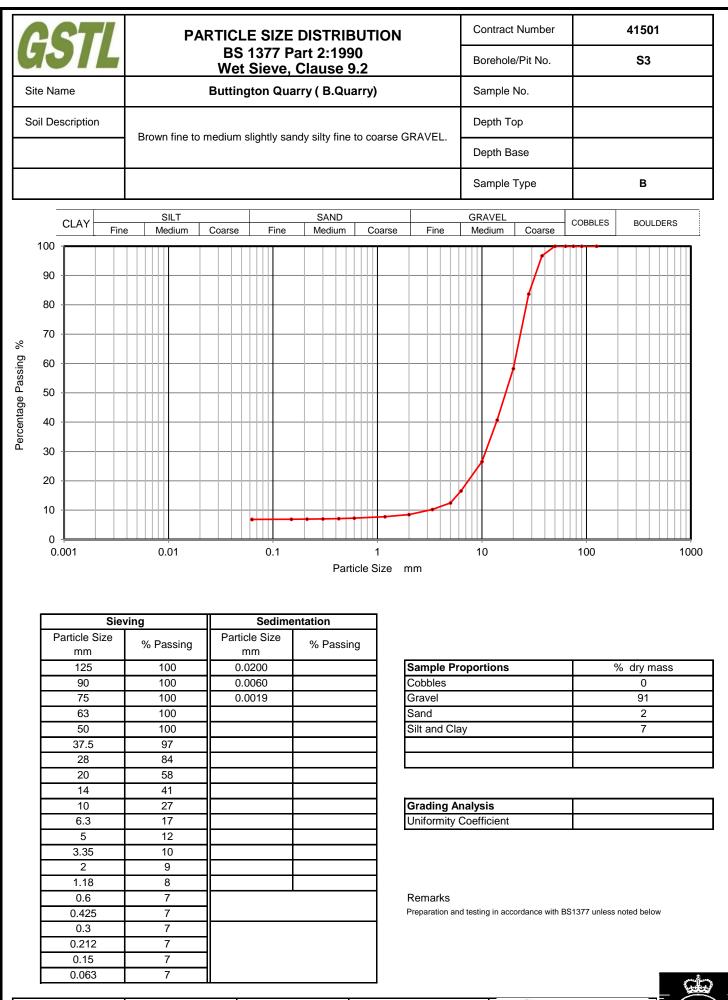
Sample Proportions	% dry mass
Cobbles	47
Gravel	43
Sand	6
Silt and Clay	4

Grading Analysis	
Uniformity Coefficient	

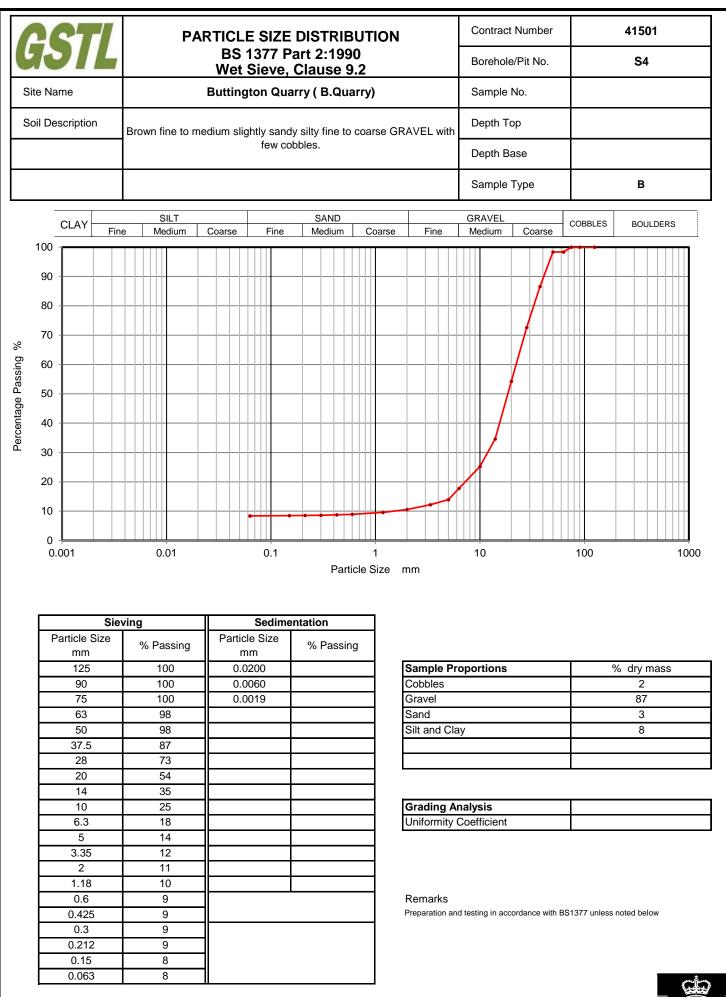
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Remarks Preparation and testing in accordance with BS1377 unless noted below

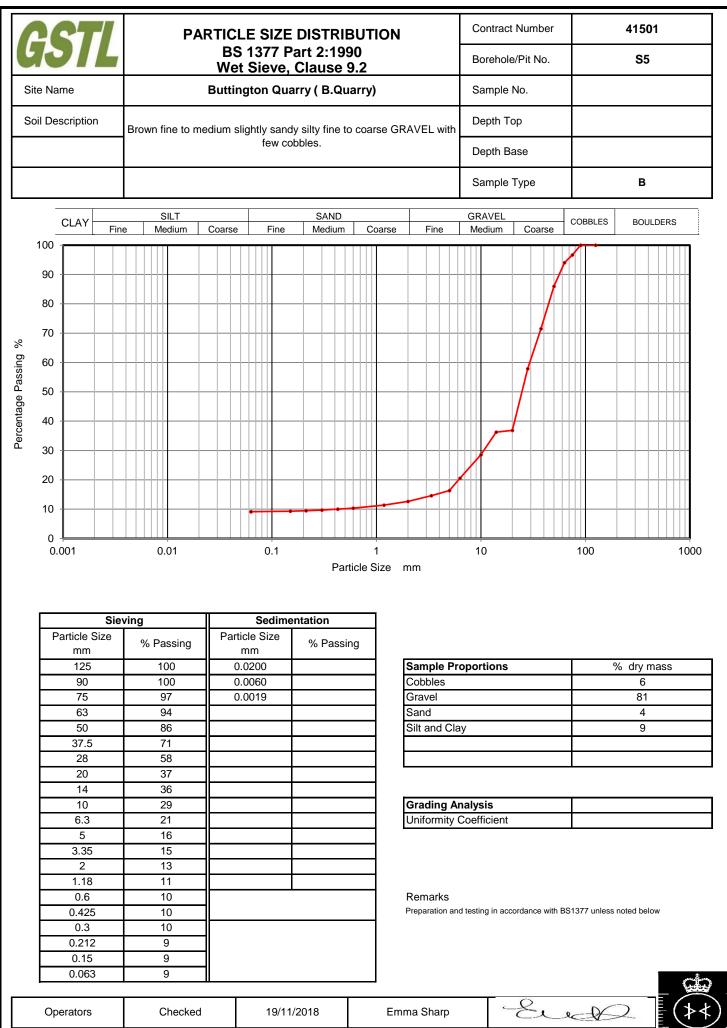
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RO/MH	Approved	20/11/2018	Paul Evans	DP Grans	UKAS TESTING 2788



Operators	Checked	19/11/2018	Emma Sharp	-Euch	$ \langle \mathbf{A} \mathbf{A} \rangle \rangle$
RO/MH	Approved	20/11/2018	Paul Evans	\$P & Grans	UKAS TESTING 2788



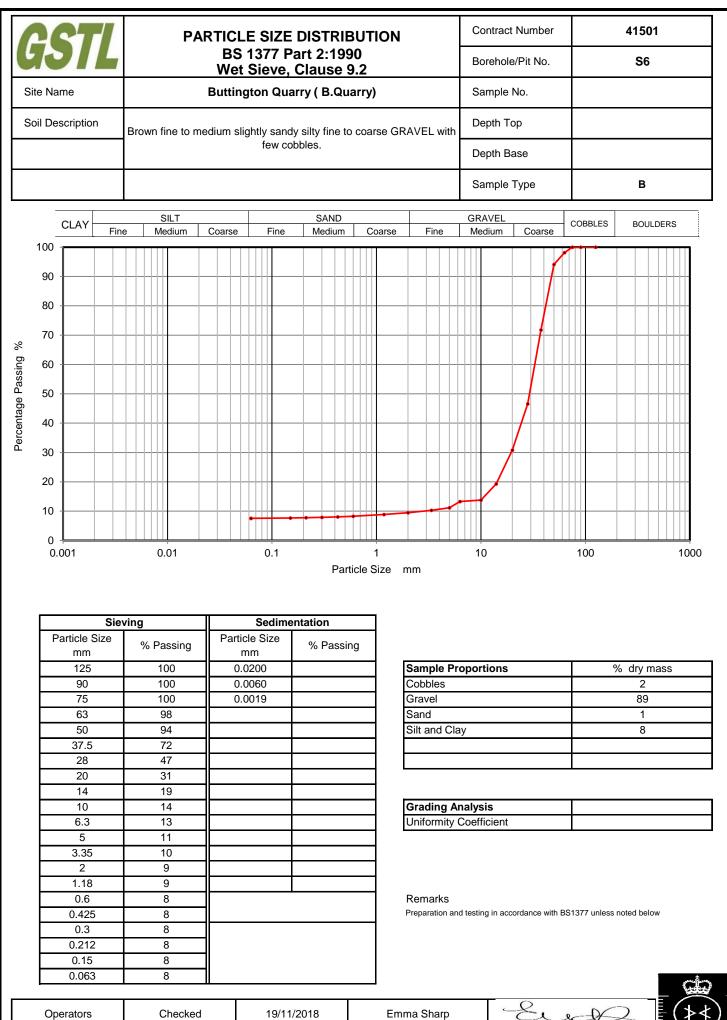
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RO/MH	Approved	20/11/2018	Paul Evans	\$P P Grans	UKAS TESTING 2788



Checked	19/11/2018	Emma Sharp	Liet
Approved	20/11/2018	Paul Evans	\$P Grans

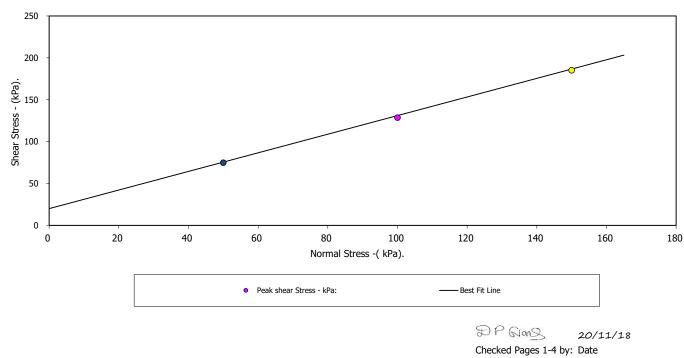
RO/MH





Operators	Checked	19/11/2018	Emma Sharp	-Euch	(≯∢
RO/MH	Approved	20/11/2018	Paul Evans	DP Grons	UKA TESTIN 2788

Borehole Number:	S1	Depth from (m):	0.00	
Sample Number :	1	Depth to (m):	0.00	
Sample Type:	В	· · · ·		
Particle Density - Mg/m3:		2.65 (Assumed)	
Specimen Tested:	At natural m	noisture content, Remoulded (Light	Tamping) Material above 20	mm removed.
Sample Description:				
Brown clayey fine to medium GRAVE	L			
STAGE		1	2	3
Initial Conditions				
Height - mm:		136.00	136.00	136.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		10	10	10
Bulk Density - Mg/m3:		2.04	2.04	2.04
Dry Density - Mg/m3:		1.85	1.85	1.85
Voids Ratio:		0.4316	0.4317	0.4318
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		133.03	131.54	129.77
Shear				
Rate of Strain (mm/min)		0.66	7 0.667	0.667
Strain at peak shear stress (%)		58.55	60.41	63.30
Peak shear Stress - kPa:		75	129	185
РЕАК				
Angle of Shearing Resistance:(0)				48.0
Effective Cohesion - kPa:				20



FAILURE CONDITIONS

Contract No.: 41501

20/11/18

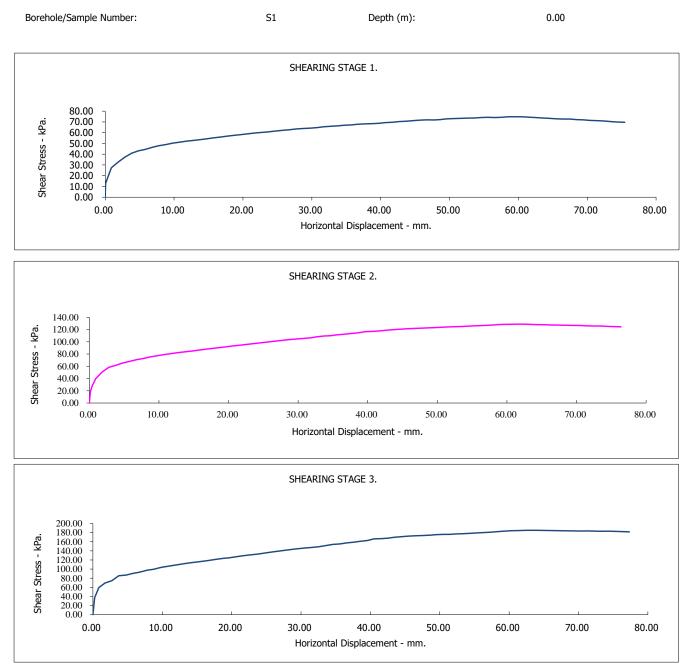
DP Glanz

Approved Pages 1-4 by: Date

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



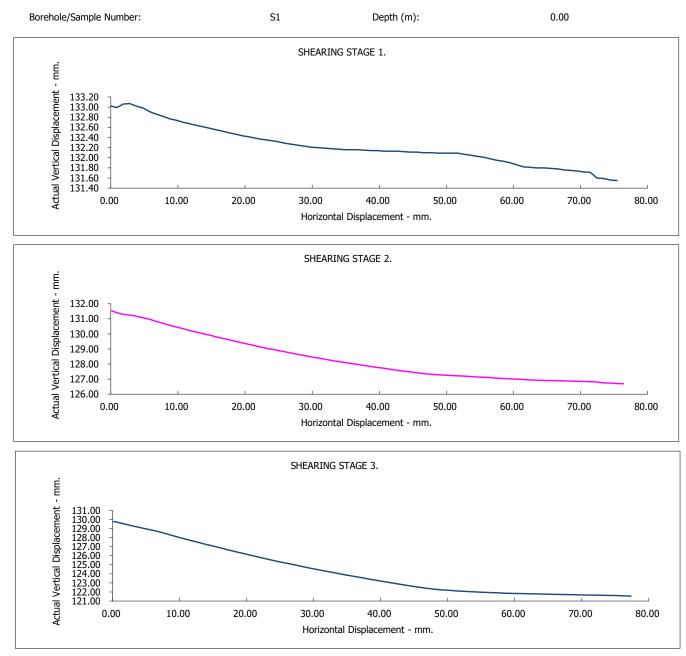
Contract No.: 41501

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



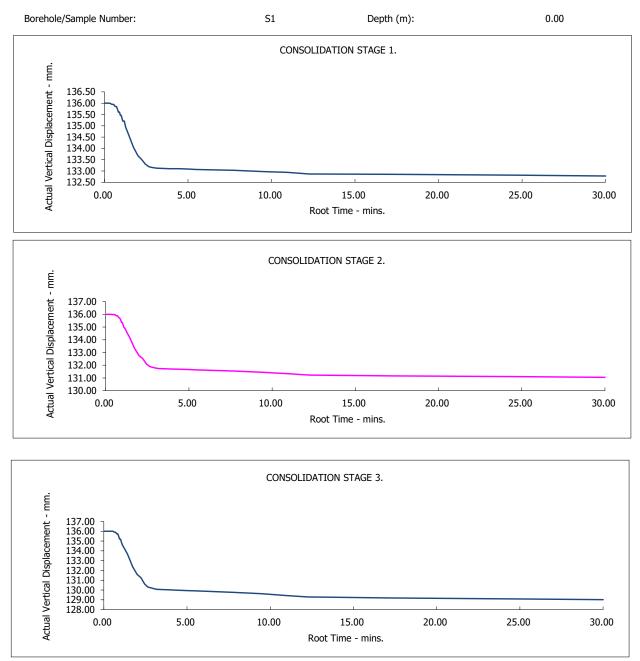
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.

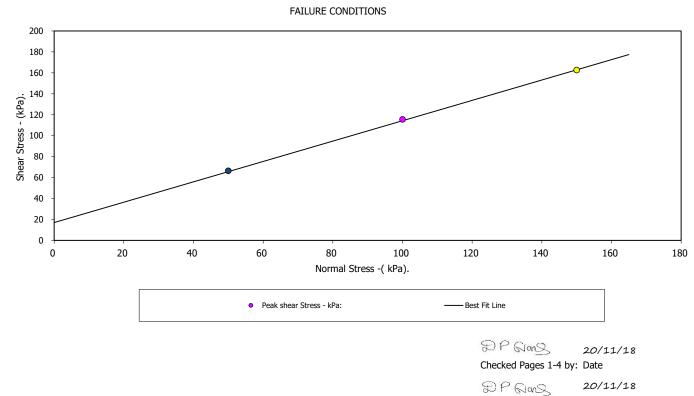


Contract No.: **41501**

Buttington Quarry (B.Quarry)



Borehole Number:	S2	Depth from (m):	0.00	
Sample Number :	2	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assume	d)	
Specimen Tested:	At natural n	noisture content, Remoulded (Ligl	nt Tamping) Material above 2	20mm removed.
Sample Description:				
Brown clayey fine to medium GRAVEL				
STAGE		1	2	3
Initial Conditions				
Height - mm:		130.0	0 130.00	130.00
Length - mm:		300.0	0 300.00	300.00
Moisture Content - %:		1	0 10	10
Bulk Density - Mg/m3:		2.0	2 2.02	2.02
Dry Density - Mg/m3:		1.8	3 1.83	1.83
Voids Ratio:		0.447	8 0.4478	0.4477
Normal Pressure- kPa		5	0 100	150
Consolidation				
Consolidated Height - mm:		126.4	0 121.96	117.52
Shear				
Rate of Strain (mm/min)		0.6	67 0.667	0.667
Strain at peak shear stress (%)		55.0	6 55.19	57.32
Peak shear Stress - kPa:		6	6 116	163
PEAK				
Angle of Shearing Resistance:(0)				44.2
Effective Cohesion - kPa:	·			17



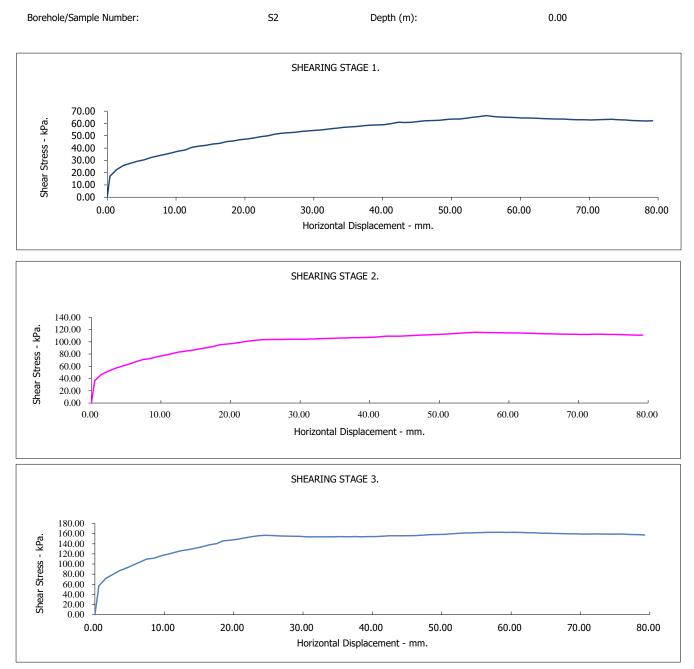
Approved Pages 1-4 by: Date

Contract No.: 41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



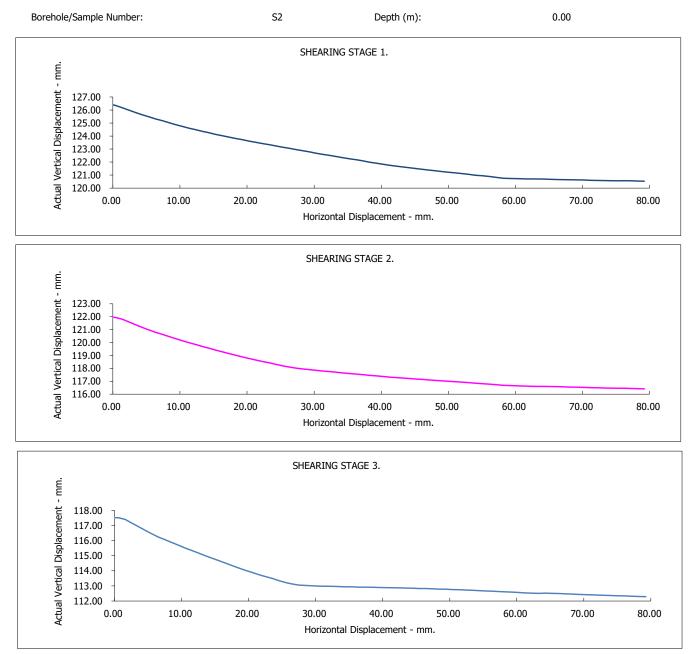
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



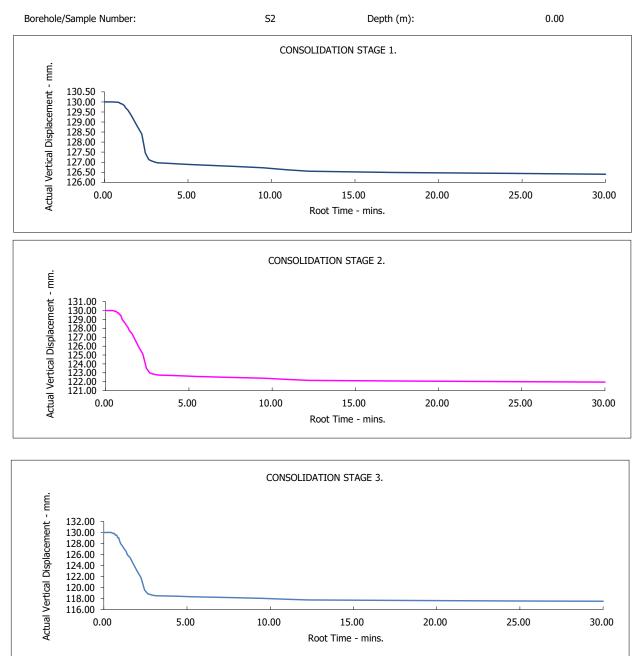
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.

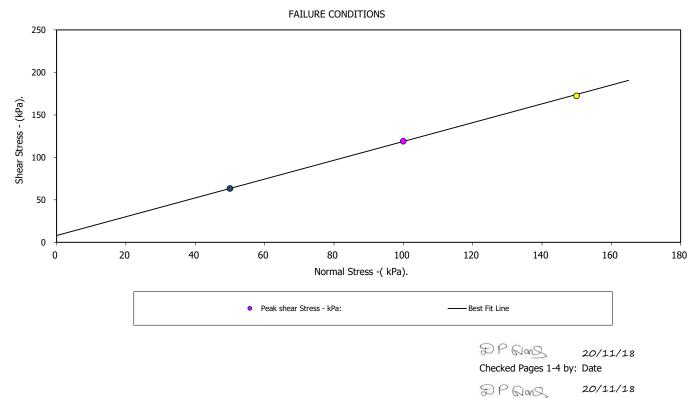


Contract No.: **41501**

Buttington Quarry (B.Quarry)



Borehole Number:	S3	Depth from (m):	0.00	
Sample Number :	3	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)		
Specimen Tested:	At natural mo	pisture content, Remoulded (Light	Tamping) Material above 20n	nm removed.
Sample Description:				
Brown slightly clayey fine to mediur	n GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		134.00	134.00	134.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		7	7	7
Bulk Density - Mg/m3:		1.62	1.62	1.62
Dry Density - Mg/m3:		1.52	1.52	1.52
Voids Ratio:		0.7425	0.7426	0.7427
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		129.93	127.63	125.80
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		54.10	65.71	66.42
Peak shear Stress - kPa:		63	119	173
PEAK				
Angle of Shearing Resistance:(0)				47.9
Effective Cohesion - kPa:				8



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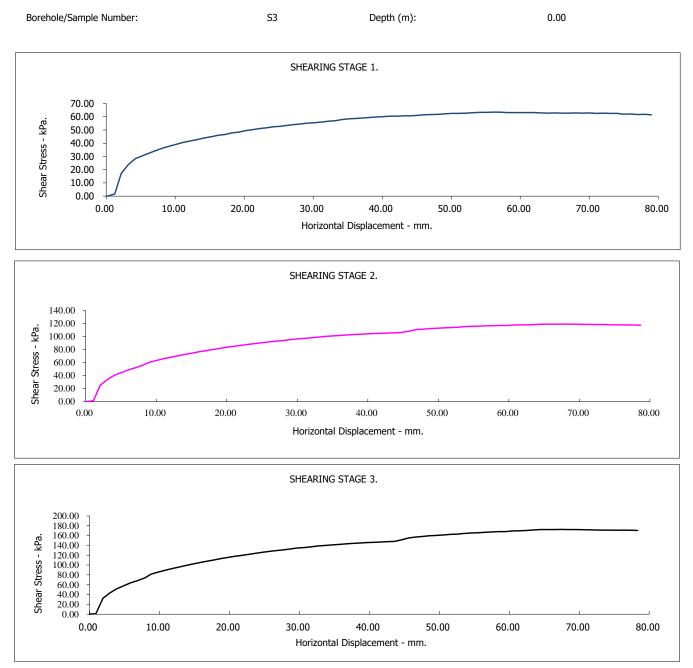
Contract No.:

41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



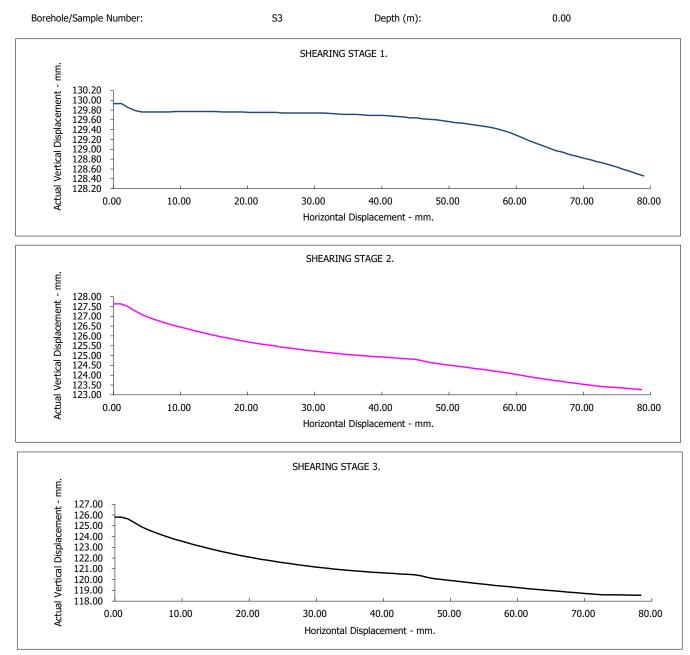
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



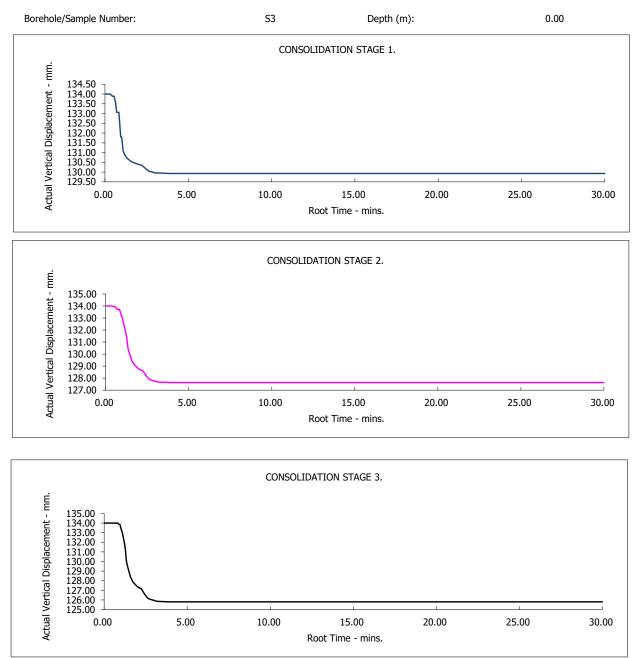
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.

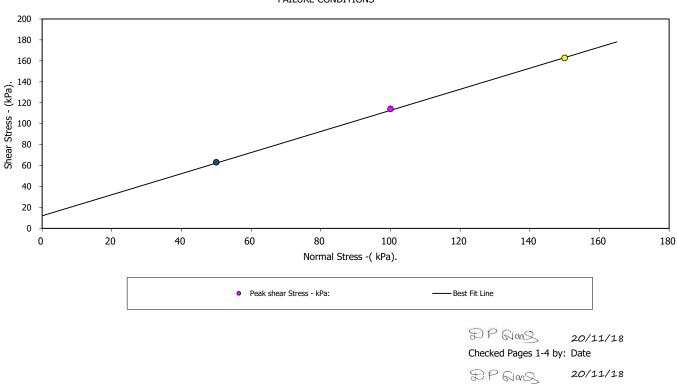


Contract No.: **41501**

Buttington Quarry (B.Quarry)



Borehole Number:	S4	Depth from (m):	0.00	
Sample Number :	4	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)	
Specimen Tested:	At natural m	oisture content, Remoulded (Light	Tamping) Material above 20r	nm removed.
Sample Description:				
Brown slightly clayey fine to mediun	n GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		134.00	134.00	134.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		12	12	12
Bulk Density - Mg/m3:		1.59	1.59	1.59
Dry Density - Mg/m3:		1.43	1.43	1.43
Voids Ratio:		0.8575	0.8577	0.8575
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		130.29	129.03	127.07
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		53.12	52.66	56.20
Peak shear Stress - kPa:		63	114	163
РЕАК				
Angle of Shearing Resistance:(0)				45.2
Effective Cohesion - kPa:				12



FAILURE CONDITIONS

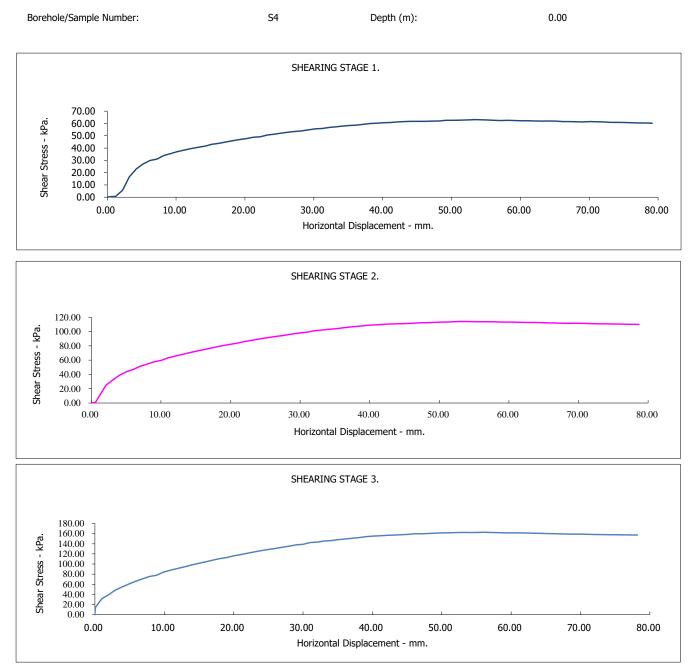
Contract No.: 41501

Approved Pages 1-4 by: Date

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



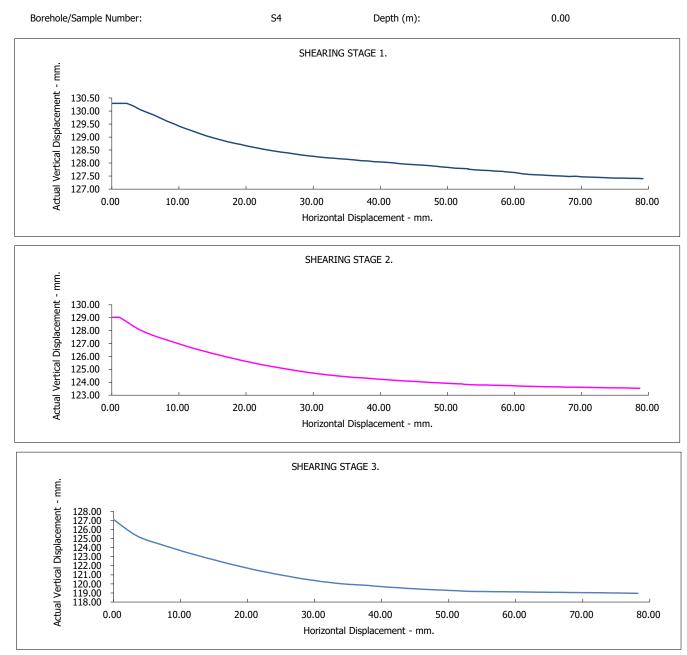
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

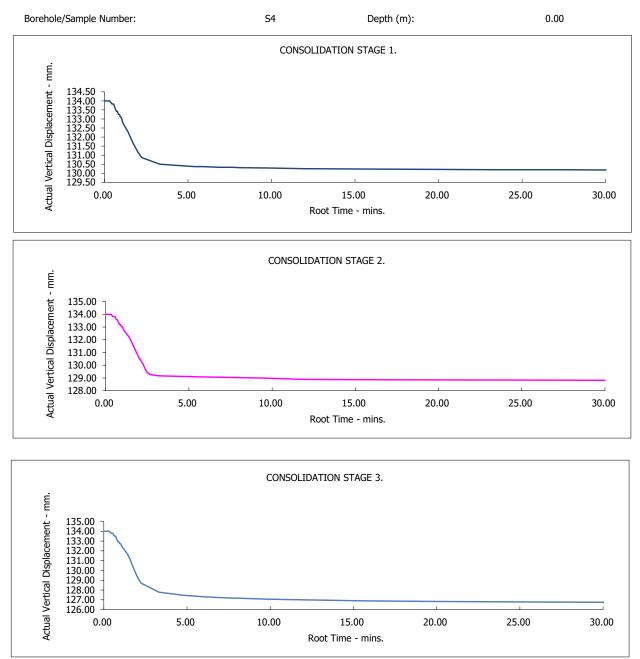
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



010705CD SBOX LARGE

BS1377:Part 7:5 :1990.

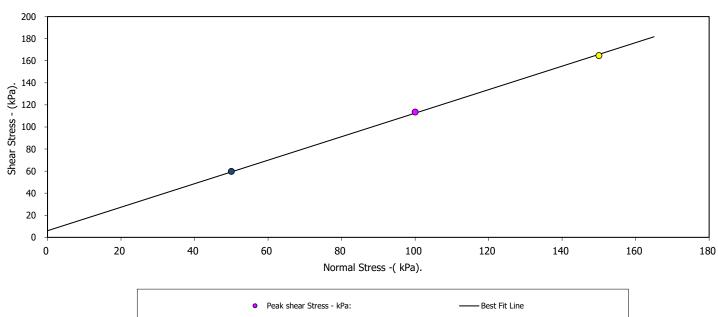


Contract No.: **41501**

Buttington Quarry (B.Quarry)



Borehole Number:	S5	Depth from (m):	0.00	
Sample Number :	5	,	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)		
Specimen Tested:	At natural m	noisture content, Remoulded (Light T	amping) Material above 20m	im removed.
Sample Description:				
Brown slightly clayey fine to mediun	າ GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		132.50	132.50	132.50
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		6	6	6
Bulk Density - Mg/m3:		1.65	1.65	1.65
Dry Density - Mg/m3:		1.55	1.55	1.55
Voids Ratio:		0.7053	0.7049	0.7050
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		128.00	126.20	124.88
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		60.01	61.02	61.02
Peak shear Stress - kPa:		60	113	165
PEAK				
Angle of Shearing Resistance:(θ)				46.8
Effective Cohesion - kPa:				6



FAILURE CONDITIONS

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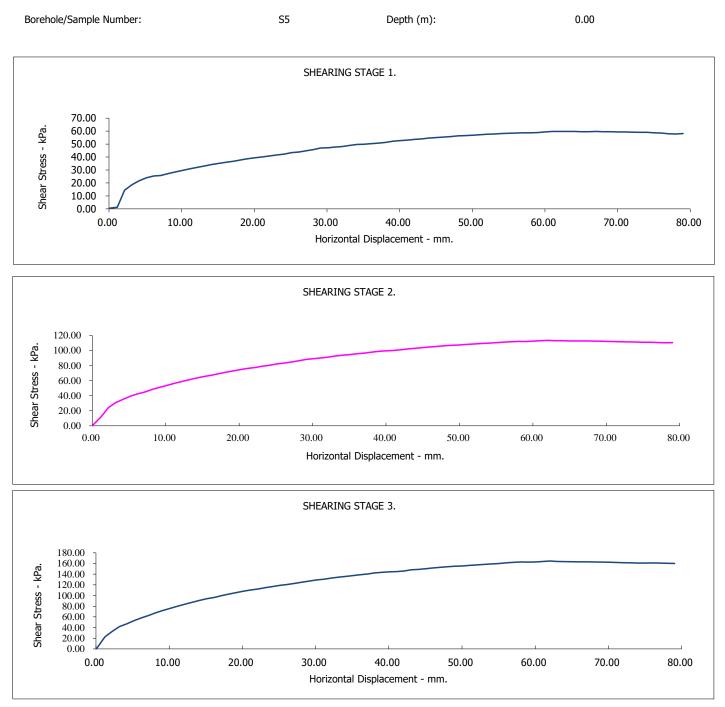
Approved Pages 1-4 by: Date

Contract No.: **41501**

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



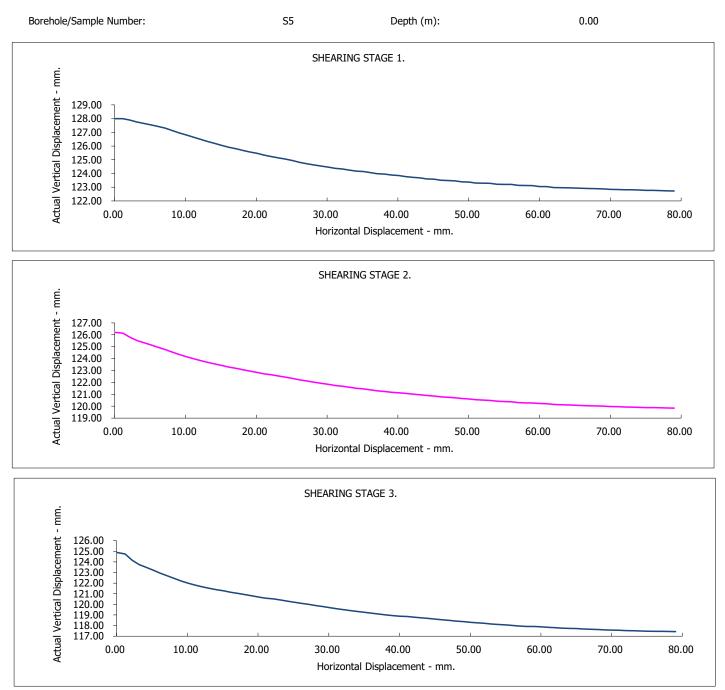


Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



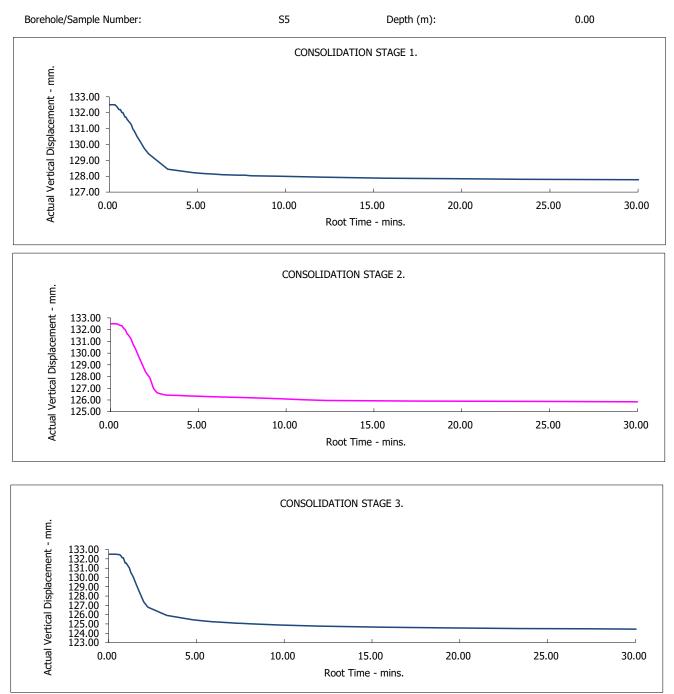
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



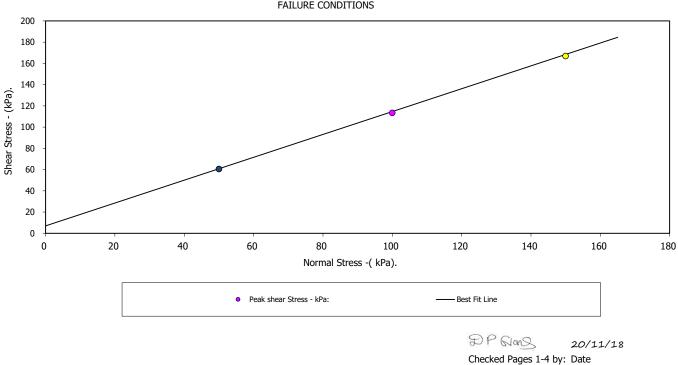
Contract No.: 41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.

Borehole Number:	S6	Depth from (m):	0.00	
Sample Number :	6	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assume	d)	
Specimen Tested:	At natural m	oisture content, Remoulded (Ligh	t Tamping) Material above 2	20mm removed.
Sample Description:				
Brown slightly clayey fine to medium	GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		135.0	0 135.00	135.00
Length - mm:		300.0	0 300.00	300.00
Moisture Content - %:		1	0 10	10
Bulk Density - Mg/m3:		1.6	0 1.60	1.60
Dry Density - Mg/m3:		1.4	4 1.44	1.44
Voids Ratio:		0.835	3 0.8351	0.8355
Normal Pressure- kPa		5	0 100	150
Consolidation				
Consolidated Height - mm:		132.2	2 129.72	128.51
Shear				
Rate of Strain (mm/min)		0.66	67 0.667	0.667
Strain at peak shear stress (%)		66.1	4 67.37	57.68
Peak shear Stress - kPa:		6	1 113	167
PEAK				
Angle of Shearing Resistance: (θ)				47.1
Effective Cohesion - kPa:				7



FAILURE CONDITIONS

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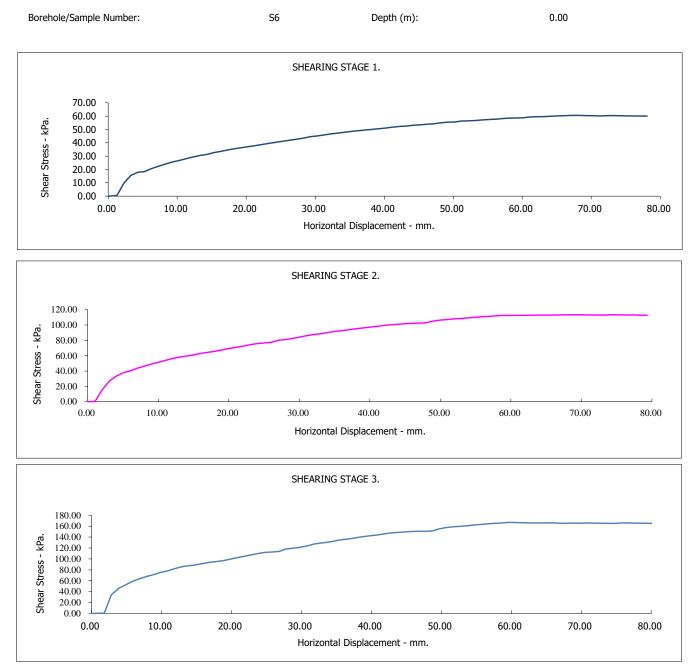
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Contract No.: 41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



Contract No.: **41501**

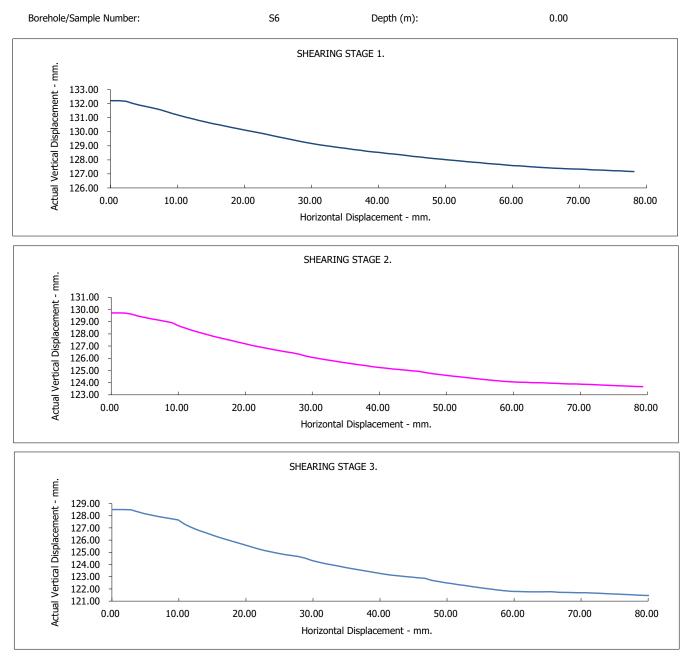
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



010705CD SBOX LARGE

BS1377:Part 7:5 :1990.



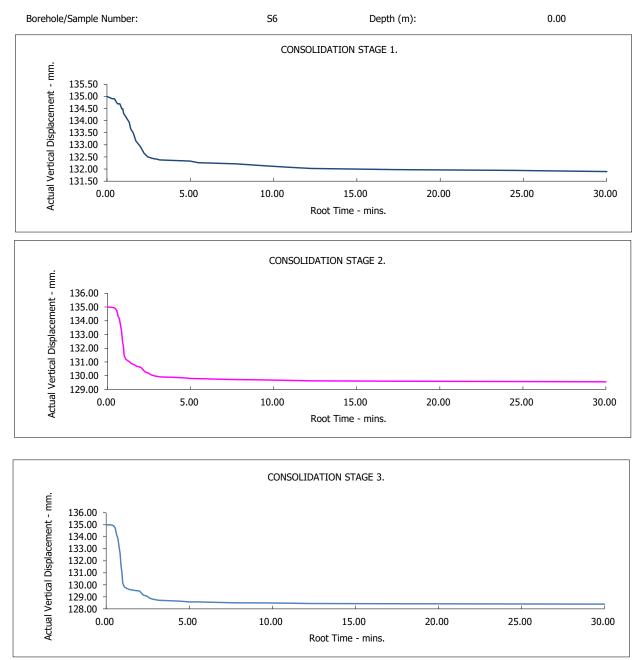
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

Buttington Quarry (B.Quarry)



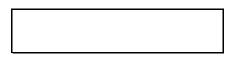


Determination of Slake Durability Index

GJIL	ISRM Part 2.2	
Contract Number	41501	
Site Name	Buttington Quarry (B.Quarry)	
Nature of Slaking Fluid	Water at 20°C	
Date Tested	19/11/2018	

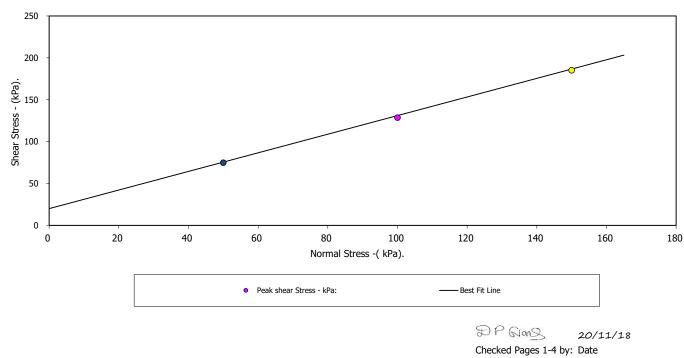
Hole Reference	Dep	oth (m)	Slake First Cycle	Slake Second Cycle	Appearance Of Material Retained In The Drum	Appearance Of Material Passing Through The Drum
S1			87.79	75.84	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S2			88.18	74.93	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S3			95.84	92.97	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S4			92.52	88.10	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S5			93.77	89.44	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S6			91.14	88.01	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.

Key	Reported As
Slake First Cycle	%
Slake Second Cycle	%



Operators	Checked	19/11/2018	Wayne Honey	W. Honey
JD	Approved	20/11/2018	Ben Sharp	

Borehole Number:	S1	Depth from (m):	0.00	
Sample Number :	1	Depth to (m):	0.00	
Sample Type:	В	· · · ·		
Particle Density - Mg/m3:		2.65 (Assumed)	
Specimen Tested:	At natural m	noisture content, Remoulded (Light	Tamping) Material above 20	mm removed.
Sample Description:				
Brown clayey fine to medium GRAVE	L			
STAGE		1	2	3
Initial Conditions				
Height - mm:		136.00	136.00	136.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		10	10	10
Bulk Density - Mg/m3:		2.04	2.04	2.04
Dry Density - Mg/m3:		1.85	1.85	1.85
Voids Ratio:		0.4316	0.4317	0.4318
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		133.03	131.54	129.77
Shear				
Rate of Strain (mm/min)		0.66	7 0.667	0.667
Strain at peak shear stress (%)		58.55	60.41	63.30
Peak shear Stress - kPa:		75	129	185
РЕАК				
Angle of Shearing Resistance:(0)				48.0
Effective Cohesion - kPa:				20



FAILURE CONDITIONS

Contract No.: 41501

20/11/18

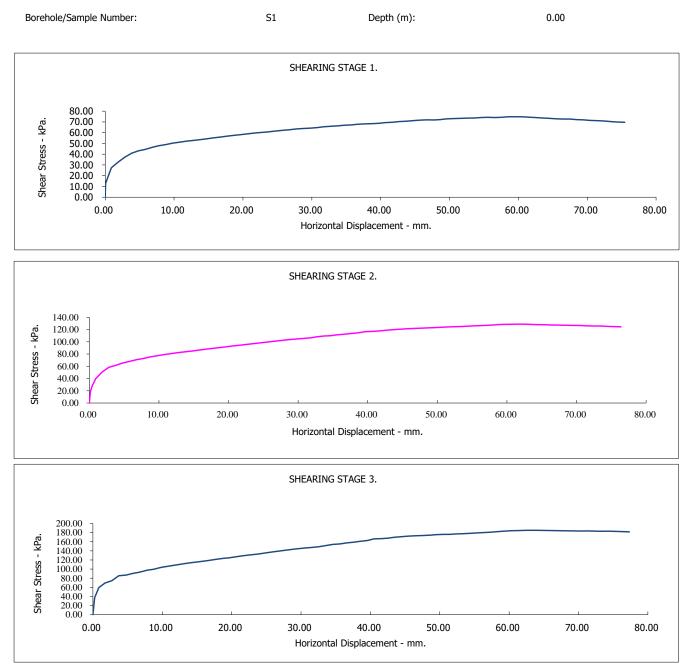
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Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



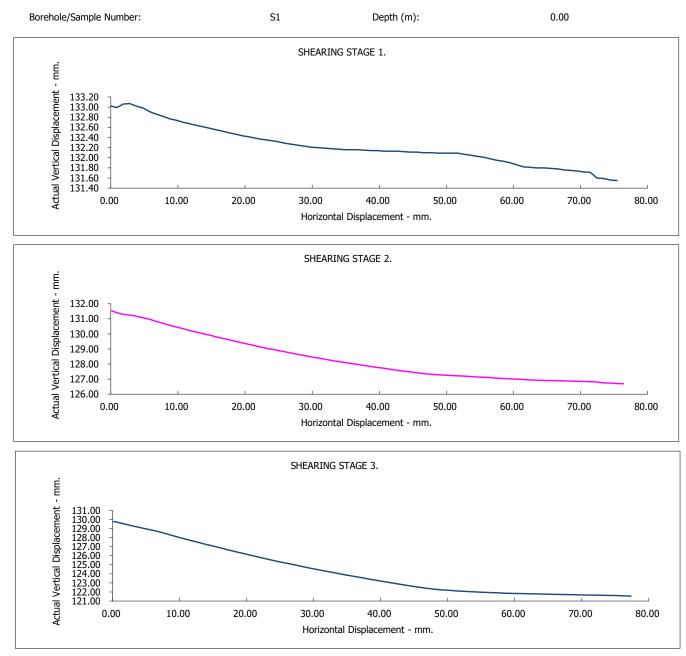
Contract No.: 41501

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



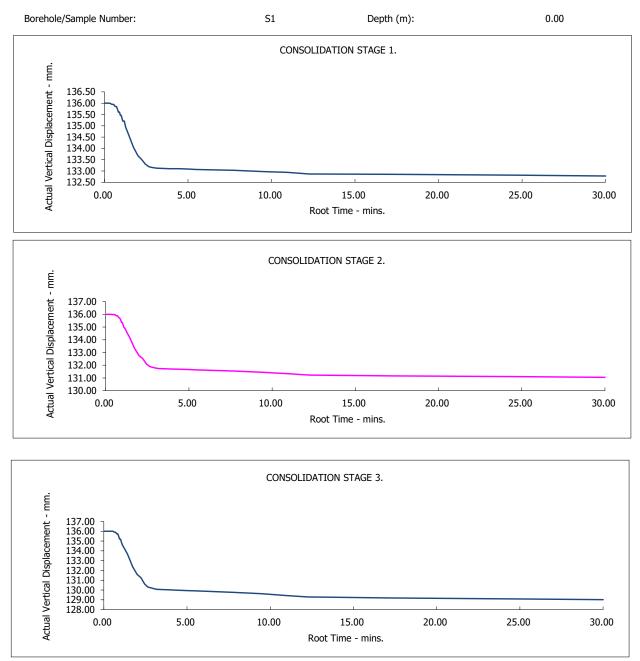
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.

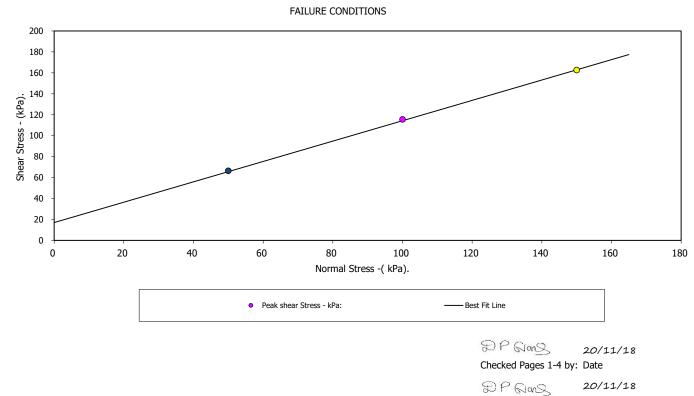


Contract No.: **41501**

Buttington Quarry (B.Quarry)



Borehole Number:	S2	Depth from (m):	0.00		
Sample Number :	2	Depth to (m):	0.00		
Sample Type:	В				
Particle Density - Mg/m3:		2.65 (Assume	d)		
Specimen Tested:	At natural moisture content, Remoulded (Light Tamping) Material above 20mm removed.				
Sample Description:					
Brown clayey fine to medium GRAVEL					
STAGE		1	2	3	
Initial Conditions					
Height - mm:		130.0	0 130.00	130.00	
Length - mm:		300.0	0 300.00	300.00	
Moisture Content - %:		1	0 10	10	
Bulk Density - Mg/m3:		2.0	2 2.02	2.02	
Dry Density - Mg/m3:		1.8	3 1.83	1.83	
Voids Ratio:		0.447	8 0.4478	0.4477	
Normal Pressure- kPa		5	0 100	150	
Consolidation					
Consolidated Height - mm:		126.4	0 121.96	117.52	
Shear					
Rate of Strain (mm/min)		0.6	67 0.667	0.667	
Strain at peak shear stress (%)		55.0	6 55.19	57.32	
Peak shear Stress - kPa:		6	6 116	163	
PEAK					
Angle of Shearing Resistance:(0)				44.2	
Effective Cohesion - kPa:				17	



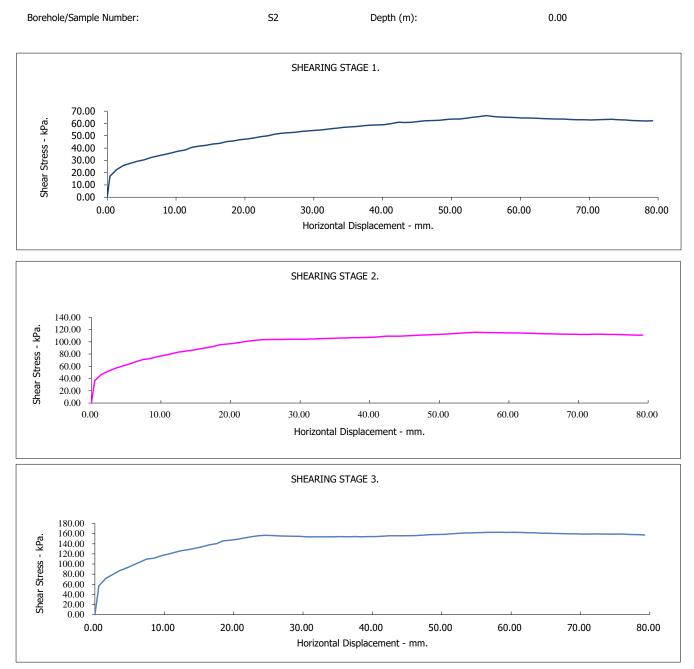
Approved Pages 1-4 by: Date

Contract No.: 41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



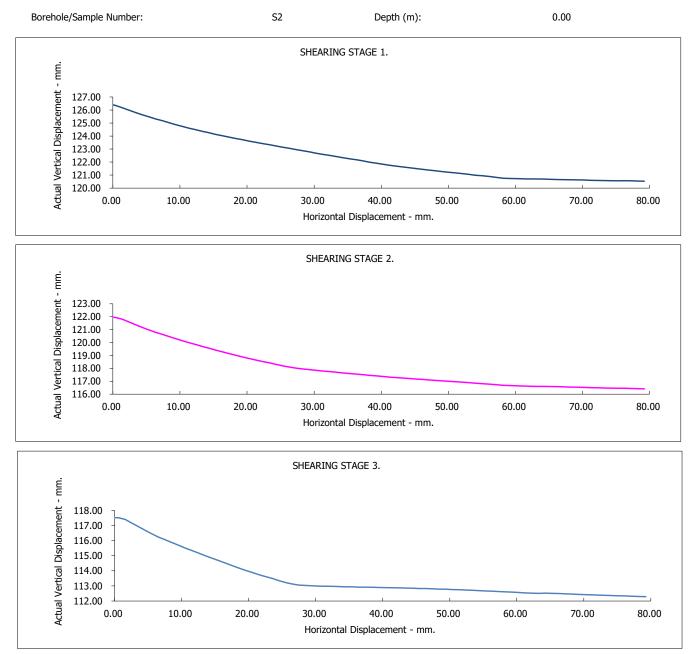
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



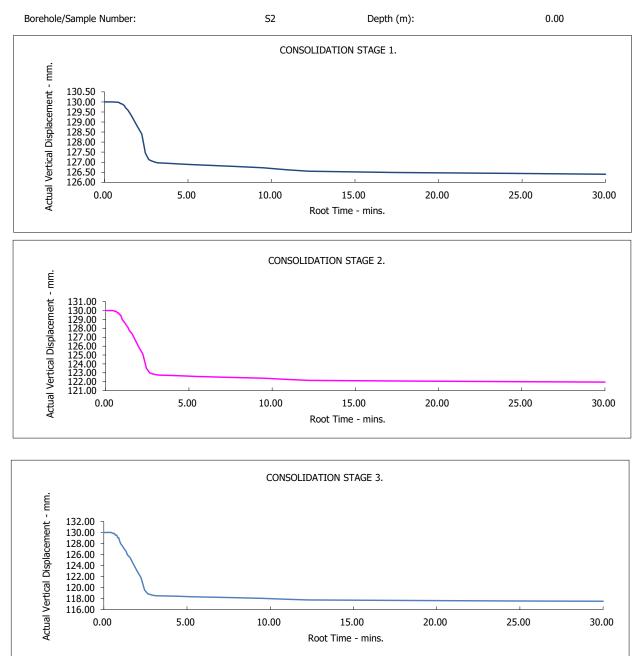
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.

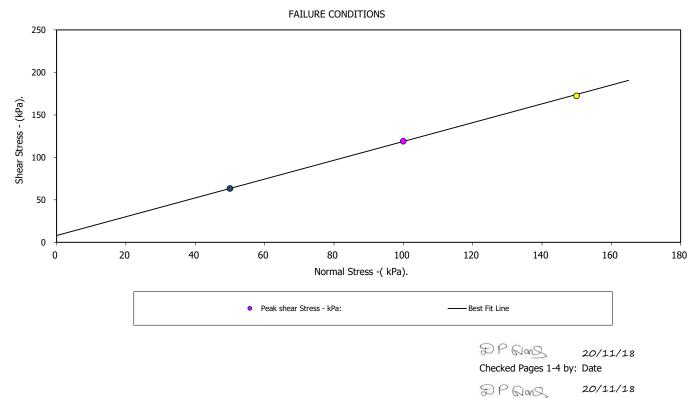


Contract No.: **41501**

Buttington Quarry (B.Quarry)



Borehole Number:	S3	Depth from (m):	0.00			
Sample Number :	3	Depth to (m):	0.00			
Sample Type:	В					
Particle Density - Mg/m3:		2.65 (Assumed)	1			
Specimen Tested:	At natural mo	At natural moisture content, Remoulded (Light Tamping) Material above 20mm removed.				
Sample Description:						
Brown slightly clayey fine to mediur	n GRAVEL					
STAGE		1	2	3		
Initial Conditions						
Height - mm:		134.00	134.00	134.00		
Length - mm:		300.00	300.00	300.00		
Moisture Content - %:		7	7	7		
Bulk Density - Mg/m3:		1.62	1.62	1.62		
Dry Density - Mg/m3:		1.52	1.52	1.52		
Voids Ratio:		0.7425	0.7426	0.7427		
Normal Pressure- kPa		50	100	150		
Consolidation						
Consolidated Height - mm:		129.93	127.63	125.80		
Shear						
Rate of Strain (mm/min)		0.667	0.667	0.667		
Strain at peak shear stress (%)		54.10	65.71	66.42		
Peak shear Stress - kPa:		63	119	173		
PEAK						
Angle of Shearing Resistance:(0)				47.9		
Effective Cohesion - kPa:				8		



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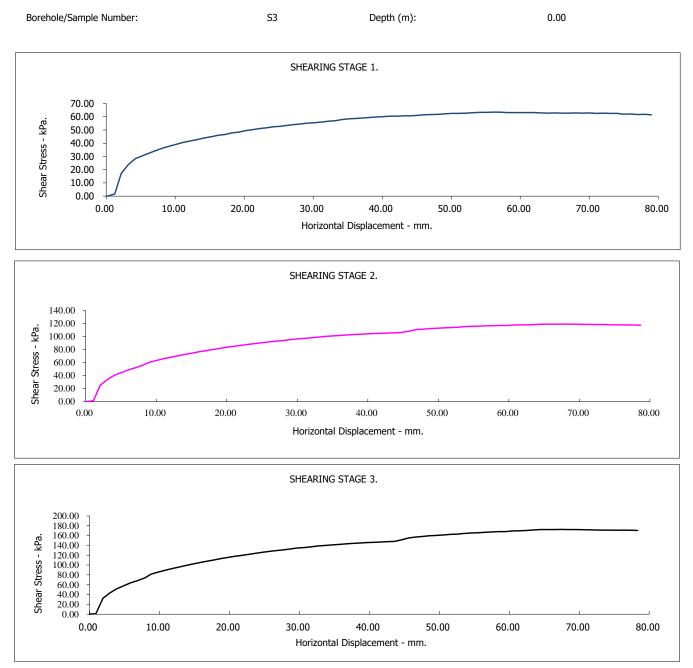
Contract No.:

41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



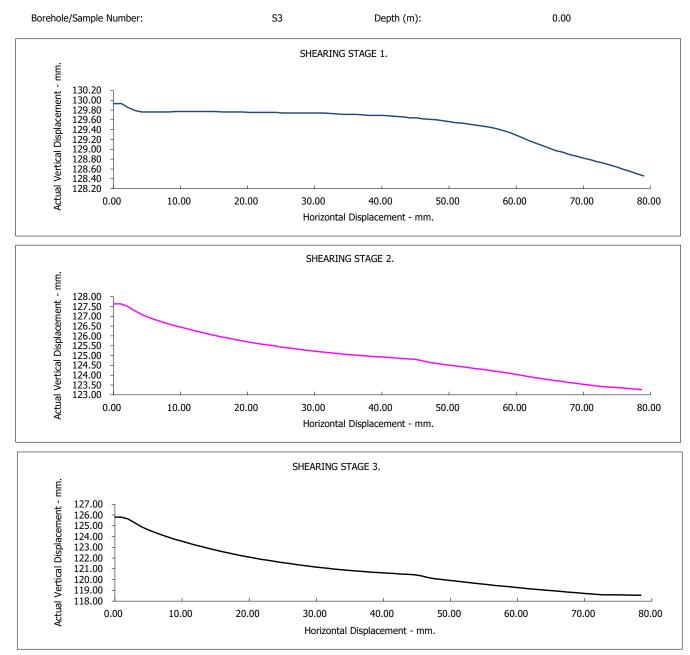
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

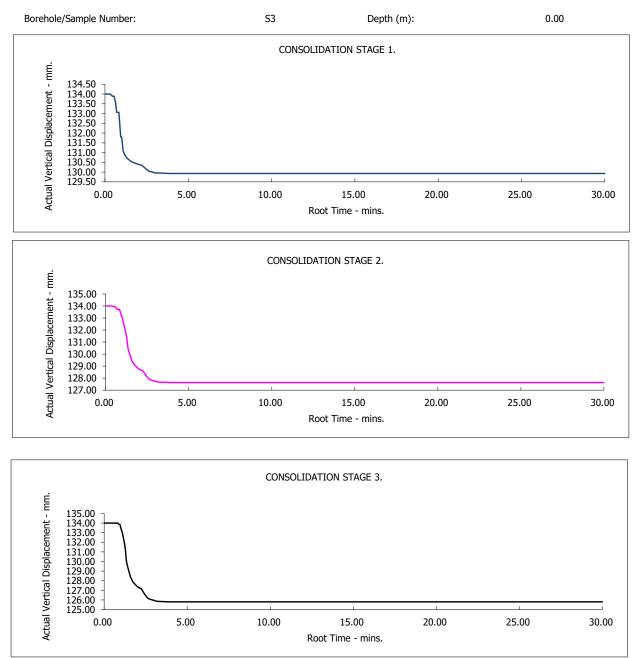
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



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BS1377:Part 7:5 :1990.



Contract No.: **41501**

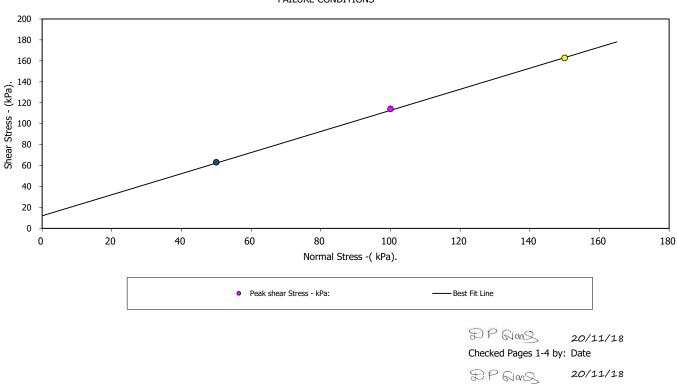
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S4	Depth from (m):	0.00	
Sample Number :	4	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)	
Specimen Tested:	At natural m	oisture content, Remoulded (Light	Tamping) Material above 20r	nm removed.
Sample Description:				
Brown slightly clayey fine to mediun	n GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		134.00	134.00	134.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		12	12	12
Bulk Density - Mg/m3:		1.59	1.59	1.59
Dry Density - Mg/m3:		1.43	1.43	1.43
Voids Ratio:		0.8575	0.8577	0.8575
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		130.29	129.03	127.07
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		53.12	52.66	56.20
Peak shear Stress - kPa:		63	114	163
РЕАК				
Angle of Shearing Resistance:(0)				45.2
Effective Cohesion - kPa:				12



FAILURE CONDITIONS

Contract No.: 41501

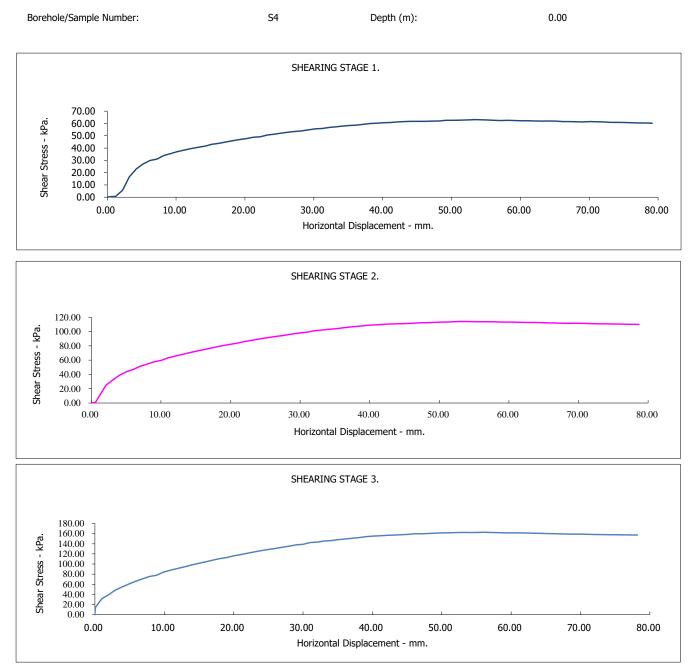
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Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH



BS1377:Part 7:5 :1990.



Contract No.: **41501**

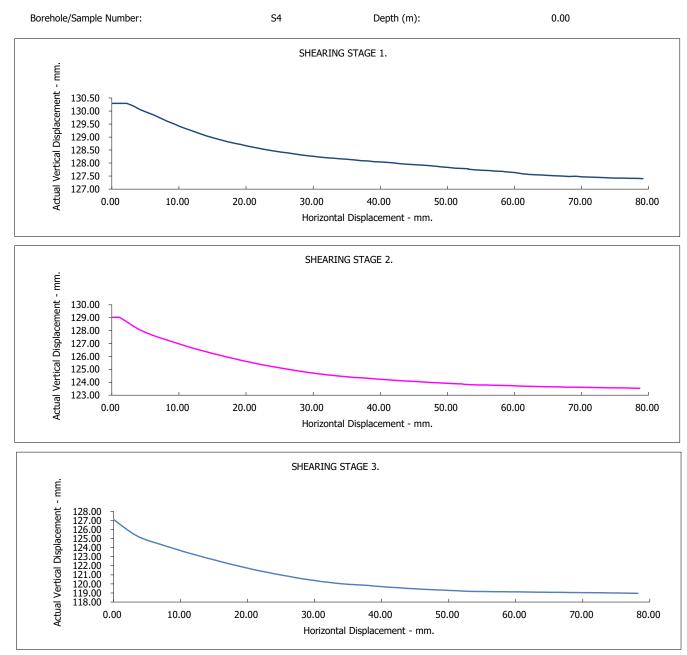
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



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BS1377:Part 7:5 :1990.



Contract No.: **41501**

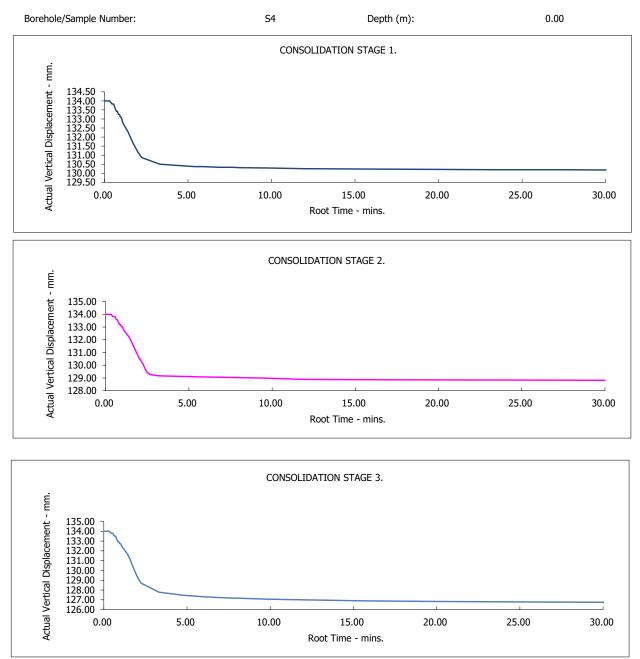
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



010705CD SBOX LARGE

BS1377:Part 7:5 :1990.



Contract No.: **41501**

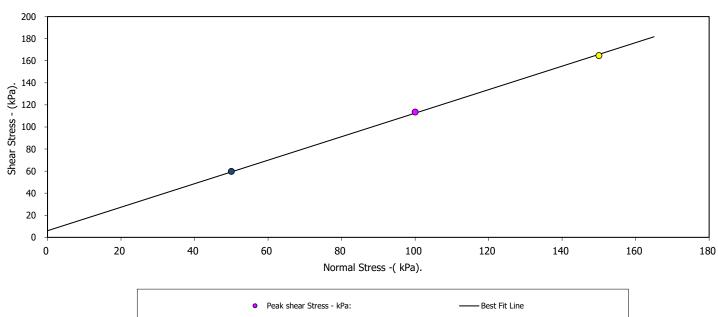
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S5	Depth from (m):	0.00	
Sample Number :	5	,	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)		
Specimen Tested:	At natural m	noisture content, Remoulded (Light T	amping) Material above 20m	im removed.
Sample Description:				
Brown slightly clayey fine to medium	GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		132.50	132.50	132.50
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		6	6	6
Bulk Density - Mg/m3:		1.65	1.65	1.65
Dry Density - Mg/m3:		1.55	1.55	1.55
Voids Ratio:		0.7053	0.7049	0.7050
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		128.00	126.20	124.88
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		60.01	61.02	61.02
Peak shear Stress - kPa:		60	113	165
PEAK				
Angle of Shearing Resistance:(0)				46.8
Effective Cohesion - kPa:				6



FAILURE CONDITIONS

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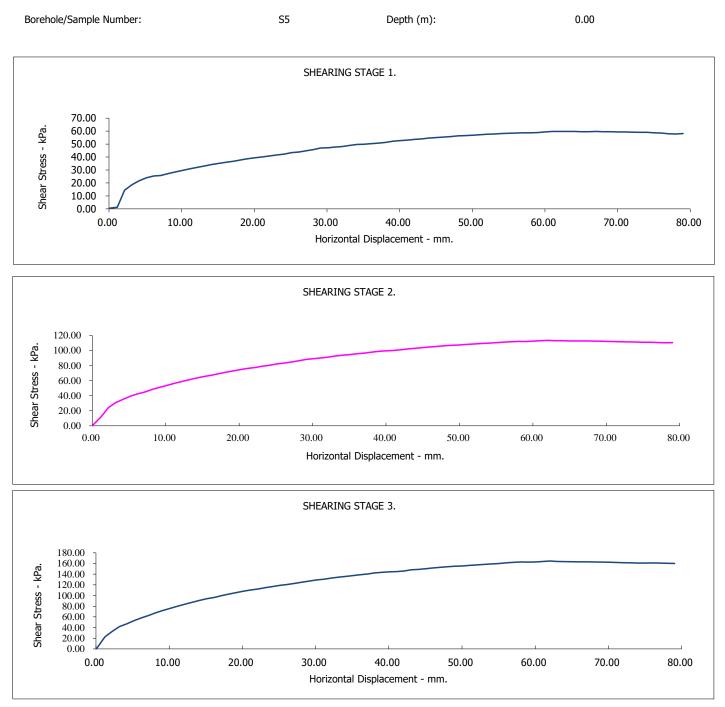
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH



BS1377:Part 7:5 :1990.





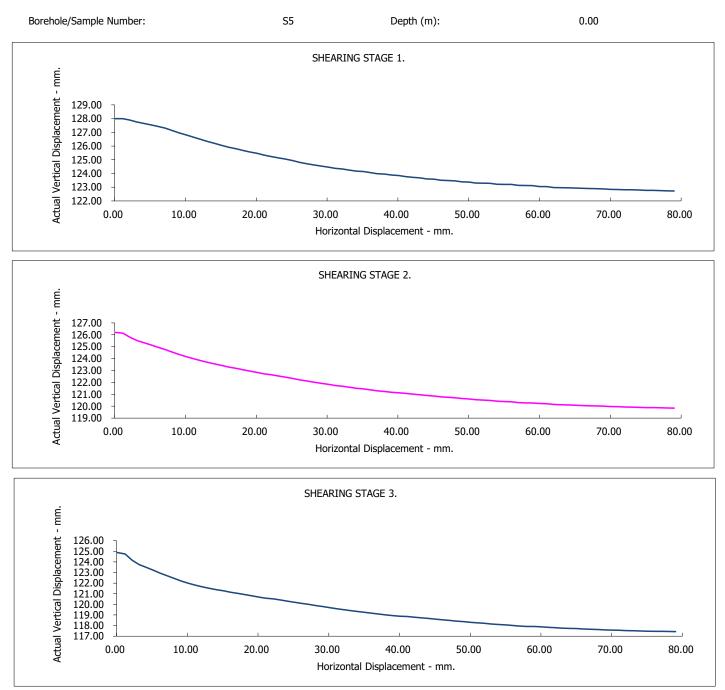
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



2 of 4

BS1377:Part 7:5 :1990.



Contract No.: **41501**

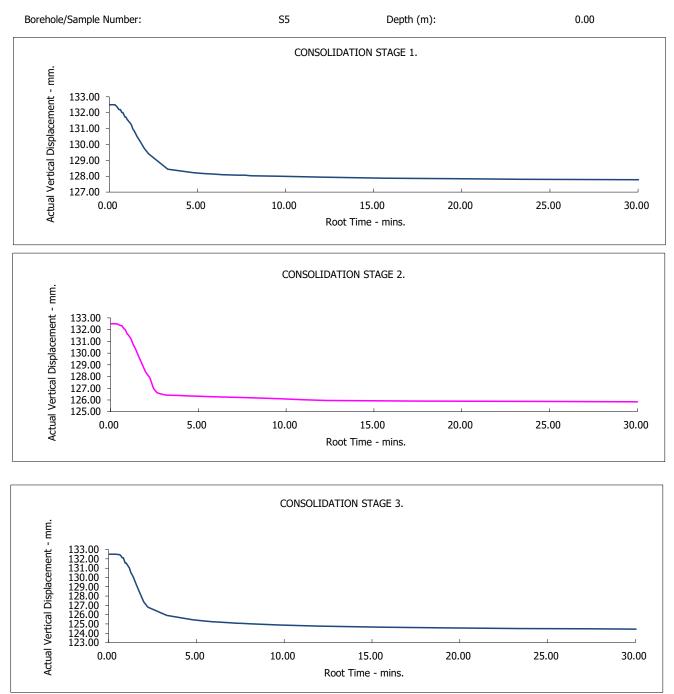
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



3 of 4

BS1377:Part 7:5 :1990.



Contract No.: 41501

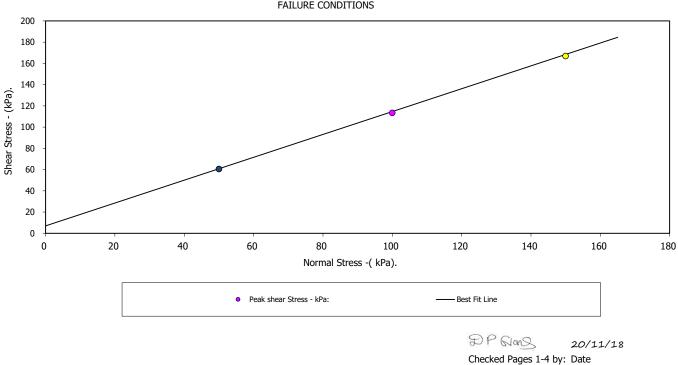
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.

Borehole Number:	S6	Depth from (m):	0.00	
Sample Number :	6	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assume	d)	
Specimen Tested:	At natural m	oisture content, Remoulded (Ligh	t Tamping) Material above 2	20mm removed.
Sample Description:				
Brown slightly clayey fine to medium	GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		135.0	0 135.00	135.00
Length - mm:		300.0	0 300.00	300.00
Moisture Content - %:		1	0 10	10
Bulk Density - Mg/m3:		1.6	0 1.60	1.60
Dry Density - Mg/m3:		1.4	4 1.44	1.44
Voids Ratio:		0.835	3 0.8351	0.8355
Normal Pressure- kPa		5	0 100	150
Consolidation				
Consolidated Height - mm:		132.2	2 129.72	128.51
Shear				
Rate of Strain (mm/min)		0.66	67 0.667	0.667
Strain at peak shear stress (%)		66.1	4 67.37	57.68
Peak shear Stress - kPa:		6	1 113	167
PEAK				
Angle of Shearing Resistance: (θ)				47.1
Effective Cohesion - kPa:				7



FAILURE CONDITIONS

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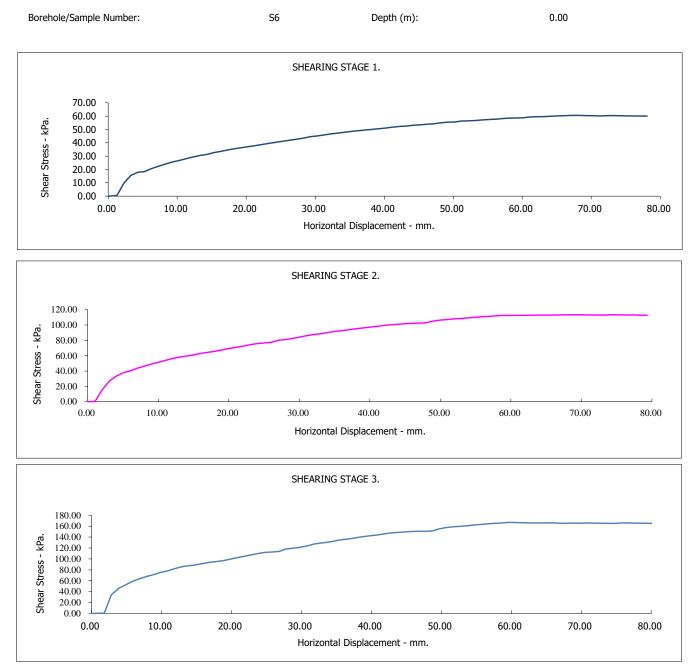
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Buttington Quarry (B.Quarry)

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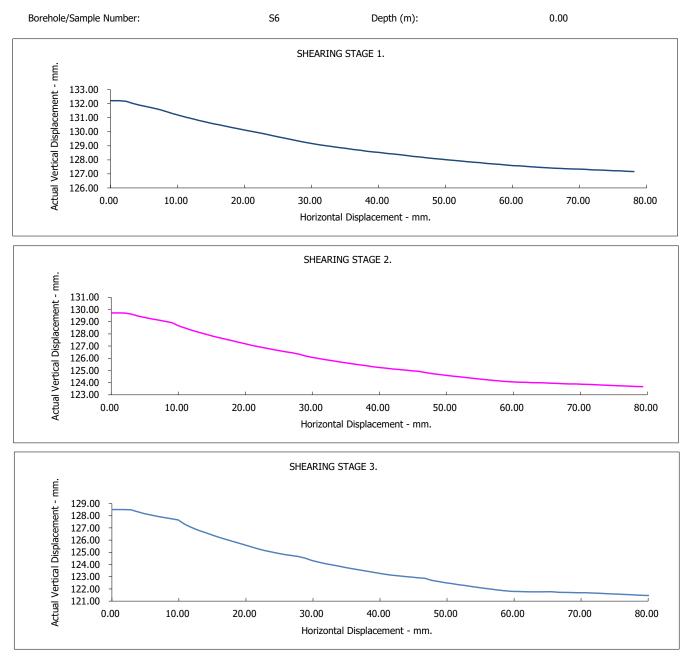
Buttington Quarry (B.Quarry)

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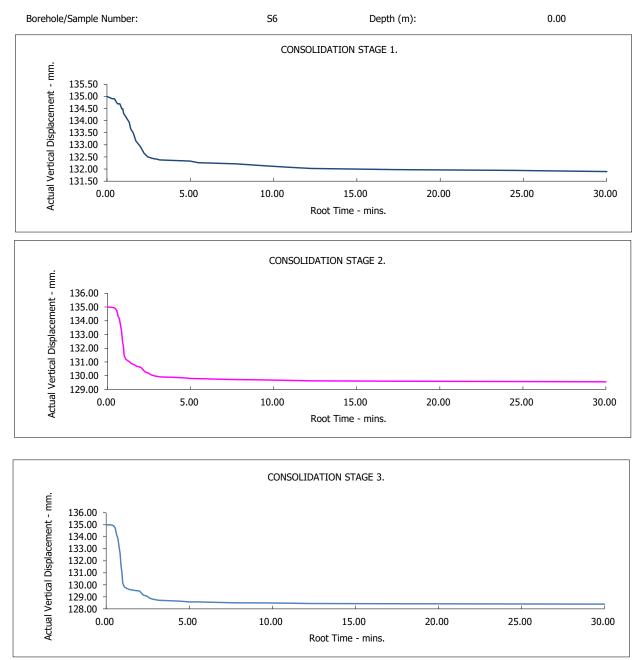
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



3 of 4

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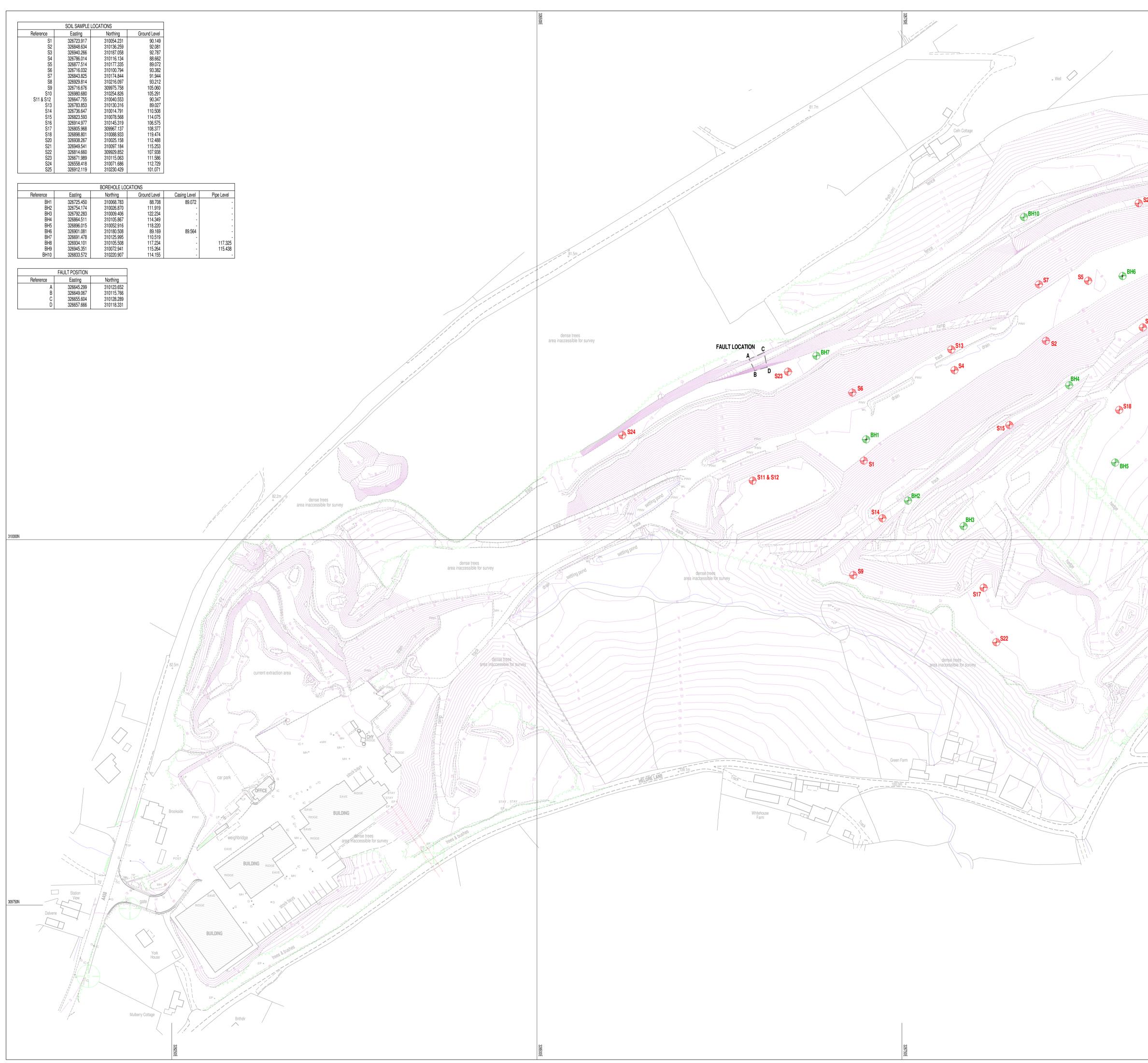
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.





DRAWINGS



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			ngton Quarry, Buttington, Wels	
		Soil	sample & borehole locations as	surveyed 07.11.18
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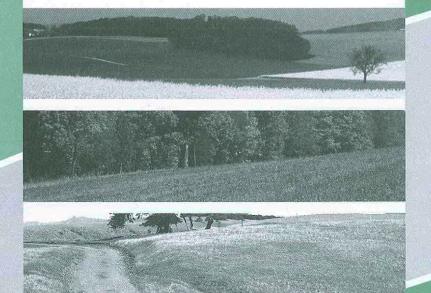
Technical Appendix 13-2 Slope Stability Report **Slope Stability Assessment**

Buttington Quarry Buttington Welshpool

Prepared for: Broad Environmental Limited

February 2019

Job No: 14880/SS





55 (111)		
REPORT TITLE	:	Slope Stability Assessment: Buttington
		Quarry, Buttington, Welshpool
REPORT STATUS	:	FINAL
JOB NUMBER	:	14880
DATE	:	February 2019
		Q the walk
PREPARED BY	:	K, / WWEERS.
		(Mrs R. Howells)
REVIEWED BY	:	<u> </u>
		(Mr D. Emanuel)
		Cam Dato
APPROVED BY	:	
		(Dr G. C. Lake)

Executive Summary

Broad Energy (Wales) Limited is proposing the development of an Energy Recovery Facility (ERF) at Buttington Quarry. The new ERF is to be constructed in the bottom of the former quarry. To accommodate this the quarry is to be widened.

Terra Firma (Wales) Limited has been commissioned to undertake a slope stability assessment.

To undertake the assessment field observations of the site geology were recorded and a physical site investigation undertaken in the form of rotary probeholes performed including rock coring. Data collected was utilised to complete a stability assessment of the current northwest quarry slope using the Geo5 slope stability model and to perform a stereonet exercise to determine the risks to newly created slopes from failure.

Upon development it is intended that the existing northwest quarry face will remain unchanged. The slope stability analysis confirmed that the existing 34 degree scree slope, is generally stable with only a very low risk of shallow slips. It is recommended that to protect the new development against any such minor scree slips or rogue rock falls that a 3m buffer zone be assigned between the base of the existing quarry face and edge of the new development area comprising a shallow trench and a catch fence.

The proposed new southeast slope will be within the Trewern Broom Mudstone Formation. This is deemed to have the same geotechnical properties as the Cefn Formation and Tarannon Mudstone Formation to the northwest. For this reason, this strata may be expected to behave in an identical way, naturally weathering to a slope of 34°, at which angle any slope instability may be expected to be minor.

The new south-eastern side of the development area upon development will be within the TBMF and align northeast-southwest at an orientation approximately 60 and 85 degrees, and dip towards the northwest. The angle of dip will determine the degree of slope stabilisation required.

For a 34° slope there are two options.

- 1. Assign a 3m buffer zone comprising a shallow trench between the development area and new base of slope and install a catch /debris barrier on the edge of the development area. Appropriate drainage measures should be installed within the base of the trench.
- 2. Cut a 34° slope from the edge of the development area and apply slope protection in the form of erosion control measures. This will act to minimise surface weathering and prevent degradation that could lead to wedge or toppling failure.

Stereonet analyses have shown that at 60° the rock will not remain stable unless stabilisation measures are introduced. Stabilisation should be achieved by:

- 1. Assign a 5m buffer zone comprising a shallow trench between the development area and new base of slope and install a catch fence on the edge of the development area. Appropriate drainage measures should be installed within the base of the trench.
- 2. Creation of the slope in two sections, stepped mid-way by a 5m long shelf. A drain should be installed along the base of the upper slope section.
- 3. Stabilisation of all 60° slopes with appropriate ground anchors or soil nails/bolts combined with rock netting to retain any loose debris. Erosion control may also be incorporated.

Slope stabilisation design and management should be performed by a specialist.

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- Annex B Photographs of Probehole Rock Cores
- Annex C UCS, Point Load and Shear Box Test Results
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SECTION 1 Introduction

1.1 General

Broad Energy (Wales) Limited is proposing the development of an Energy Recovery Facility (ERF) at Buttington Quarry, near Welshpool, a renewable energy plant that will fuelled by non-recyclable waste.

The new ERF is to be constructed in the bottom of the former quarry. To accommodate this the quarry is to be widened.

Terra Firma (Wales) Limited has been commissioned to undertake a slope stability assessment.

The objectives of the slope stability are:

- To inspect the nature and quality of existing quarry slopes
- To determine surface and sub-surface ground conditions including the structure and competency of the different geological units
- Provide recommendations for the most viable future quarry configuration and how the long-term integrity all new quarry faces, and slopes may be maintained.

1.2 Limitations and Exceptions of Investigation

Broad Energy (Wales) Limited has requested that a Slope Stability Assessment be undertaken

The slope stability analysis was conducted and this report has been prepared for the sole internal reliance of Broad Energy (Wales) Limited and its design and construction team. This report shall not be relied upon or transferred to any other parties without the express written authorisation of Terra Firma (Wales) Limited. If an unauthorised third party comes into possession of this report they rely on it at their peril and the authors owe them no duty of care and skill.

The report represents the findings and opinions of experienced geo-technical consultants. Terra Firma (Wales) Limited does not provide legal advice and the advice of lawyers may also be required.

The subsurface geological profiles are based on the information found at the locations of the exploratory holes and depths sampled and tested.

SECTION 2 Site Setting

Buttington Quarry sits into a natural hillside just northeast of Buttington, adjacent to and east of the A458 between Welshpool and Shrewsbury. The surrounding area is entirely rural.

There is a history of quarrying and clay pits dating back to the late 1800s, which has gradually formed the quarry that is present today. There have been no extractions from the existing quarry for circa 20 years. An associated brick works was in operation near to the quarry, established between 1885 and 1903. It is understood that the brick works closed in 1990.

The quarry is accessed through the site of the former brick works, which is now used for commercial purposes. Low-scale quarrying of materials between the former brick works land and the A482 presently continues.

The base of the quarry aligns northeast-southwest and lies at 88m - 89m AOD. The quarry sides extend up to approximately 118.5m - 127m to the northwest and a maximum of 119.5m AOD to the southeast.

Quarry faces on both sides are stepped at various intervals, forming trackways midslope to the southeast and mid to top slope to the northwest.

The quarry sides remain exposed and unvegetated, and weathering of these surfaces has led to ravelling where the rock has deteriorated to form a scree of fine gravel. Where rock faces are exposed this gravel debris has accumulated at the base of the face. The gravel is loose but remains stable having settled at its natural angle of repose. No evidence of any rockfalls is evident within the quarry.

Exposed rock faces are primarily present towards the top of the quarry sides, particularly on its north-western side.

The area south-east of the quarry, which is included in the development area, slopes downhill towards the southeast. It may be accessed via an inclined track that cuts from the main entrance track into the bottom of the quarry. The hillside remains unaltered towards the northeast and comprises two grassy fields declining from around 119.5m to 111.5m AOD. The smaller of these fields is heavily overgrown and largely enclosed by hedgerows. The hillside has also been quarried south of the fields and numerous stockpiles of stone material remain. A through-track to other areas of the property passes through this section of the site, which sits at around 108m – 109.5m AOD.

A newly formed earth bund defines the south-eastern boundary of the development area.

Two settlement ponds are present at the entrance to the quarry, either side of the access track. During wet weather surface waters were also noted to collect in areas of the quarry floor.

SECTION 3 Geology

The solid geology at the quarry is illustrated in **Figure 3.1** below. Please note that this plan is not to scale and actual boundaries between each strata will vary.

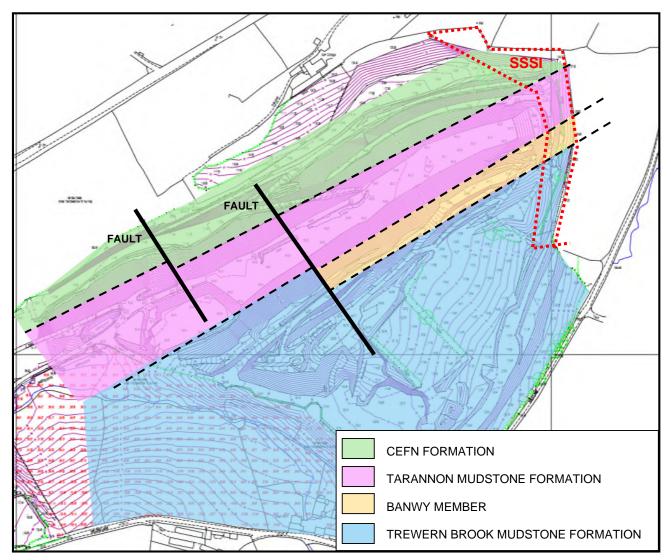


Figure 3.1: Site Geology

Figure 3.1 shows four different strata to be present at Buttington Quarry, younging towards the southeast. Table 3.1 summarises the stratigraphic sequence.

Wenlock	Sheinwoodian	Trewern Brook Mudstone Formation	
Silurian			Banwy River Member
Sildhan		Telychian	Tarannon Mudstone Formation
			Cefn Formation

Table 3.1: Stratigraphic Sequence

Geology (Continued)

Cefn Formation (CF)

This is comprised of primarily of grey to dark grey mudstones, with thin sandstone beds. Concretions and nodules recorded.

Tarannon Mudstone Formation (TMF)

The Tarannon Mudstone Formation is comprised of purple/red brown mudstone/shale, also fossiliferous, with graptolites. It is this strata that has been extracted for brick making.

Banwy Member (BM)

A section of mudstone upon the quarry face that is defined by its specific graptolite fossil biostratigraphy that spans the lower Wenlock and upper Llandovery boundary.

Trewern Brook Mudstone Formation (TBMF)

Comprised of blue-grey mudstone beds, also host to graptolite fossils. At the base of the TBMF the Butterley Member is recorded, comprising an approximate 9m thick horizon of bio-turbated silty mudstone with shelly, trilobite and graptolite fossils (Lydell *et al*).

Two faults have been found to cross roughly perpendicular to the length of the quarry, as illustrated in **Figure 3.1**. These down-throw strata towards the southwest.

A continuous sequence of Llandovery to Wenlock rocks is designated as a geological SSSI (Site of Special Scientific Interest). This encompasses the Buttington Shale Formation (TMF) from the upper Llandovery through to the TBMF. The approximate area of the SSSI is illustrated on **Figure 3.1**.

Superficial Devensian fluvioglacial fan deposits (sand and gravel) or Devensian till is recorded in the immediate areas surrounding the quarry top but cover is anticipated to be very shallow, with bedrock at or near the surface.

SECTION 4 Site Investigation

Data was compiled to enable assessment of the quarry through field observations and intrusive investigation works.

4.1 Field Observations

Geologically trained TFW engineers visited the site to inspect the different geological units exposed at the surface.

Due to the vivid purple colour of the Tarannon Mudstone each lithology was easily distinguishable. **Figure 4.1** provides a generalised view of the different strata.

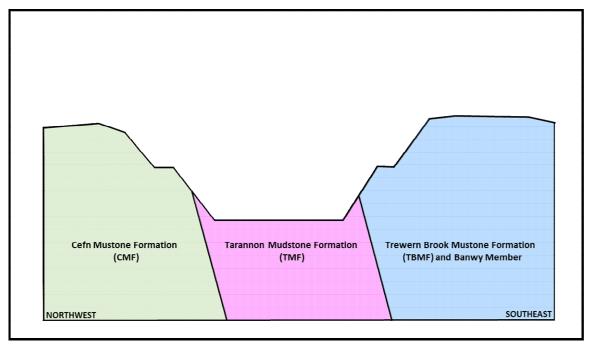


Figure 4.1: Generalised Cross-Section of Buttington Quarry

The bedding orientation of each of the geological unit was measured from exposed bedding planes, i.e. the divide between different geological units/beds.

Bedding is found to dip very steeply, typically between 75°-85° towards the southeast, although this does vary on a localised scale and shallower/steeper readings were recorded.

Numerous fractures and joints were also observed in the TBMF from different exposure locations. Fracture and joint planes were found to be variable in both orientation and dip and no dominant fracture groups could be deciphered with the exception of where mineralisation of some parallel fracture planes in localised areas was evident. Mineralised fractures were found to be a maximum width of only a few millimetres.

TMF exposures were limited and highly weathered so no fracture or joint readings could be reliably taken.

The CF will not be further exposed upon development and so limited data for this strata was obtained.

4.1 Field Observations (Continued)

Several faults are documented to be present. The western most fault shown in **Figure 3.1** was confirmed in the north-western face of the quarry.



Figure 4.2: Fault line as seen in upper north-western quarry face

The two sides of this fault may be seen on **Drawing 01**.

Several small unmapped faults may also be clearly observed in the lower northeastern end of the north-western quarry face, down-throwing strata towards the northeast, see **Figure 4.3**.



Figure 4.3: Localised faults towards the northeast end of the quarry

4.2 Physical Investigation

4.2.1 Probeholes

An intrusive investigation was undertaken to obtain representative samples of the different geological units at depth and from areas where the new northeast quarry face may be anticipated to intersect the landscape.

Ten rotary probeholes (PH1–PH10) were sunk in accessible areas, positioned along pre-determined cross-sectional lines across the quarry, during October and November 2018.

PH1 and PH6 were situated with the quarry bottom, targeting the TMF. PH7 and PH10 were drilled in to the CMF. The remaining probeholes extended in to the TBMF.

The exploratory hole locations are illustrated on **Figure 4.4** below.

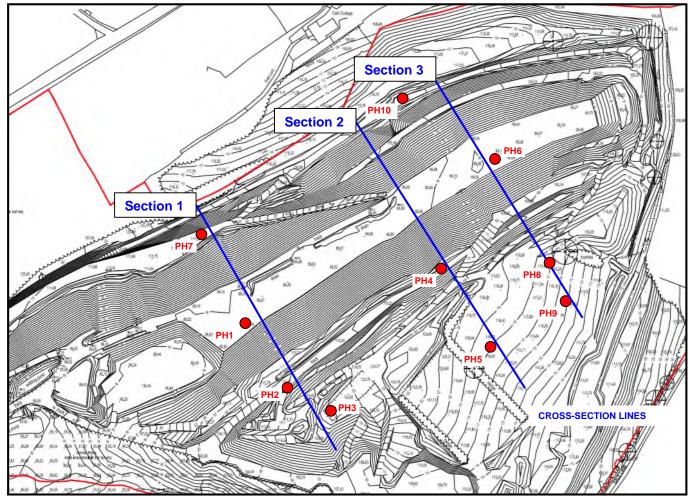


Figure 4.4: Probehole Locations

The exact borehole co-ordinates and levels are detailed on the probehole logs, see **Annex A**.

4.2.1 Probeholes (Continued)

The probeholes were sunk using a Beretta T44 drilling rig.

The probeholes were almost entirely drilled via core sampling and only limited open hole drilling was carried out. Open hole drilling was carried out using compressed air as the flushing medium.

The fieldworks were supervised by Terra Firma (Wales) Limited. The probehole cores were logged to the requirements of BS5930: 2015. Copies of the probehole logs are presented in **Annex A**.

Photographs of the extracted rock cores may be found in **Annex B**.

The Tarannon Mudstone (PH1 and PH6) was found as weak dark reddish brown locally light greenish grey mudstone with closely spaced fractures stained orangish brown. Bedding fractures were recorded as orientated 75°- 85° with primarily planar smooth to polished surfaces. Other fractures were found to be variable in orientation with no consistent fracture surface type, but fractures were clean and generally tight to open.

The Cefn Mudstone (PH7 and PH10) was found to be completed weathered to soil to around 1m depth. In PH7 this grades in to extremely weak dark grey mudstone with bands of non-intact laminated mudstone and siltstone retrieved as angular gravel between 3.85–5.05m, 6.45–7.15m and 9.65m–10.75m depth. Bedding fractures are identified by their 80°- 85° orientation, with variable surfaces but often striated. Other fracture planes are dominantly found to be 15°- 45° to around 11m depth before favouring a 35°- 60° orientation but 60°- 70° fracture planes were also found to regularly feature to the full depth of the probehole. Fractures were generally clean. Non-intact greenish grey mudstone retrieved as gravel extended to 3.0m depth in PH10, succeeded by very weak grey mudstone with very close to closely and occasionally medium spaced fractures dominantly orientated 5°- 35° and stained orangish brown or dark grey/black. Bedding fractures were consistently dipping 80°-85°.

The Trewern Brook Mudstone Formation (PH2 – PH6) was found weathered to very gravelly clay soil in some areas to 1.0m depth, and made ground was noted in PH2 to 1.0m depth comprised of rubble hardcore material. In general, the strata is formed of weak grey to dark grey mudstone beds, initially non-intact or very weak in areas and becoming medium strong to strong at depth (PH2 & PH8). Bedding fractures follow a 75°- 85° orientation. Other fractures and joints are prevalent but no relationship between spacing and orientation may be determined between different boreholes. Most fractures are clean but occasionally found to be infilled with soft to stiff grey clay to no more than a few centimetres in thickness. Mineralisation of some fractures was also noted, but these were typically no wider than 1mm. Graptolite fossils (monograptids) were observed in particular beds and often seen on bedding fracture surfaces.

4.2.2 Groundwater

Groundwater was only recorded in two probeholes during drilling works.

Groundwater monitoring wells were installed in seven of the ten probeholes. A return visit to site on the 21.11.2018 was made to dip the wells and ascertain groundwater levels.

Table 4.1 Groundwater Levels					
Borehole	Groundwater noted during drilling	Water level 21.11.2018 (mbgl)	Water level AOD 21.11.2018		
BH1	0.6	0.3	88.408		
BH2	-	18.35	93.569		
BH3	-	-			
BH4	-	12.69	101.649		
BH5	-	-			
BH6		0.27	89.499		
BH7	-	11.8	98.719		
BH8	-	11.3	105.934		
BH9	6.7m borehole wet	10.2	105.064		
BH10	-	-	-		

4.2.3 Geotechnical Testing

In order to confirm the competency and strength of the quarry rocks in-situ CPT tests were performed in the probeholes and core sections were retrieved and submitted for laboratory testing for unconfined compressive strength (UCS) and point load testing.

CPT results are not included on the probehole logs (**Annex A**) due to difficulties presenting test data alongside coring data, but most tests met refusal.

Samples of weathered rock material were also retrieved and submitted for laboratory shear box, grading and slake durability testing. These results are discussed in **Section 7**.

Laboratory test results may be found in Annexes C and F.

SECTION 5 Slope Stability Modelling

5.1 General

Geological planes comprise bedding planes and fractures/joints.

The dip of the bedding within the quarry is known to generally be 75°-85° towards the southeast, with local variation in this range.

Field measurements taken in the TBMF recorded numerous fracture and joint planes, which had variable and inconsistent alignment. A list of readings taken may be found in **Annex D**.

TMF exposures were limited and highly weathered so no fracture or joint readings were could be reliably taken. Limited readings from the CF were taken.

Upon development it is intended that the existing northwest quarry face will remain unchanged and the CF and TMF will not be disturbed other than for localised earthworks related to filling towards the far northwest of the quarry.

Rock failure can occur in a number of ways:

- 1. **Ravelling:** This is the natural weathering and disintegration of rock to scree where exposed. The weathered material will settle at its natural angle of repose, i.e. the maximum angle before instability occurs. Ravelling has occurred along the lower quarry slopes and further up the quarry side at the base of rock faces.
- 2. Plane Failure: Where a section of rock may slide along a single plane.
- **3. Toppling Failure:** This is where steeply dipping beds may weaken and topple forwards
- **4. Wedge Failure:** Where failure occurs where two planes intersect forming a 'wedge'.

Two methods of slope stability analysis were employed, use of the Geo5 Geotechnical Software for stability analysis and stereonet assessment.

Whilst the Geo5 software can model stability of soil and rock, given the steepness of the bedding and frequency of fractures and joints in all three rock formations this method has only limited application as the model assumes a homogenous rock unit. This program has been used only for assessment of the existing northwest quarry face, specifically to verify that the current degraded slopes faces are indeed acceptably stable at their acquired natural angle of repose.

Please refer to **Section 5.2** for details on the Geo5 Assessment.

A stereonet is a geological graphical method of assessment whereby the orientation and dip of 3D geological planes may be illustrated in 2D on a circular projection plane. Stereographic projection permits a 3D representation of the planes on a half-sphere pictorially. A stereonet may be used to understand the relationship between different geological planes and whether the intersection between different geological planes may indicate a potential method of rock failure.

Please refer to **Section 5.3** for the stereonet assessment.

5.2 Geo5 Slope Stability Assessment

The current northwest face of the quarry comprises both exposed bedding planes and rock surfaces, and weathered rock material that has accumulated as a result of ravelling. The weathered material is located primarily along the lower part of the quarry face, with rock out-cropping mid-way up the slope and above and localised ravelling at the base of these outcrops.

The naturally formed slopes of weathered material have been measured to be at an approximate angle of 34°.

The original profile of the quarry face prior to weathering is unknown, and the thickness of the scree material that has accumulated is therefore unknown and may be variable.

As the thickness of the scree material is unknown stability assessment for two different scree thickness scenarios has been performed.

The boundary between the TMF and the CF has been determined from drilling records and visual inspection of the slope, estimated though extrapolation taking into account the known dip of the strata.

Circular slip mechanisms were considered during computer analysis. Circular slopes were assessed by the Bishop Method. Further details of this method can be found in published literature. Analyses were performed based on shear strength parameters. The circular slips were derived automatically using the optimisation function. All other settings were left in default mode.

Upon completion of the Bishop Method analysis the model was re-run under the Safety Factors setting to obtain the value of the minimum factor of safety calculated.

5.2.1 Geotechnical Parameters

Table 5.1 Geotechnical Soil and Rock Parameters for Geo5 Assessment					
Strata	Angle of Shearing Resistance, ° (φ΄)	Effective Cohesion, kPa (c´)	Bulk Density kN/m ³		
Cefn Formation	60°	20	26		
Tarannon Mudstone (quarried)	60°	20	26		
Cefn Formation scree	34°	0	16		
Tarannon Mudstone (quarried) scree	34°	0	20		

Parameters used in the assessment are detailed below:

Notes:

Laboratory test results may be found in Annex C.

[•] The angle of shearing resistance for the bedrock is taken from BS 6031

[•] The angle of shearing resistance for the scree is taken as the approximate angle of the current scree slopes

The bulk density of the materials is taken from laboratory unconfined compressive strength (UCS) and shear box tests of scree and rock samples taken on site.

5.2.2 Groundwater

The scree material was found to be damp upon the surface following periods of wet weather. Due to its loose consistency, on-going stability and absence of any localised water-formed erosive features it may be assumed that this material is free-draining enabling it to maintain a stable 34° the slope. A water table has therefore not been applied to the model.

5.2.3 Factor of Safety

The programme assesses multiple failure circles rotating about centre points within the predetermined grid.

The minimum acceptable factor of safety applied is 1.3 to the model. Slopes with slip circles that have a factor of safety greater than 1.3 are considered sufficiently stable that a slip is unlikely to occur.

Any slope with a factor of safety less than 1 is considered to be unstable. The minimum acceptable factor of safety is 1.3.

Slips achieving a factor of safety of between 1 and 1.3 although unlikely, are considered to have the potential to occur.

5.2.4 Assessment Results

Analysis of the northwest quarry face was carried out across three cross-sections of the slope, along the section lines illustrated in **Figure 4.4**.

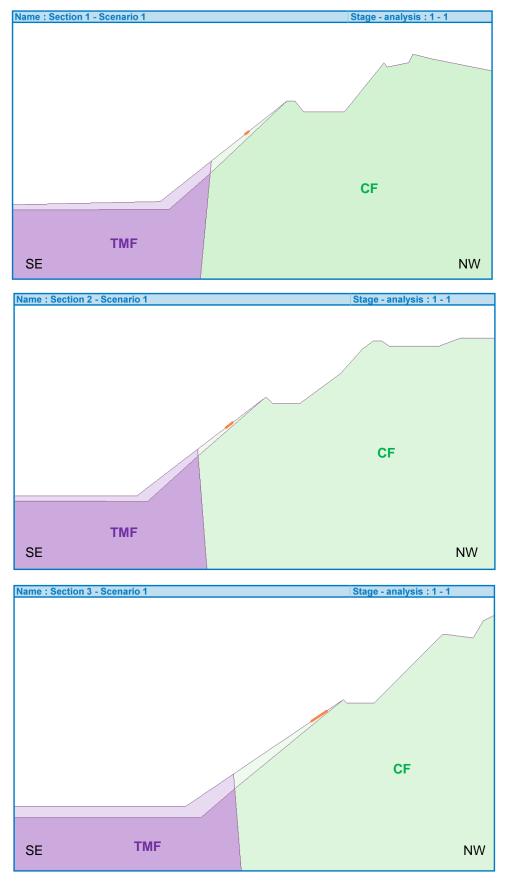
The slope is divided part-way up by a level cut, and any future weathering and creation of scree on the upper slope above this would not be expected to affect the lower slope. The lower slope only is therefore considered in the assessment.

The model is run several times, with variation in the applied potential slip plane.

Examples of the output of the analysis for the different model runs are illustrated in **Sections 5.2.4.1 and 5.2.4.2**. The failure slip circle with the lowest factor of safety identified are illustrated in orange on each model run.

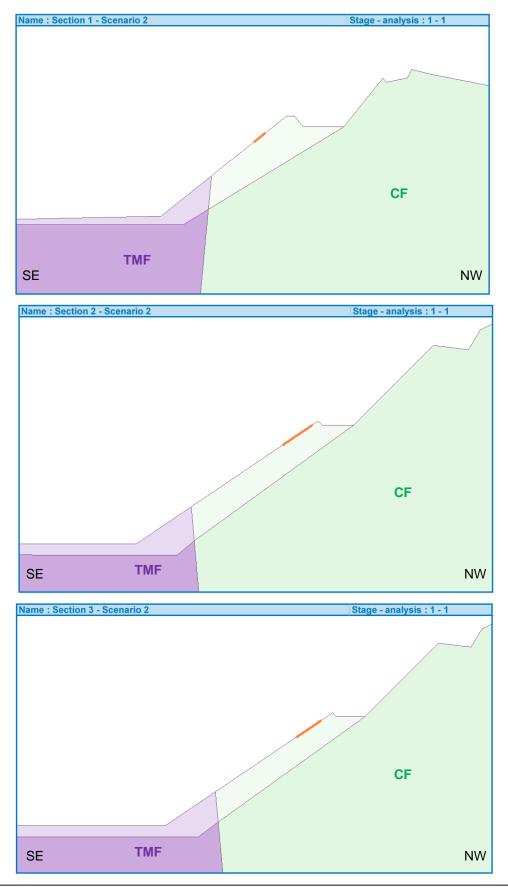
5.2.4.1 Scenario 1

The scree thickness has been set as a few metres thick at its base, thinning towards the top (light shading).



5.2.4.2 Scenario 2

The scree (light shading) thickness has been increased significantly to include the terrace above.



5.2.4.3 Conclusions of Geo5 Assessment

The resultant factors of safety calculated for the most unstable circles are listed in **Table 5.2**.

Table 5.2 Lowest	Calculated Factors of Safety
Analysis Run	Factor of Safety
Section 1 – Scenario 1	0.84 – 0.85
Section 1 – Scenario 2	0.84 – 0.85
Section 2 – Scenario 1	0.87 – 0.88
Section 2 – Scenario 2	0.87 – 0.88
Section 3 – Scenario 1	1.0
Section 3 – Scenario 2	1.0

These results confirmed that the degree of weathering and the thickness of the scree has no bearing on the stability of the existing 34° slope.

The analyses found the lowest factor of safety values for Section 1 and Section 2 analyses to fall below 1.0, signifying that the slopes are unstable.

Section 3 achieved a factor of safety of 1.0. This suggests the slope is stable and that the potential for slips is very low.

However, as the analyses sections show, the low factors of safety are actually attributed to superficial slips on the surface of the scree slopes and not significant failures.

Please refer to **Section 6** for recommendations for maintaining future stability of the northwest quarry slope.

The TBMF, on the opposing side of the quarry where the new slope face will be created, is deemed to have the same geotechnical properties as the CF and TMF. For this reason, this strata may be expected to behave in an identical way, naturally weathering to a slope of 34°, at which angle any slope instability may be expected to be minor.

5.3 Stereonet Assessment

The new south-eastern side of the development area upon development will be within the TBMF and align northeast-southwest at an orientation of 59.5° (239.5°), 84.63° (264.63°), 84.23° (264.23°) and 10° (190°) and dip towards the northwest.

For assessment the natural dip angle of repose of the strata has been taken to be 34°.

The maximum recommended angle of cut/slopes for the mudstone/shale is 60°. This is the angle of shearing resistance (ϕ), and this value is taken from BS 6031:1009 Code of Practice for Earthworks, Table 3.

Based on the proposed orientation of the new development footprint, stereonets were produced for the following scenarios:

- 190 orientation, 34° dip (190/34)
- 190 orientation, 60° dip (190/34)
- 240 orientation, 34° dip (240/34)
- 240 orientation, 60° dip (240/60)
- 265 orientation, 34° dip (265/34)
- 265 orientation, 60° dip (265/60)

Please refer to **Annex E** for the stereonet projections. Both 2D and 3D views are provided.

The planes of the above slope profiles are shown in red.

The bedding planes are shown in green and fracture/joint places in blue.

The stereonets were utilised to determine the risk from plane, toppling failure and wedge.

The typical angle of friction of the rock fracture/joint surfaces is applied to the assessment. This is the extent to which the rock can withstand shear stress before failure.

A fracture/joint surface friction angle of 27° has been used for the TBMF, the value for a shale or mudstone/marl, as quoted in publication Rock Slope Engineering, Table 4.1.

5.3.1 Potential for Plane Failure

It is intended that the new south-eastern quarry face will dip towards the northwest on a 190°, 240° and 85° alignment.

The strata on site follow a similar broadly northeast-southwest alignment between 052° (232) and 068° (248) but dip towards the southeast.

Due to these opposing directions there is no opportunity for plane failure.

5.3.2 Potential for Toppling Failure

The proposed slope profiles were compared against recorded bedding planes.

Where poles to the bedding surfaces lie within the toppling failure window a risk from toppling is recognised. The toppling failure window is defined at 27° (angle of friction for fracture surfaces) from the slope plane.

A high potential for toppling failure on a new slope configuration of 240/60 is indicated.

A low risk from toppling was identified for a 240/34 slope.

For a slope cut at 265/60 no risk from toppling failure has been identified but recorded bedding data fall close to the toppling failure window.

There is no risk of toppling failure for the slope cut at 190/34 or 190/60.

5.3.3 Potential for Wedge Failure

The proposed slope profiles were compared against measured fracture/joint planes.

Sliding can occur where the plunge of the line of intersection between two joints or fractures exceed the angle of internal friction of the fracture/joint plane.

A very low risk was identified for a slopes cut at a dip of 34° because the failure window is very small.

Given the steepness of the 60° slopes a much a larger fracture window is defined for all three slope face orientations, illustrating that more fracture/joint planes would be exposed upon the slope face.

5.3.4 Conclusions of Stereonet Assessment

The assessment has shown that new slopes cut at 34° are at low risk from failure. This is especially so as the rock is known to naturally degrade to a natural angle of repose of 34°.

A slope of 240/60 is a high risk from both toppling and wedge failure.

For a slope of 265/60 wedge failure can be expected, but toppling failure is unlikely to occur.

For a slope of 190/60 wedge failure can be expected, but toppling failure will not occur.

SECTION 6 Recommendations For Slope Stability

6.1 Northwest Quarry Face

The Geo5 slope stability modelling on the existing scree slopes identified a risk of lowscale localised surface failures only. Any such failures are not expected to compromise the overall stability of the quarry face.

The exposed rock outcrops higher up the quarry face will continue to degrade with the effects of weathering. However, all new scree material will degrade to the same 34° angle of repose. It will also predominantly accumulate on current trackways/breaks or slope mid-way up the quarry face, above the lower slope sections analysed. The likelihood of any rock falls is considered extremely low; no evidence of any previous rock falls have been identified or recorded.

It is recommended that to protect the new development against any such minor scree slips or rogue rock falls that a 3m buffer zone be assigned between the base of the existing quarry face and edge of the new development area.

The buffer zone should comprise a shallow trench and a catch fence. Any unwanted materials can then be removed periodically as part of a maintenance contract.

6.2 New Southeast Face

Taking the footprint of the new development in to account and the above requirement for a 3m buffer zone along the northwest edge of the development area, the position of the proposed development area has been set to align northeast-southwest at an orientation of 59.5° (239.5°), 84.63° (264.63°) and 84.23° (264.23°) and dip towards the northwest.

The angle that the new face is cut to will directly determine the volume of rock to be extracted. It will also have an impact on the resultant area of the remainder of quarry land above and southeast of the new development area.

The degree of any slope stabilisation is dependent on the angle of the new slope.

A stereonet assessment was performed for the strata at a proposed slope angle of 34° or 60°. An angle of 34° is deemed to be that at which the strata will naturally attain through if left exposed. This is the steepest angle slope to require the minimum protection measures. An angle of 60° is considered the steepest angle at which the slope may be safety stabilised for long term integrity. A steeper slope will keep the volume of rock to be extracted to a minimum but will present the need for greater and more extensive slope stabilisation.

Any material extracted will be re-used on site where possible, and the remainder taken off site. There are implications for managing storage and movement of a large volume materials on site. Taking material away also presents logistical organisation and environmental concerns.

Design of development should not encroach at any point upon the nearby SSSI.

During creation of the new slopes inspection should be carried out where the geological faults are identified by a geotechnical engineer or proprietary specialist and any necessary localised dental work carried out to stabilise individual sections.

6.2.1 34 Degree Slope

Slope stability assessment has confirmed that at 34° the TBMF may be expected to stable, with minor risk of slippages once extensive weathering of the newly exposed rock surface has occurred.

Stereonet analysis has identified a very low risk wedge failure for a slope cut at 34° and a low risk for topping failure of a slope cut to 240/34.

Based on the above, there are two options for a 34° slope.

1. Assign a 3m buffer zone comprising a shallow trench between the development area and new base of slope and install a catch /debris barrier on the edge of the development area. The barrier will ensure any stray debris is managed and prevented from entering the development area. The most suitable barrier should be recommended by a specialist.

Appropriate drainage measures should be installed within the base of the trench. No further stability mitigation or stabilisation measures required.

2. Cut a 34° slope from the edge of the development area and apply slope protection in the form of erosion control measures. This will act to minimise surface weathering and prevent degradation that could lead to wedge or toppling failure.

Erosion control in its simplest form would comprise a passive drapery system whereby a high tensile steel mesh is used to provide a curtain, beyond which falling rock cannot pass. Upon detachment from the face, the loose rock will impact on the mesh curtain and then rebound on the rock face, each time dissipating energy and preventing high velocities from developing.

Drapery systems utilise bolts at the crest and optionally at the toe of the rock face.

The fallen materials can then be removed from the preformed trench at the base of the cliff.

Slope stabilisation design and management should be performed by a specialist.

6.2.2 60 Degree Slope

Stereonet analyses have shown that at 60° the rock will not remain stable unless stabilisation measures are introduced. Stabilisation should be achieved by:

- 1. Assign a 5m buffer zone comprising a shallow trench between the development area and new base of slope and install a catch fence on the edge of the development area. Appropriate drainage measures should be installed within the base of the trench.
- 2. Creation of the slope in two sections, stepped mid-way by a 5m long shelf. A drain should be installed along the base of the upper slope section.
- 3. Stabilisation of all 60° slopes with appropriate ground anchors or soil nails/bolts combined with rock netting to retain any loose debris. Erosion control may also be incorporated.

Slope stabilisation design and management should be performed by a specialist.

6.2.3 Other Slope Configurations

Depending on economical restrictions and management of slope excavation it may be preferable to create an alternative slope.

Creation of a slope greater between 34° and 60° is not recommended as slope stabilisation measures will be required.

A combination of a 34° and 60° would however be feasible, with a lower 34° and upper fully stabilised 60° slope, separated by a mid-way step with appropriate drainage.

SECTION 7 Earthworks

7.1 General

Upon development the excavated rock material is to be retained on site where possible. This will include filling the current quarry bottom from approximately 88 - 89AOD to 95AOD.

Some filling on land southeast of the quarry is also intended.

During site works representative bulk samples of each of the three main strata were taken for laboratory geotechnical property testing.

Samples 1 and 2 were taken from the Tarannon Mudstone. Sample 3 was taken from the Cefn Formation. Samples 4, 5 and 6 represent the Trewern Mudstone Formation.

It should be noted that the samples tested represent weathered materials that could be retrieved at or close to the surface.

Test certificates may be found in **Annex F**.

7.2 Slake Durability Testing

Slake durability testing may be used to understand how susceptible rock may be to degradation when subject to weathering processes such as wetting and drying and freezing and thawing cycles. This is particularly important with respect to mudstones and shales.

		Table 7.1	Slake Durability T	est Results	
Sample	Strata	% retained after one 10 min cycle	Durability Classification	% retained after two 10 min cycles	Durability Classification
S1	TMF	88	Medium	76	Medium
S2	TMF	88	Medium	75	Medium
S3	CF	96	Medium High	93	Medium High
S4	TBMF	93	Medium	88	Medium High
S5	TBMF	94	Medium	89	Medium High
S6	TBMF	91	Medium	88	Medium High

Slake durability test results are compared to Gamble's Slake Durability Classification

The samples used for testing comprised weathered rock (although not as weathered as the exposed scree materials) and results for more competent undisturbed rock may be expected to show the rock to be more durable.

7.3 Grading Analysis

All our samples were tested in the laboratory by dry and wet sieving analysis to determine their grading characteristics. These tests were conducted in accordance with BS1377: Part 2, Clause 9.2: 1990.

Based upon the soil property test results, and referring to Table 6/1: Acceptable Earthworks Materials: Classification and Compaction Requirements and Table 6/2: Grading Requirements for Acceptable Earthworks Materials, of the 'Series 600 Specification for Highway Works', the samples can be classified as:

Tab	le 7.2 Grading Ar	alysis Results and So	il Classification
Sample	Strata	Type (Table 6/2)	Classification (Table 6/1)
S1	TMF		
S2	TMF		Well graded grapular
S3	CF	10	Well graded granular material
S4	TBMF	1A	
S5	TBMF		Compaction Method 2
S6	TBMF		

A 1A classification assumes a maximum particle size of 300mm. Please note that on removal, how the rock will fragment will be governed largely by the bedding and fracture planes and the way it is extracted.

Segments larger than 300mm are likely to be retrieved, particularly with depth where the competency of the rock increases.

Where this occurs, the rock should be crushed to conform with a 1A particle size classification or re-classified and the appropriate compaction method determined.

7.4 Compaction Specification

Compaction should be undertaken in accordance with Table 6/4: Method Compaction for Earthworks Materials: Plant and Methods of the 'Series 600 Specification for Highway Works', as summarised in **Table 7.3**

The minimum number of passes, 'N', is the minimum number of times that each point on the surface of the layer being compacted should be traversed by the compaction plant, in its operating mode 'D' is the maximum depth of the compacted layer.

		Table 7.3 Com	paction M	lethod
Plant Type			Plant Type	
Smooth Wheeled Roller	<u>D = 125mm</u> 2100-2700kg 2700-5400kg <u>D = 150mm</u> >5400kg	N = 8 N = 6 N = 4	Grid Roller	$\frac{D = 125mm}{5400-8000kg} N = 12$ $\frac{D = 150mm}{>8000kg} N = 12$
Dead Weight Tamping Roller	<u>D = 150mm</u> 4000-6000kg <u>D = 200mm</u> >6000kg	N = 12 N = 12	Pneumatic Tyred Roller	$\frac{D = 125mm}{2000-2500kg} N = 12$ $2500-4000kg N = 10$ $4000-6000kg N = 10$ $\frac{D = 150mm}{6000-8000kg N = 8}$ $8000-12000kg N = 8$ $\frac{D = 175mm}{>12000kg N = 6}$

Please refer to Series 600 Specification for Highway Works for specifications for alternative plant.

Compaction should be undertaken in accordance with Table 6/1 and 6/4, as soon as practicable after deposition.

Where combinations of different types or categories of plant are used, the depth of the layer should be for the type of plant requiring the least depth of layer, and the number of passes should be that for the type of plant requiring the greatest number of passes.

Earthmoving plants are not recommended for use as compaction plant, nor are lighter categories of plants used to provide preliminary compaction to assist the use of heavier plant.

The maximum particle size of any fill material should not exceed more than two thirds of the compacted layer thickness. Any larger fragments should be crushed or removed prior to use.

The stability of excavations or fills should not be compromised by the location of stockpiled materials or use of plant or location of temporary buildings/structures.

All earthworks must be kept free of water including arranging for the rapid removal of water, water shed onto the earthworks and water entering the earthworks from any source.

7.4 Compaction Specification (Continued)

All exposed fill surfaces must be adequately weather proofed during inclement weather or at the end of the working day/compaction process.

Any exposed cohesive fill that becomes wet and slurrified due to water ingress or weather erosion must be stripped off, spread into thin layers and aerated. The fill should then be re-compacted.

Plant movement across compaction layers should be restricted to that plant necessary for its deposition, spreading and compaction.

Fill areas should be constructed evenly over their full width and their fullest possible extent and the contractor should control and direct constructional plant and other traffic uniformly over them. Damage by construction plant should be made good with material having the same characteristics and strength as the material had before it was damaged.

Where fill is to be placed against an existing slope, the existing slope should be cut and benched before placing the fill.

It is recommended that a number of in-situ plate load tests be performed throughout the earthworks and at the final finished level, particularly beneath any proposed buildings or the access road. This is to confirm the the compaction works have been carried out satisfactorily.

The earthworks should be supervised by a suitably qualified engineer.

The tests should be conducted in accordance with BS 1377: Part 9: 1990 under the supervision of a qualified geotechnical engineer.

Allowances should also be made for the removal of soft spots and their replacement with imported suitable selected inert granular materials or suitable inert site won materials. ANNEX A Probehole Logs

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13.20 - 14.60		100	100	88			••••••••••				Fracture: 65° planar smooth	
14.60 - 16.00		100	91	86			· · · · · · · · · · · · · · · · · · ·					
16.00 - 17.40	-	86	80	0			° • • • • • • • • •				Fracture: sub-vertical planar smooth Bedding Fracture: 80° planar to curved smooth	
	-						· · · · · · · · · · · · · · · · · · ·				Bedding Fracture: 85° planar smooth with thin veneer of light grey clay infill	
17.40 - 18.80		93	93	93							Very soft grey CLAY	
18.80 - 20.20		100	89	78			· · · · · · · · · · · · · · · · · · ·				Bedding Fracture: 85° planar smooth infilled with 1cm stiff grey clay	- - - - - - - - - -
	Name: E n: E Depth E 10.40 - 11.80 13.20 11.80 - 13.20 14.60 13.20 - 14.60 14.60 14.60 - 16.00 14.60 16.00 - 17.40 17.40	Name: Butting n: Butting Depth Type 10.40 - 11.80 13.20 11.80 - 13.20 14.60 14.60 - 16.00 14.60 17.40 - 18.80 14.60	Name: Buttington Quant n: Buttington X Broad Energy Depth (m) Type /FI TCR 10.40 - 11.80 100 11.80 - 13.20 10 13.20 - 14.60 10 14.60 - 16.00 10 16.00 - 17.40 10 17.40 - 18.80 93	Name: Buttington Quarry n: Buttington, Wellshow Broad Energy (Wall Depth (m) Type (Market Ambridge) 10.40 - 11.80 100 91 11.80 - 13.20 100 91 13.20 - 14.60 100 100 14.60 - 16.00 100 91 16.00 - 17.40 86 80 17.40 - 18.80 93 93	Name: Buttington, Weishpool Broad Energy (Wales) Limit Depth (m) Type (Corrego (Corrego (Corrego)) Depth (m) Type (Corrego) Corrego (Corrego) RQD 10.40 - 11.80 100 91 91 11.80 - 13.20 100 100 96 13.20 - 14.60 100 100 88 14.60 - 16.00 100 91 86 16.00 - 17.40 100 86 80 0 17.40 - 18.80 93 93 93	Name: Buttington Uuarry Project 14880 n: Buttington, Weishpool Project 14880 Broad Energy (Wales) Limited Broad Energy (Wales) Limited Depth (m) Depth (m) 10.40 - 11.80 Image:	Depth of the construction Depth of the construction Project No. 14880 Name: Buttington, Welshpool Project No. 14880 n: Buttington, Welshpool Image: State of the construction of the construc	Depty Court, Where the product of the produ	Depth (m) Type (m) Coring (m) Depth (m) Level (m) 10.40 - 11.80 100 91 91 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Deprivation Substrain Substrain	Name: Buttington Quarry Project No. 14880 Co-ords: n: Buttington, Welshpool Level: Depth Tornational control contro contro contro control control contro control control control con	Construction S Dayn Could Cr23 THA Dates (Cr23 THA (Cr23 THA) Description PH Sheet Name Buttington Quarry Project No. 14880 Co-ords: 326754.17 - 310026.87 Hole (Cr23 THA) Name Buttington Quarry Project No. 14880 Co-ords: 326754.17 - 310026.87 Hole (Cr23 THA) Broad Energy (Wales) Limited Dates: 30/10/2018 - 07/11/2018 Logge Depth TCR SCR ROD Depth Level: 11.92 Sca 10.40 - 11.80 100 91 Optimized Fracture: 55" planar smooth Bedding Fracture: 55" planar smooth 11.80 - 13.20 100 100 96 Hole (Cr23 THA) Hole (Cr23 THA) Hole (Cr23 THA) 11.80 - 13.20 100 100 96 Hole (Cr23 THA) Hole (Cr23 THA) Hole (Cr23 THA) 11.80 - 13.20 100 100 96 Hole (Cr23 THA) Hole (Cr23 THA) Hole (Cr23 THA) 11.80 - 13.20 100 100 96 Hole (Cr23 THA) Hole (Cr23 THA) Hole (Cr23 THA) 11.80 - 13.20 100

	te	erra	af	irr	na	5 De Pent	a Firma (Wa ryn Court, ' wyn, Cardi 3 7HA	Wharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH2 Sheet 3 of 5
Project	Name:	Butting	ton Qı	Jarry		Projec 14880	t No.		Co-ords:	326754.17 - 310026.87	Hole Type RC
ocatio	n: E	Buttingt	ton, W	/elshpo	ool				Level:	111.92	Scale 1:50
Client:	E	Broad E	Energy	/ (Wale	es) Limi	ted			Dates:	30/10/2018 - 07/11/2018	Logged By
Water Strikes	Depth (m)	Type /FI		Corin	-	Depth (m)	Level (m)	Well	Legend	Stratum Descriptio	n
	20.20 - 21.60	_	100	84	83					Weak grey MUDSTONE. Fracture closely to medium spaced 10° - 4 smooth	es are very - 45° planar - - - - - - - - - - - - - - - - - - -
	21.60 - 23.00		73	71	52						
	23.00 - 23.80		100	84	65	23.70	88.22			Very soft grey CLAY Weak becoming medium strong o	lark grev
	23.80 - 25.10		100	64	53					MUDSTONE. Fractures are close closely and occasionally widely s 20° planar smooth. Many closed fill fractures. Bedding Fracture: 85° planar smoot veneer of light grey stiff clay Fracture: 5° planar smooth Fracture: sub-vertical curved smoot	Ity to very
	25.10 - 26.60		96	83	83					Fracture: 5° planar stepped Fracture: 10° planar smooth with pa mineralisation	
-	26.60 - 28.10		95	95	84						- - - - - - - - - - - - - - - - - - -
-	28.10 - 29.60		100	100	100						
Remar											-

	te	rr	af	irı	ma	5 De Pent	i Firma (Wa ryn Court, wyn, Cardi 3 7HA	Wh			Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	PH2 Sheet 4 o	
Project	Name: E	Butting	ton Q	Jarry		Project 14880	No.			Co-ords	: 326754.17 - 310026.87	Hole Typ RC	pe
.ocatio	n: B	uttingt	ton, W	/elshp	ool					Level:	111.92	Scale 1:50	
Client:	В	road E	Energy	/ (Wal	es) Limi	ted				Dates:	30/10/2018 - 07/11/2018	Logged E	By
Water Strikes	Depth (m)	Type /FI		Corin	-	Depth (m)	Level (m)	v	Vell	Legend	Stratum Descriptio	n	
	29.60 - 30.40 30.40 - 31.60		100 87	SCR 71 71	RQD 64 71	()					Weak becoming medium strong of MUDSTONE. Fractures are closed closely and occasionally widely s 20° planar smooth. Many closed fill fractures.	ely to very paced 5° -	
	31.60 - 32.90		100	100	89			· · · · · · · · · · · · · · · · · · ·			Bedding Fracture: 85° 3cm infilled v clay	vith light grey	
	32.90 - 34.40		100	86	76								
	34.40 - 35.80		100	199	71	35.50	76.42				Medium strong to strong grey ML Fractures are close to medium sp	IDSTONE.	
	35.80 - 37.25		100	199	26			· · · · · · · · · · · · · · · · · · ·			35° planar smooth to occasional rough. Inconsistent and random p mineralisation. Bedding Fracture: 80° planar polish mineralisation paralleling fracture pl Bedding Fracture: 70° planar polish	undulating batches of ed. Some ane	
	37.25 - 38.65		100	199	57						Bedding Fracture: 70° 1mm mineral Fracture: 60° planar rough Fracture: 60° planar rough Fracture: 65° planar smooth Fracture: 65° planar smooth	infill	
	38.65 - 40.05		100	78	78			· · · · · · · · · · · · · · · · · · ·			Bedding Fracture: 75° planar rough		

	te	err	af	irı	ma	5 De Pent	Firma (Wa ryn Court, wyn, Cardi	Wharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH2
Project		Butting				Project	3 7HA No.		Co-ords:	: 326754.17 - 310026.87	Sheet 5 of 5 Hole Type
Location		Butting				14880			Level:	111.92	RC Scale
						tod			Dates:	30/10/2018 - 07/11/2018	1:50 Logged By
Client:		Т			es) Limi						
Water Strikes	Depth (m)	Type /FI		Corin SCR	RQD	Depth (m)	Level (m)	Well	Legend		
	40.05 - 41.50		96	96	78					Medium strong to strong grey ML Fractures are close to medium sp 35° planar smooth to occasional rough. Inconsistent and random mineralisation. Bedding Fracture: 75° planar rough	paced 5°
	41.50 - 43.00		100	37	37					Bedding Fracture: 85° planar smoo	- - 4
-										Bedding Fracture: 80° planar rough mineralised infill	
	43.00 - 44.50		96	96	93	43.45	68.47			End of Borehole at 43.000	Jm
	44.50 - 46.00		100	100	80						- - - - - - - - - - - - - - - - - - -
	46.00 - 47.00		47	47	39						- 4 - - - - - - -
		-									- 4 - - - - - - -
											- 4 - - - - - - - -
											- 4 - 4

	te	erra	af	irı	na	5 De Pent	a Firma (Wa eryn Court, V twyn, Cardif 3 7HA	Wharfe		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH3 Sheet 1 of 2
Project	Name:	Butting	ton Q	uarry		Projec 14880			Co-ords:	326792.28 - 310009.40	Hole Type RC
ocatio	n:	Buttingt	ton, W	/elshp	ool				Level:	112.23	Scale 1:50
Client:		Broad E	Energy	/ (Wal	es) Limi	ted			Dates:	08/11/2018 - 09/11/2018	Logged By
Water Strikes	Depth (m)	Type /FI		Corin	-	Depth (m)	Level (m)	Well	Legend	Stratum Description	
	,	_		SCK	RQD	1.00	111.23			Grey very gravelly CLAY Very weak brownish grey MUDSTONE Recovered non-intact.	-
	1.00 - 2.50	_	60	0	0						
	2.50 - 4.00		30	0	0						
	4.00 - 5.00	_	80	0	0						
	5.00 - 6.30	_	92	0	0	5.70	106.53			Weak grey MUDSTONE. Fractures are closely to closely spaced 35° - 50° pla rough. Some stained orangish brown.	e very nar
	6.30 - 7.80		86	7	0					Fracture: 70° planar rough	
	7.80 - 9.20		88	0	0					Bedding Fracture: 70° - 85° undulating s Bedding Fracture: 85° 2cm wide infilled w orange brown clay and some partial mine	vith stiff
	9.20 - 10.70		93	85	35	9.30	102.93			Weak grey MUDSTONE. Fractures are closely to medium spaced. Fracture: 50° curved smooth. Stained ora brown.	F

	+	r	raf	ir		Terra 5 De	a Firma (Wa ryn Court,			Tel: 02920 735354	Borehole N
	X te	21	d			Pent CF2	wyn, Cardi 3 7HA			info@terrafirmawales.co.uk www.terrafirmawales.co.uk	PH3
						Projec					Sheet 2 of Hole Type
Project	Name:	Butti	ngton C	Quarry		14880	LINO.		Co-ords:	326792.28 - 310009.40	RC
ocatio	n.	Butti	ngton, V	Nolehn					Level:	112.23	Scale
ocatio	11.	Dutti	igion, v	veisiip	001				Level.	112.25	1:50
lient:		Broa	d Energ	gy (Wal	es) Limi	ted			Dates:	08/11/2018 - 09/11/2018	Logged B
Water Strikes	Depth (m)	Tyj /F		Corir	-	Depth (m)	Level (m)	Well	Legend	Stratum Description	า
linkes	(11)		TCF	SCR	RQD	(11)	(11)		_	Weak grey MUDSTONE. Fracture	es are
										closely to medium spaced.	
										Bedding Fracture: 80° planar smoo orangish brown.	th. Stained
		_		_						Fracture: 50° planar smooth. Staine	ed orangish
										brown. Fracture: 25° planar smooth. Staine	dorangish
										brown.	u orangish
	10.70 - 12.2	0	100	20	20					Fracture: 5° planar smooth. Stained	l orangish
	10.70 12.2	Ĩ		20	20					brown. Fracture: 65° planar smooth. Staine	ed orangish
										brown.	
										Fracture: 20° planar smooth. Staine brown.	a orangisn
										Fracture: 75° curved smooth. Staine	d orangish
										brown. Fracture: 10° planar smooth. Staine	ed orangish
										brown.	-
	12.20 - 13.7	0	90	21	21					Bedding Fracture: 75° planar rough orangish brown.	. Stained
										Fracture: 60° planar smooth. Staine	ed orangish
										brown. Bedding Fracture: 80°planar smoo	th Stained
		_								orangish brown.	
										Fracture: 75° planar smooth. Staine brown.	ed orangish
										Fracture:: Sub-vertical curved. Stain	ed orangish
	13.70 - 15.2	0	100	63	63					brown. Fracture: 20°planar rough. Stained	lorongich
	10.70 10.2	Ĭ			00					brown.	
										Bedding Fracture: 80° undulating sn	nooth. Stained
										orangish brown. Fracture: 60° planar smooth. Staine	ed orangish
										brown.	
										Bedding Fracture: 85° undulating si prangish brown.	mooth. Stained
										Fracture: 55° undulating rough. Stail	ned orangish
	15.20 - 16.7	0	100	68	64					brown. Fracture: 25° planar smooth. Staine	d oranaish
										brown.	a erangien
										Fracture: 15° planar smooth. Fracture: 75° planar smooth. Staine	d orangish
		_								brown.	-
										Fracture: 60° undulating rough. Stail brown.	ned orangish
										Fracture: 65° planar smooth. Staine	ed orangish
	16.70 - 18.1	0	100	100	100					brown. Fracture: 25° planar smooth. Staine	d orangish
										brown.	
										Fracture: 55° planar smooth. Fracture: 30° planar smooth.	
		_				18.10	94.13			Fracture: 40° planar smooth.	
										Fracture: 45° planar smooth.	
										Fracture: 55° planar smooth. Fracture: 55° planar smooth.	
										Fracture: 70° planar smooth.	
										Fracture: 15° planar smooth. Fracture: 60° undulating rough.	
										Fracture: 40° undulating rough	
										Fracture: 35° planar smooth. Fracture: 55° planar smooth.	
										Fracture: 15° planar smooth.	
										End of Borehole at 18.100	m

	te	erra	af	irr	na	5 De Peni CF2	a Firma (Wa eryn Court, \ twyn, Cardif 23 7HA	Wharfe		d Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	PH4 Sheet 1 of
Project	Name:	Butting	ton Q	uarry		Projec 14880			Co-ord	ds: 326864.51 - 310105.86	Hole Type RC
ocatio	n:	Buttingt	ton, W	√elshp [,]	ool				Level:	114.35	Scale 1:50
Client:		Broad F	Energ	y (Wal	les) Limi	ited			Dates:	12/11/2018 - 15/11/2018	Logged B
Water	Depth	Туре		Corin	-	Depth	Level	Wel	II Legen	d Stratum Descriptio	<u> </u>
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)			Grey gravelly CLAY grading in to	
						- 1.00	113.35			Weak grey MUDSTONE. Fractur closely spaced 5° - 40° planar ro smooth, often stained orangish b	res are ough to planar prown. Sub-
	1.00 - 2.50	_	24	0	0	- - - - - - - - - - - - - - - - - - -				vertical fracture planar smooth fre 2.6m depth.	
	2.50 - 4.00	,	100	0	0					Bedding Fracture: 75° planar rough orangish brown. Graptolite fossils v bedding surface. Bedding Fracture: 85° planar smoo orangish brown.	visible on
	4.00 - 5.50)	100	33	23	5.00	109.35	to medium spaced 10° - 20° planar stained orangish brown.		res are close har smooth,	
	5.50 - 6.80)	100	77	38					Fracture: 60° planar smooth. Staine brown. Fracture: 60° planar rough. Stained brown. Fracture: 65° planar smooth. Fracture: 75° undulating smooth.	Ū.
	6.80 - 8.30)	100	70	62						
-	8.30 - 9.50)	100	16	16					Bedding Fracture: 85° undulating ro stiff light grey clay fill in places	ugh with slight
F	9.50 - 10.00	0	80	80	80	10.00	104.35				
Remar	ks.					10.00	104.00				

X t	erraf	irma	Terra F 5 Dery Pentwy CF23 7	Firma (Wales n Court, Wh yn, Cardiff 7HA	s) Lim Iarfeda	ited ale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH4 Sheet 2 of 4
Project Name:	Buttington G	Juarry	Project N 14880	No.		Co-ords:	326864.51 - 310105.86	Hole Type RC
Location:	Buttington, V	Velshpool			I	Level:	114.35	Scale 1:50
Client:	Broad Energ	y (Wales) Lim	ited		I	Dates:	12/11/2018 - 15/11/2018	Logged By
Water Depth Strikes (m)		Coring	Depth (m)	Level (m)	Vell	Legend	Stratum Description	1
							MUDSTONE	

	te	erra	af	irr	na	5 De Pent	a Firma (Wa ryn Court, ' wyn, Cardi 3 7HA	Wharfeo	nited Jale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH4 Sheet 3 of 4
Project	Name:	Butting	ton Q	Jarry		Project 14880	t No.		Co-ords:	326864.51 - 310105.86	Hole Type RC
ocatio	n:	Butting	ton, W	/elshpo	bol				Level:	114.35	Scale 1:50
Client:		Broad E	Energy	/ (Wale	es) Limi	ted			Dates:	12/11/2018 - 15/11/2018	Logged By
Water	Depth	Туре		Corin	g	Depth	Level	Wall	Legend	Stratum Description	
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)		Legenu	MUDSTONE	
	25.00 - 26.5 26.50 - 28.0	_	24	23	21	25.00	89.35			Weak dark grey MUDSTONE. Fra widely but sometimes closely spa Graptolite fossils Fracture: 15° planar smooth.	actures are iced.

	te	erra	af	irı	na	5 De Pent	a Firma (Wa eryn Court, twyn, Cardi 3 7HA	Wharfeo	nited dale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH4 Sheet 4 of 4	
Project	Name:	Butting	ton Q	Jarry		Projec 14880			Co-ords:	326864.51 - 310105.86	Hole Type RC	
ocatio	n:	Butting	ton, W	/elshpo	ool				Level:	114.35	Scale 1:50	
Client:		Broad E	Energy	/ (Wale	es) Limi	ted			Dates:	12/11/2018 - 15/11/2018	Logged By	Y
Water	Depth	Туре		Corin		Depth	Level	Well	Legend	Stratum Descriptior	ı	
Strikes	(m) 31.20 - 32.5 37.00 - 37.8		TCR 88	88 52	RQD 88	(m)	(m)			Weak dark grey MUDSTONE. Fra widely but sometimes closely space Graptolite fossils Fracture: 15° undulating rough Fracture: 30° planar smooth.	ctures are	
	37.95 - 39.4	5	96	96	90	39.45	74.90			Fracture: 10° planar smooth. Fracture: 10° planar smooth. End of Borehole at 39.450		
Remai	rks:											

	t e	arr	af	ir	ma	Terra 5 De	a Firma (Wa eryn Court, \	Wharfe		Tel: 02920 735354 info@terrafirmawales.co.uk	Borehole N PH5	
		211	aı	111		Pent CF2	twyn, Cardif 3 7HA	f		www.terrafirmawales.co.uk		
niect	Name:	Butting	ton Q	uarry		Projec			Co-ords:	326896.01 - 310052.91	Sheet 1 of Hole Type	
-			-			14880					RC Scale	_
catio	n:	Butting	ton, W	/elshp	ool				Level:	118.22	1:50	
ient:		Broad	Energ	y (Wal	les) Limi	ited			Dates:	29/10/2018 - 29/11/2018	Logged B	Зy
/ater rikes	Depth (m)	Type /FI		Corin	-	Depth (m)	Level (m)	Well	Legend	Stratum Description	n	Τ
likes			TCR	SCR	RQD			─	·····	Grey very gravelly CLAY grading		┽
ļ	I									weak mudstone	-	-
ļ	I											F
ļ	I					1.00						F
ļ				1		1.00	117.22			Very weak brownish grey MUDST retrieved mostly non-intact. Some		ŧ
ļ										very closely spaced fractures 5° -	- 15°.	ŀ
ļ	1.00 - 2.10	1	91	0	0					Fracture: 50° planar smooth infilled of light grey clay	with 1cm band	+
ļ	I											F
ļ		1		1								
ļ	I											ŀ
ļ	2.10 - 3.30	1	96	0	0 0							ŀ
ļ	I									ļ		
ļ	3.30 - 4.60	\neg	<u> </u>	──		4						ŀ
ļ												
ļ			100									Ī
ļ	3.30 - 4.00		100	0	0	4.00	114.22			Weak grey MUDSTONE. Fracture		
ļ	I									closely to medium spaced 25° - 4 smooth to planar rough. Some fra		ŀ
ļ		\neg		+		1				stained orangish brown. Fracture: 35° planar smooth 1mm m	nineralised infill	F
ļ	I											ļ
ļ	4.60 - 5.80	,	100	0	0					1		ŀ
ļ	I									Fracture: 70° planar smooth		ŀ
ļ	 			<u> </u>		4						F
ļ	6.00	С										ŀ
ļ	I									Three sub-vertical fractures planar s	smooth stained	-
ļ	5.80 - 7.30	,	90	40	32					orangish brown		
ļ	I											ŀ
ļ	I									Fracture: 70° - 85° curved to planar	smooth.	
ļ		\neg		+		1				<u>Stained orangish brown.</u> Three sub-vertical fractures planar s	smooth stained	ł
ļ	I									orangish brown		ŀ
ļ			93	0	0					Fracture: 80° planar smooth. Staine]brown.	d orangish	
ļ	7.30 - 8.80		90	0	U							ŀ
ļ	I											
ļ	J			 		8.80	109.42			Fracture: 80° planar smooth. Staine	d orangish	
ļ	I									brown. Weak grey MUDSTONE. Fracture	/ es are	/
ļ	8 80 - 10 3	^	26	21	21					closely to medium spaced 15° - 3 smooth to occasionally undulating	30° planar	
	8.80 - 10.30 9.50	° C	20		21					often stained orangish brown. 9.2	23 - 17.6m	
	l									numerous 45° closed <1.5mm thi mineralised fractures	СК	
ļ	1					1						†

	te	err	af	irı	na	5 De Pent	a Firma (Wa eryn Court, \ twyn, Cardif 3 7HA	Nharfeo	nited dale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole N PH5 Sheet 2 of	
Project	Name:	Butting	ton Q	uarry		Projec 14880			Co-ords:	326896.01 - 310052.91	Hole Type RC	
Locatio	n: ł	Butting	ton, W	/elshp	ool	14000			Level:	118.22	Scale 1:50	
Client:		Broad E	Energy	y (Wal	es) Limi	ted			Dates:	29/10/2018 - 29/11/2018	Logged B	у
Water	Depth	Туре		Corin		Depth	Level		Logond	Stratum Descriptio		
Strikes	(m)	/FI		SCR	RQD	(m)	(m)	vveii	Legend	Stratum Descriptio		
-	10.30 - 11.80		93	33	33					closely to medium spaced 15° - 3 smooth to occasionally undulating often stained orangish brown. 9. numerous 45° closed <1.5mm thi mineralised fractures Fracture: Sub-vertical curved to plan Stained orangish brown. Fracture: 65° planar rough Fracture: 65° planar rough Fracture: 45° closed <1mm thick mi	0° planar g smooth, 23 - 17.6m ck nar smooth.	
	11.80 - 13.30		93	45	45							
-	13.30 ⁴ -094.80	с	100	44	40					Fracture: 65° planar smooth Fracture: Sub-vertical planar to curv	red smooth	
	15.40 14.80 - 16.30	с	96	45	26							
	16.30 - 17.80		100	66	66							
-						17.80	100.42			End of Borehole at 17.800	lm	

	te	err	af	irı	ma	5 De Pent	a Firma (Wa eryn Court, twyn, Cardi 3 7HA	Wha) Lir arfe	nited dale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH6 Sheet 1 of 2
Project	Name:	Butting	ton Q	uarry		Projec 14880				Co-ords	: 326901.08 - 310180.50	Hole Type RC
_ocatio	n:	Butting	ton, W	/elshp	loc	·				Level:	89.17	Scale 1:50
Client:		Broad B	Energy	y (Wal	es) Limi	ted				Dates:	16/10/2018 - 17/10/2018	Logged By
Water Strikes	Depth (m)	Type /FI		Corin		Depth (m)	Level (m)	w	/ell	Legend	Stratum Descriptio	n
	0.00 - 1.00		63	6	RQD 0	()					Weak dark reddish brown locally greenish grey MUDSTONE Fractures are closely spaced 30° - rough. Stained orangish brown.	-
	1.00 - 2.50		88	5	0							
	2.50 - 4.00 3.60	С	86	56	54				· · · · · · · · · · · · · · · · · · ·		Fracture: 10° undulating rough Bedding Fracture: 85° planar smoo Fracture: 15° undulating rough Fracture: 65° undulating smooth	th
	4.00 - 5.50 5.00	С	94	94	94						Fracture: 10° planar rough	
	5.50 - 7.00		92	92	92						Fracture: 65° undulating smooth Fracture: 45° planar smooth	
	7.00 - 8.50		93	93	93						Fracture: 10° planar smooth	
	8.50 9.00 8.50 - 10.00	- c c	94	70	64						Fracture: 15° undulating smooth Fracture: sub-horizontal planar smo Fracture: 55° undulating smooth Bedding Fracture: 85° planar smoo	E
		_						••••			Fracture: 20° planar smooth	-

	terr	af	irr	na	5 De Pent CF2	a Firma (Wa ryn Court, ^v wyn, Cardif 3 7HA	Wharfeo	nited dale Road	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH6 Sheet 2 of 2
Project Name:	Butting	ton Q	uarry		Projec 14880	t No.		Co-ords:	326901.08 - 310180.50	Hole Type RC
Location:	Butting	ton, W	/elshp	loc				Level:	89.17	Scale 1:50
Client:	Broad	Energ	y (Wal	es) Limi	ted			Dates:	16/10/2018 - 17/10/2018	Logged By
Water Depti Strikes (m)			Corin	g RQD	Depth (m)	Level (m)	Well	Legend	Stratum Description	ו ו
10.00 - 1		92	78	78					Weak dark reddish brown locally I greenish grey MUDSTONE Fracture: 45° undulating rough Fracture: 75° undulating smooth Fracture: 15° undulating smooth Fracture: 65° undulating smooth Bedding Fracture: 80° undulating rough Fracture: 35° undulating smooth Fracture: 40° undulating smooth	
11.50 - 1		93	93	74					Fracture: 75° undulating rough Fracture: 65° undulating rough Fracture: 40° undulating rough	
					14.00	75.17			End of Borehole at 14.000	m

	te	err	af	irı	ma	5 De Pent	a Firma (Wa eryn Court, ' twyn, Cardi	Wharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No PH7
	Name:	Butting				Projec			Co-ords:		Sheet 1 of 3 Hole Type
ocatio		Buttingt	-			14880			Level:	110.52	RC Scale 1:50
Client:					les) Limi	ited			Dates:	15/11/2018 - 19/11/2018	1:50 Logged By
Water	Depth	Туре	1	Corin	-	Depth	Level		Legend	Stratum Description	
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)		Loyona 	Grey gravelly CLAY grading in to mudstone	
	1.00 - 1.75 3.00 - 3.25	; ;	93	93	58	- 1.00	109.52			Extremely weak dark grey MUDS Fractures are very closely to close 25° - 45° undulating smooth and stained orangish brown Fracture: 65° planar rough. Stained brown. Fracture: 60° planar rough. Stained	ely spaced polished ' orangish
	3.00 - 3.25	5	100	100	29	-				brown.	
	3.25 - 4.25	; ;	90	90	28	3.85	106.67			Bedding Fracture: 85° planar rough. orangish brown. Non Intact: Weak laminated MUD SILTSTONE retrieved as fine to c	OSTONE and
	4.25 - 5.75	<i>i</i>	99	99	0	5.05	105.47			angular gravel Extremely weak grey MUDSTON are very closely to closely spaced undulating striated and polished s orangish brown Fracture: 70° undulating polished ar	d 25° - 45° stained
	5.75 - 7.15	;	68	0	0	6.45	104.07			Non Intact: Weak laminated MUD SILTSTONE retrieved as fine to c angular gravel	DSTONE and
	7.15 - 8.15	;	83	15	15	7.15	103.37			Extremely weak grey MUDSTON are close to medium spaced 15° - undulating striated and polished Fracture: 80° undulating rough Fracture: 70° undulating polished ar	- 45°
	8.15 - 9.65	;	95	0	0					Bedding Fracture: 80° planar rough	
					ļ!	9.65	100.87			Non Intact: Weak laminated MUD SILTSTONE retrieved as fine to c	

	te	erra	af	irı	ma	5 De Pent	a Firma (W eryn Court, wyn, Cardi 3 7HA	Wharfe		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole N PH7 Sheet 2 of	
Project	Name:	Butting	ton Q	uarry		Projec 14880	t No.		Co-ords:	326691.47 - 310125.99	Hole Typ RC	
ocatio	n:	Butting	ton, W	/elshp	ool				Level:	110.52	Scale 1:50	
Client:		Broad E	Energy	y (Wal	es) Limi	ted			Dates:	15/11/2018 - 19/11/2018	Logged B	Зy
Water Strikes	Depth (m)	Type /FI	TOD	Corin SCR	-	Depth (m)	Level (m)	Well	Legend	Stratum Description		
	9.65 - 10.75		70	40	RQD 27					Non Intact: Weak laminated MUDS SILTSTONE retrieved as fine to co angular gravel		
	10.75 - 12.25	5	66	23	0	10.75	99.77			Extremely weak grey MUDSTONE are very close to medium spaced 3 undulating striated and polished 1cm wide band of dark grey mudston Bedding Fracture: 85° undulating rou	85° - 60° e 75°	
	12.25 - 13.7	5	90	60	14					Fracture: 50° Planar polished Fracture: 60° planar rough Band of dark grey mudstone 70° und striated	ulating rough	
	13.75 - 15.2	5	100	100	17					Fracture: 60° planar rough Bedding Fracture: 80° - 90° undulatin striated	g smooth	
	15.25 - 16.7	5	100	75	0					-Bedding Fracture: 80° planar smooth	striated	
	16.75 - 18.2	5		19	19					Fracture: 65° planar smooth Fracture: 65° undulating polished Bedding Fracture: 85° planar to undu striated 3cm thick band of dark grey laminate 80° 4cm band of light grey mudstone with of soft light grey clay 80° Fracture: 65° undulating smooth stria	lating smooth d mudstone n thin veneer	
	18.25 - 19.75	5	93	55	12					Fracture: 65° undulating smooth stria Fracture: 65° undulating smooth stria Fracture: 65° undulating rough striate	ted ted	
												F

	te	err	af	irı	ma	5 De Pent	a Firma (Wa eryn Court, twyn, Cardi	Wharfe		ad	Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole N PH7	lo.
						CF2 Projec	3 7HA		_			Sheet 3 of Hole Type	
Project	Name: I	Butting	ton Q	uarry		14880			Co-or	ds:	326691.47 - 310125.99	RC	
Locatio	on: E	Butting	ton, W	/elshp	ool				Level		110.52	Scale 1:50	
Client:	E	Broad I	Energ	y (Wal	es) Lim	ted			Dates	:	15/11/2018 - 19/11/2018	Logged B	iy
Water Strikes	Depth (m)	Type /FI		Corin SCR	g RQD	Depth (m)	Level (m)	Wel	Lege	nd	Stratum Descriptio	n	
Strikes	(m) 19.75 - 21.25 21.25 - 22.75 22.75 - 24.25	-	93 95 95	SCR 11 0	RQD 11	(m) 24.25	(m)				Extremely weak grey MUDSTON are very close to medium spaced undulating striated and polished Sub-vertical Fracture : undulating polished Fracture: 65° undulating polished Fracture: 65° planar polished Fracture: 80° undulating rough Sub-vertical Fracture undulation sm 1cm wide laminated band of dark m Bedding Fracture: 80° planar rough End of Borehole at 24.250	NE. Fractures 1 35° - 60° urved polished olished striated nooth nudstone 80°	21 22 23 23 24 24 25 26 26 27 27 28 28
Remai	rks:												- 30

M terra firma							a Firma (Wa eryn Court, \ wyn, Cardif 3 7HA	Nharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH8 Sheet 1 of 5	
Project Name: Buttington Quarry						Projec 14880			Co-ords:	326934.10 - 310105.50	Hole Type	
_ocatior	า:	Butting	ton, W	/elshpc	ool				Level:	117.23	Scale 1:50	
Client:	ater Depth Type Coring				ted	ed			22/10/2018 - 26/10/2018	Logged By	y	
Water Strikes					-	Depth	Level	Well	Legend	Stratum Description	n	
	(11)		TCR	SCR	RQD	(m)	(m)			Grey very gravelly CLAY grading weak mudstone	in to very	
-	1.00 - 2.40		96	0	0	1.00	116.23			Very weak greenish brown MUDS Recovered non-intact.	ITONE.	
_	2.40 - 3.70		100	0	0	3.70	113.53					
_	3.70 - 5.20		96	0	0					Weak dark brownish grey MUDST Fractures are 20° - 45° very close spaced planar smooth. Locally sta orangish brown. Fracture: Sub-vertical 3.7 - 8m plana very thin infill of light grey clay. Fracture: 50° undulating smooth Fracture: 45° undulating smooth. Sta brown	Hole Typ RC Scale 1:50 Logged E n in to very STONE. STONE. STONE. STONE. Store and the second	
	5.20 - 6.60		98	0	0					Fracture: 60° curved smooth. Staine	d orangish	
	6.60 - 8.00		97	0	0					brown. Fracture: 80° - 90° curved smooth. S orangish brown.	Stained	
-	8.00 - 9.40	,	92	92	80	8.00	109.23			Weak dark grey MUDSTONE. Fra 45° very closely to medium space smooth to undulating rough. Loca orangish brown. Fracture: 75° undulating rough	d planar	
	ks:										-	

M terra firma						5 De Pent	a Firma (Wa eryn Court, wyn, Cardi 3 7HA	Wh			Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH8 Sheet 2 of 5	
Project Name: Buttington Quarry Location: Buttington, Welshpool					Project No. 14880 Level:				326934.10 - 310105.50	Hole Type			
									117.23	Scale 1:50			
Client: Broad Energy (Wales) Limite					ted				Dates:	22/10/2018 - 26/10/2018	Logged I	Зу	
Water Strikes	Depth (m)	Type /Fl		Corin	Depth (m)	Level (m)	v	Vell	Legend	Stratum Description			
lines	(111)	/ []			RQD	(11)		·			Weak dark grey MUDSTONE. Fra 45° very closely to medium space	ctures 20° -	
	9.40 - 10.65		93	76	63			•••••			smooth to undulating rough. Local orangish brown.	ly stained	
	10.70	C									Fracture: 55° undulating smooth. Slig brown staining	ght orangish	-
	40.05 40.41		00	74	07			· · · · · ·			Fracture: 5° planar smooth Fracture: 5° planar smooth		-
	10.65 - 12.15		96	74	87			····					
								· · · · · · · · · · · · · · · · · · ·				1:50 Logged	
													-
	40.45 40.00	_						•••••••••••••••••••••••••••••••••••••••					-
	12.15 - 13.65		96	88	80			•••••					F
	14.00] c						· · · · · · · · · · · · · · · · · · ·					E
	13.65 - 15.00	_	98	92	81			•••••••••••••••••••••••••••••••••••••••					F
	15.00	- c						•••••••••••••••••••••••••••••••••••••••					E
	15.00 - 16.40)	91	85	85						Fracture: 60° undulating rough. Stair	ned orangish	-
								····			Fracture: 60° undulating rough		
		-											
	16.40 - 17.70)	100	80	69			••••••			Fracture: 60° undulating smooth		-
								····					
											Fracture: 80° - 90° curved smooth		
	17.70 - 19.10		100	76	76			· · · · · · · · · · · · · · · · · · ·					E
													-
		_						· · · · · · · · · · · · · · · · · · ·			Fracture: 20° - 60° curved smooth		F
	19.10 - 20.40		100	93	73								F
						19.80	97.43	· · · · ·			Weak dark grey MUDSTONE. Sub	o-vertical	ŧ
emar	ks:												

	te	af	irı	ma	5 De Pent	a Firma (Wa eryn Court, wyn, Cardi 3 7HA	Wharfeo		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH8 Sheet 3 of 5	
Project Name: Buttington Quarry					Projec 14880			Co-ords:	326934.10 - 310105.50	Hole Type RC	
ocation: Buttington, Welshpool							Level:	117.23	Scale 1:50		
Client: Broad Energy (Wales) Limite Water Depth Type Coring					ted			Dates:	22/10/2018 - 26/10/2018	Logged By	
Water				Corin	g	Depth	Level	Well	Legend	Stratum Descriptio	n
Strikes	(m) 20.40 - 21.8	/FI 5	96	SCR 0	RQD 0	(m)	(m) (m)			Weak dark grey MUDSTONE. Su Fracture infilled with thin veneer of clay. Fractures 15° - 30° very clo medium spaced undulating rough Fracture: Sub-vertical planar smooth Fracture: 65° undulating smooth	b-vertical of light grey sely to
	21.85 - 23.3	0	96	0	0						
	23.30 - 24.79 24.50	5 C	100	0	0	24.70	92.53			Weak dark grey MUDSTONE. Fra	netures 10°
	24.75 - 26.1	5	100	89	89					30° very closely to medium spaces smooth	adules 10 -
	26.50 26.15 - 27.3	C 5	89	89	86						
	27.35 - 28.8 28.60	0 C	100	95	95						
	28.80 - 30.24	0	94	94	94						

	e te	err	af	irı	ma	5 De Pent	a Firma (Wa eryn Court, wyn, Cardi 3 7HA	Wh			Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH8 Sheet 4 of 5	
		Butting	gton Q	uarry		Project No. 14880				326934.10 - 310105.50		Hole Type	
5 / 1								Level:	117.23	Scale 1:50			
lient: Broad Energy (Wales) Limited				ted				Dates:	22/10/2018 - 26/10/2018	Logged I	By		
Vater trikes	Depth	Туре	•	Corin	g	Depth	Level	v	Vell	Legend	Stratum Descriptio		
rikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)		H:		Weak dark grey MUDSTONE. Fr	actures 10° -	_
											30° very closely to medium spac smooth	ed planar	
	30.20 - 31.5		100	92	92								-
	00.20 01.0			52	52						Fracture: 85° planar smooth		
											Fracture: Sub-vertical planar smoot	th	
											Bedding Fracture: 85° undulating s	mooth	F
	31.50 - 34.0	D	100	0	0								F
	33.50	С											
													F
	34.00 - 35.4	0	100	66	66								
											Fracture: 50° planar smooth		-
	35.40 - 36.8	5	100	91	91								
	00.40 - 00.0			51	51						Fracture: 40° planar smooth		
											Fracture: 70° planar smooth		-
	36.85 - 38.3		93	90	70								
									H		Fracture: 75° 1mm thick mineralise	d infilled	F
		1									fracture: 45° planar smooth		E
	38.35 - 39.8	5	96	96	72					,			Ē
											Fracture: 45° planar rough		
		-								• •			
Remai													

	te	err	af	irı	ma	5 De Pent CF23	a Firma (Wa ryn Court, wyn, Cardi 3 7HA	Wharfe		Tel: 02920 735354 info@terrafirmawales.co.uk www.terrafirmawales.co.uk	Borehole No. PH8 Sheet 5 of 5	
Project Name: Buttington Quarry Location: Buttington, Welshpool Client: Broad Energy (Wales) Limited						Projec 14880	t No.		Co-ords:	326934.10 - 310105.50	Hole Type RC	
									Level:	117.23	Scale 1:50	
						ted			Dates:	22/10/2018 - 26/10/2018	Logged E	By
Water Strikes	Depth (m)	Type /FI		Corin	-	Depth (m)				Stratum Descriptio	n	
	40.30 39.85 - 41.3	с	92	57	RQD 43	()				Weak dark grey MUDSTONE. Fra 30° very closely to medium space smooth Fracture: 45° planar smooth	actures 10° - ed planar	- 4
	41.35 - 42.8	.5	93	93	93	41.35	75.88			Medium strong dark grey MUDSTONE. Fractures 10° - 30° very closely to widely spaced planar smooth		- - - - - - - - - - - - - - - - - - -
	43.00 42.85 - 44.0	5 5	100	100	100							- - - - - - - - - - - - - - - - - - -
	44.05 - 45.4	5	100	100	93							- - - - - - - - - - - - - - - - - - -
	45.4 <u>5</u> .0 1 6.4	5 C	57	57	53	46.45	70.78					-
						70.78			End of Borehole at 46.45	m		
Remar	ks:		1	1	I		1	<u> </u>	<u> </u>	1		

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Project	Name:	Buttington Quarry Project No. 14880							Co-ords:	Hole Tyr			
ocatio	n:	Butting	ton, W	Velshp	ool	i				Level:	115.26 Scale 1:50		
Client:		Broad	Energ	y (Wal	les) Limi	ited	ed			Dates:	18/10/2018 - 19/10/2018 Logged E	Logged By	
Water Strikes	Depth (m)	Type /Fl		Coring		Depth (m)	Depth Level We (m) (m)		əll	Legend	Stratum Description	T	
		_				- 1.00	114.26	· · · ·	• • • • • • • • • • • • • • • • • • •		Grey brown very gravelly CLAY grading into very weak mudstone Very weak dark greenish grey mudstone. Recovered non-intact.		
	1.00 - 2.30	'	100	0	0	2.50	112.76					-	
	2.30 - 3.80)	86	15	15				· · · · · · · · · · · · · · · · · · ·		Very weak to weak dark greenish grey MUDSTONE. Fractures are 10°- 40° very closely to closely spaced, undulating rough tending to planar smooth. Fracture surfaces rarely stained orangish brown.)° very g rough surfaces	
	3.80 - 5.25	;	89	0	0						Very thin bed of very stiff light orangish brown and light grey CLAY		
	5.25 - 6.70)	100	0	0						Bedding Fracture: 70°-85° undulating smooth. Stained orangish brown.		
	6.70 - 7.85	;	95	42	42				******		Bedding Fracture: 85° planar smooth. Stained orangish brown. Fracture: 65° planar smooth . Stained orangish brown Fracture: 60° planar smooth. Stained orangish		
	7.85 - 9.35 9.00	5 C	94	20	9						brown. Bedding Fracture: 85° - 90° undulating smooth. Stained orangish brown. Bedding Fracture: 85° - 90° undulating rough.		
	9.35 - 10.50		96	37	37						Stained orangish brown. Bedding Fracture: 85° - 90° undulating rough. Stained orangish brown. Fracture: 55° planar smooth. 1mm calcite mineralisation Fracture: 75 - 90° undulating smooth locally planar.	r.	

Project Name: Location: Client: Water Depth Strikes (m)	Butting	ton Q		IId	Pent CF23 Project 14880	eryn Court, Y wyn, Cardif 3 7HA t No.			Co-ords:	info@terrafirmawales.co.uk www.terrafirmawales.co.uk	PH9 Sheet 2 of 2 Hole Type	
Location: Client: Water Depth			uarry		Project							
Client: Water Depth	Butting	ton M		Project Name: Buttington Quarry						326945.35 - 310072.94	Hole Type RC	
Water Depth		Location: Buttington, Welshpool							Level: 115.26		Scale 1:50	
	Client: Broad Energy (Wales) Limite								Dates:	18/10/2018 - 19/10/2018	Logged By	
()	Type /FI		Corin	-	Depth (m)	Level (m)	W	/ell	Legend	Stratum Descriptio	n	
11.00 10.50 - 12.0 	C 00 C	78 95 30	SCR 78 95 23	RQD 78 95 23	10.50	104.76				Very weak to weak dark greenish MUDSTONE. Fractures are 10°- closely to closely spaced, undula tending to planar smooth. Fractur <i>rarely stained orangish brown.</i> <i>Fracture: 75 ° 90° undulating smoot</i> <i>Stained orangish brown.</i> <i>Fracture: 55° planar smooth. 1mm of</i> <i>mineralisation</i> Weak dark grey MUDSTONE. Fr 5° - 25° very closely to medium sp smooth. Fracture surfaces staine brown. <i>Fracture: 55° planar smooth.</i> <i>Fracture: 55° planar smooth.</i> <i>Fracture: 55° planar smooth.</i> <i>Fracture: 50° planar smooth. Stained</i> <i>brown.</i> <i>End of Borehole at 14.000</i>	40° very ting rough re surfaces th locally planar. calcite actures are baced, planar d orangish	- 11 - 12 - 12 - 13 - 13 - 14 - 14 - 15 - 16 - 17 - 17 - 17 - 17 - 17 - 17 - 19 - 19 - 19

	te	err	af	irı	ma	5 De Pent	Terra Firma (Wales) Limited 5 Deryn Court, Wharfedale R Pentwyn, Cardiff CF23 7HA				
Project	Name:	Butting	jton Q	uarry		Projec 14880	Project No. 14880			Sheet 1 : 326833.57 - 310220.90 RC	
ocatio.	cation: Buttington, Welshpool			ool	I				114.16	Scale 1:50	
lient: Broad Energy (Wales) Limite					ited	d			01/11/2018 - 02/11/2018	Logged B	
Water Strikes	Depth (m)	Type /FI		Coring		Depth (m)	Depth Level We (m)		Legend	Stratum Description	
	1.00 - 2.50		16	0	0	- 1.00	113.16			Grey gravelly CLAY grading into mudstone Non-Intact greenish grey MUDST retrieved as fine to coarse angula	ΓΟΝΕ
	2.50 - 4.00		93	0	0	3.00	111.16			Very weak grey MUDSTONE. Fra very close to closely spaced, occ medium spaced 5° - 35° stained o brown and/or dark grey/black Bedding Fracture: 80° curved rough orangish brown/brown.	asionally orangish
	4.00 - 5.50	,	96	13	13					Fracture: sub-vertical planar rough. orangish brown. Fracture: 45° planar rough. Stained brown. Bedding Fracture: 80°planar rough. orangish brown. Curved undulating rough. Stained o Bedding Fracture: 85° Curved to pla	l orangish Stained orangish brown.
	5.50 - 7.00	,	90	0	0					Stained orangish brown. Fracture: 70° to sub-vertical curved orangish brown. Fracture: 70° planar rough. Stained brown. Bedding Fracture: 80° planar rough.	l orangish
	7.00 - 8.50)	93	0	0					Fracture: 65° planar to curved rough	
·	8.50 - 10.00	5	96	0	0					Bedding Fracture: 80° planar rough orange. Bedding Fracture: 80° planar rough orangish brown.	

				Terra	ı Firma (Wa	ales) Lir	nited	Tel: 02920 735354	Borehole No.				
terrafirma					5 De Pent	ryn Court, V wyn, Cardif	Nharfeo f	dale Road	info@terrafirmawales.co.uk www.terrafirmawales.co.uk	PH10			
						Project	3 7HA				Sheet 2 of 2 Hole Type		
Project Name: Buttington Quarry							INO.		Co-ords:	326833.57 - 310220.90	RC	e	
Locatio	n: E	Butting	ton, W	/elshp	ool				Level:	114.16	Scale 1:50		
Client: Broad Energy (Wales) Limited									Dates:	01/11/2018 - 02/11/2018	Logged B		
Water	Depth	Туре		Corin	-	Depth	Level	Well	Legend	Stratum Descriptio	n		
Strikes	(m)	/FI	TCR	SCR	RQD	(m)	(m)			Very weak grey MUDSTONE. Fra			
										very close to closely spaced, occ medium spaced 5° - 35° stained	asionally	E	
										brown and/or dark grey/black	-	F	
	10.00 - 11.50		76	10	10					Fracture: 65° to sub-vertical curved. orange.	Stained	Ē	
												- 11 -	
						11 50	102.66					F	
						- 11.50	102.00			End of Borehole at 11.500m		F	
												- - 12	
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Remar	ks:												

ANNEX B Photographs of Probehole Rock Cores









































































































































PROBEHOLE 9











PROBEHOLE 10









ANNEX C UCS, Point Load and Shear Box Test Results





Qty

1

Contract Number: 41501

Client Ref: Client PO: **14880RH**

Laboratory Report

Report Date: 20-11-2018

Client Terrafirma Wales Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HB

Contract Title: Buttington Quarry (B.Quarry) For the attention of: Ruth Howells

Date Received: 06-11-2018 Date Commenced: 06-11-2018 Date Completed: 20-11-2018

Test Description

 Particle size Distribution (Aggregate)
 6

 BS EN 933-1 - * UKAS
 6

 Determination of the slake durability index, two cycles.
 6

 ISRM Suggested Method For Determining Slake Durability - @ Non Accredited Test
 6

 Large Shear Box 300mm Peak with 3 confining pressures includes remoulding
 6

 BS 1377:1990 - Part 7 : 5 and Specification for Highway Works Vol.1 Clause 636 Part 2 - @ Non Accredited Test
 6

Disposal of samples for job

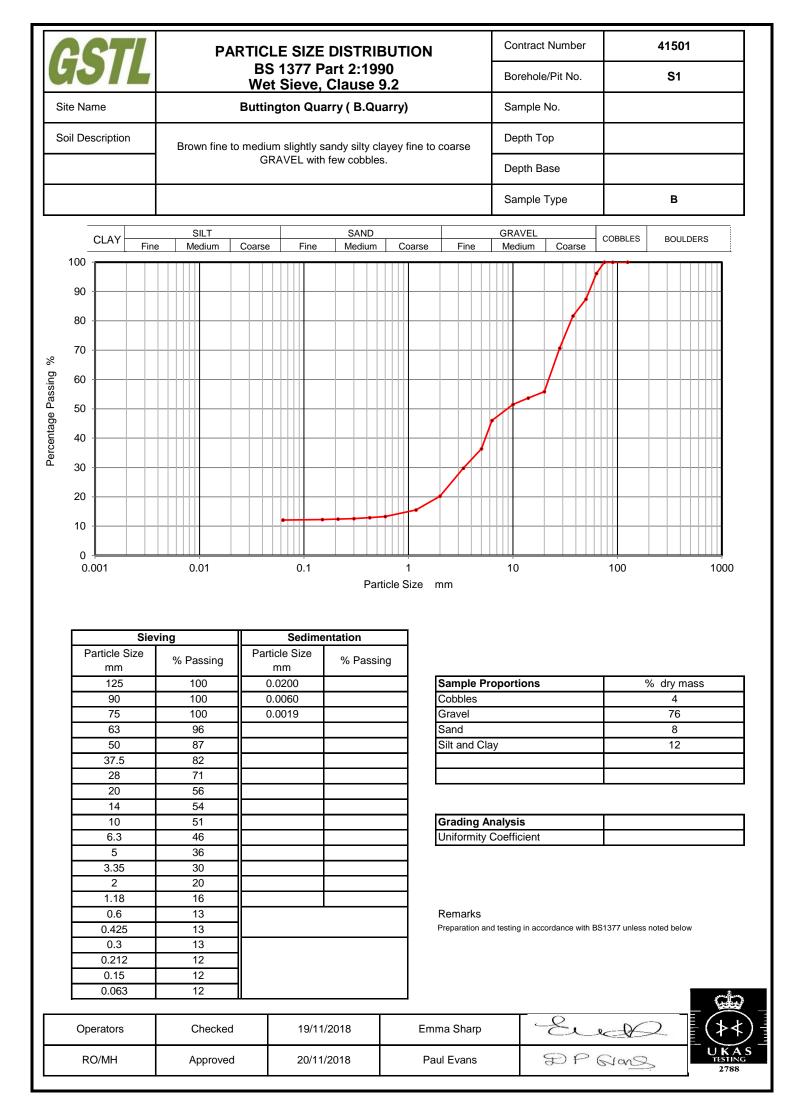
Notes: Observations and Interpretations are outside the UKAS Accreditation

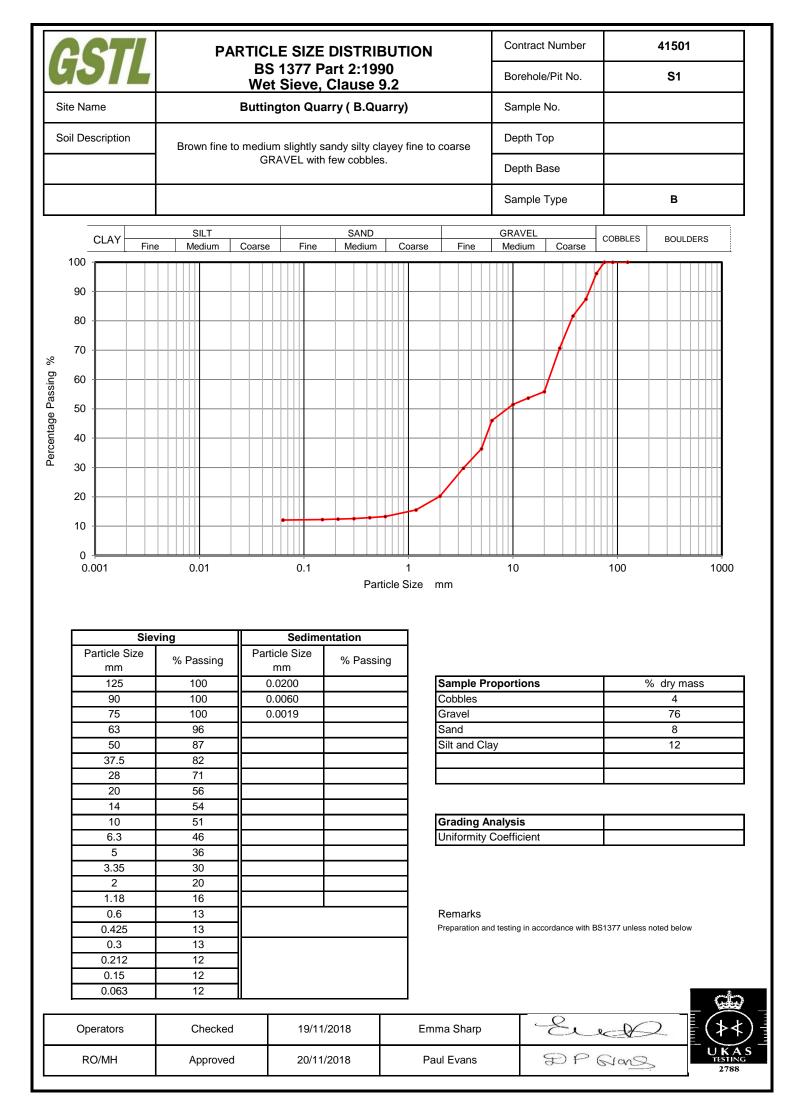
- * denotes test included in laboratory scope of accreditation
- # denotes test carried out by approved contractor
- @ denotes non accredited tests

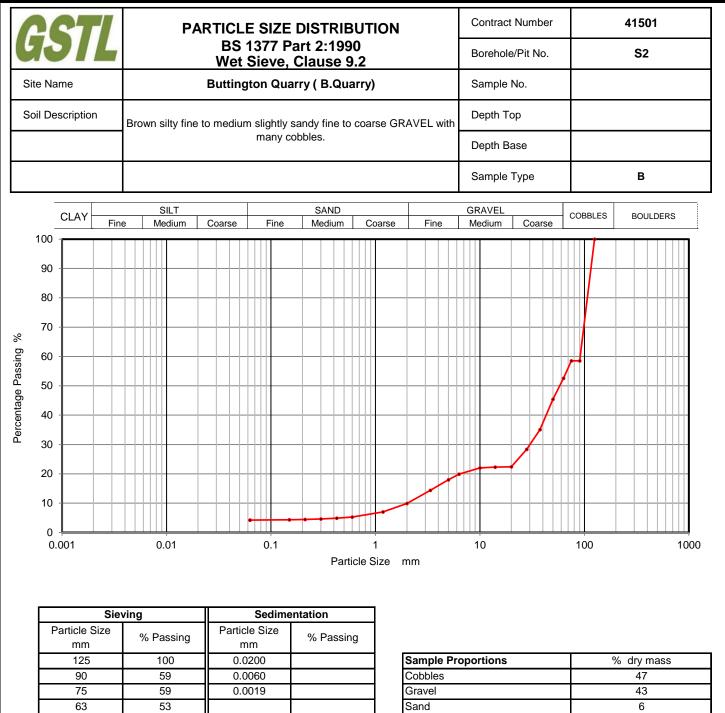
This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory. **Approved Signatories:**

Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager) Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative/Accounts Assistant) Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk







Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	59	0.0060	
75	59	0.0019	
63	53		
50	45		
37.5	35		
28	28		
20	22		
14	22		
10	22		
6.3	20		
5	18		
3.35	14		
2	10		
1.18	7		
0.6	5		
0.425	5		
0.3	5		
0.212	4		
0.15	4		
0.063	4		

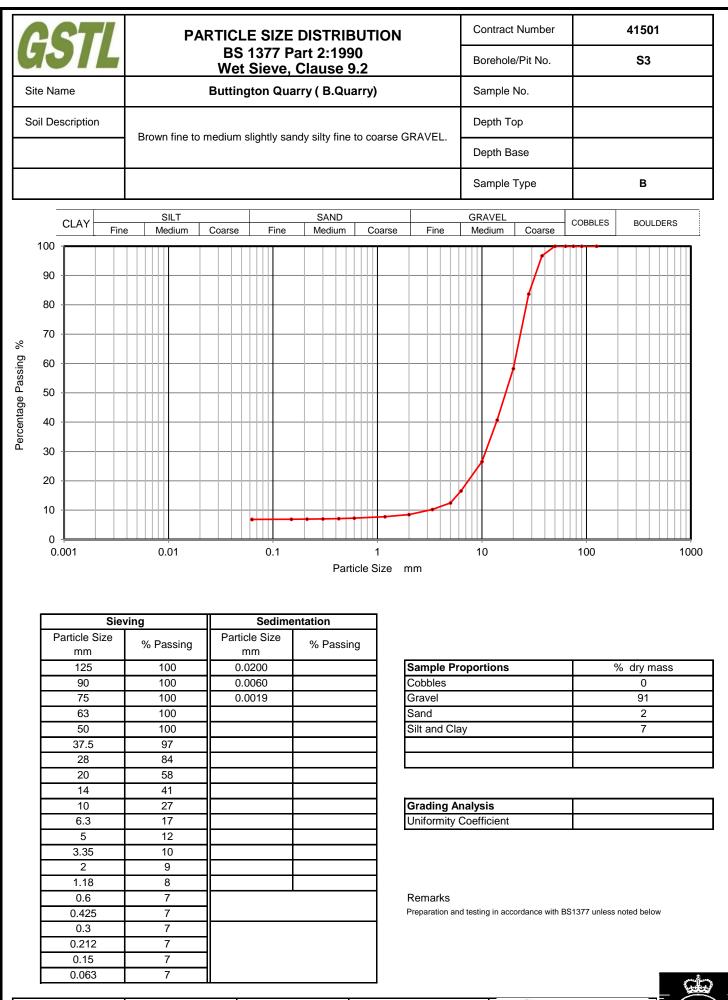
Sample Proportions	% dry mass
Cobbles	47
Gravel	43
Sand	6
Silt and Clay	4

Grading Analysis	
Uniformity Coefficient	

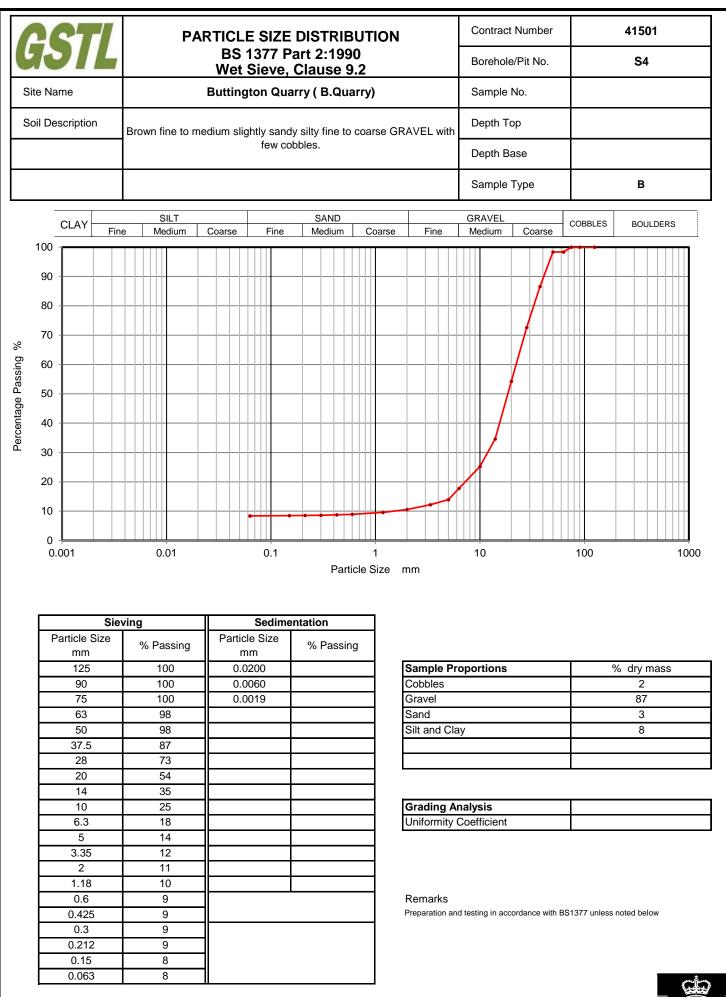
 \hat{c}

Remarks Preparation and testing in accordance with BS1377 unless noted below

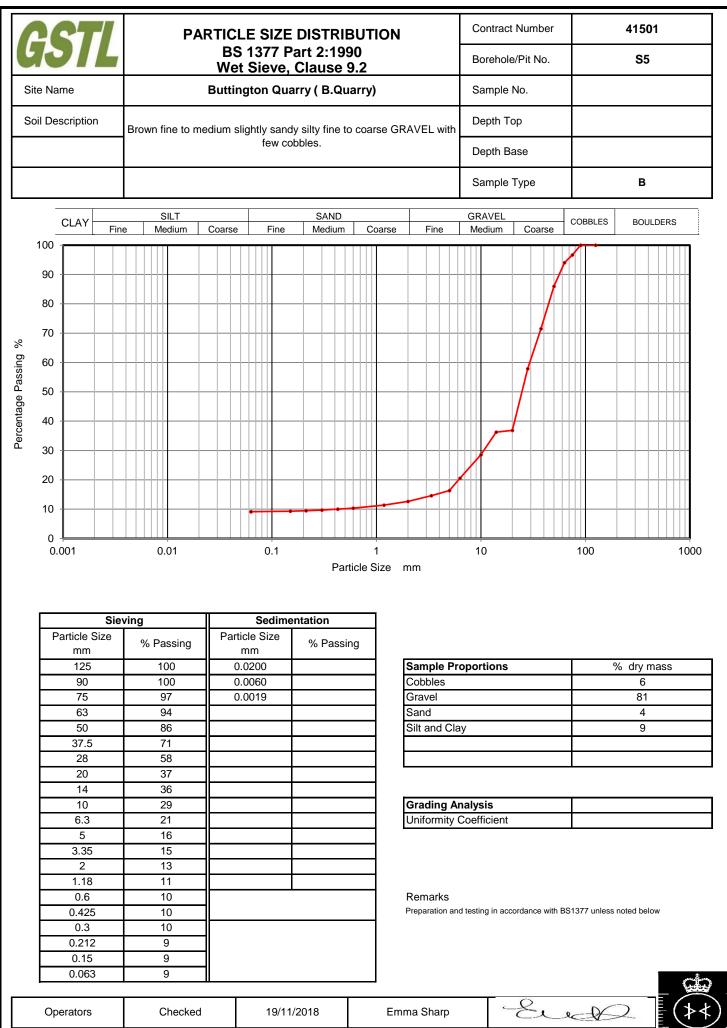
Operators	Checked	19/11/2018	Emma Sharp	Gener	
RO/MH	Approved	20/11/2018	Paul Evans	DP Grans	UKAS TESTING 2788



Operators	Checked	19/11/2018	Emma Sharp	-Euch	$ \langle \mathbf{A} \mathbf{A} \rangle \rangle$
RO/MH	Approved	20/11/2018	Paul Evans	\$P & Grans	UKAS TESTING 2788



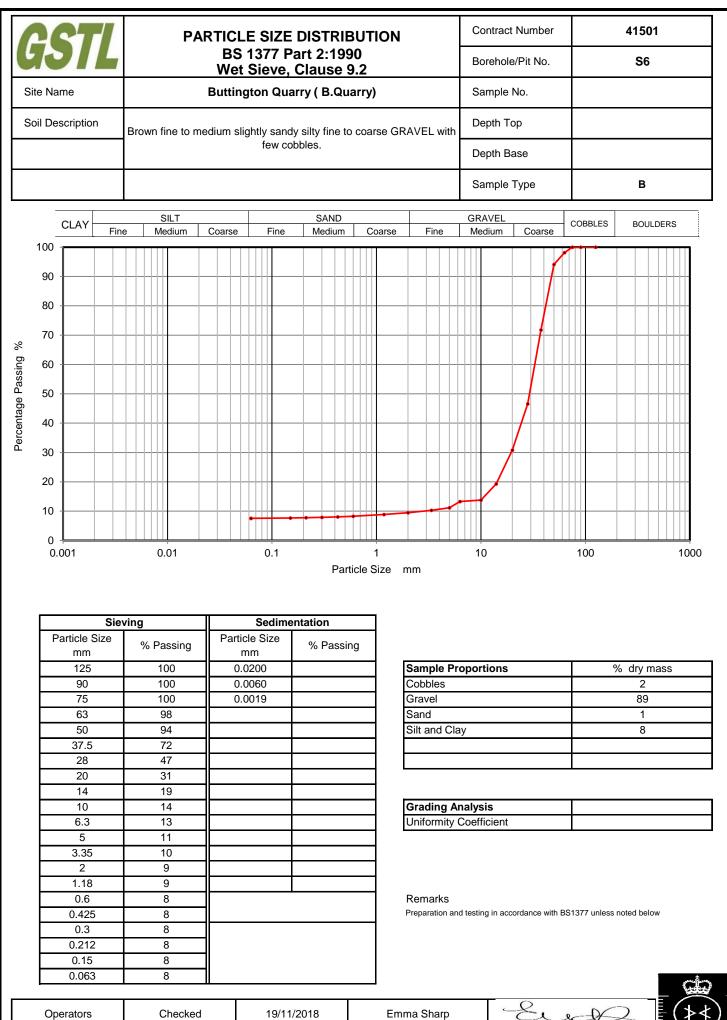
Operators	Checked	19/11/2018	Emma Sharp	-Euch	$(\mathbf{A} \mathbf{A})$
RO/MH	Approved	20/11/2018	Paul Evans	\$P P Grans	UKAS TESTING 2788



Checked	19/11/2018	Emma Sharp	Such
Approved	20/11/2018	Paul Evans	\$P Grons

RO/MH

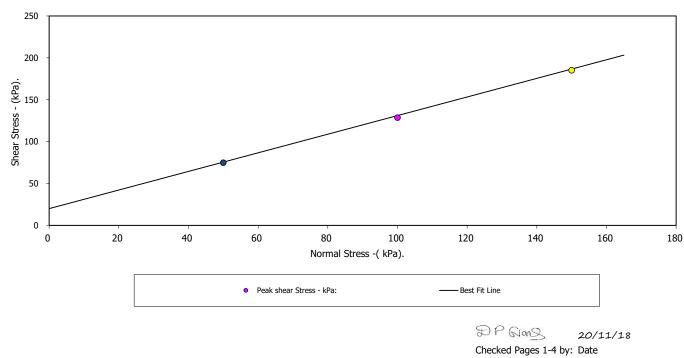




Operators	Checked	19/11/2018	Emma Sharp	-Euch	(≯∢
RO/MH	Approved	20/11/2018	Paul Evans	DP Grons	UKA TESTIN 2788

Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S1	Depth from (m):	0.00	
Sample Number :	1	Depth to (m):	0.00	
Sample Type:	В	· · · ·		
Particle Density - Mg/m3:		2.65 (Assumed)	
Specimen Tested:	At natural m	noisture content, Remoulded (Light	Tamping) Material above 20	mm removed.
Sample Description:				
Brown clayey fine to medium GRAVE	L			
STAGE		1	2	3
Initial Conditions				
Height - mm:		136.00	136.00	136.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		10	10	10
Bulk Density - Mg/m3:		2.04	2.04	2.04
Dry Density - Mg/m3:		1.85	1.85	1.85
Voids Ratio:		0.4316	0.4317	0.4318
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		133.03	131.54	129.77
Shear				
Rate of Strain (mm/min)		0.66	7 0.667	0.667
Strain at peak shear stress (%)		58.55	60.41	63.30
Peak shear Stress - kPa:		75	129	185
РЕАК				
Angle of Shearing Resistance:(0)				48.0
Effective Cohesion - kPa:				20



FAILURE CONDITIONS

Contract No.: 41501

20/11/18

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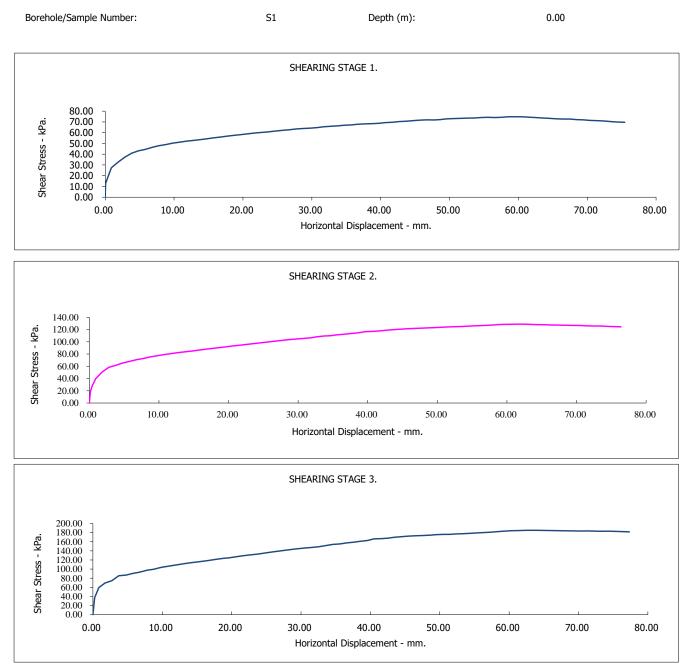
Approved Pages 1-4 by: Date

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH



BS1377:Part 7:5 :1990.



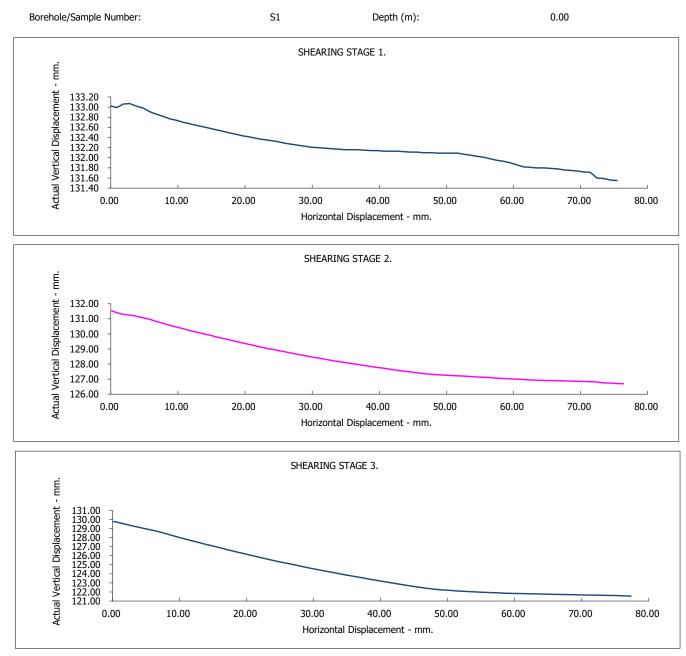
Contract No.: 41501

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



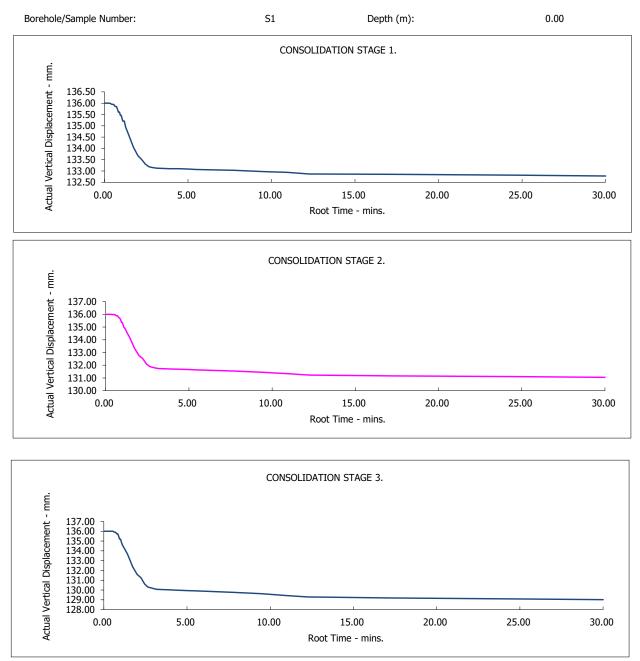
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

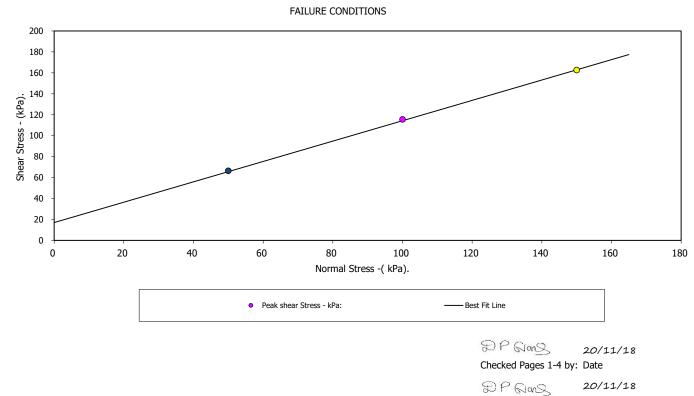
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S2	Depth from (m):	0.00	
Sample Number :	2	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assume	d)	
Specimen Tested:	At natural n	noisture content, Remoulded (Ligl	nt Tamping) Material above 2	20mm removed.
Sample Description:				
Brown clayey fine to medium GRAVEL				
STAGE		1	2	3
Initial Conditions				
Height - mm:		130.0	0 130.00	130.00
Length - mm:		300.0	0 300.00	300.00
Moisture Content - %:		1	0 10	10
Bulk Density - Mg/m3:		2.0	2 2.02	2.02
Dry Density - Mg/m3:		1.8	3 1.83	1.83
Voids Ratio:		0.447	8 0.4478	0.4477
Normal Pressure- kPa		5	0 100	150
Consolidation				
Consolidated Height - mm:		126.4	0 121.96	117.52
Shear				
Rate of Strain (mm/min)		0.6	67 0.667	0.667
Strain at peak shear stress (%)		55.0	6 55.19	57.32
Peak shear Stress - kPa:		6	6 116	163
PEAK				
Angle of Shearing Resistance:(0)				44.2
Effective Cohesion - kPa:	·			17



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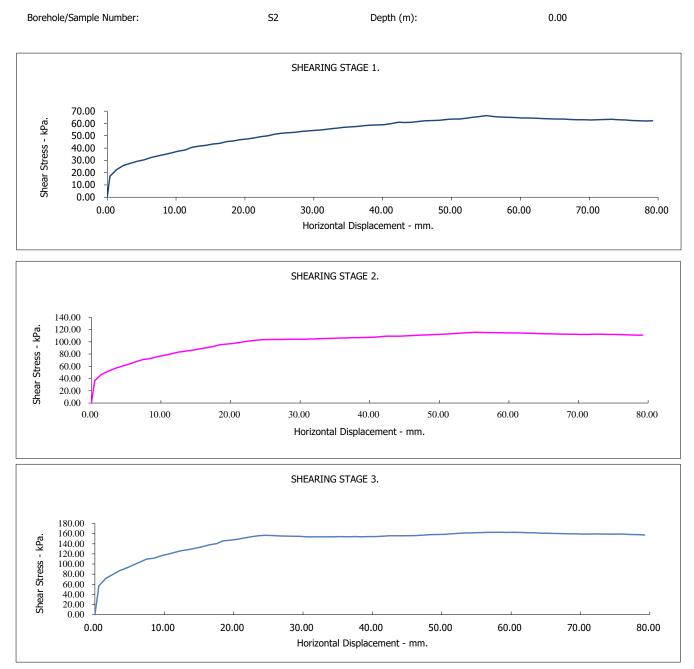
Contract No.: 41501

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH



BS1377:Part 7:5 :1990.



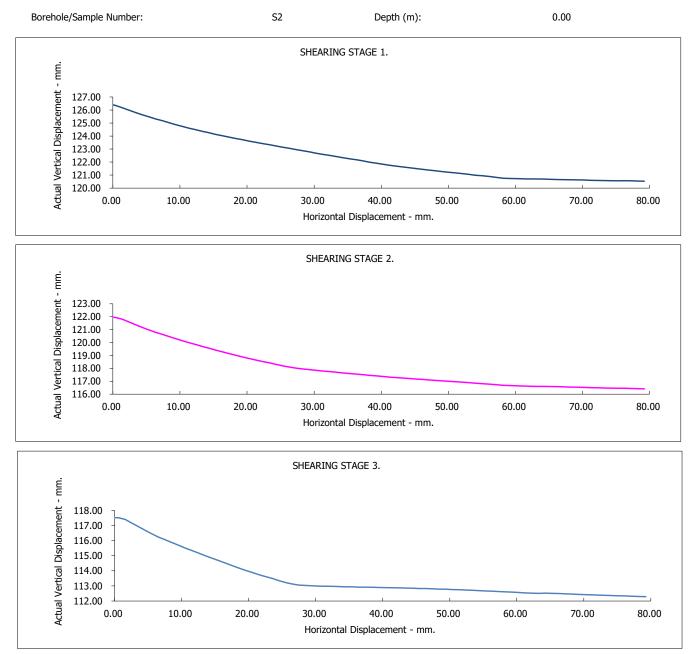
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



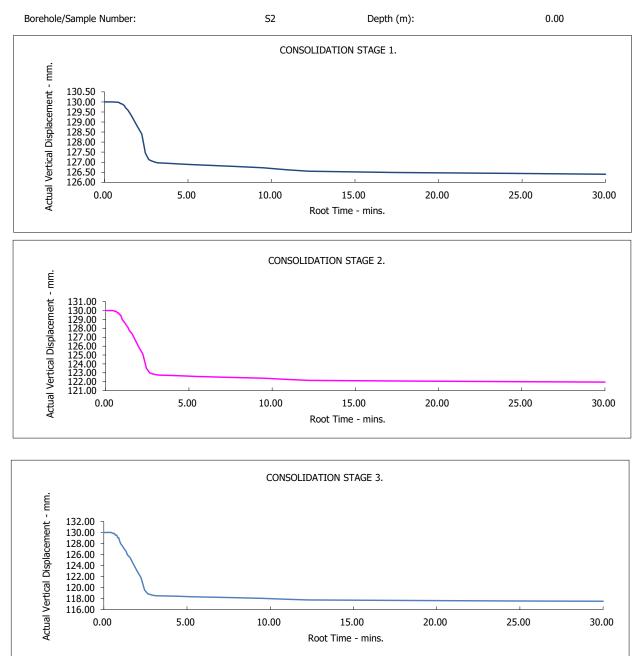
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

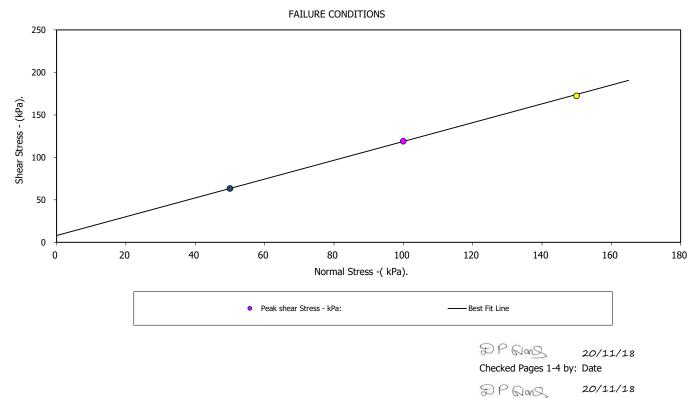
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S3	Depth from (m):	0.00	
Sample Number :	3	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)		
Specimen Tested:	At natural mo	pisture content, Remoulded (Light	Tamping) Material above 20n	nm removed.
Sample Description:				
Brown slightly clayey fine to mediur	n GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		134.00	134.00	134.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		7	7	7
Bulk Density - Mg/m3:		1.62	1.62	1.62
Dry Density - Mg/m3:		1.52	1.52	1.52
Voids Ratio:		0.7425	0.7426	0.7427
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		129.93	127.63	125.80
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		54.10	65.71	66.42
Peak shear Stress - kPa:		63	119	173
PEAK				
Angle of Shearing Resistance:(0)				47.9
Effective Cohesion - kPa:				8



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Contract No.:

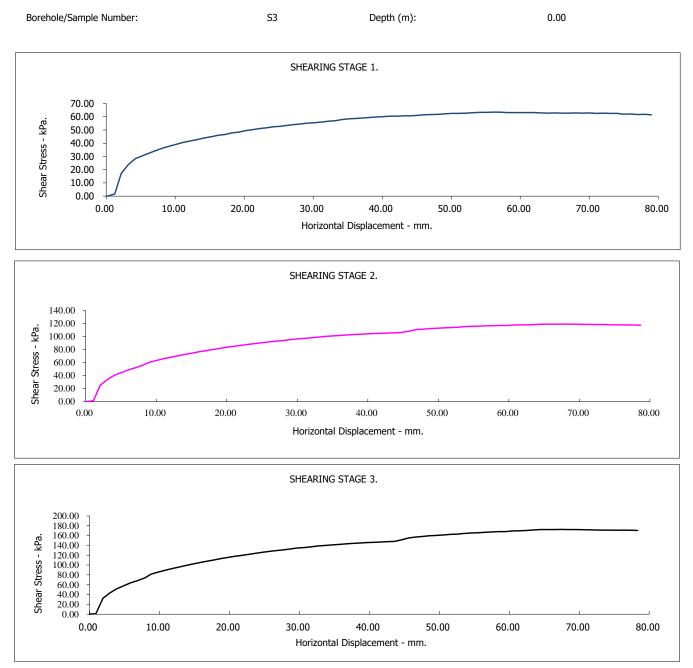
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Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH



BS1377:Part 7:5 :1990.



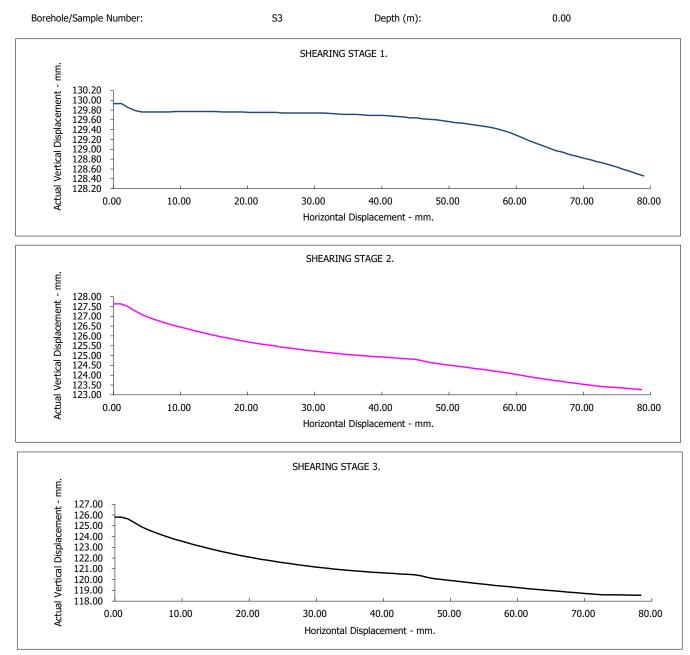
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



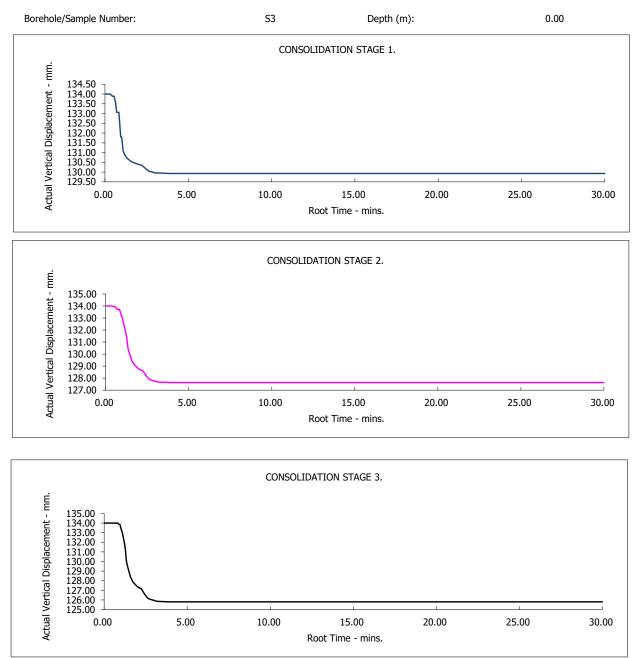
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

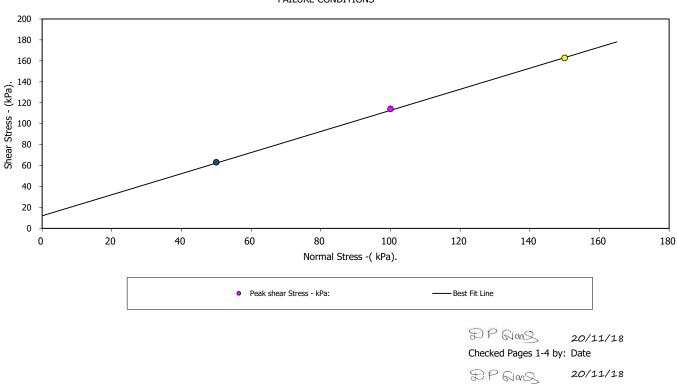
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S4	Depth from (m):	0.00	
Sample Number :	4	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)	
Specimen Tested:	At natural m	oisture content, Remoulded (Light	Tamping) Material above 20r	nm removed.
Sample Description:				
Brown slightly clayey fine to mediun	n GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		134.00	134.00	134.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		12	12	12
Bulk Density - Mg/m3:		1.59	1.59	1.59
Dry Density - Mg/m3:		1.43	1.43	1.43
Voids Ratio:		0.8575	0.8577	0.8575
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		130.29	129.03	127.07
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		53.12	52.66	56.20
Peak shear Stress - kPa:		63	114	163
РЕАК				
Angle of Shearing Resistance:(0)				45.2
Effective Cohesion - kPa:				12



FAILURE CONDITIONS

Contract No.: 41501

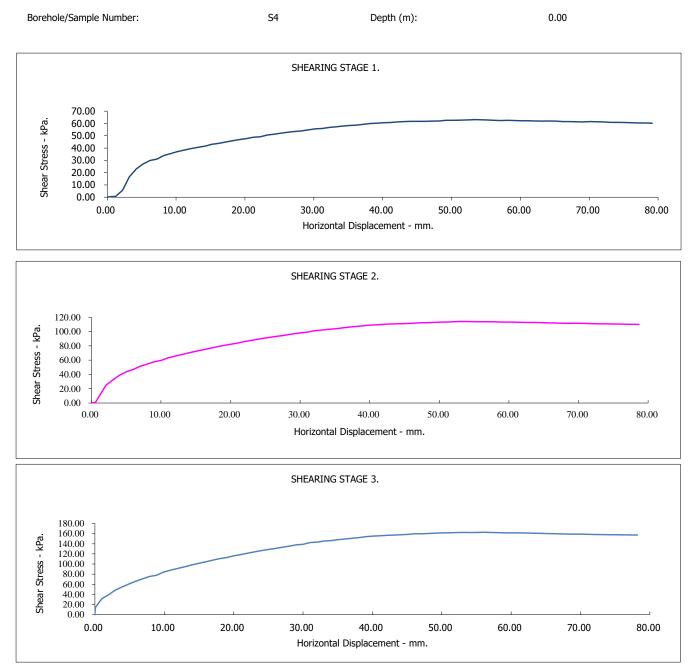
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Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH



BS1377:Part 7:5 :1990.



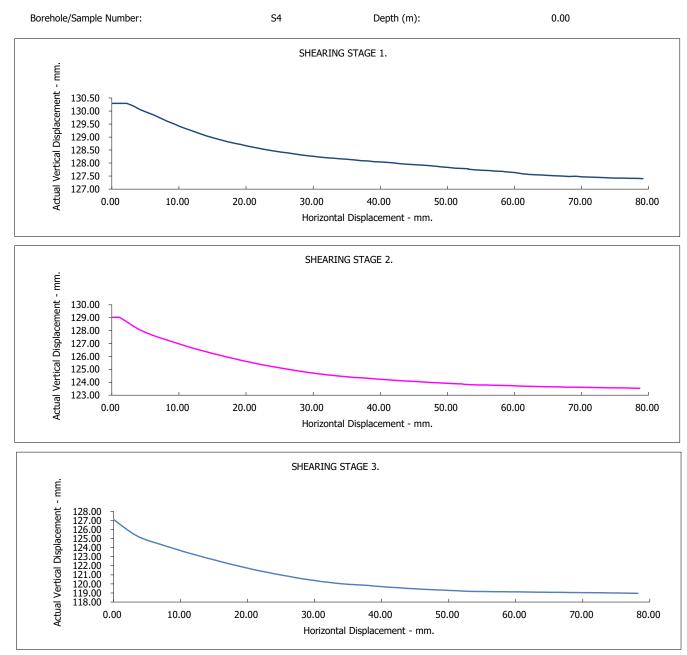
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

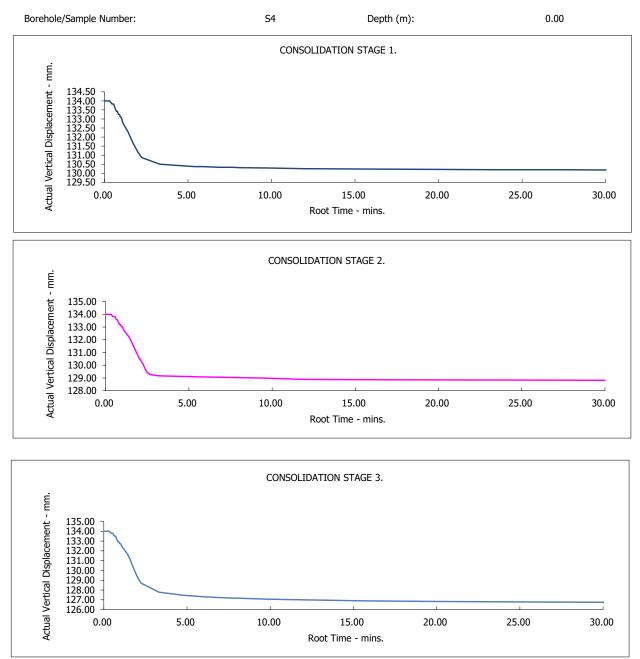
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



010705CD SBOX LARGE

BS1377:Part 7:5 :1990.



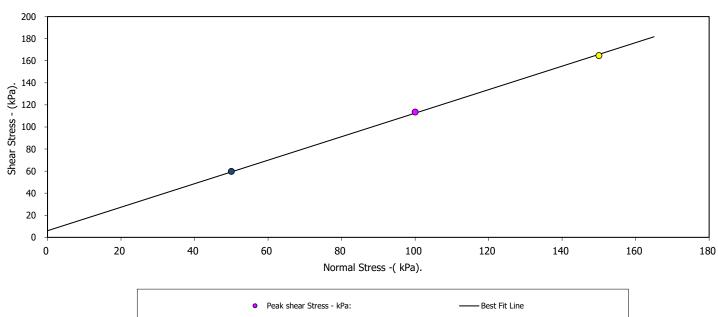
Contract No.: **41501**

Buttington Quarry (B.Quarry)



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S5	Depth from (m):	0.00	
Sample Number :	5	,	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)		
Specimen Tested:	At natural m	noisture content, Remoulded (Light T	amping) Material above 20m	im removed.
Sample Description:				
Brown slightly clayey fine to mediun	າ GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		132.50	132.50	132.50
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		6	6	6
Bulk Density - Mg/m3:		1.65	1.65	1.65
Dry Density - Mg/m3:		1.55	1.55	1.55
Voids Ratio:		0.7053	0.7049	0.7050
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		128.00	126.20	124.88
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		60.01	61.02	61.02
Peak shear Stress - kPa:		60	113	165
PEAK				
Angle of Shearing Resistance:(θ)				46.8
Effective Cohesion - kPa:				6



FAILURE CONDITIONS

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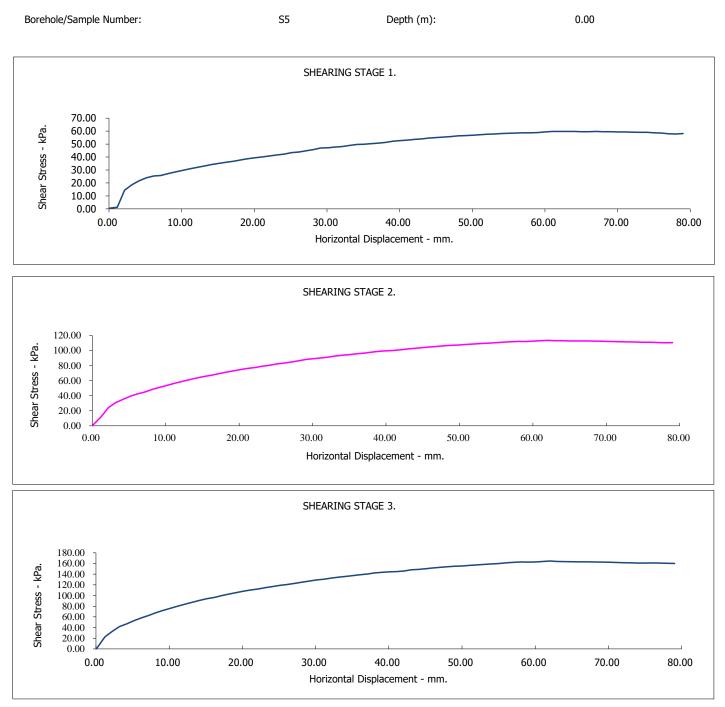
Approved Pages 1-4 by: Date

Contract No.: **41501**

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



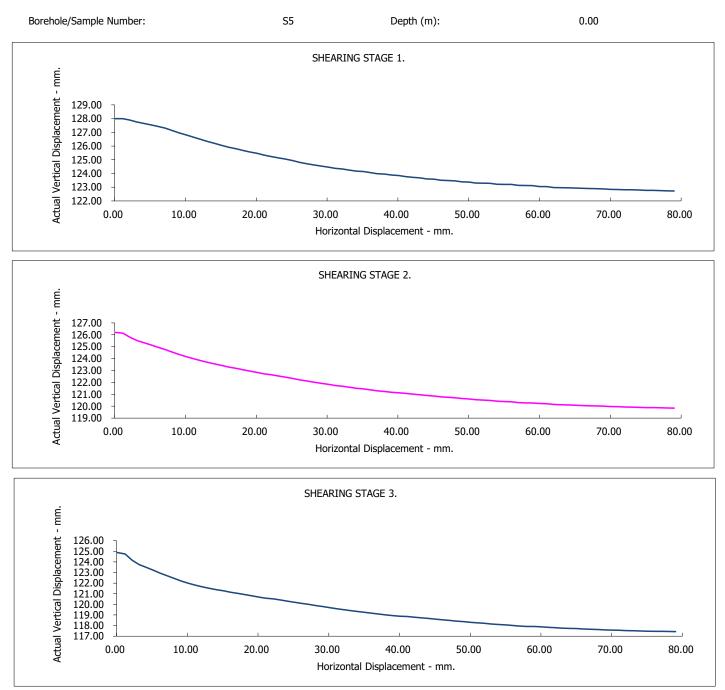


Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



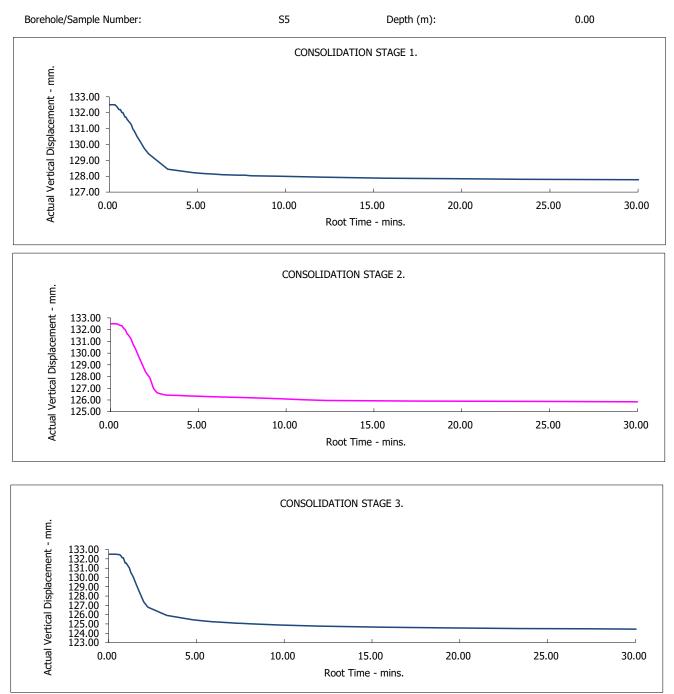
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



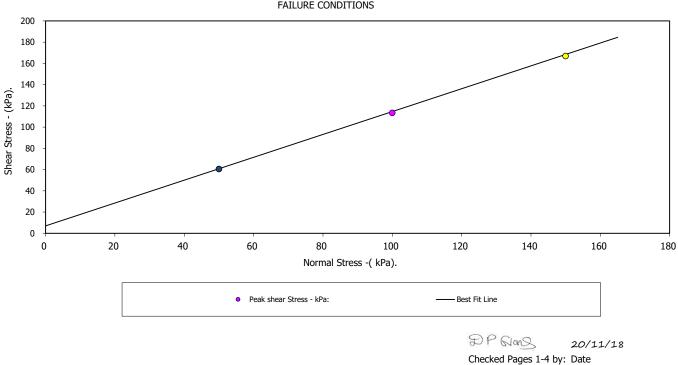
Contract No.: 41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.

Borehole Number:	S6	Depth from (m):	0.00	
Sample Number :	6	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assume	d)	
Specimen Tested:	At natural m	oisture content, Remoulded (Ligh	t Tamping) Material above 2	20mm removed.
Sample Description:				
Brown slightly clayey fine to medium	GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		135.0	0 135.00	135.00
Length - mm:		300.0	0 300.00	300.00
Moisture Content - %:		1	0 10	10
Bulk Density - Mg/m3:		1.6	0 1.60	1.60
Dry Density - Mg/m3:		1.4	4 1.44	1.44
Voids Ratio:		0.835	3 0.8351	0.8355
Normal Pressure- kPa		5	0 100	150
Consolidation				
Consolidated Height - mm:		132.2	2 129.72	128.51
Shear				
Rate of Strain (mm/min)		0.66	67 0.667	0.667
Strain at peak shear stress (%)		66.1	4 67.37	57.68
Peak shear Stress - kPa:		6	1 113	167
PEAK				
Angle of Shearing Resistance: (θ)				47.1
Effective Cohesion - kPa:				7



FAILURE CONDITIONS

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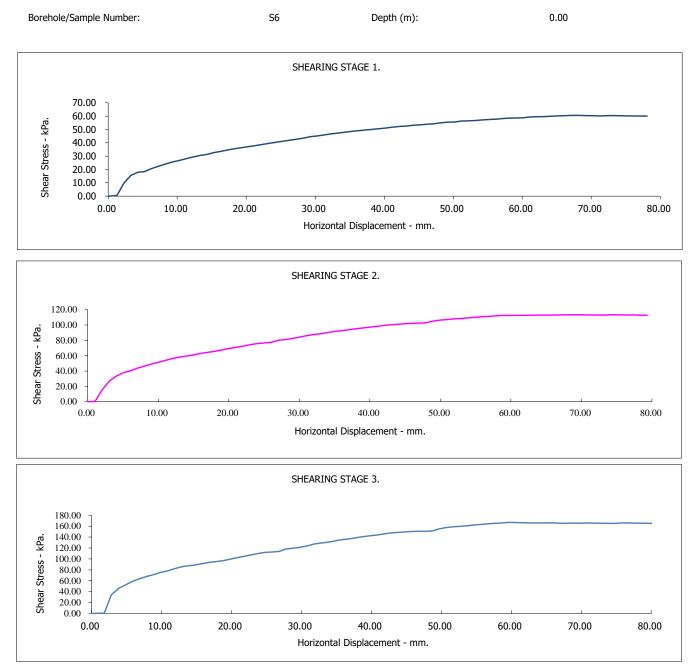
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Contract No.: 41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



Contract No.: **41501**

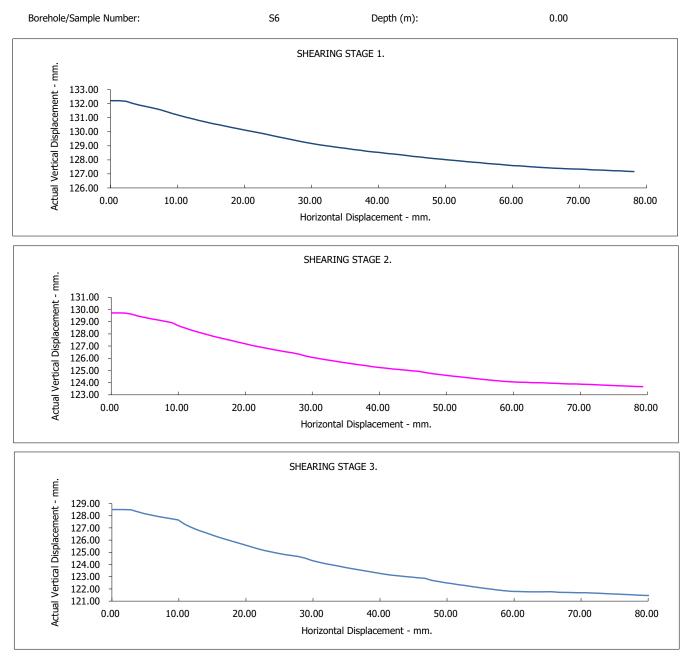
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



010705CD SBOX LARGE

BS1377:Part 7:5 :1990.



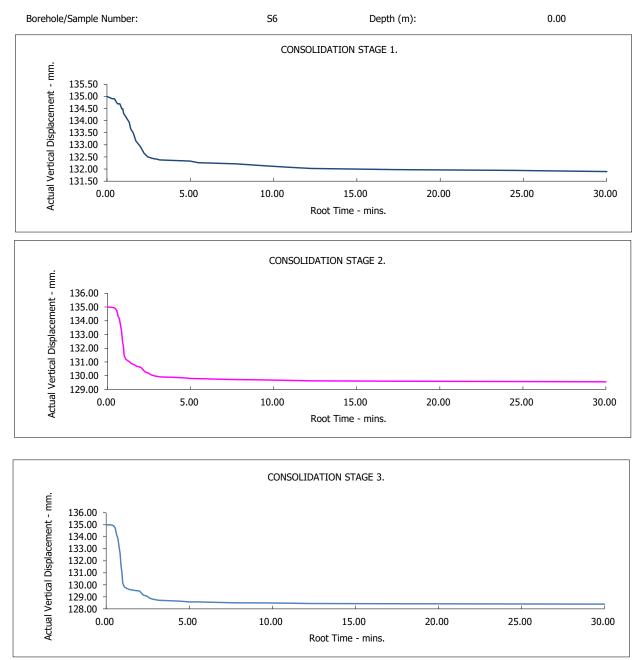
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

Buttington Quarry (B.Quarry)



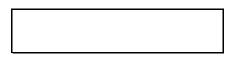


Determination of Slake Durability Index

GJIL	ISRM Part 2.2	
Contract Number	41501	
Site Name	Buttington Quarry (B.Quarry)	
Nature of Slaking Fluid	Water at 20°C	
Date Tested	19/11/2018	

Hole Reference	Dep	oth (m)	Slake First Cycle	Slake Second Cycle	Appearance Of Material Retained In The Drum	Appearance Of Material Passing Through The Drum
S1			87.79	75.84	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S2			88.18	74.93	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S3			95.84	92.97	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S4			92.52	88.10	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S5			93.77	89.44	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S6			91.14	88.01	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.

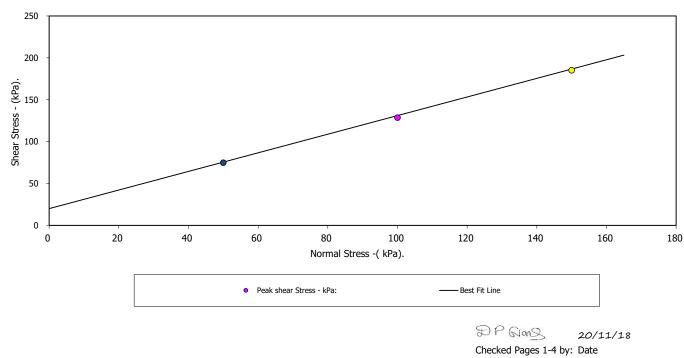
Key	Reported As
Slake First Cycle	%
Slake Second Cycle	%



Operators	Checked	19/11/2018	Wayne Honey	W. Honey
JD	Approved	20/11/2018	Ben Sharp	

Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S1	Depth from (m):	0.00	
Sample Number :	1	Depth to (m):	0.00	
Sample Type:	В	· · · ·		
Particle Density - Mg/m3:		2.65 (Assumed)	
Specimen Tested:	At natural m	noisture content, Remoulded (Light	Tamping) Material above 20	mm removed.
Sample Description:				
Brown clayey fine to medium GRAVE	L			
STAGE		1	2	3
Initial Conditions				
Height - mm:		136.00	136.00	136.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		10	10	10
Bulk Density - Mg/m3:		2.04	2.04	2.04
Dry Density - Mg/m3:		1.85	1.85	1.85
Voids Ratio:		0.4316	0.4317	0.4318
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		133.03	131.54	129.77
Shear				
Rate of Strain (mm/min)		0.66	7 0.667	0.667
Strain at peak shear stress (%)		58.55	60.41	63.30
Peak shear Stress - kPa:		75	129	185
РЕАК				
Angle of Shearing Resistance:(0)				48.0
Effective Cohesion - kPa:				20



FAILURE CONDITIONS

Contract No.: 41501

20/11/18

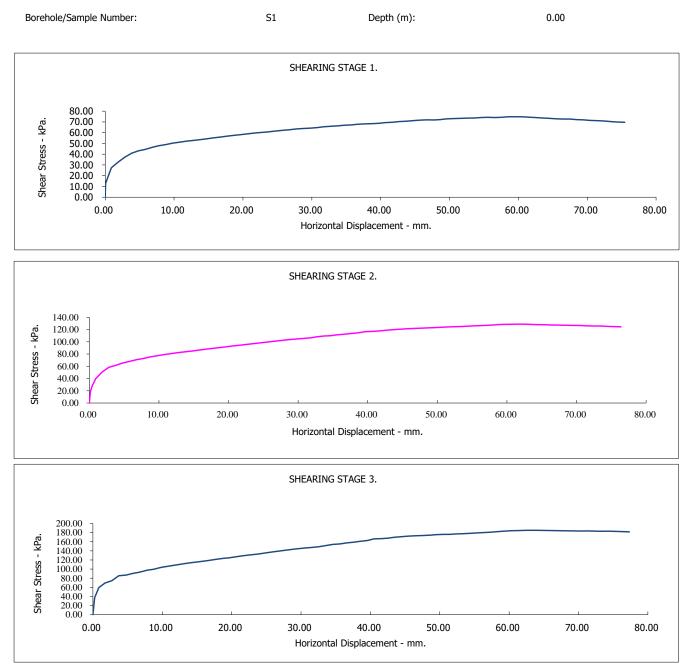
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Approved Pages 1-4 by: Date

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



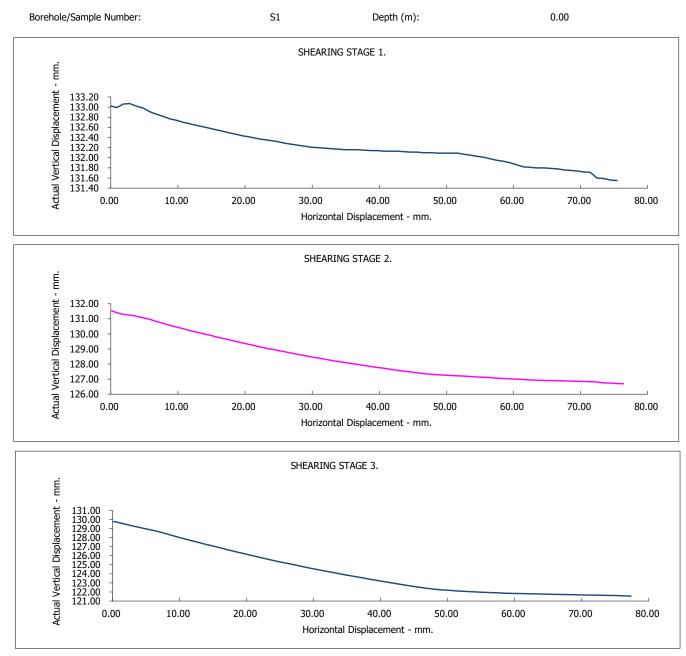
Contract No.: 41501

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



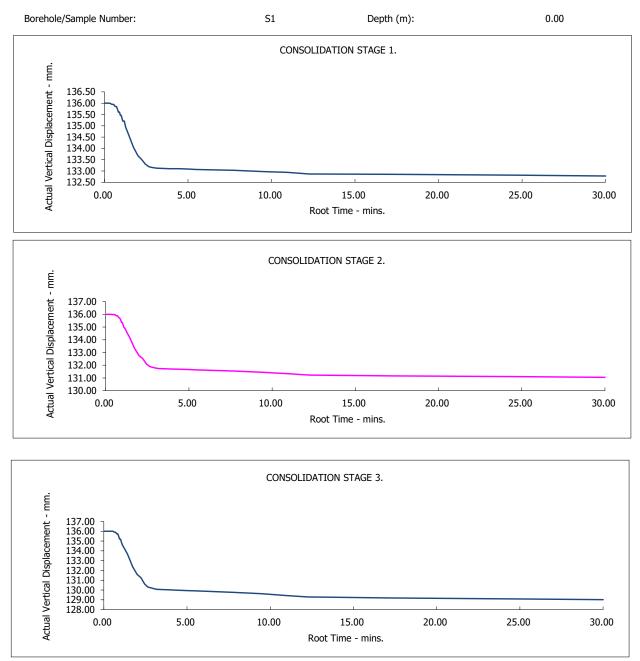
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



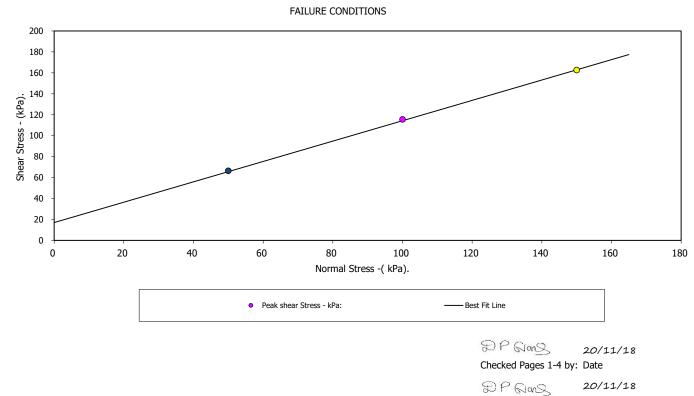
Contract No.: **41501**

Buttington Quarry (B.Quarry)



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S2	Depth from (m):	0.00	
Sample Number :	2	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assume	d)	
Specimen Tested:	At natural n	noisture content, Remoulded (Ligl	nt Tamping) Material above 2	20mm removed.
Sample Description:				
Brown clayey fine to medium GRAVEL				
STAGE		1	2	3
Initial Conditions				
Height - mm:		130.0	0 130.00	130.00
Length - mm:		300.0	0 300.00	300.00
Moisture Content - %:		1	0 10	10
Bulk Density - Mg/m3:		2.0	2 2.02	2.02
Dry Density - Mg/m3:		1.8	3 1.83	1.83
Voids Ratio:		0.447	8 0.4478	0.4477
Normal Pressure- kPa		5	0 100	150
Consolidation				
Consolidated Height - mm:		126.4	0 121.96	117.52
Shear				
Rate of Strain (mm/min)		0.6	67 0.667	0.667
Strain at peak shear stress (%)		55.0	6 55.19	57.32
Peak shear Stress - kPa:		6	6 116	163
PEAK				
Angle of Shearing Resistance:(0)				44.2
Effective Cohesion - kPa:	·			17



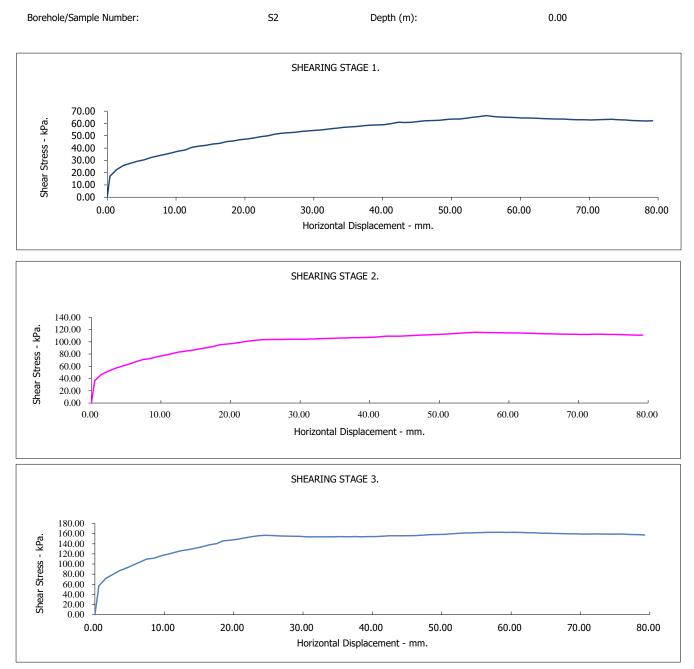
Approved Pages 1-4 by: Date

Contract No.: 41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



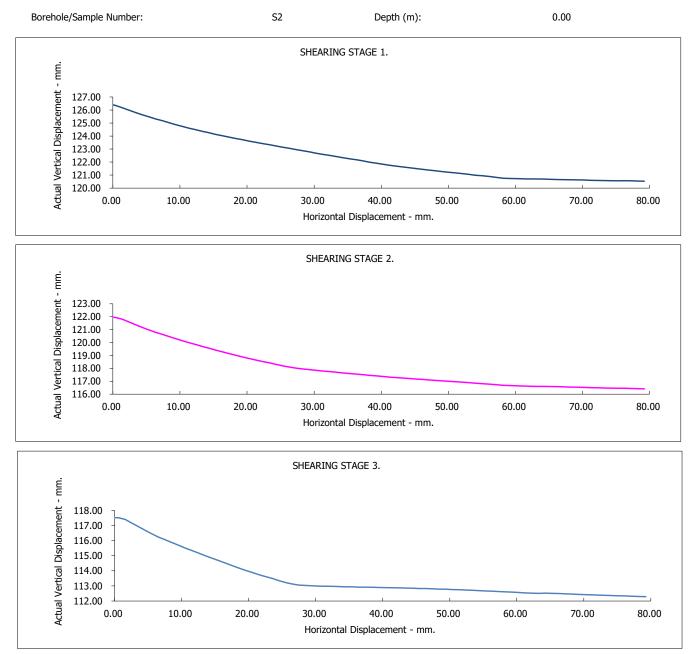
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



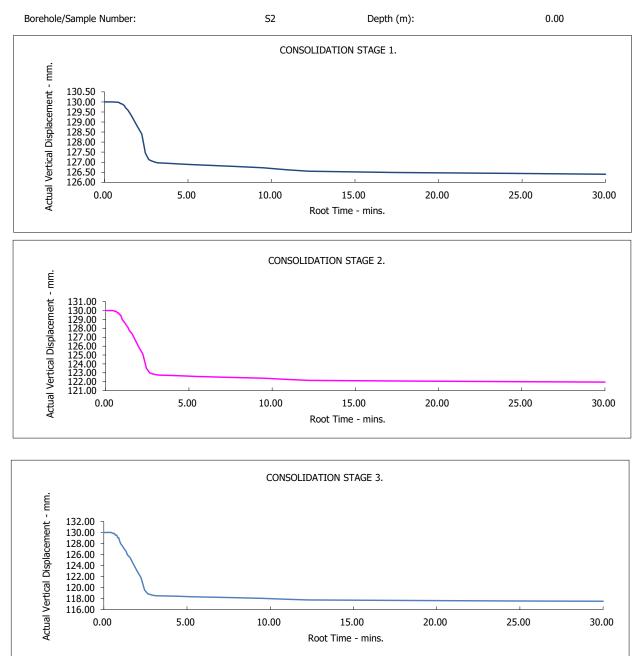
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



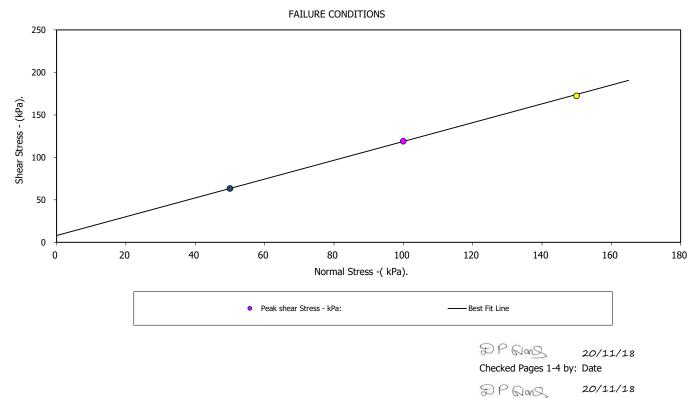
Contract No.: **41501**

Buttington Quarry (B.Quarry)



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S3	Depth from (m):	0.00	
Sample Number :	3	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)		
Specimen Tested:	At natural mo	pisture content, Remoulded (Light	Tamping) Material above 20n	nm removed.
Sample Description:				
Brown slightly clayey fine to mediur	n GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		134.00	134.00	134.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		7	7	7
Bulk Density - Mg/m3:		1.62	1.62	1.62
Dry Density - Mg/m3:		1.52	1.52	1.52
Voids Ratio:		0.7425	0.7426	0.7427
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		129.93	127.63	125.80
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		54.10	65.71	66.42
Peak shear Stress - kPa:		63	119	173
PEAK				
Angle of Shearing Resistance:(0)				47.9
Effective Cohesion - kPa:				8



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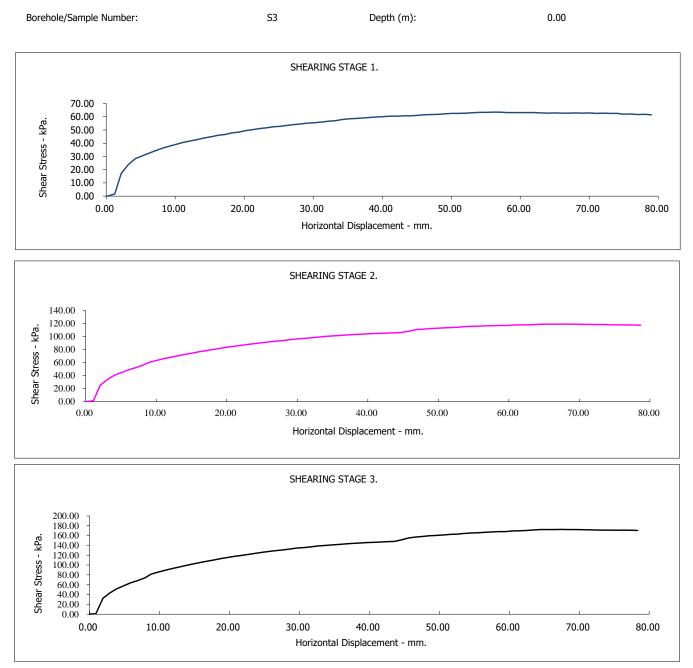
Contract No.:

41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



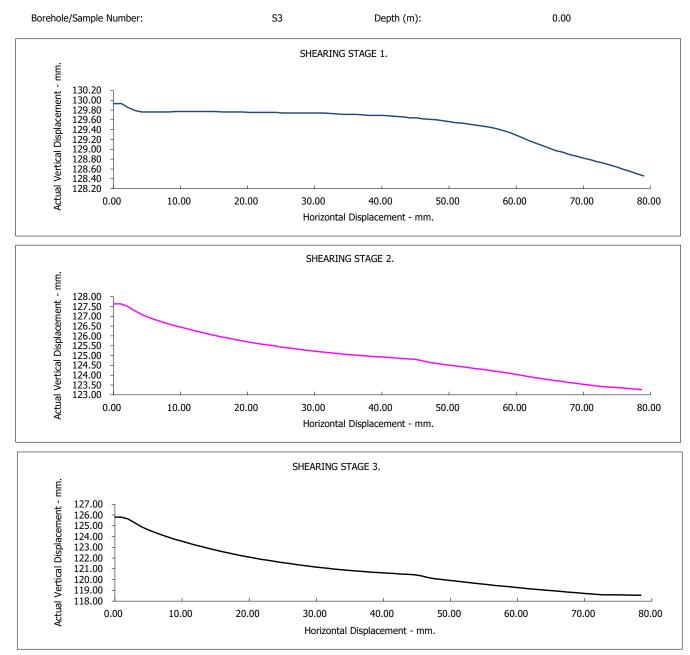
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



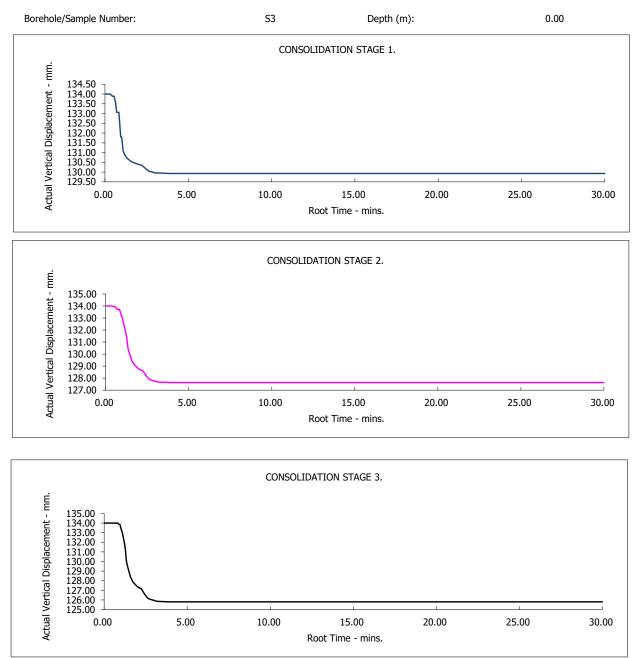
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



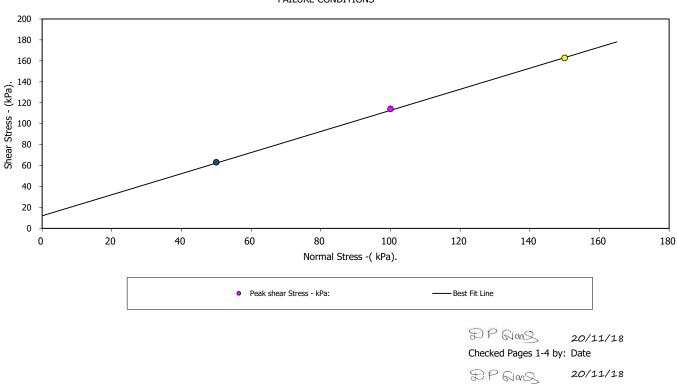
Contract No.: **41501**

Buttington Quarry (B.Quarry)



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S4	Depth from (m):	0.00	
Sample Number :	4	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)	
Specimen Tested:	At natural m	oisture content, Remoulded (Light	Tamping) Material above 20r	nm removed.
Sample Description:				
Brown slightly clayey fine to mediun	n GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		134.00	134.00	134.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		12	12	12
Bulk Density - Mg/m3:		1.59	1.59	1.59
Dry Density - Mg/m3:		1.43	1.43	1.43
Voids Ratio:		0.8575	0.8577	0.8575
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		130.29	129.03	127.07
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		53.12	52.66	56.20
Peak shear Stress - kPa:		63	114	163
РЕАК				
Angle of Shearing Resistance:(0)				45.2
Effective Cohesion - kPa:				12



FAILURE CONDITIONS

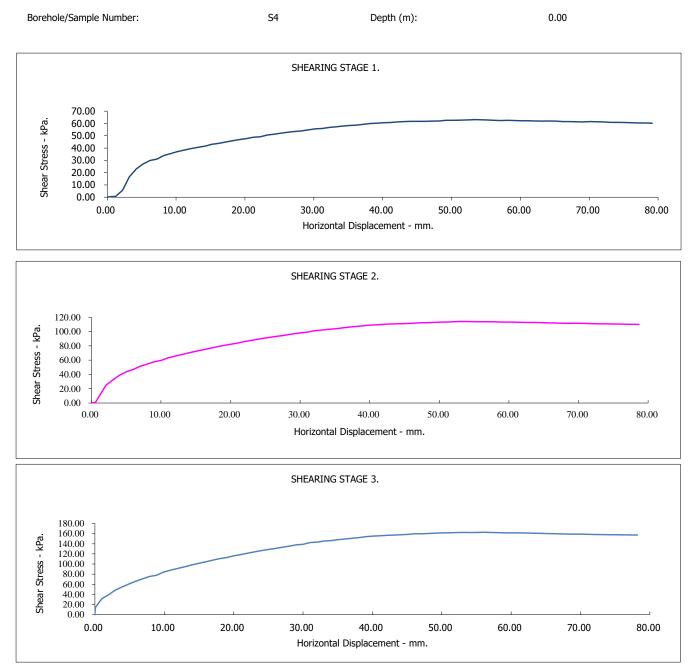
Contract No.: 41501

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Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



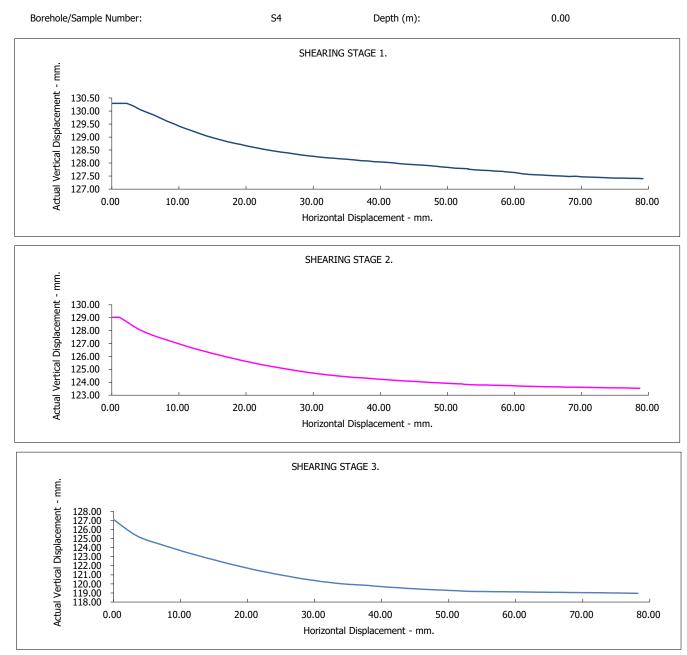
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

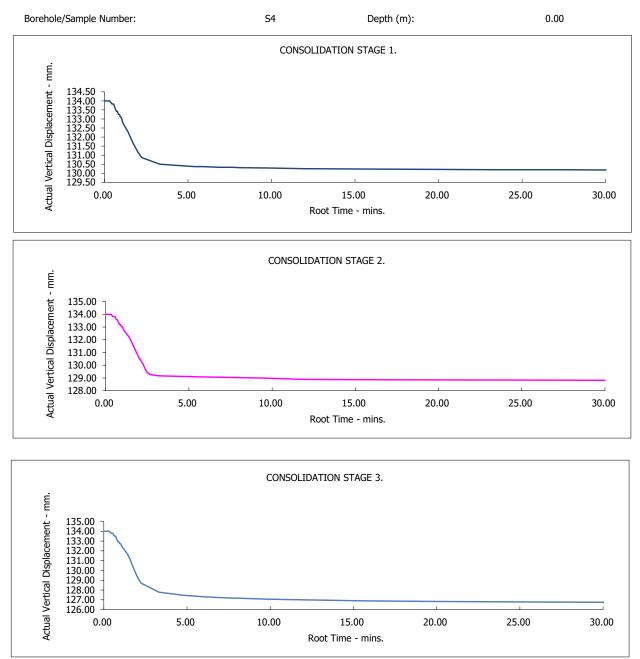
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



010705CD SBOX LARGE

BS1377:Part 7:5 :1990.



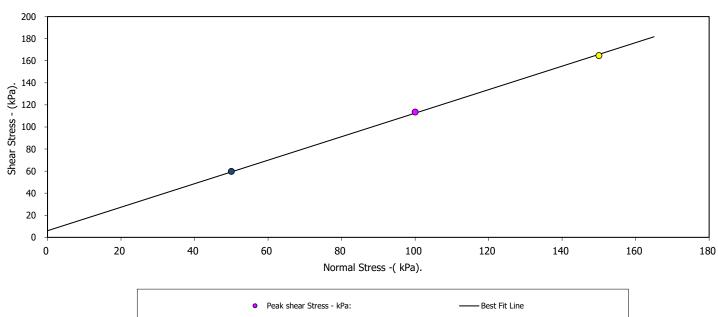
Contract No.: **41501**

Buttington Quarry (B.Quarry)



Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S5	Depth from (m):	0.00	
Sample Number :	5	,	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)		
Specimen Tested:	At natural m	noisture content, Remoulded (Light T	amping) Material above 20m	im removed.
Sample Description:				
Brown slightly clayey fine to mediun	າ GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		132.50	132.50	132.50
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		6	6	6
Bulk Density - Mg/m3:		1.65	1.65	1.65
Dry Density - Mg/m3:		1.55	1.55	1.55
Voids Ratio:		0.7053	0.7049	0.7050
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		128.00	126.20	124.88
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		60.01	61.02	61.02
Peak shear Stress - kPa:		60	113	165
PEAK				
Angle of Shearing Resistance:(θ)				46.8
Effective Cohesion - kPa:				6



FAILURE CONDITIONS

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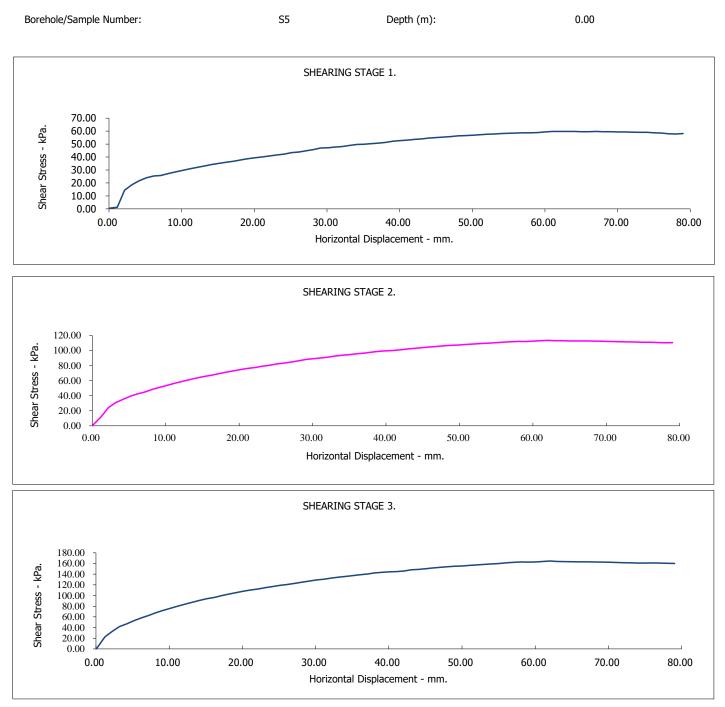
Approved Pages 1-4 by: Date

Contract No.: **41501**

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



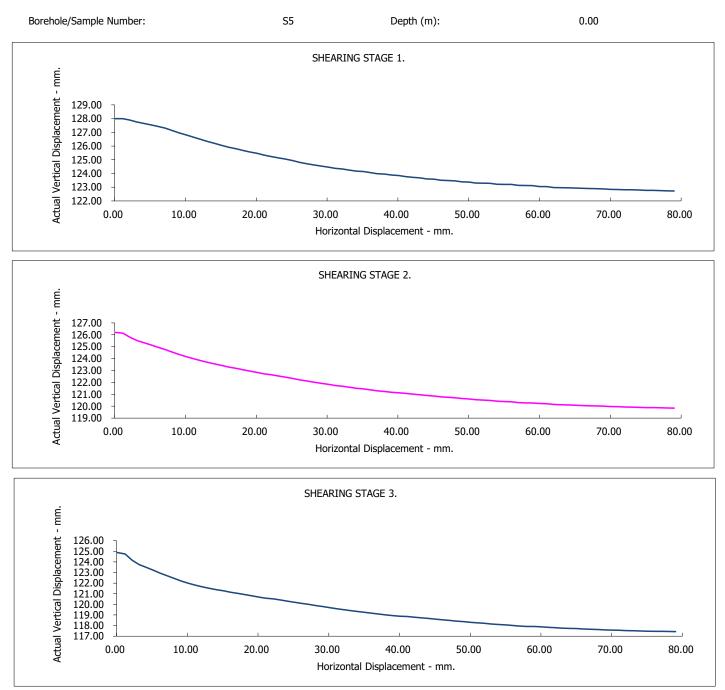


Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



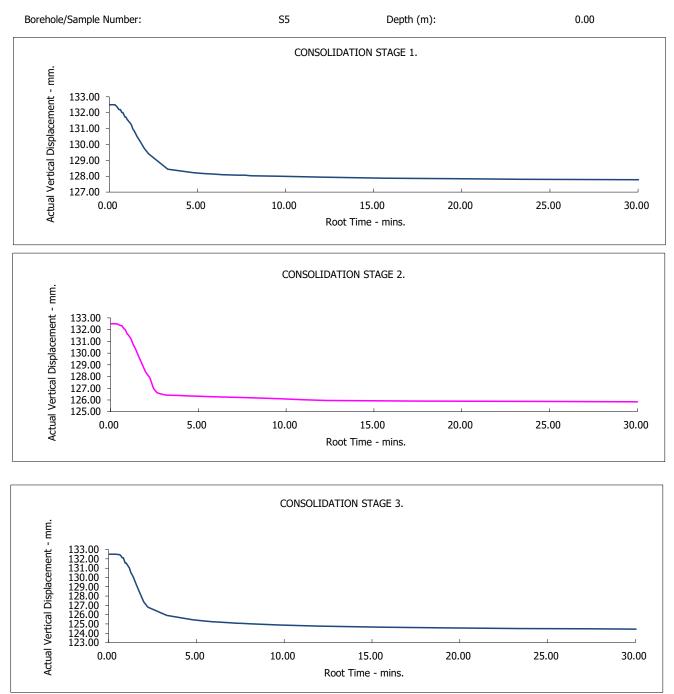
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



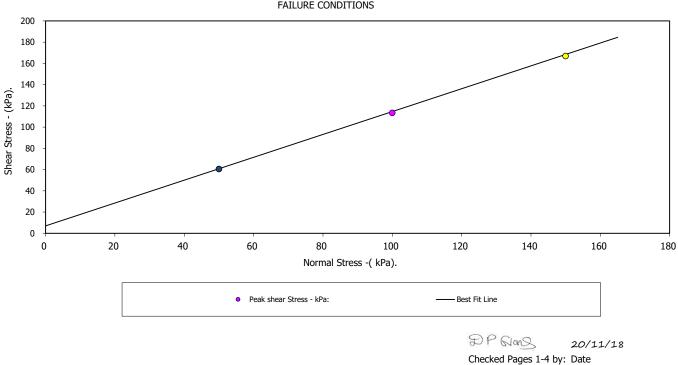
Contract No.: 41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.

Borehole Number:	S6	Depth from (m):	0.00	
Sample Number :	6	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assume	d)	
Specimen Tested:	At natural m	oisture content, Remoulded (Ligh	t Tamping) Material above 2	20mm removed.
Sample Description:				
Brown slightly clayey fine to medium	GRAVEL			
STAGE		1	2	3
Initial Conditions				
Height - mm:		135.0	0 135.00	135.00
Length - mm:		300.0	0 300.00	300.00
Moisture Content - %:		1	0 10	10
Bulk Density - Mg/m3:		1.6	0 1.60	1.60
Dry Density - Mg/m3:		1.4	4 1.44	1.44
Voids Ratio:		0.835	3 0.8351	0.8355
Normal Pressure- kPa		5	0 100	150
Consolidation				
Consolidated Height - mm:		132.2	2 129.72	128.51
Shear				
Rate of Strain (mm/min)		0.66	67 0.667	0.667
Strain at peak shear stress (%)		66.1	4 67.37	57.68
Peak shear Stress - kPa:		6	1 113	167
PEAK				
Angle of Shearing Resistance: (θ)				47.1
Effective Cohesion - kPa:				7



FAILURE CONDITIONS

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20/11/18

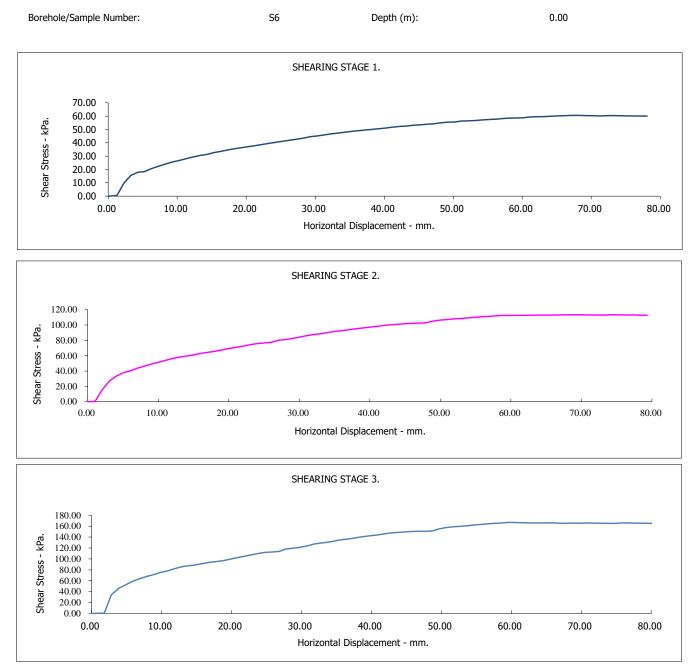
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Contract No.: 41501

Buttington Quarry (B.Quarry)



BS1377:Part 7:5 :1990.



Contract No.: **41501**

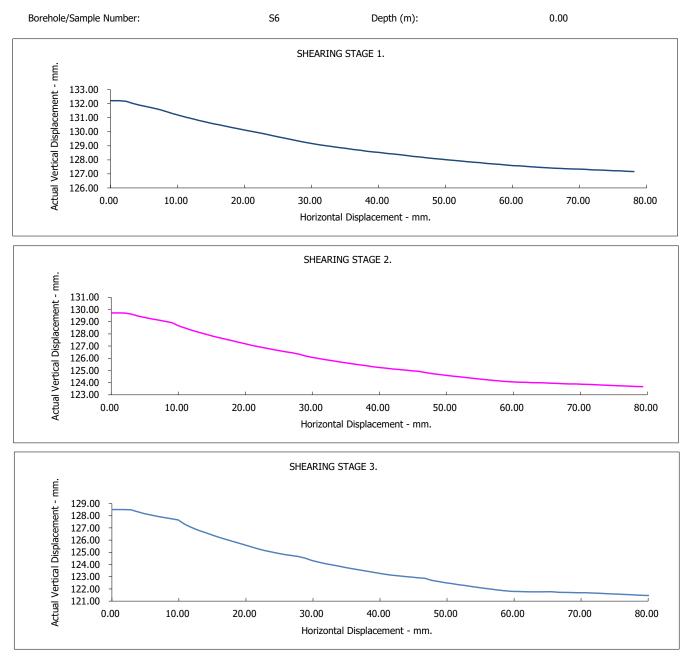
Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



010705CD SBOX LARGE

BS1377:Part 7:5 :1990.



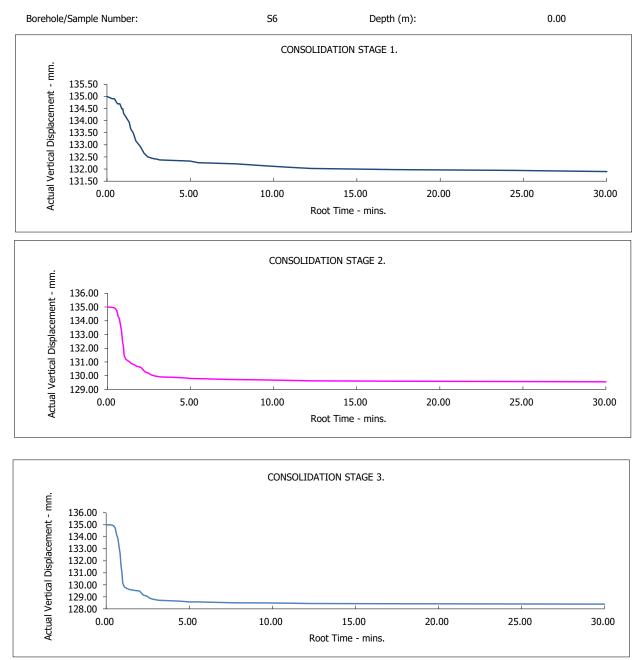
Contract No.: **41501**

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH Figure.



BS1377:Part 7:5 :1990.



Contract No.: **41501**

Buttington Quarry (B.Quarry)



ANNEX D TBMF Field Measurements

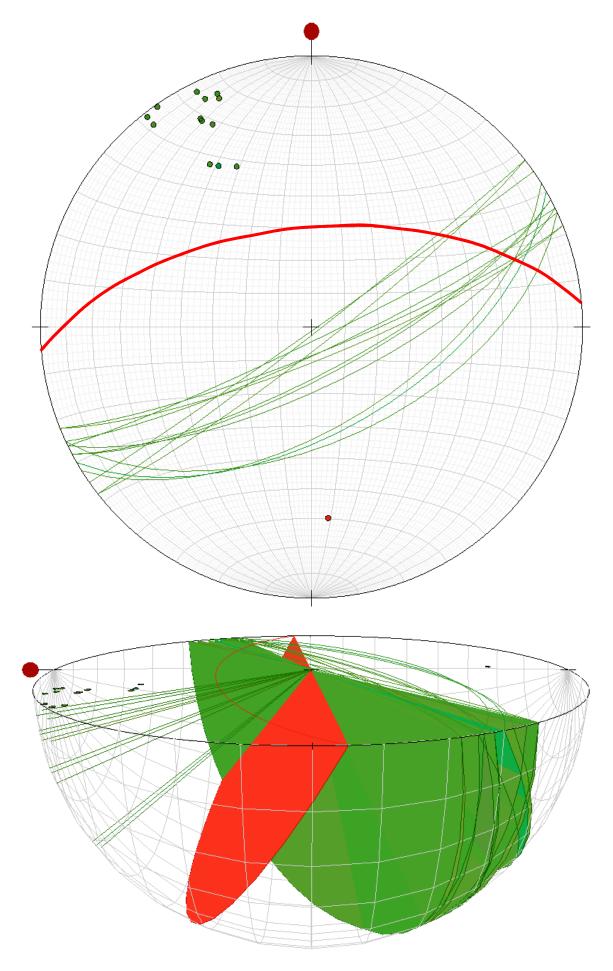
TBMF Field Measurements

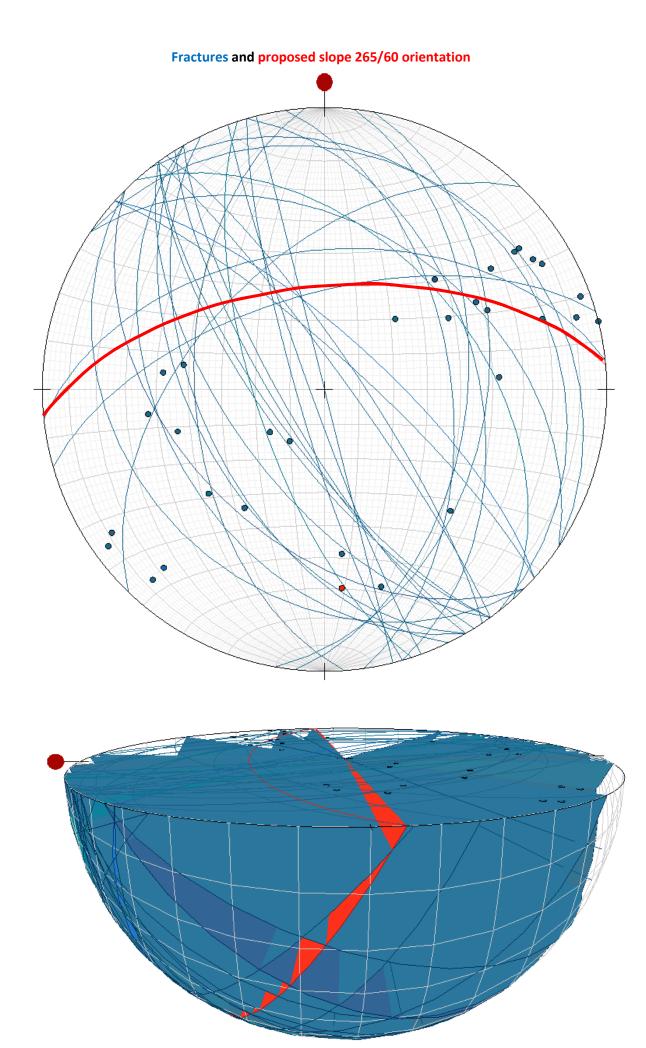
Bedding	Joints	
062/76	135/46	264/49
065/55	135/29	148/76
055/89	006/48	254/62
062/75	150/78	144/72
060/58	144/62	312/74
058/60	164/82	312/80
068/82	324/84	224/52
068/80	322/20	326/80
064/86	318/46	166/90
065/82	304/18	304/42
064/72	344/45	326/70
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	162/70	,

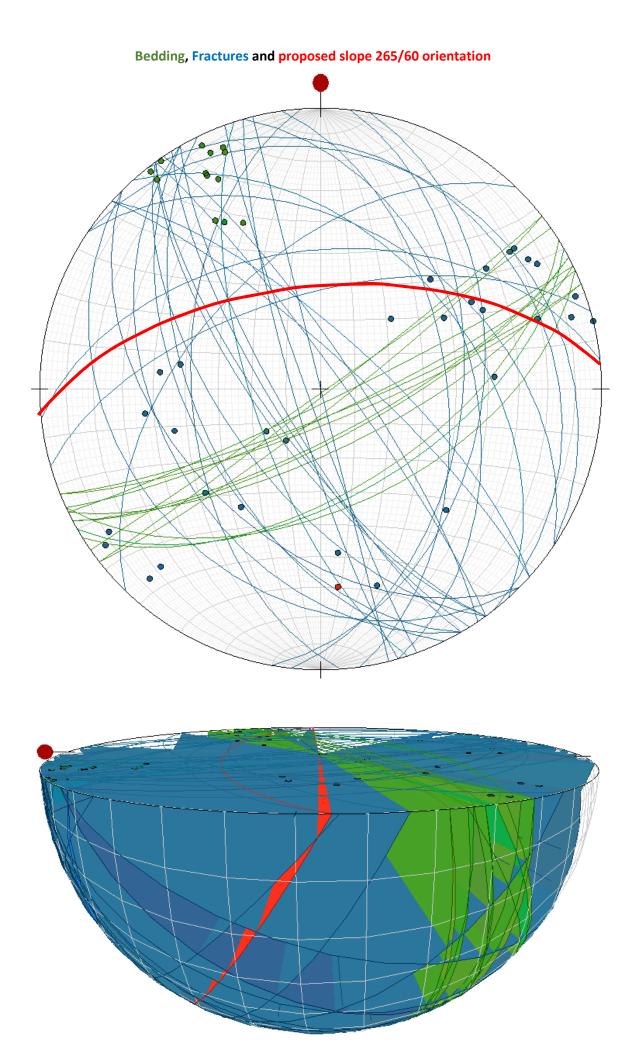
ANNEX E	
Stereonets	

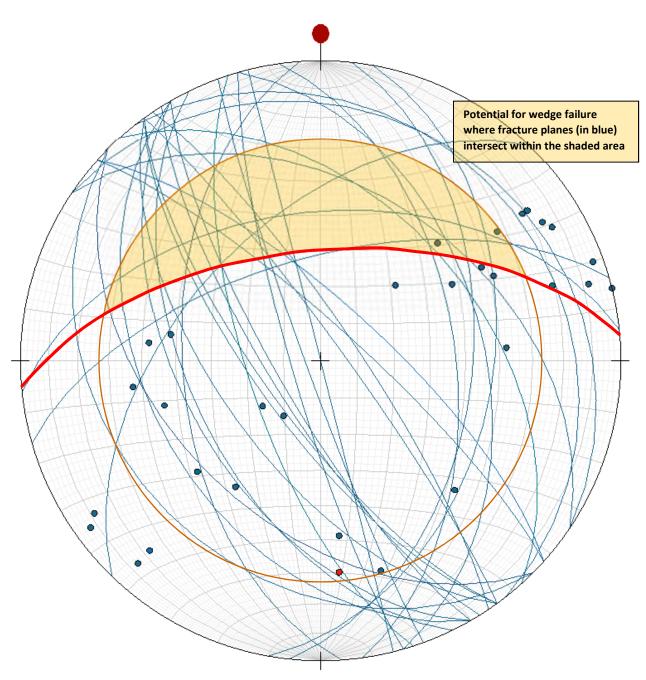
SLOPE CUT AT 265/60

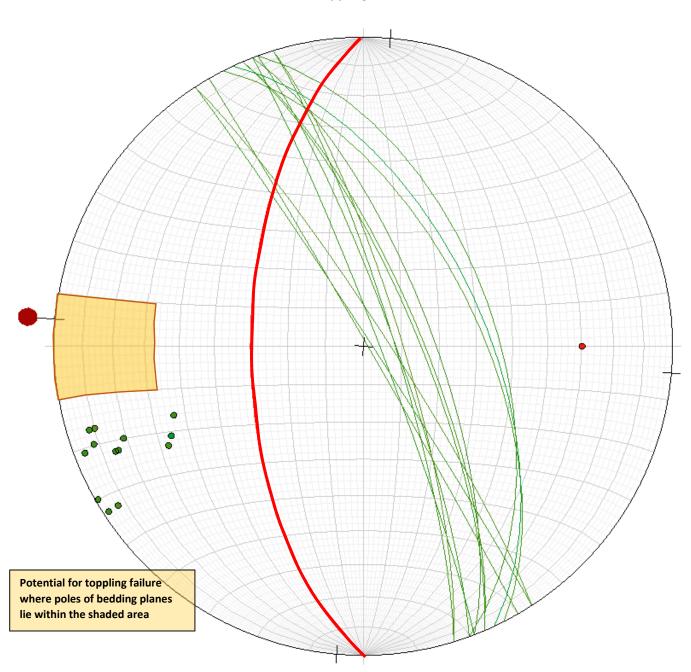
Bedding and proposed slope 265/60 orientation



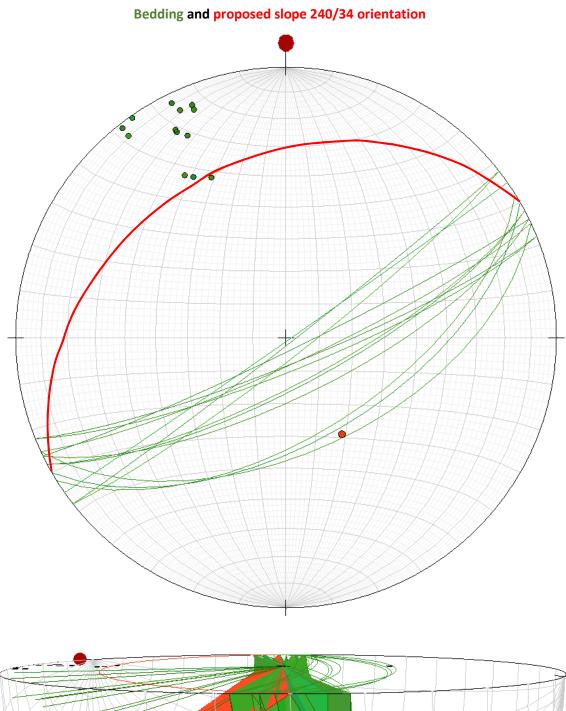


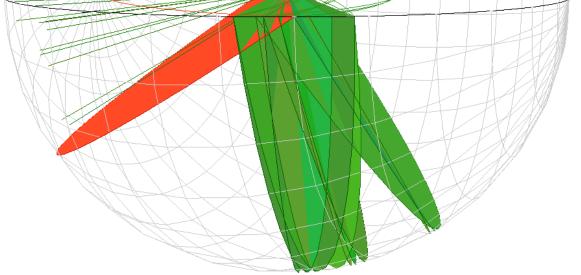




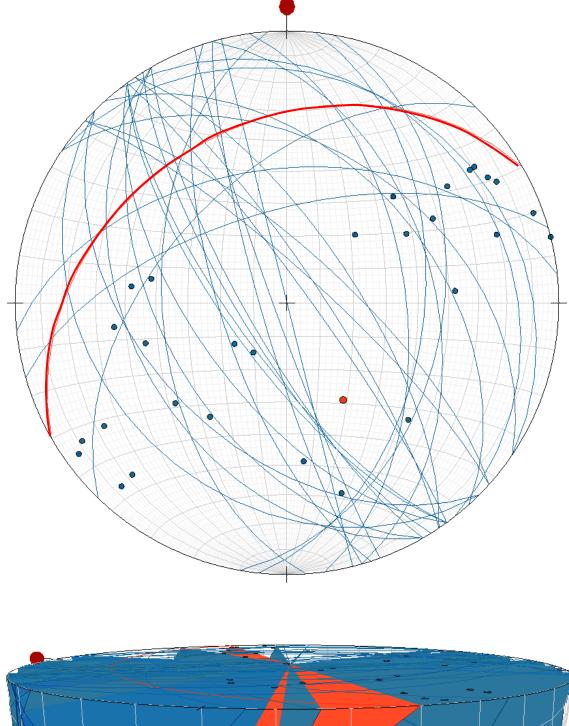


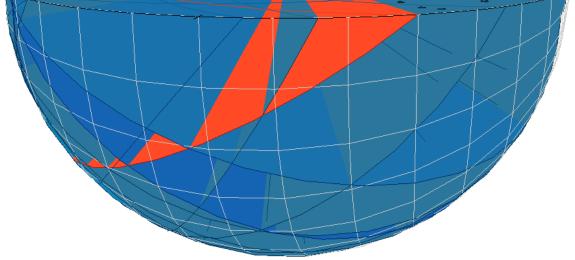
SLOPE CUT AT 240/34

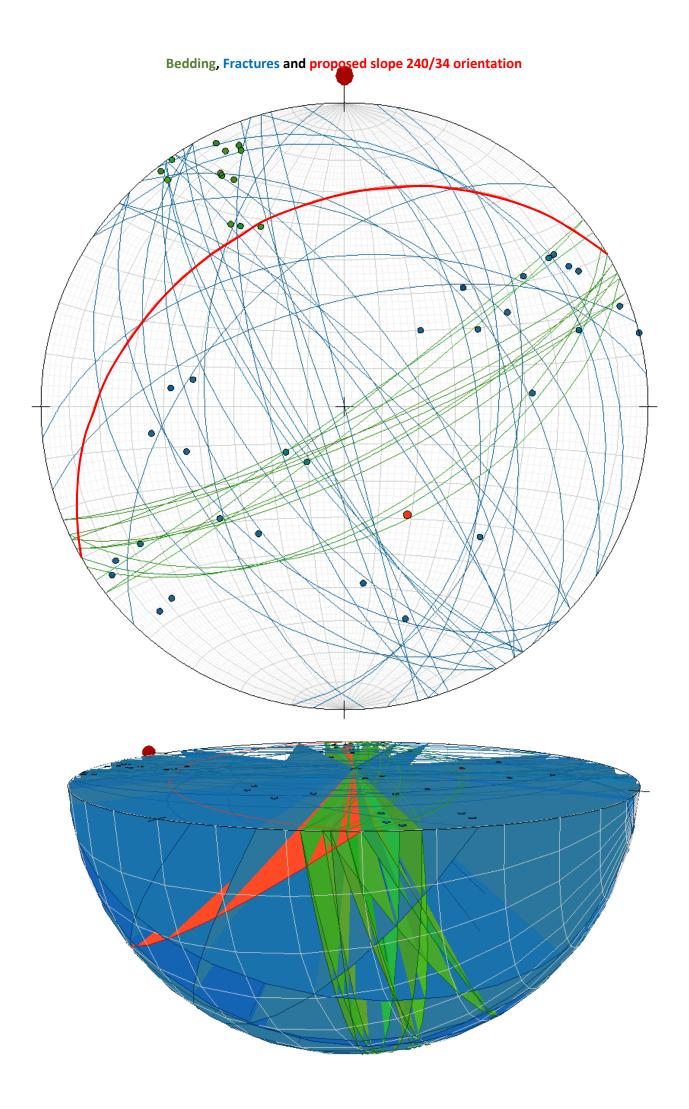


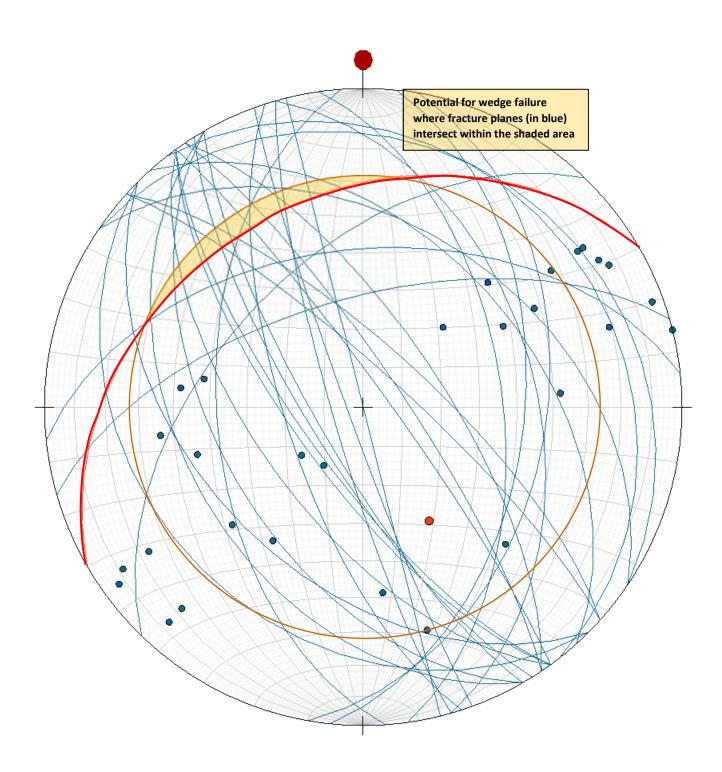


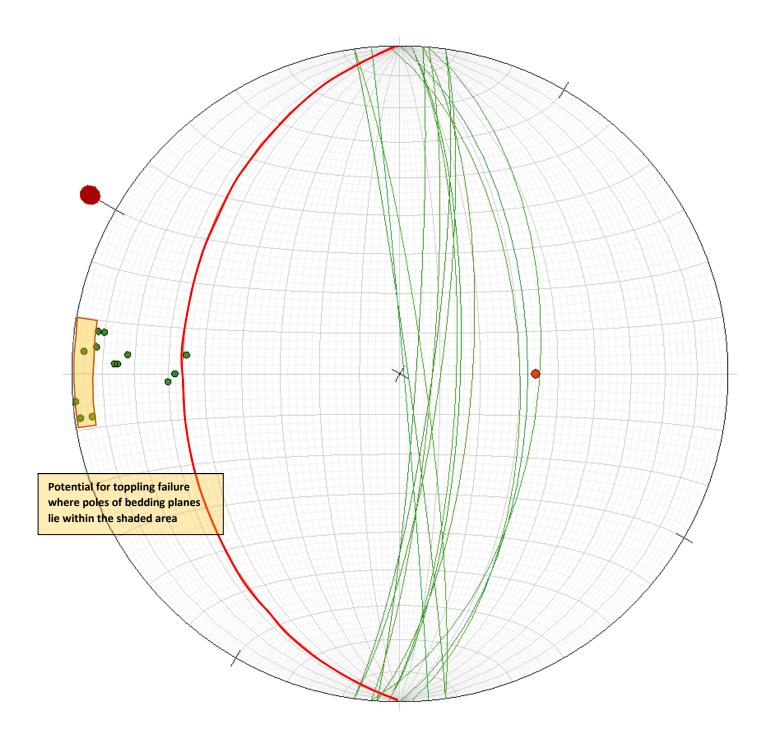
Fractures and proposed slope 240/34 orientation



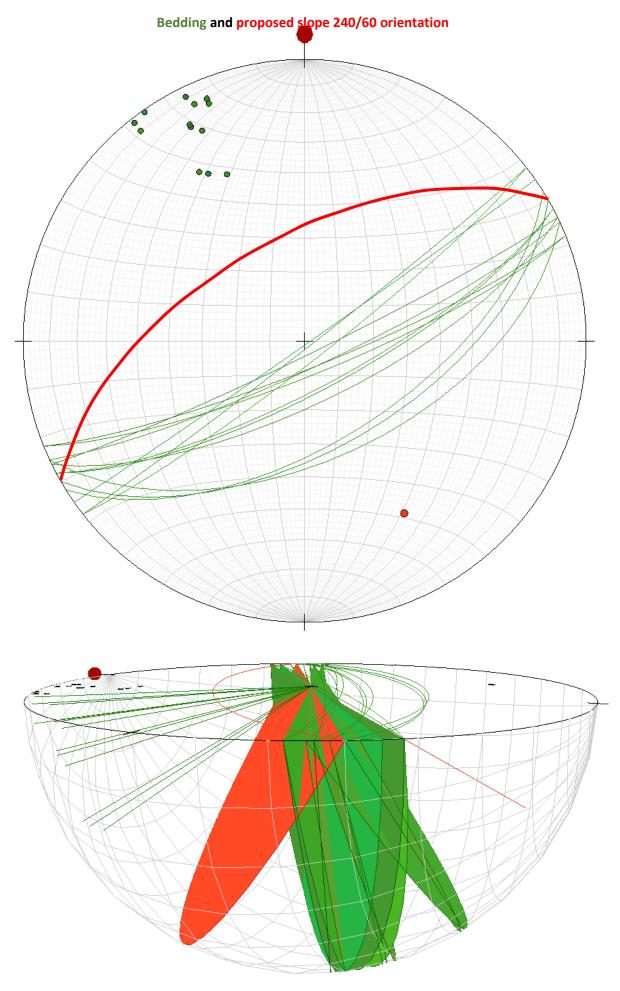


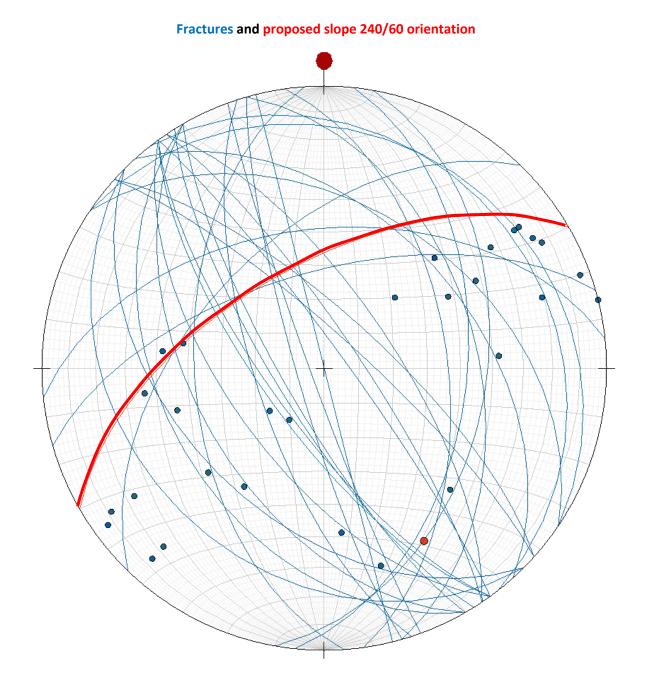


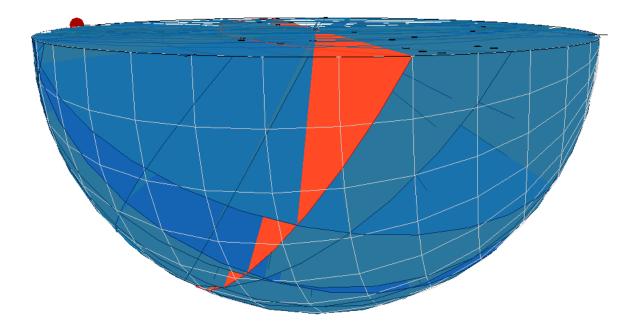




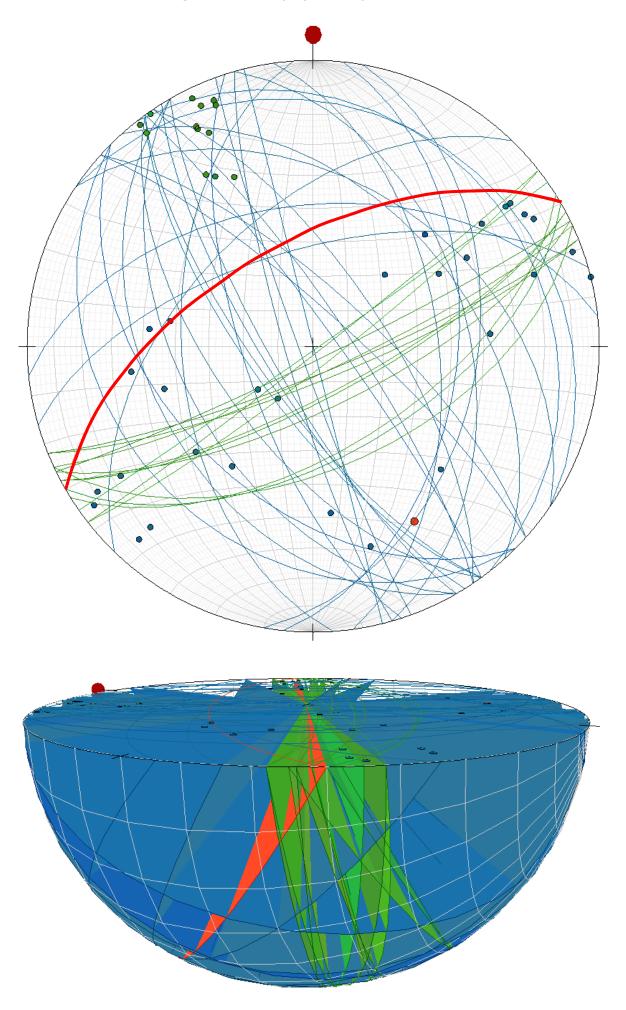
SLOPE CUT AT 240/60

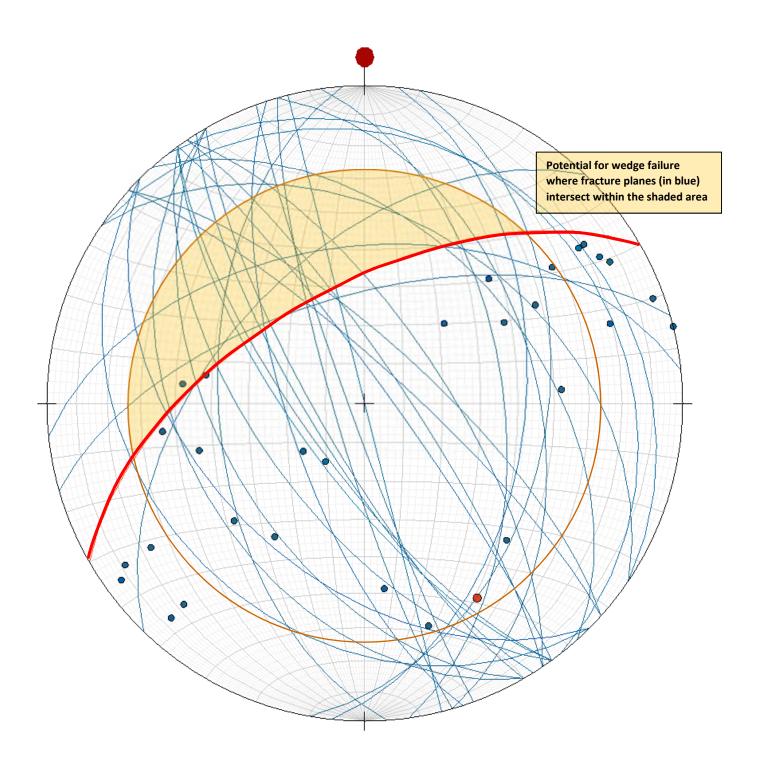


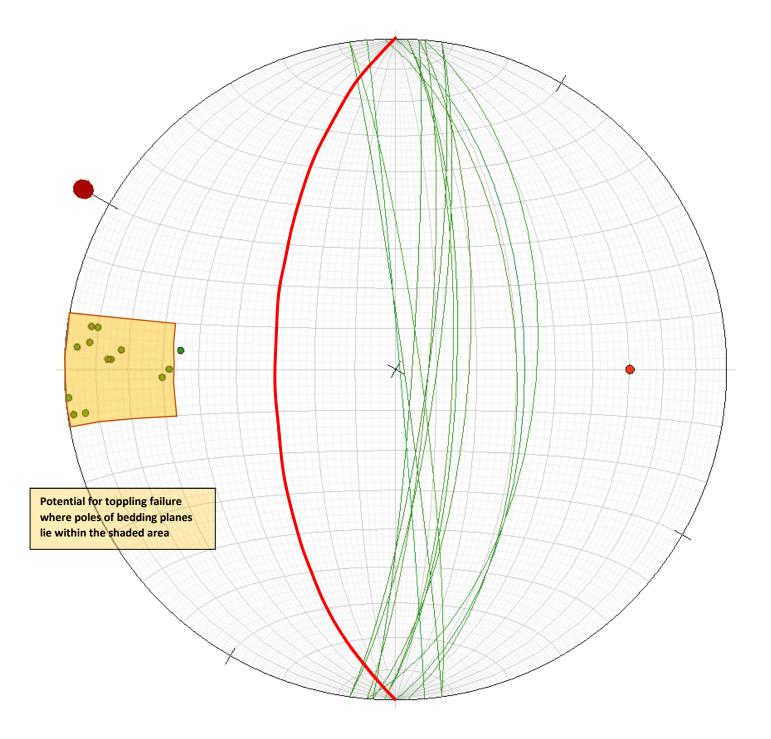




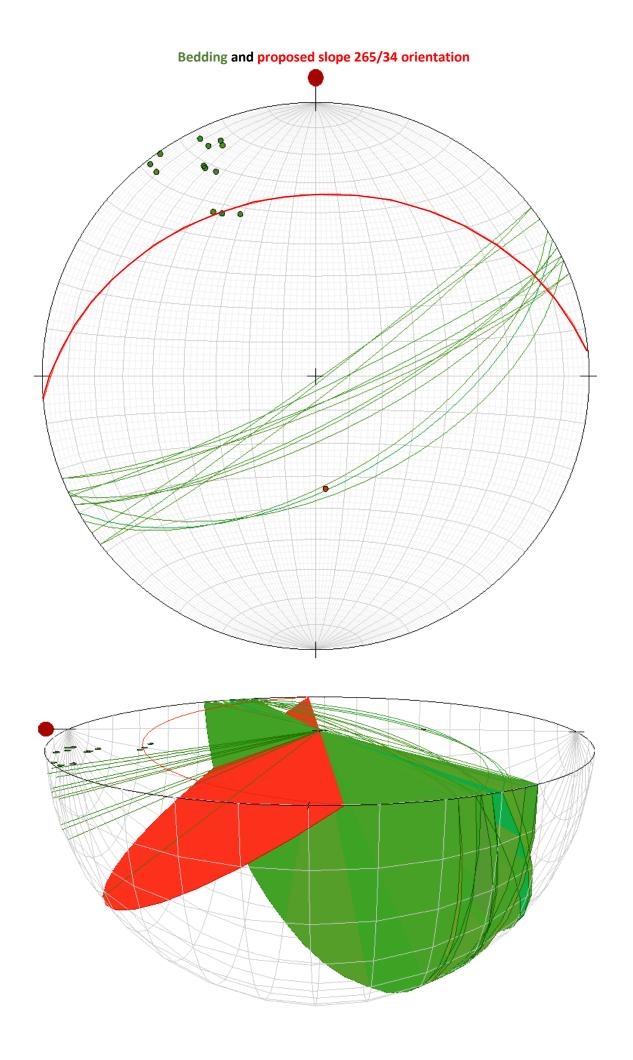
Bedding, Fractures and proposed slope 240/60 orientation



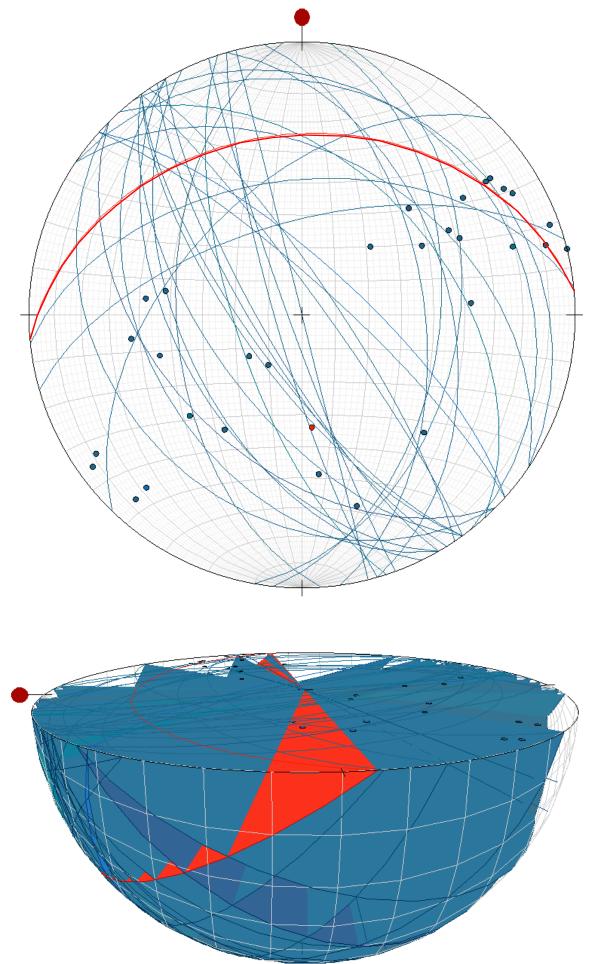


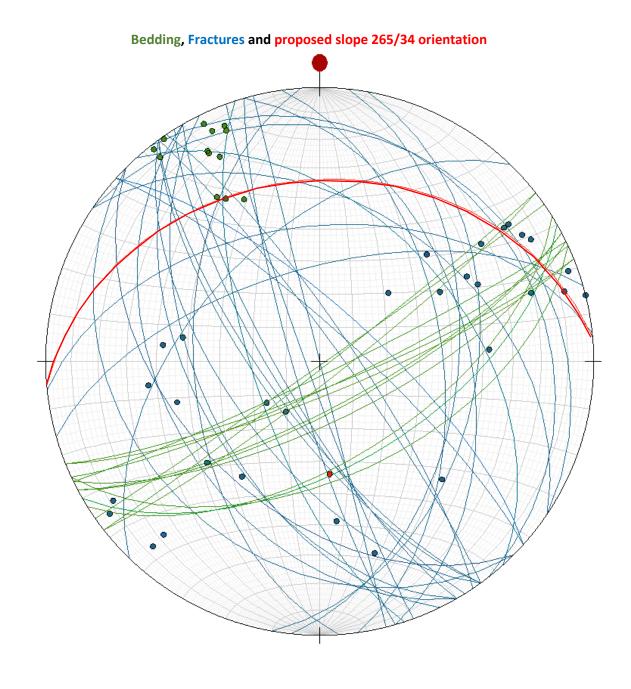


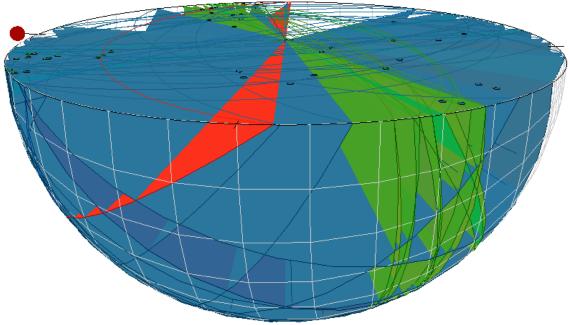
SLOPE CUT AT 265/34

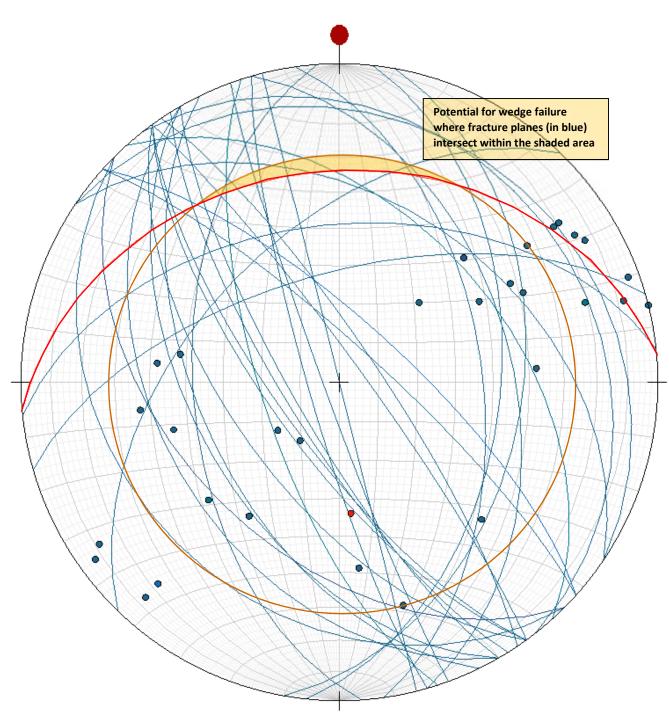


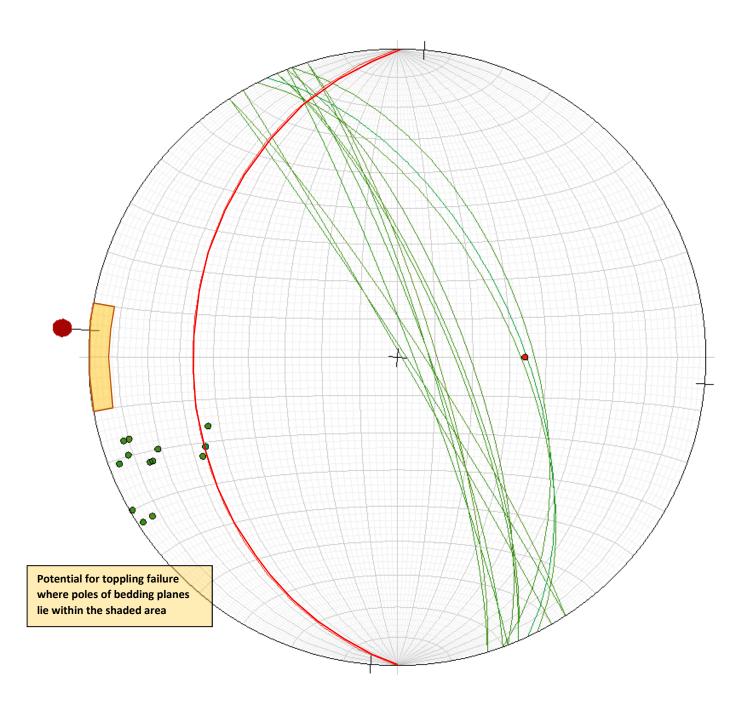












ANNEX F PSD and Slake Durability Test Results





Qty

1

Contract Number: 41501

Client Ref: Client PO: **14880RH**

Laboratory Report

Report Date: 20-11-2018

Client Terrafirma Wales Ltd 5 Deryn Court Wharfedale Road Pentwyn Cardiff CF23 7HB

Contract Title: Buttington Quarry (B.Quarry) For the attention of: Ruth Howells

Date Received: 06-11-2018 Date Commenced: 06-11-2018 Date Completed: 20-11-2018

Test Description

 Particle size Distribution (Aggregate)
 6

 BS EN 933-1 - * UKAS
 6

 Determination of the slake durability index, two cycles.
 6

 ISRM Suggested Method For Determining Slake Durability - @ Non Accredited Test
 6

 Large Shear Box 300mm Peak with 3 confining pressures includes remoulding
 6

 BS 1377:1990 - Part 7 : 5 and Specification for Highway Works Vol.1 Clause 636 Part 2 - @ Non Accredited Test
 6

Disposal of samples for job

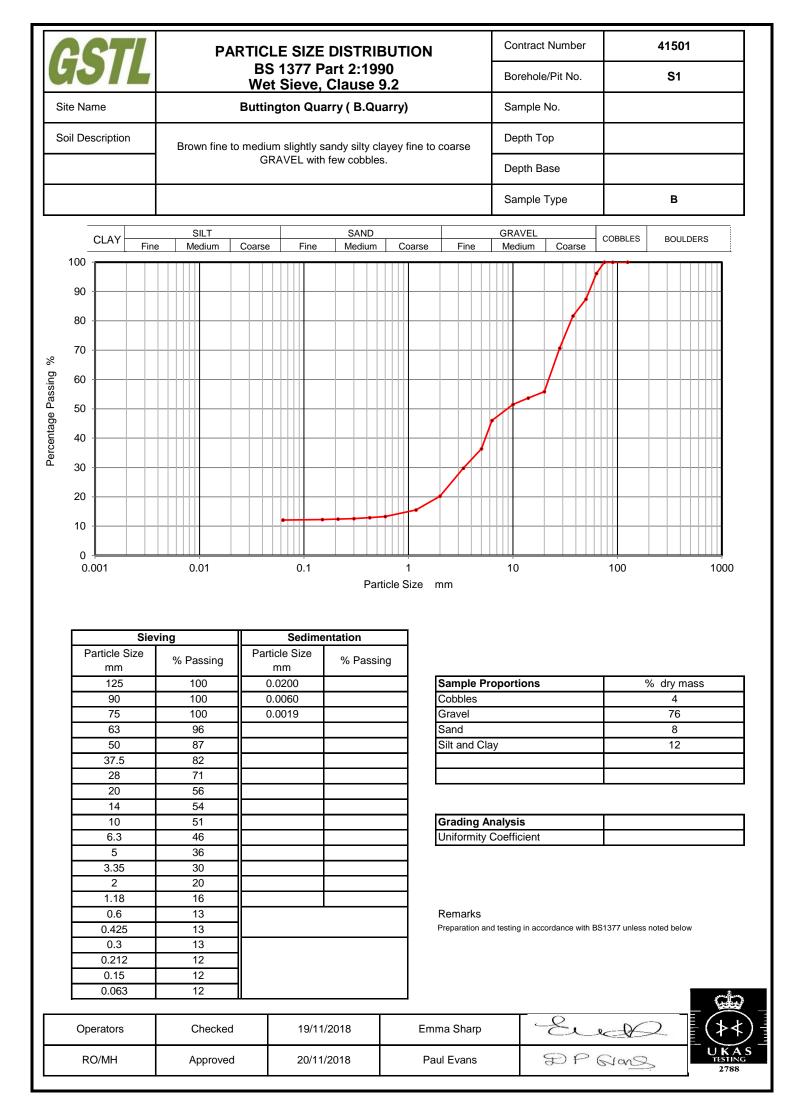
Notes: Observations and Interpretations are outside the UKAS Accreditation

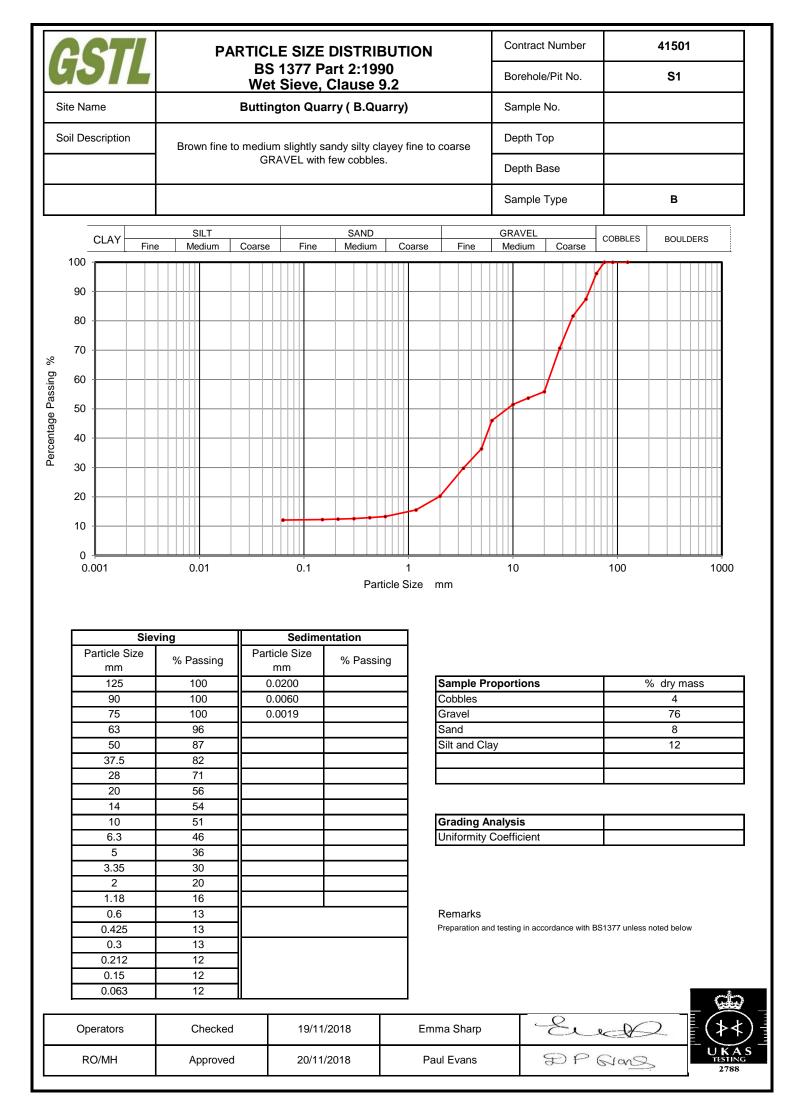
- * denotes test included in laboratory scope of accreditation
- # denotes test carried out by approved contractor
- @ denotes non accredited tests

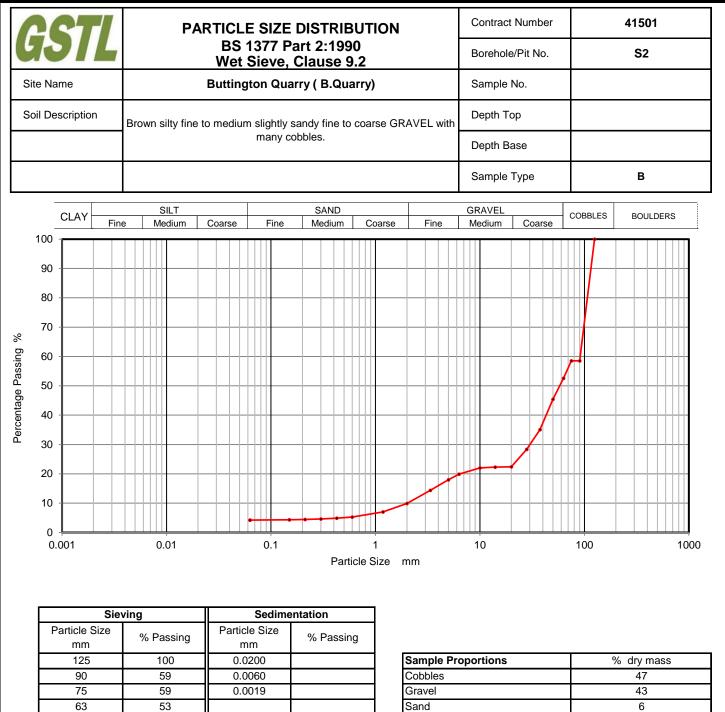
This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory. **Approved Signatories:**

Alex Wynn (Associate Director) - Ben Sharp (Contracts Manager) - Emma Sharp (Office Manager) Paul Evans (Quality/Technical Manager) - Richard John (Advanced Testing Manager) - Sean Penn (Administrative/Accounts Assistant) Wayne Honey (Administrative/Quality Assistant)

GEO Site & Testing Services Ltd Unit 3-4, Heol Aur, Dafen Ind Estate, Dafen, Llanelli, Carmarthenshire SA14 8QN Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk







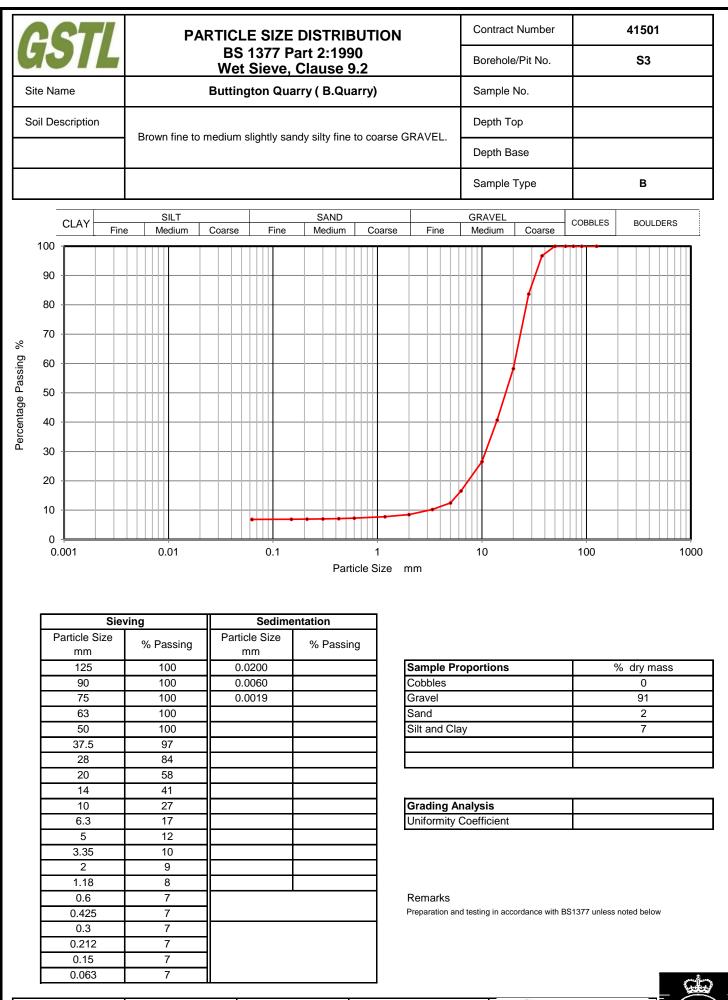
	0		
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0200	
90	59	0.0060	
75	59	0.0019	
63	53		
50	45		
37.5	35		
28	28		
20	22		
14	22		
10	22		
6.3	20		
5	18		
3.35	14		
2	10		
1.18	7		
0.6	5		
0.425	5		
0.3	5		
0.212	4		
0.15	4		
0.063	4		

Sample Proportions	% dry mass
Cobbles	47
Gravel	43
Sand	6
Silt and Clay	4

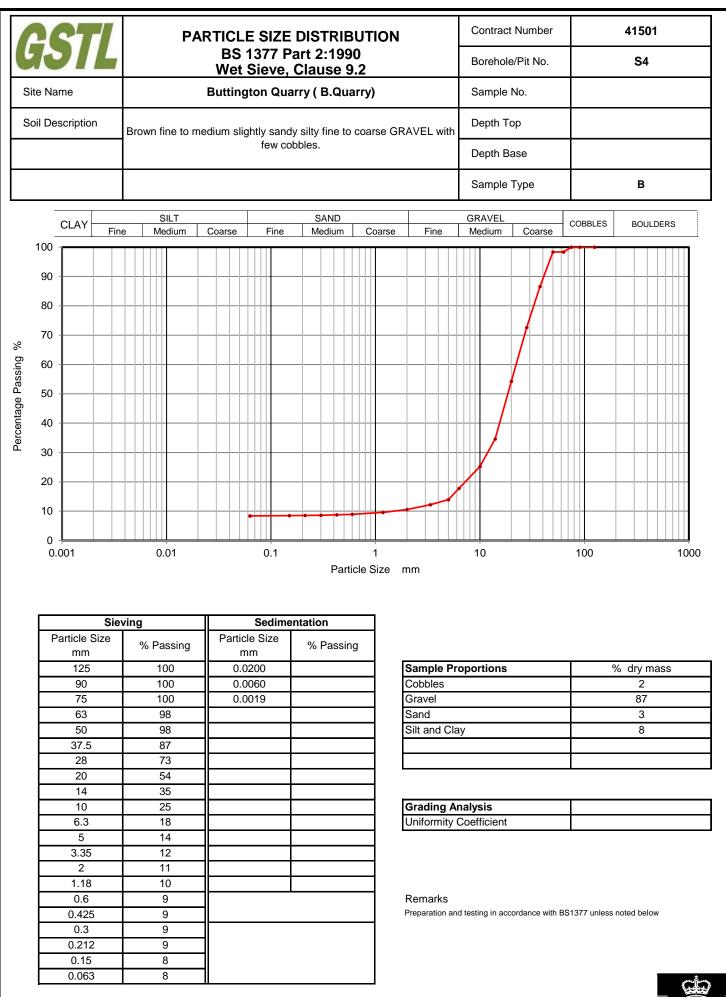
Grading Analysis	
Uniformity Coefficient	

Remarks Preparation and testing in accordance with BS1377 unless noted below

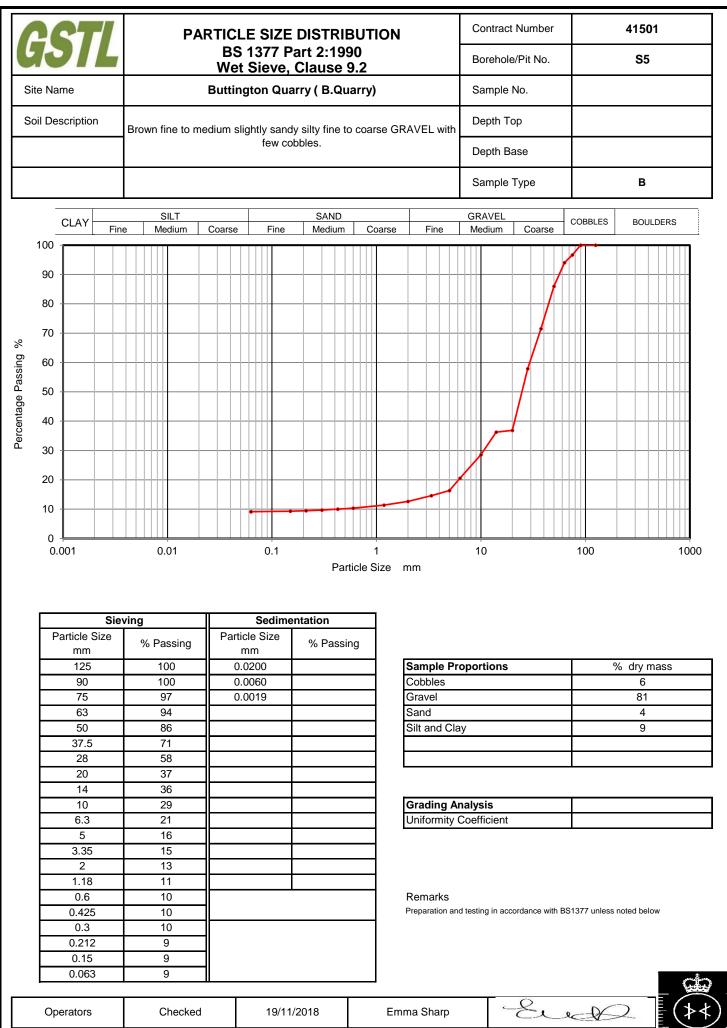
	Operators	Checked	19/11/2018	Emma Sharp	-Euco	$(\diamond \langle)$
	RO/MH	Approved	20/11/2018	Paul Evans	\$P & Grans	UKAS TESTING 2788
_						-



Operators	Checked	19/11/2018	Emma Sharp	-Euch	$ \langle \mathbf{A} \mathbf{A} \rangle \rangle$
RO/MH	Approved	20/11/2018	Paul Evans	\$P & Grans	UKAS TESTING 2788



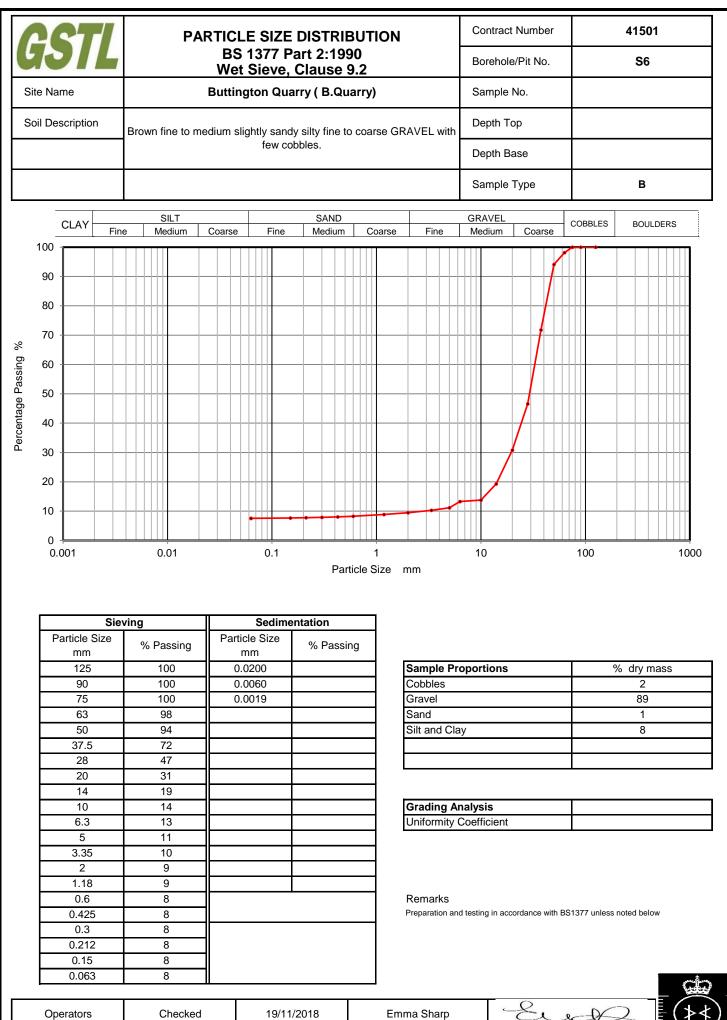
Operators	Checked	19/11/2018	Emma Sharp	-Euch	$(\mathbf{A} \mathbf{A})$
RO/MH	Approved	20/11/2018	Paul Evans	\$P P Grons	UKAS TESTING 2788



Checked	19/11/2018	Emma Sharp	Such
Approved	20/11/2018	Paul Evans	\$P Grons

RO/MH

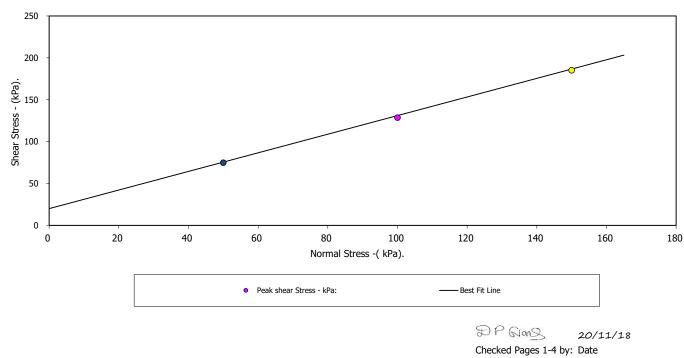




Operators	Checked	19/11/2018	Emma Sharp	Such	$(\mathbf{A} \mathbf{A})$
RO/MH	Approved	20/11/2018	Paul Evans	DP Grans	UKAS TESTING 2788

Test Report: CONSOLIDATED DRAINED LARGE SHEARBOX TEST. BS1377:Part 7:5 :1990.

Borehole Number:	S1	Depth from (m):	0.00	
Sample Number :	1	Depth to (m):	0.00	
Sample Type:	В			
Particle Density - Mg/m3:		2.65 (Assumed)		
Specimen Tested:	At natural m	noisture content, Remoulded (Light	Tamping) Material above 20	mm removed.
Sample Description:				
Brown clayey fine to medium GRAV	L			
STAGE		1	2	3
Initial Conditions				
Height - mm:		136.00	136.00	136.00
Length - mm:		300.00	300.00	300.00
Moisture Content - %:		10	10	10
Bulk Density - Mg/m3:		2.04	2.04	2.04
Dry Density - Mg/m3:		1.85	1.85	1.85
Voids Ratio:		0.4316	0.4317	0.4318
Normal Pressure- kPa		50	100	150
Consolidation				
Consolidated Height - mm:		133.03	131.54	129.77
Shear				
Rate of Strain (mm/min)		0.667	0.667	0.667
Strain at peak shear stress (%)		58.55	60.41	63.30
Peak shear Stress - kPa:		75	129	185
PEAK				
Angle of Shearing Resistance:(0)				48.0
Effective Cohesion - kPa:				20



FAILURE CONDITIONS

Contract No.: 41501

20/11/18

DP Glanz

Approved Pages 1-4 by: Date

Buttington Quarry (B.Quarry)

Client Ref Number: 14880RH



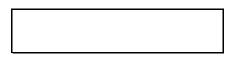


Determination of Slake Durability Index

GJIL	ISRM Part 2.2	
Contract Number	41501	
Site Name	Buttington Quarry (B.Quarry)	
Nature of Slaking Fluid	Water at 20°C	
Date Tested	19/11/2018	

Hole Reference	Dep	oth (m)	Slake First Cycle	Slake Second Cycle	Appearance Of Material Retained In The Drum	Appearance Of Material Passing Through The Drum
S1			87.79	75.84	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S2			88.18	74.93	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S3			95.84	92.97	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S4			92.52	88.10	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S5			93.77	89.44	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.
S6			91.14	88.01	10 Pieces of Subangular aggregate material with some pieces with ground corners and edges	Sub-angular to <2mm fragments to a sand/silt.

Key	Reported As
Slake First Cycle	%
Slake Second Cycle	%



Operators	Checked	19/11/2018	Wayne Honey	W. Honey
JD	Approved	20/11/2018	Ben Sharp	