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# **MONA OFFSHORE WIND PROJECT**





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Prepared by:	Prepared for:
RPS	Mona Offshore Wind Ltd.



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# **Glossary**

Term	Meaning
Abstraction licence	The authorisation granted by the Environment Agency to allow the removal of surface water or groundwater.
Aquifer	A water-bearing geological unit that can yield economically viable amounts of groundwater.
COMAH Site	Industrial sites that subject to the Control of Major Accident Hazards Regulations 1999 based on the substances stored on the facility and quantities thereof
Groundwater	Water that is contained in underground rocks and sediments below the ground surface.
Groundwater Body	Groundwater bodies are the discrete groundwater management units defined by the Environment Agency as required under Article 5 of the Water Framework Directive.
Source Protection Zone	Groundwater catchment areas defined by travel time around important potable groundwater abstraction sites to safeguard drinking water quality. Certain land-uses are controlled or prohibited with certain source protection zone areas.

# Acronyms

Acronym	Description
BGS	British Geological Survey
COMAH	Control of Major Accident Hazards
GCR	Geological Conservation Review
GHGC	Geology, hydrogeology and ground conditions
JNCC	Joint Nature Conservation Committee
MDS	Maximum Design Scenario
NRW	Natural Resource Wales
PWSS	Private Water Supply Source
RIGS	Regionally Important Geological Site
SPZ	Source Protection Zone
SSSI	Site of Special Scientific Interest

# Units

Unit	Description		
m	Metres		
mAOD	Metres above Ordnance Datum		
km²	Square kilometres		

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# 1 AQUIFERS, GROUNDWATER ABSTRACTIONS AND GROUND CONDITIONS

#### 1.1 Introduction

1.1.1.1 This technical report provides a summary of key information on aquifers, groundwater abstractions, pollution incidents and ground conditions to inform the baseline environment and assessment of volume 3, chapter 16: geology, hydrogeology and ground conditions of the Preliminary Environmental Information Report.

## 1.1.2 Study area

- 1.1.2.1 The study area to be used for the assessment of geology, hydrogeology and ground conditions focuses on areas located above Mean High Water Springs (MHWS) where potential impacts are most likely to occur on geological and hydrogeological receptors. As such, the geology, hydrogeology and ground conditions (GHGC) study area includes:
  - The area of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning of the Mona Offshore Wind Project (hereafter referred to as the Mona Proposed Onshore Development Area).
  - Geological and hydrogeological receptors within 1km of the Mona Proposed
    Onshore Development Area. The 1km buffer was used as impacts on
    geological, hydrogeological and ground conditions receptors are most likely to
    occur within this distance.
  - Ground condition constraints within the Mona Proposed Onshore Development Area.
- 1.1.2.2 The GHGC study area will be reviewed and modified in response to refinements made to the Mona Proposed Onshore Development Area during the EIA process.

# 1.2 Methodology

# 1.2.1 Desk top data sources

- 1.2.1.1 The data presented in this technical report has been taken from the following sources:
  - Geological information from the British Geological Survey (BGS) and Natural Resources Wales (NRW)
  - Aguifer unit information from the BGS
  - Information regarding ground conditions within the geology, hydrogeology and ground conditions study area taken from a Groundsure Insights report that includes the following datasets:
    - General information regarding geological, hydrogeological and hydrological setting
    - Groundwater abstraction licences
    - Current and historical landfill sites

- Current and historical waste sites
- Pollution incidents
- Discharge consents
- Current and historical land-use
- Mining and ground working areas (coal and non-mining)
- Geotechnical constraints
- Historical Ordnance Survey mapping and some aerial photography.

## 1.2.2 Geology

- 1.2.2.1 The bedrock geology and superficial deposits present across the GHGC study area has been obtained from the mapped data of the BGS. Nationally, regionally and locally important geological sites are also presented and, where present, include:
  - Sites of Special Scientific Interest (SSSI) of geological and geomorphological importance
  - Geological Conservation Review (GCR) sites as defined by the Joint Nature Conservation Committee (JNCC)
  - Regionally Important Geological Sites (RIGS).

#### 1.2.3 Hydrogeology

- 1.2.3.1 Aquifer units in the bedrock geology and superficial deposits have been obtained from the designations provided by the BGS. Key groundwater receptors have been reviewed and, where present, include:
  - Licensed groundwater abstractions (active and historical) as presented in the Groundsure Insights report.
  - Groundwater Source Protection Zones (SPZs) that have been defined to safeguard drinking water quality around important potable groundwater abstraction sites.
  - Nationally and locally important ecological sites that may have a groundwater dependence.
  - The location and details of Private Water Supply Sources (PWSSs) present within the GHGC study area will be defined through the landowner consultation (and associated site walkover surveys where required) to be presented within the Environmental Statement.

#### 1.2.4 Ground conditions

1.2.3.2

1.2.4.1

Ground conditions, most notably land quality, is a potentially constraint during the construction of the Mona Offshore Wind Project. A qualitative ground condition constraints assessment has been undertaken for the key aspects across the GHGC study area. The assessment is based on the Groundsure Insights report, the details of which are summarised in Table 1.1.



Table 1.1: Summary of the Groundsure Insight report to inform geology, hydrogeology and ground conditions.

Title	Extent of data coverage	Contractor	Format	Date
Mona Onshore Route	18.7 km <sup>2</sup>	Groundsure	Hardcopy report	27/06/2022

- 1.2.4.2 The qualitative assessment considers the potential risk posed by the land use (current and historical) and activities identified in the GHGC study area, based on the following risk criteria:
  - <u>High Risk</u> Presence of an activity or land use with the potential to result in highly contaminated land or groundwater, particularly where activities are recent, well-defined and/or situated close to or within the Mona Onshore Proposed Development Area.
  - <u>Moderate Risk</u> Presence of an activity or land use with the potential to result in contaminated land or groundwater. Or higher risk activities or land use situated at distance from the Mona Onshore Proposed Development Area or are historical in nature.
  - <u>Low Risk</u> Activity or land-use considered unlikely to result in significant contamination. Or potentially contaminative activity or land use which by virtue of position, age or certainty is considered unlikely to represent a significant constraint to the Mona Onshore Proposed Development Area.
- 1.2.4.3 On the constraints plans only those activities or land uses with a risk considered to be above low risk have been presented.

#### 1.3 Results

## 1.3.1 Geology

1.3.1.1 The bedrock geology and superficial deposits across the geology, hydrogeology and ground conditions study area are presented in Figure 1.1 and Figure 1.2 respectively.

#### **Geological and Groundwater Dependent Designated Sites**

1.3.1.2 Designated sites identified within the GHGC study area are shown in Figure 1.1 and Figure 1.2 and summarised in Table 1.2.

Table 1.2: Protected sites within the GHGC study area

RPS ID	Site name	Site Type	Qualitative risk ranking	Justification
PS_01	Coedydd ac Ogofau Elwy a Meirchion	SSSI	Low	The SSSI is designated on the basis of the geological and palaentological interest of Galltfaenan, Cefn and Pontnewydd Caves. It also has botanical interest in the presence of seminatural broadleaved woodland, rare lowering plant and scarce bryophyte assemblages. Located 0.6km southwest of the Mona Onshore Proposed Development Area.
PS_02	Llanddulas Limestone and Gwrych Castle Wood	SSSI	Moderate	The SSSI includes geological features, but is designated largely on the basis of ecology rather than its geological or geomorphological importance. Located within the Mona Onshore Proposed Development Area
PS_03	Coed y Gopa	SSSI	Low	The SSSI is principally designated on the presence of bat roosts. Located 600m east of the Mona Onshore Proposed Development Area.
PS_04	Traeth Pensarn	SSSI	Low	The SSSI is designated on the basis of importance of botanical features in coastal zone. Located within the Mona Onshore Proposed Development Area

- 1.3.1.3 The Coedydd ac Ogofau Elwy a Meirchion SSSI contains four GCR sites which are important for the Pleistocene sediments and vertebrate mammalian fossils within the caves. The Coedydd ac Ogofau Elwy a Meirchion SSSI (and the GCR sites) are located outside the Mona Onshore Proposed Development Area.
- 1.3.1.4 There are two RIGs within the GHGC study area: they are summarised in Table 1.3 and shown in Figure 1.1 and Figure 1.2. Both of the RIGS are located outside the Mona Onshore Proposed Development Area.

Table 1.3: Summary of RIGS in the GHGC study area.

RPS ID	Site Name	Notes
GS_01	Cefn yr Ogof	It is noted that BGS records show localised areas of tufa formation approximately 200m to the northeast of this site.
GS_02	Cefn Meiriadog	-





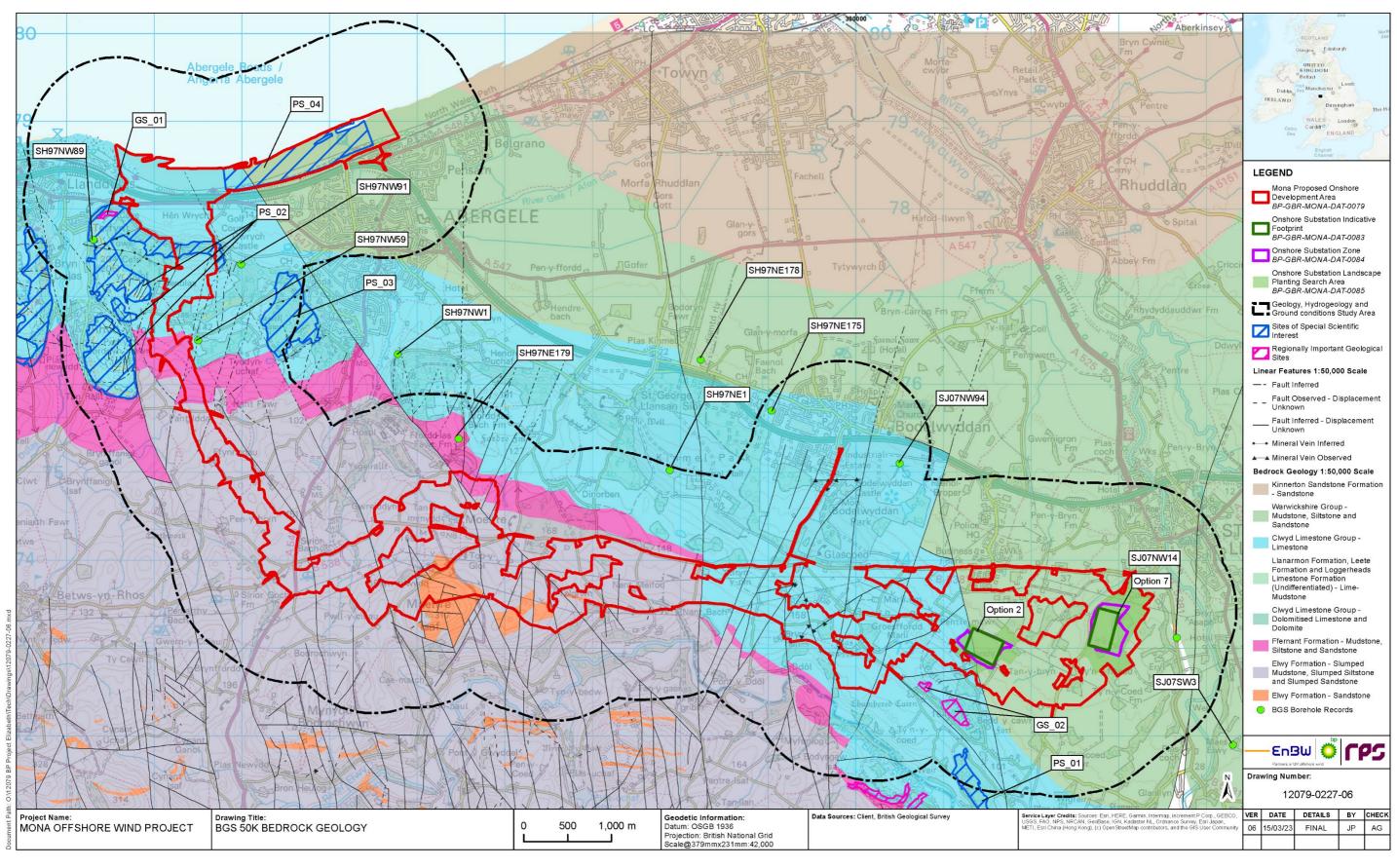


Figure 1.1: Bedrock geology and designated sites within the GHGC study area.



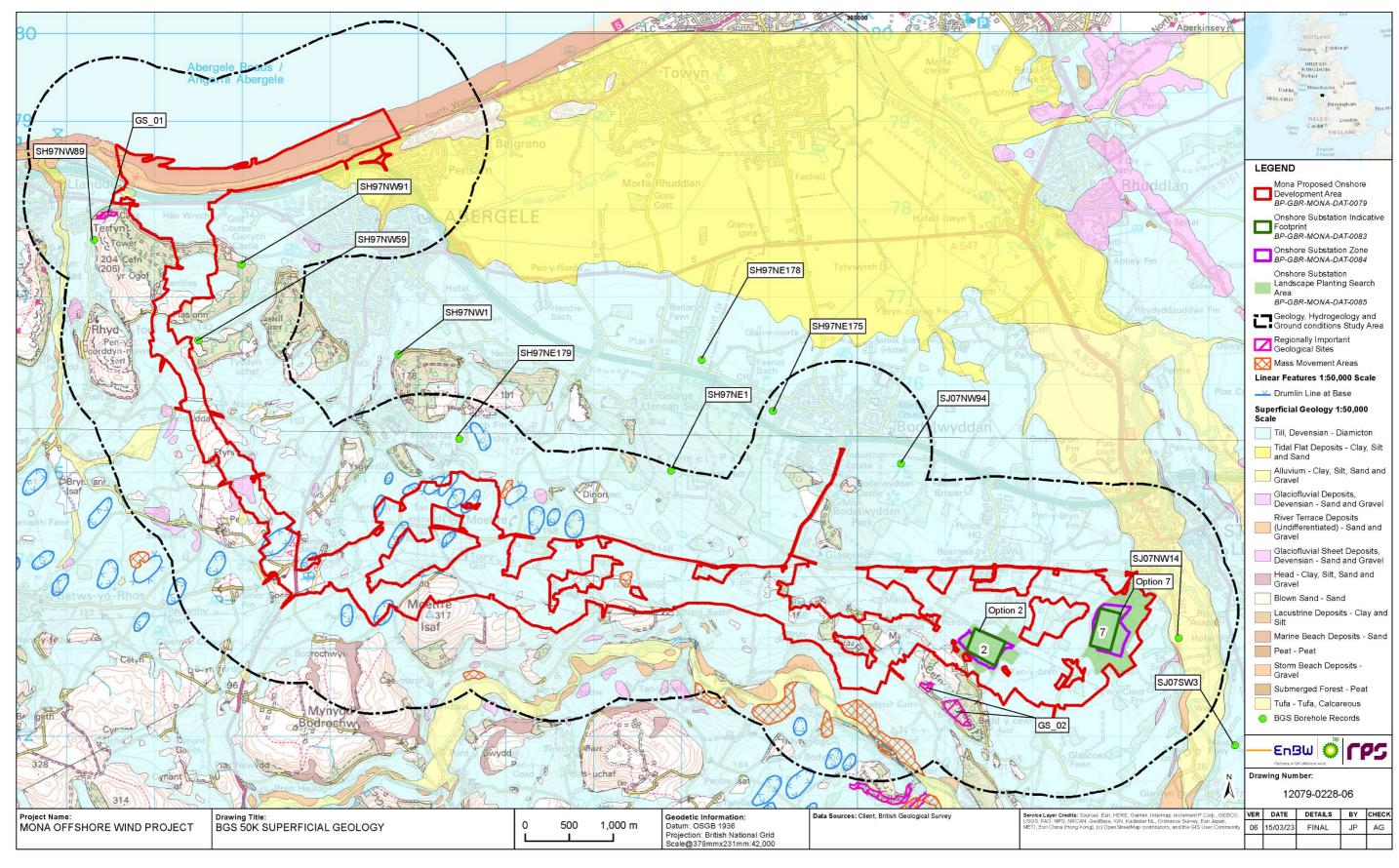


Figure 1.2: Superficial deposits and designated sites within the GHGC study area.

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## 1.3.2 Hydrogeology

#### **Aquifer designation**

- 1.3.2.1 Aquifer designations for the bedrock geology and superficial deposits across the GHGC study area are shown in Figure 1.3 and Figure 1.4 respectively. The following designations are presented in those drawings:
  - Principal aquifers that yield significant groundwater that support regionally or nationally important supplies and support rivers, lakes and wetlands.
  - **Secondary A aquifers** that comprise permeable layers that can support local water supplies and may form an important source of baseflow to rivers.
  - **Secondary B aquifers** that are mainly lower permeability layers that may store and yield limited amounts of groundwater.
  - Secondary undifferentiated aquifers where it is not possible to apply either a Secondary A or B definition because of the variable characteristics of the rock type, but generally have only a minor resource value.
  - **Unproductive strata** that are largely unable to provide usable water supplies and are unlikely to have surface water and wetland ecosystems dependent on them

#### Licensed groundwater abstractions

1.3.2.2 A total of 14 licensed abstractions have been identified in the geology, hydrogeology and ground conditions study area. Those abstractions are shown in Figure 1.3 and Figure 1.4. and are summarised in Table 1.4. Only GWA\_06 and GWA\_07 are active: both are situated above the Warwickshire Group bedrock in St Asaph, approximately 1km northeast of the Proposed Onshore Development Area.

Table 1.4: Licensed groundwater abstractions within the GHGC study area.

RPS ID	Point name	Status	Geology/ aquifer	Licence number	Notes
GWA_01	Borehole A	Historical	Clwyd Limestone Group	24/66/7/0044	Approximately 1km from the Proposed Onshore Development Area.
GWA_02	Borehole at Bryn Pin Mawr	Historical	Clwyd Limestone Group	24/66/6/0013	Approximately 50m from the Proposed Onshore Development Area.
GWA_03	Mine adit	Historical	Clwyd Limestone Group	24/66/7/0016	Approximately 660m east from the Proposed Onshore Development Area. Distance measured from closest point on Engine Hill where no significant construction activities (as defined by the MDS) are taking place.

RPS ID	Point name	Status	Geology/	Licence	Notes
			aquifer	number	
GWA_04	Well b - St. Asaph livestock market	Historical	Warwickshire Group	24/66/6/0017	Approximately 750m from the Mona Onshore Proposed Development Area
GWA_05	Well	Historical	Warwickshire Group	24/66/6/0004	Approximately 750m from the Proposed Onshore Development Area.
GWA_06	Well b - St. Asaph livestock market	Active	Warwickshire Group	24/66/6/0017	Approximately 950m from the Proposed Onshore Development Area.
GWA_07	Well a - St. Asaph livestock market	Active	Warwickshire Group	24/66/6/0017	Approximately 950m from the Proposed Onshore Development Area.
GWA_08		Historical	Warwickshire Group	WA/466/0006/ 0003	Approximately 950m from the Proposed Onshore Development Area.
GWA_09	8m deep, 250mm diameter borehole (superficial deposits)	Historical	Superficial deposits / Warwickshire Group	24/66/6/0011	Approximately 950m from the Proposed Onshore Development Area.
GWA_10	Borehole at St. Asaph Mart	Historical	Warwickshire Group	24/66/6/0017	Approximately 950m from the Proposed Onshore Development Area
GWA_11		Historical	Warwickshire Group	WA/466/0006/ 0003	Approximately 950m from the Proposed Onshore Development Area.
GWA_12	109m deep, 114mm dia. Borehole.	Historical	Clwyd Limestone Group	24/66/6/0012	Approximately 1.1km from the Proposed Onshore Development Area.
GWA_13	Well	Historical	Warwickshire Group	24/66/6/0002	Approximately 1.1km from the Proposed Onshore Development Area.
GWA_14	100m deep, 120mm diameter borehole	Historical	Warwickshire Group	24/66/7/0043	Approximately 830m from the Proposed Onshore Development Area.





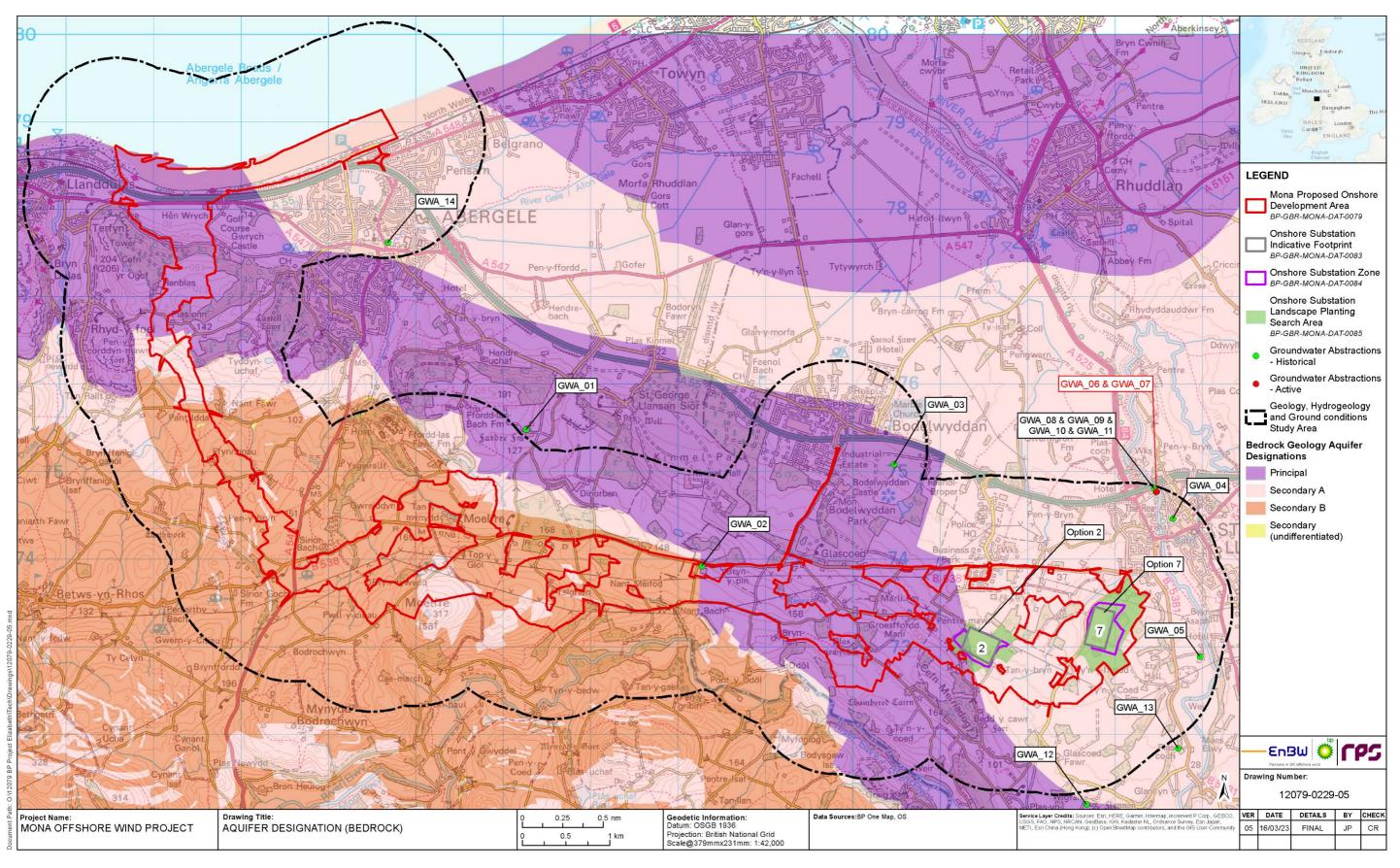


Figure 1.3: Bedrock aquifer units within the GHGC study area.



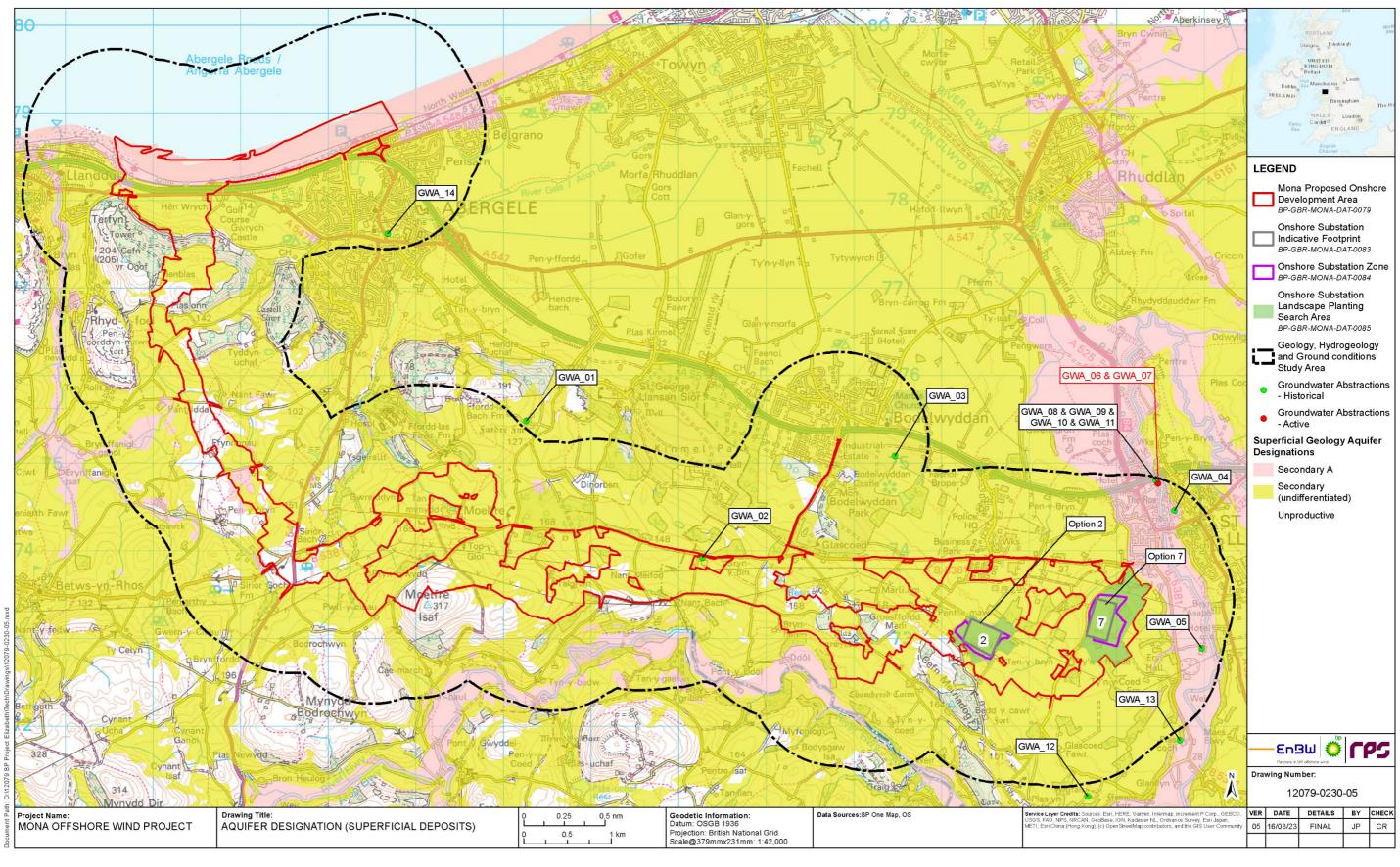


Figure 1.4: Superficial aquifer units within the GHGC study area.



**Groundwater Source Protection Zones** 

1.3.2.3 There are no groundwater Source Protection Zones (SPZs) within the GHGC study area. The closest SPZs are at Llannerch Park and Trofarth Farm. The Llannerch Park abstraction borehole is located 2.3km to the east of the Mona Onshore Proposed Development Area and abstracts groundwater from the Kinnerton Sandstone formation. The Trofarth Farm abstraction borehole is located over 8km to the west southwest of the Mona Onshore Proposed Development Area where water is abstracted from the Elwy Formation.

#### 1.3.3 Ground conditions

1.3.3.1 The detailed ground condition constraints maps are presented in Figure 1.5A to Figure 1.5E.

#### **Landfill sites**

1.3.3.2 Details of the current and historical landfill sites presented in those figures are summarised Table 1.5.

Table 1.5: Landfill sites (current and historical) within the geology, hydrogeology and ground conditions study area

RPS ID	Site name and status)	Waste type accepted	Qualitative risk ranking	Justification
LF_01A	Llanddulas Beach Landfill (Historical)	Industrial, Commercial, Household	High	The landfill contains potentially biodegradable 'household' waste and has active leachate and gas monitoring in place. The landfill is historical and located within the Proposed Onshore Development Area.
LF_01B	Llanddulas Beach No.1. (Historical)	Industrial, Commercial, Household	Moderate	The landfill contains a possible biodegradable or contaminated waste mass but is a small site and is situated on the edge of the Proposed Onshore Development Area.
LF_02	Ty Mawr Ucha Farm (Active / recent)	Non- biodegradable waste or 'other waste'	Low	The landfill is situated 620m northeast of Proposed Onshore Development Area on opposite side of high topographical area.
LF_03	Moelfre (Historical)	Inert, Household (NRW: Inert)	Low to Moderate	The landfill contains a possible biodegradable waste mass, but it is a historical site situated on Silurian bedrock of the Elwy Formation and glacial till. It is located adjacent to the Proposed Onshore Development Area.
LF_04	Plas Newydd Cefn (Historical)	Industrial, Commercial, Household	Moderate	The landfill contains a possible biodegradable waste mass, however, it is historical and a site of small area. It is located within the Proposed Onshore Development Area.
LF_05	Ffordd Las (Historical)	Inert, Commercial, Household.	Negligible	The landfill is a small historical site. Located within approximately 600m north of Proposed Onshore Development Area

#### Licensed waste sites

1.3.3.3 Details of licensed waste sites identified in the GHGC study area are summarised Table 1.6. The waste management licences for the sites at Llanddulas Beach and Ty Mawr Farm suggest they relate to the landfills LF\_01A and LF\_02 in Table 1.5. The licences are registered to the postcode of where the licence was registered rather than the location of the waste site, which explains the inconsistency in locations.

Table 1.6: Licensed waste sites within the GHGC study area

RPS ID	Site name	Licence number	Qualitative risk ranking	Justification
WS_01	Llanddulas Beach Landfill	JEN001	High	This is likely to be the same landfill site as LF-01A and therefore, the same risk ranking has been applied.
WS_02	Ty Mawr Farm Landfill	GRI034	Low	This is likely to be the same landfill site as LF-02 and therefore, the same risk ranking has been applied. Located 500m northeast of the Proposed Onshore Development Area.

#### **Pollution incidents**

- 1.3.3.4 Details of the five recorded pollution incidents identified in the GHGC study area are summarised Table 1.7. Four categories of pollution incident are recorded:
  - Category 1 major, serious, persistent and/or extensive impact or effect on the environment, people and/or property
  - Category 2 significant impact or effect on the environment, people and/or property
  - Category 3 minor or minimal impact or effect on the environment, people and/or property
  - Category 4 substantiated incident with no impact
- 1.3.3.5 Only the Category 1 and 2 pollution incidents that affect land and water within the GHGC study area have been presented.





Table 1.7: Environmental pollution incidents within the GHGC study area

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RPS ID	Incident ID	Principal impacted medium (pollutant)	Severity category	Qualitative risk ranking	Justification			
PI_01	4189	Land (Inert materials and wastes)	2	Low to Moderate	Not a major incident. The area is underlain by thick glacial till. The incident was located 220m north of the Proposed Onshore Development Area.			
PI_02	1800785	Land (Household waste)	3	Low	The impact from the incident was principally on amenity, rather than land or water. The incident was located 800m north of the Proposed Onshore Development Area.			
PI_03	1700857	Land (Household waste)	2	Low to Moderate	Not a major incident. The area is underlain by thick glacial till. The incident was located 900m north of the Proposed Onshore Development Area.			
PI_04	1604913	Land (Inert materials or waste)	2	Moderate	As for PI_03			
PI_05	1704753	Land	3	Low	As for PI_03			

# Licensed discharges to groundwater

1.3.3.6 Details of the eleven licensed discharges to groundwater are identified in the GHGC study area and summarised Table 1.8.

Table 1.8: Licensed discharges to groundwater within the GHGC study area.

RPS ID	Permit Number	Location (Effluent Type)	Consent Status	Qualitative risk ranking	Justification
GD_01	CG0301201	Glascoed – Chlorinated O/F (Unspecified)	Expired	Moderate	Possible organic compounds in discharge but is historical and is likely to have been controlled by risk assessment and permit conditions. Located 150m north of the Proposed Onshore Development Area.
GD_02	CM0145201	Cefn Marli sewage treatment works (presumed treated sewage)	Expired	Low	Likely to have been controlled by risk assessment and permit conditions. The discharge consent is historical. It was located 210m southwest of Proposed Onshore Development Area at lower topographic elevation.

RPS ID	Permit Number	Location (Effluent Type)	Consent Status	Qualitative risk ranking	Justification
GD_03	CM0145301	Marli Glascoed sewage treatment works (treated sewage)	Effective	Low to Moderate	As for GD_02 but is active.
GD_04	CG0193901	Abergele Hospital (Unspecified)	Expired	Low	This is a historical discharge consent. The area is underlain by Silurian bedrock. It is located 310m northwest of Proposed Onshore Development Area.
GD_05	YP3325GU	Hunters Hamlet Caravan Park (Treated sewage)	Effective	Negligible to Low	Historical discharge. Area underlain by Silurian bedrock. Located 300m southwest of the Proposed Onshore Development Area on opposite side of watercourse.
GD_06	EPRYP3325GU	Hunters Hamlet Caravan Park (Treated sewage)	New. Issued under EPR 2010	Low	As for GD_05 except active discharge.
GD_07	VP3820XR	Bryn Olwyn Farm (Treated sewage)	Effective	Low to Moderate	Active discharge. Area underlain by Silurian bedrock. but outside of Located 520m northwest of the Proposed Onshore Development Area at lower elevation.
GD_08	EPRVP3820XR	Bryn Olwyn Farm (Treated sewage)	New issued under EPR 2010	Low to Moderate	As for GD_07
GD_09	CG0428301	Castle Cove Caravan Park (Treated sewage)	Effective	Low to Moderate	Active infiltration system. Located adjacent to the Proposed Onshore Development Area.
GD_10	TP3727GC	Sewage treatment plant serving Elwydale, (Treated sewage)	Effective	Low to Moderate	Active discharge but located 100m north of the Proposed Onshore Development Area at lower elevation and down hydraulic gradient
GD_11	EPRTP3727GC	Sewage treatment plant serving Elwydale, (Treated sewage)	New. issued under EPR 2010	Low to Moderate	As for GD_10





#### Fuel stations and hazardous waste storage sites

1.3.3.7 Fuel stations represent a particular risk to land and groundwater quality. The details of three current or historical garages identified in the GHGC study area are summarised Table 1.9.

Table 1.9: Recent and historical fuel stations within the GHGC study area

RPS ID	Address	Status	Qualitative risk ranking	Justification
FS_01	Penreefail Crossroads, Moelfre, Abergele, Conwy, LL22 8PN	Open	Moderate	The fuel station is underlain by Silurian bedrock (Elwy Formation) and glacial till. It is located 25m south of the Proposed Onshore Development Area.
FS_02	Lower Denbigh Road, St Asaph, Denbighshire, LL170EG	Obsolete	Low	It is a historical fuel station site and is located 400m northeast of the Proposed Onshore Development Area, at low elevation and down hydraulic gradient.
FS_03	Lower Denbigh Road, St Asaph, Denbighshire, LL170EG	1961 - 1987	Low	As for FD_03 (Same station)

1.3.3.8 Only one site has been identified within the GHGC study area that is licensed for the storage of hazardous substances. That site is summarised Table 1.10.

Table 1.10 Hazardous substance storage within the GHGC study area

RPS ID	Locations (Substances)	Application Ref Number	Qualitative risk ranking	Justification
HZ_01	Pilkington Special Glass Ltd, St Asaph. (Substances not known)	46/2000/0756	Moderate	Substances not known. Site is no longer in operation. Located 50m north of the Proposed Onshore Development Area and is underlain by thick glacial till.

#### Historical licensed industrial activities

1.3.3.9 Four historical licensed industrial activities are identified with the GHGC study area. Those sites are shown in Figure 1.5A to Figure 1.5E and summarised Table 1.11. It is evident that the four licensed activities all relate to the former Pilkington Glass factory site in St. Asaph. The site is no longer operational.

Table 1.11 Historical licensed industrial activities within the GHGC study area.

RPS ID		Location (Process)	Effective date	Status	Qualitative risk ranking	Justification
HA_01	AP4742	Glascoed Road, St. Asaph. LL17 0ER (Inorganic Chemical Processes)	02/03/1998	Superseded By Variation	Moderate to High	The area is underlain by thick glacial till and is located 100m north of the Mona Onshore Proposed Development Area
HA_02	BD0583	Glascoed Road, St. Asaph. LL17 0ER (Inorganic Chemical Processes)	30/11/1998	Revoked	Moderate to High	As for HA_01
HA_03	BC0693	Glascoed Road, St. Asaph. LL17 0LL (Inorganic Chemical Processes)	06/07/1999	Superseded By Variation	Moderate	The area is underlain by thick glacial till and is located approximately 40m northwest of Proposed Onshore Development Area.
HA_04	BK4995	Glascoed Road, St. Asaph. LL17 0LL (Inorganic Chemical Processes)	31/05/2001	Revoked. Now IPPC	Moderate	As for HA_03

- 1.3.3.10 Table 1.5 to Table 1.11 identify those activities and land uses that are considered to represent the highest risk with respect to ground conditions within the GHGC study area and potentially the most significant constraints for the construction phase and operation and maintenance phase of the Mona Offshore Wind Project.
- 1.3.3.11 There is also evidence of a wide range of other current, recent or historical activities and land uses. These features are shown in the constraints mapping in Figure 1.5A to Figure 1.5E.



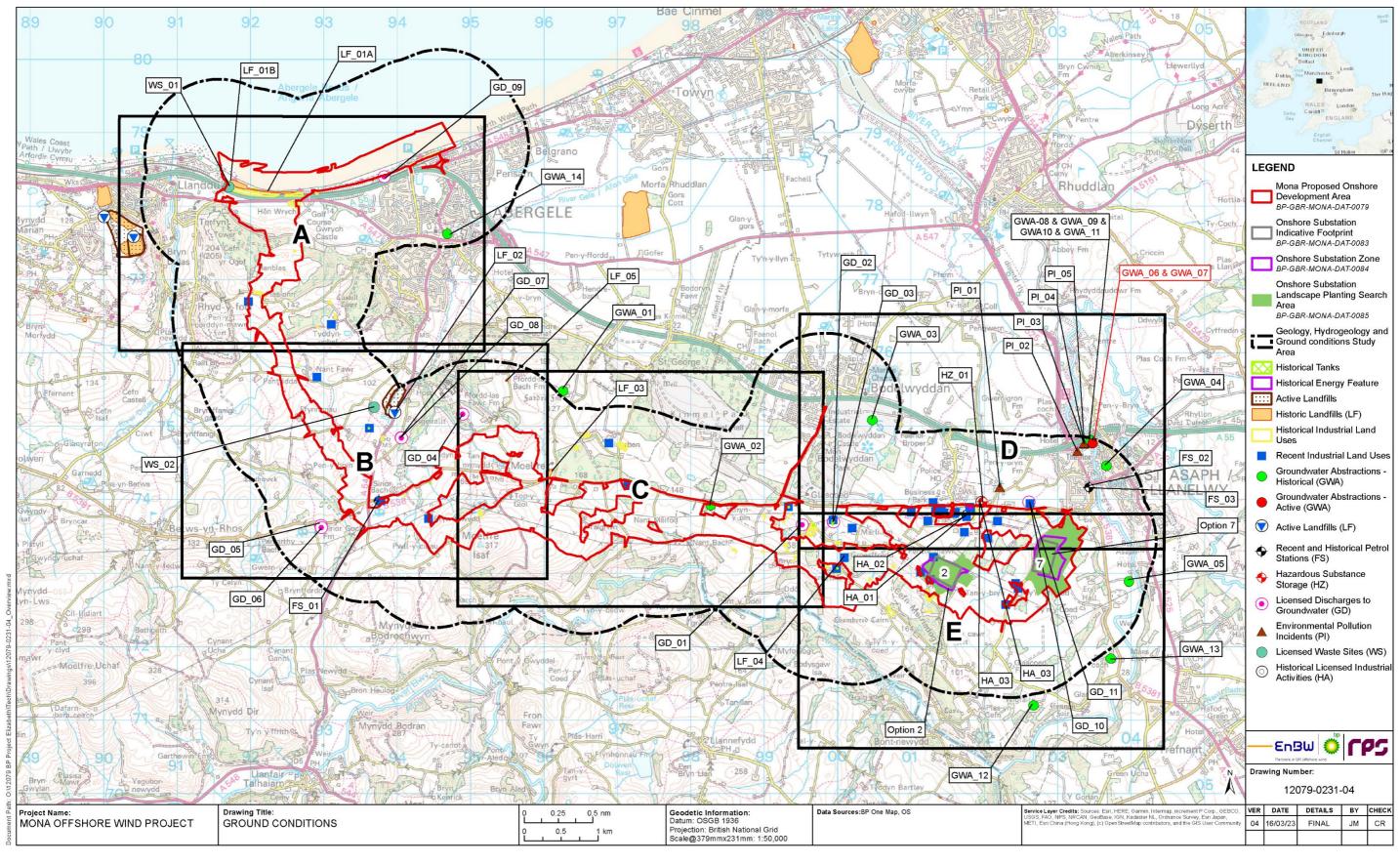


Figure 1.5: Overview of ground conditions constraints within the GHGC study area



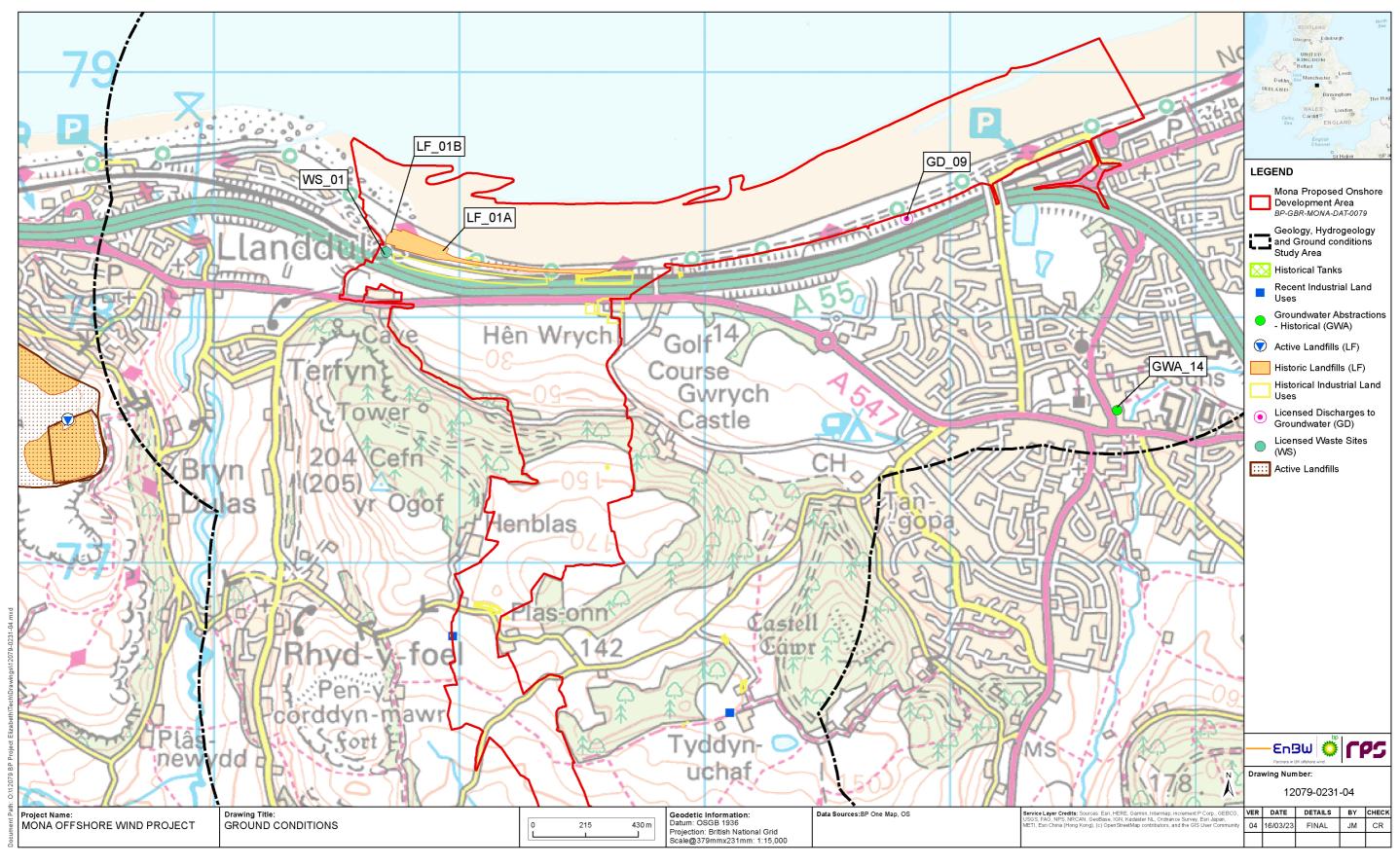


Figure 1.5A: Ground conditions constraints within the GHGC study area (Sheet A)



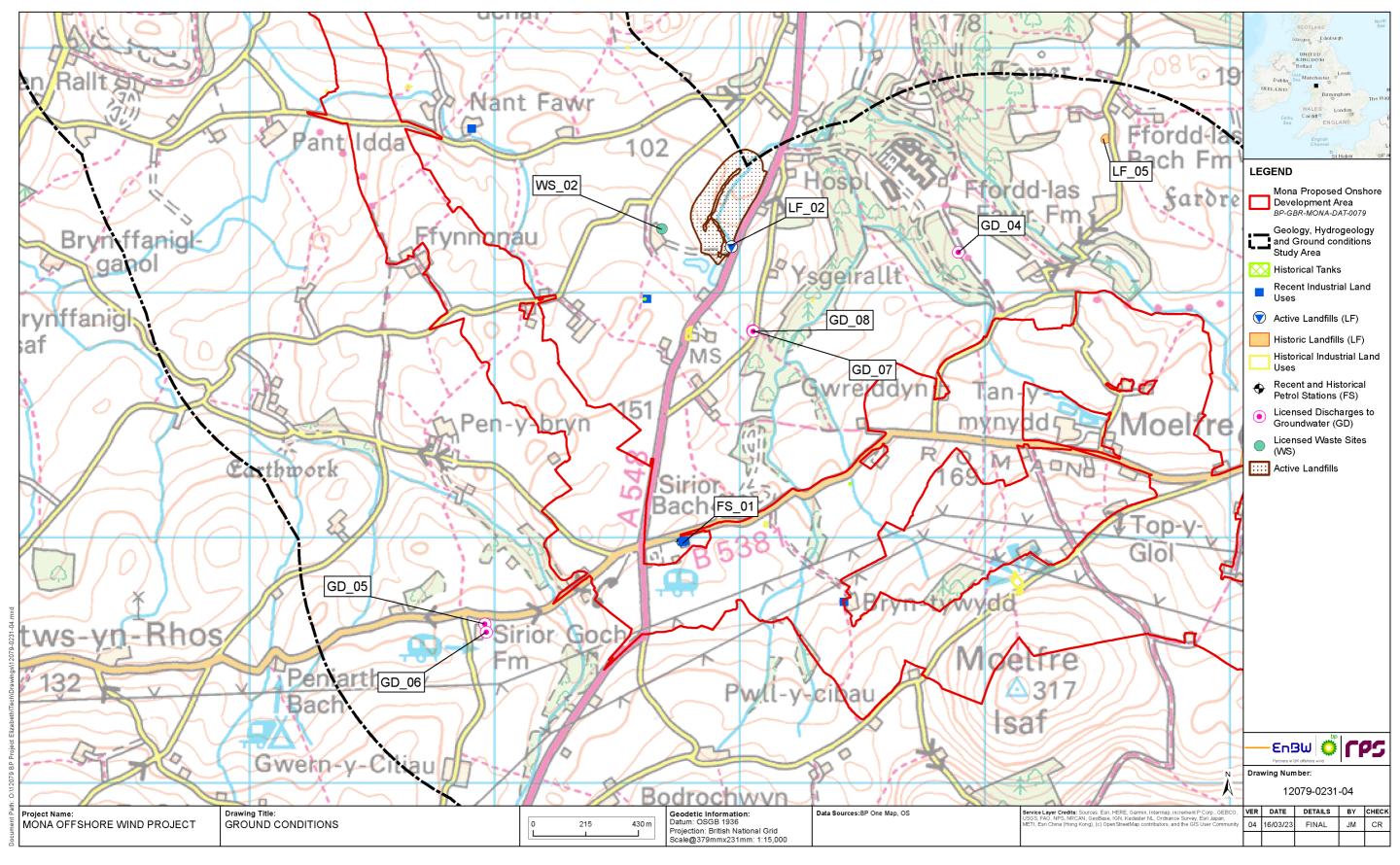


Figure 1.5B: Ground conditions constraints within the GHGC study area (Sheet B)



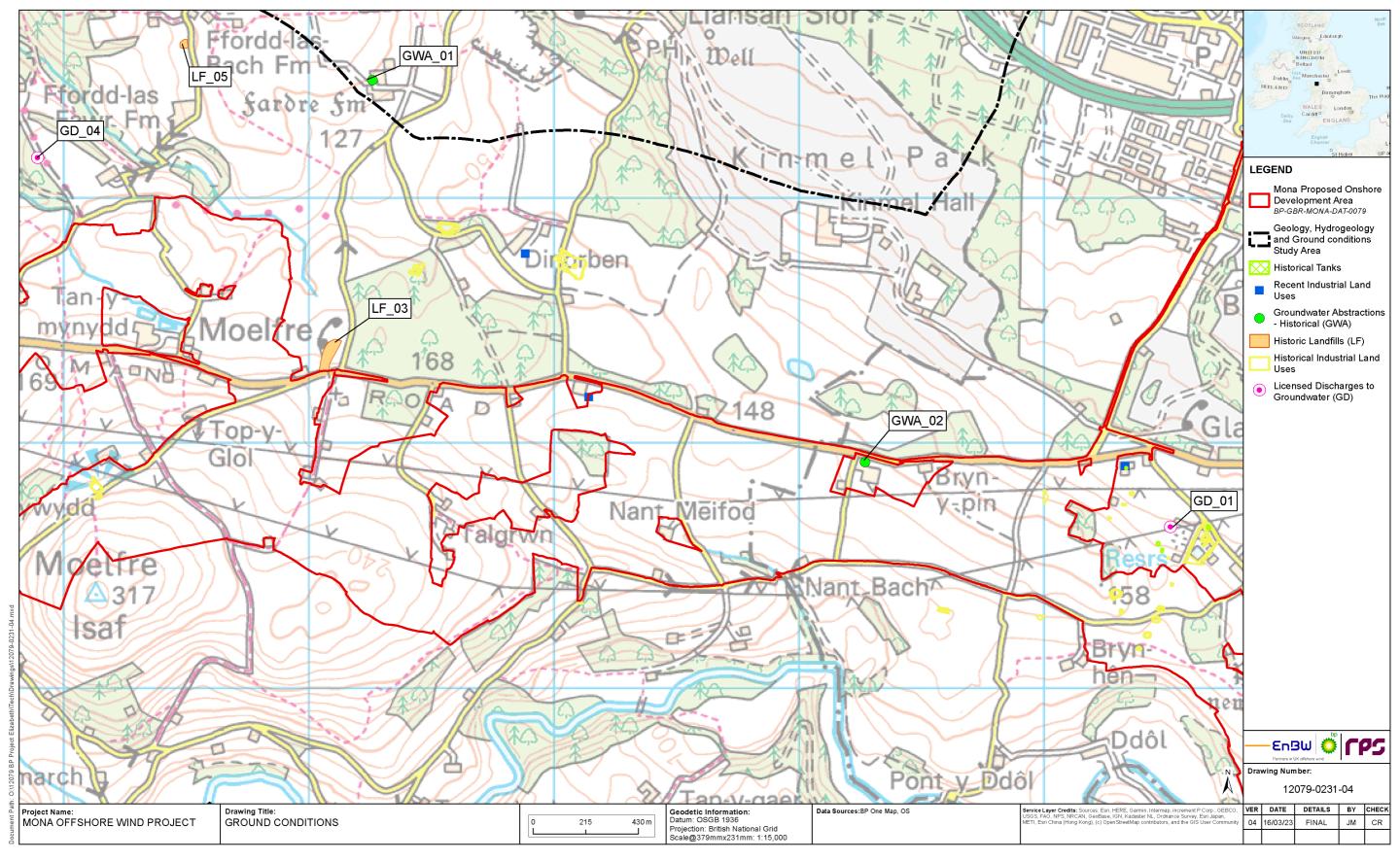


Figure 1.5C: Ground conditions constraints within the geology, hydrogeology and ground conditions study area (Sheet C)



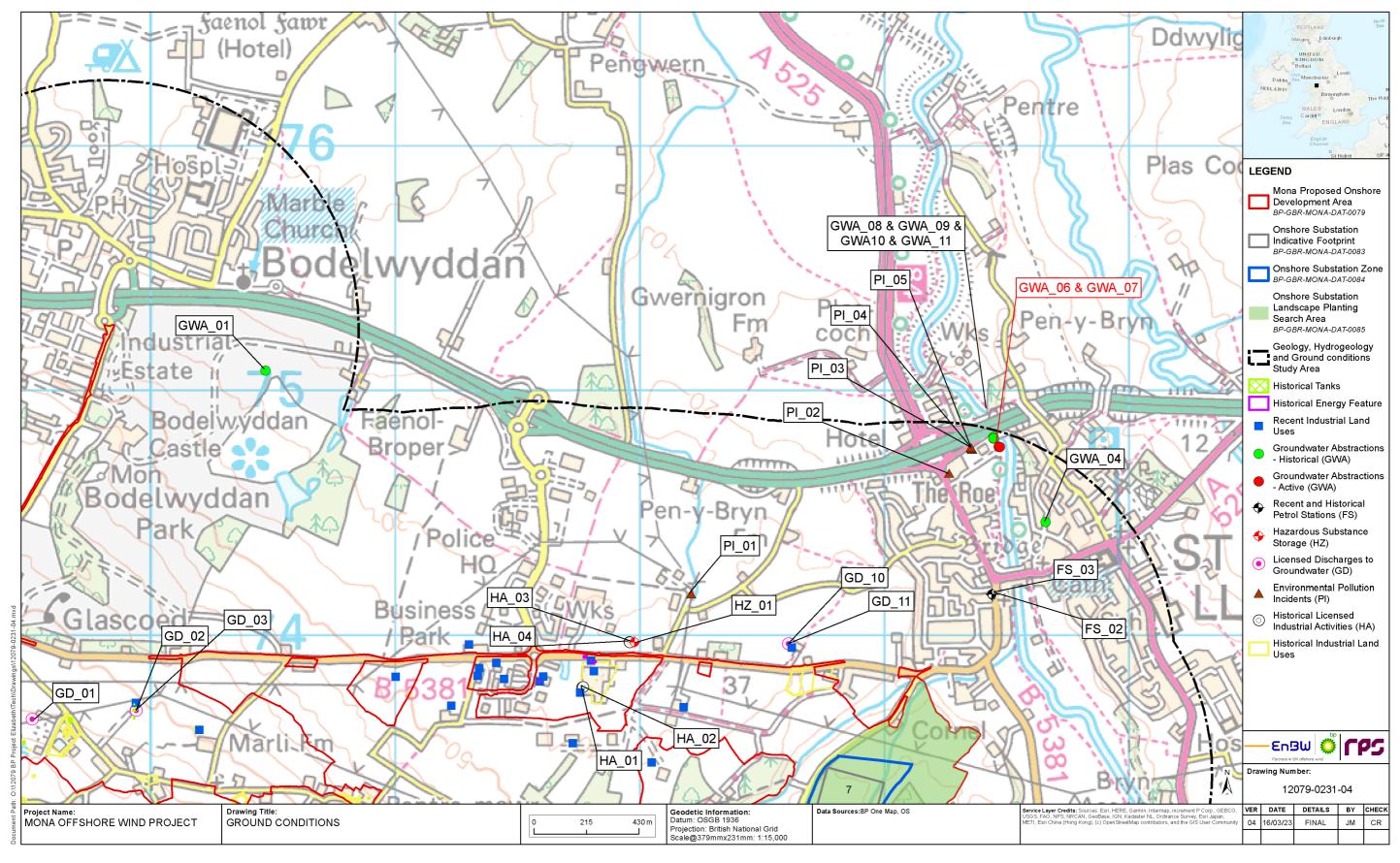


Figure 1.5D: Ground conditions constraints within the GHGC study area (Sheet D)



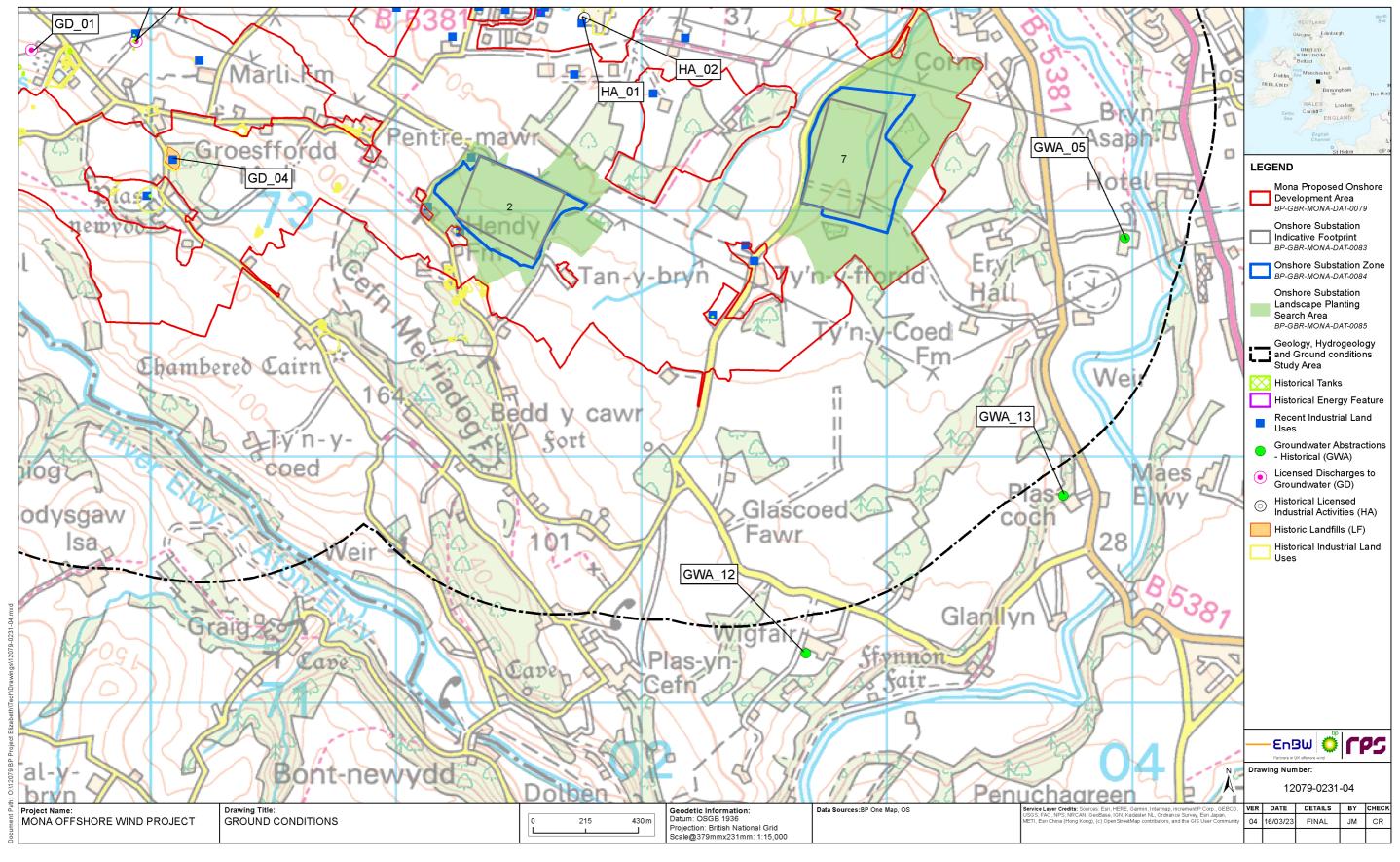


Figure 1.5E: Ground conditions constraints within the GHGC study area (Sheet E)



# **Historical mining operations**

- 1.3.3.12 The Groundsure Insights reports presents multiple datasets that relate to historical mining within the geology, hydrogeology and ground conditions study area. The digital data for those datasets has been used to produce Figure 1.6. Individual features and their associated risk will be reviewed as part of route refinement and detailed design.
- 1.3.3.13 Several historical mines have also been identified from BGS reporting. These features are listed in Table 1.12 and shown in Figure 1.6. A strong spatial correlation can be observed between these reported mines and the historical mining features / datasets identified in the Groundsure Insights.

Table 1.12 - Historical mines reported by the British Geological Survey within and adjacent to the GHGC study area

Name	Easting	Northing	Qualitative risk ranking	Justification
Cefn yr Ogof	291700	377300	Low	Located 400 to 500m west of the Proposed Onshore Development Area.
Castell Cawr  - North / Ffos-y- Bleiddiaid	293600	376600	Negligible to Low	Located 1km east of the Proposed Onshore Development Area.
Castell Cawr – South / Tyddyn Morgan Mine	293700	376400	Negligible to Low	Located 1km east of the Proposed Onshore Development Area.
Nant uchaf Mine	293400	376000	Negligible to Low	Located 720m east of the Proposed Onshore Development Area.
Bodelwyddan Mine	299700	374900	Low	Located adjacent to Proposed Onshore Development Area. Distance measured from closest point on Engine Hill where no significant construction activities (as defined by the MDS) are taking place.
Score Mine	299300	373700	Moderate to High	Located 50m southeast of the Proposed Onshore Development Area.
Coed- Carreg- Dafydd Mine	299500	373300	Moderate to High	Located within Proposed Onshore Development Area.
Panty Celyn Lead Mine	301300	372700	Moderate	Located adjacent to Proposed Onshore Development Area.



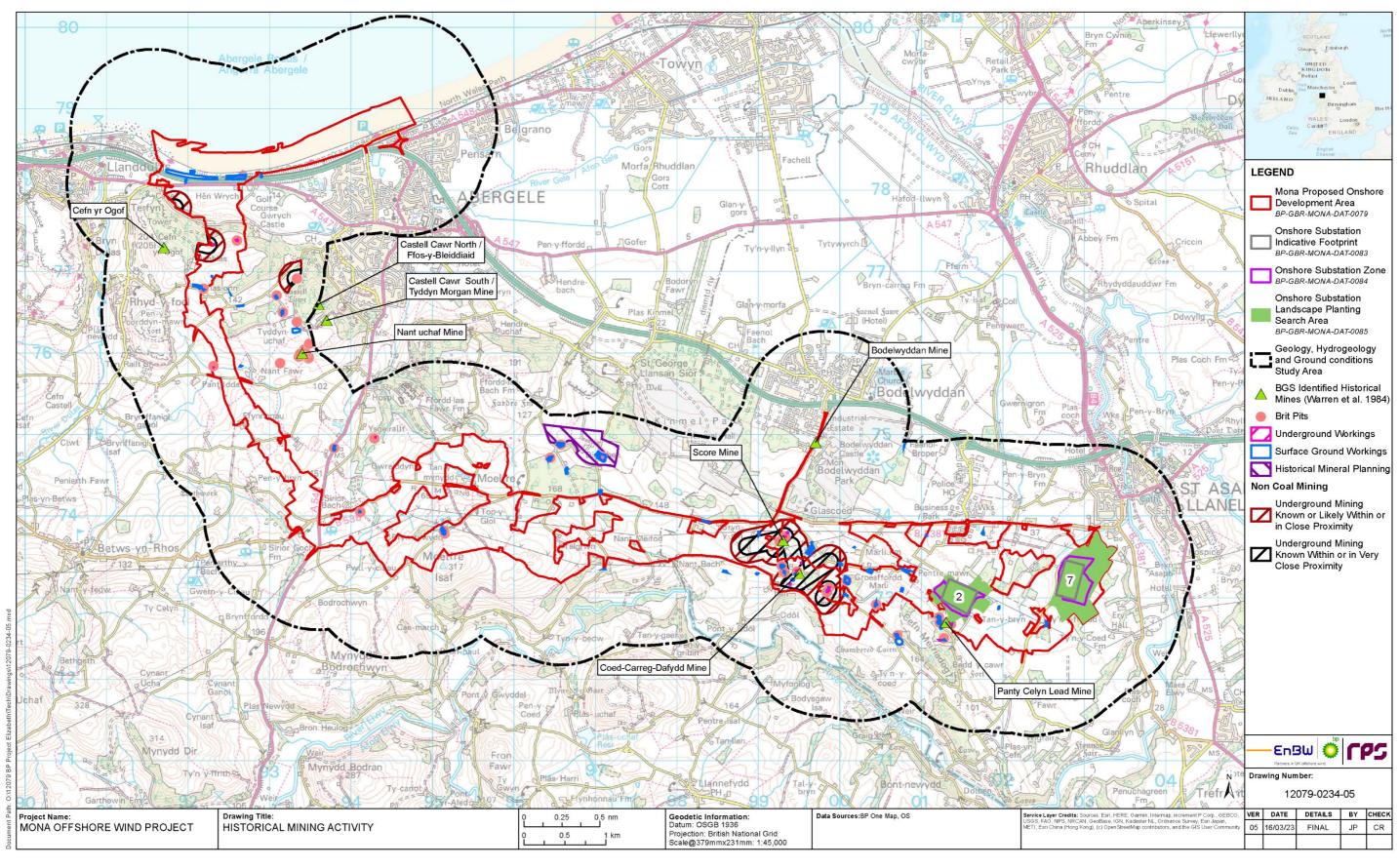


Figure 1.6: Overview of historical mining activity within the GHGC study area



## 1.4 References

Groundsure Insight Report: Mona Onshore Route, Report Ref. GSIP-2022-12806-10820 (A to E). 27 June 2022 (available on request).

NRW Environmental Pollution Incidents. Available:

https://lle.gov.wales/catalogue/item/EnvironmentalPollutionIncidents/?lang=en Accessed: March 2017.

British Geological Survey 1:50,000k Data purchased from Bluesky Mapshop. Available: <a href="http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2/">http://www.nationalarchives.gov.uk/doc/open-government-licence/version/2/</a> Accessed July 2022.



# **Appendix A BGS Borehole records**

02/10/2022, 16:28

Page 1 | Borehole SH97NE1 | Borehole Logs



Survey

Version 2.0.6.6

BGS ID: 140216 : BGS Reference: SH97NE1 British National Grid (27700): 297880,375020 Report an issue with this borehole

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(	Town or Village  County  For Mr. Knylos (kecenel.) **  Six-inch quarter sheet  State whether owner, tenint, und  contractor, consultant, etc.:-
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	Level of ground surface  Level of ground surface  Above;  above sea-level (O.D.) State how far {above; below; ft.
	SHAFTft.; diameterft.; Details of headings
	BOREft.; diameter of bore: at topins.; at bottomins.  British Geological Survey
	Details of permanent lining tubes
	Water struck at depths offt. below well-top.
ONS	Rest-level of water ft. above well-top. Suction at ft. Yield on hours' test
TEST	pumping atgalls. perwith depression toft. below well-top.
8 (	Recovery to rest-level inmins. Capacity of pumpg.p.h. Date of measurements
(	Description of permanent pumping equipment :
NORMAL CONDITIONS	Make and/or typeMotive power
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,	Amount pumped galls. per day. Estimated consumption galls. per week.
	Well made by Date of well
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Page 1 | Borehole SH97NE1 | Borehole Logs

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SOUTH KENSINGTON,
LONDON, S.W.7. 1" O.S. Map Site marked (use symbol) on 1" Map on 6" Map Date Received



Geological

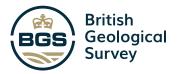
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Version 2.0.6.6

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3 0231
DRAGON DRILLING (WATER & ENERGY) LIMITED
BRICKFIELD LANE
RUTHIN
LL15 2TN
TEL: 01824 707777 11/LBHS BENTONITE (MBGL) 0.0 - 15.0 DATE 31/3/2015 15.0 - 60.0 STONE (MBGL) Ш GL AOD BH No. :1 BGS No. SN15/52 Grid Ref - SH99047570 PLAIN (M) 30.0 OTTED (M) 30.0 DEPTH (M) DRILLING LOG GL 0.5 14.0 30.0 YES TOTAL GROUNDWATER (MBGL) TO DEPTH (M) 14.0 42.0 SITE: 353 -Mc Lords, LL18 5SX 티 티 티 SIZE (MM) ACTUAL DEPTH (M) 0.09 OPERATION PREDICTED DEPTH (M) 100.00

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Report an issue with this borehole

British Geological Survey

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Page 1 | Borehole SH97NE178 | Borehole Logs

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DRAGON DRILLING (WATER & ENERGY) LIMITED

GRAIG LELO INDUSTRIAL ESTATE

CORWEN

LL21 9SD

TEL: 01824 707777 LOG NUMBER 9WB 339

JOB REFERENCE: 583

SITE: Thorncliffe

SITE BH NUMBER: 1

GRID REF: SH98237628 BGS No: SN18/165

DATE: 6/6/18

MATERIAL & DEPTH (M)

	DESCRIPTION	Soils	Stiff red clay	Stiff red clay and round gravel	Stiff red clay and round gravel (slightly damp)	Red boulder clay	Grey sandy clay	Small rounded gravel	Hole collapsing past 30m	4m3 of drilling mud used	Water strike depths - 30m (Rest level 1.3m AG	
	DEPTH (M)	9.0-0	8.7 - 9.0	7.8 – 8.6	8.6 – 10.5	10.5 - 25	25 - 30	30 - 35				
											12123	
	TOTAL	-		=		11.5		35.5	11		,	
TO	DEPTH (M)			10.5		=		35	=			
FROM	DEPTH (M)			0.5 AGL		0.5AGL		0.5 AGL	GL			
	SIZE			194				152	200			
	OPERATION	Set up		Permanent Steel		Cement		Mud drilling (Drag bit)	CFA drilling		Artif.	

Slotted casing size - 113/1mm

Bentonite type

Gravel pack size - 6mm

Glass media size - n/a

30m (Rest level 1.3m AGL)

Solid casing size - 113mm

GRAVEL/GLASS PACK (MBGL)	30 - 17
END CAP	yes
PLAIN (M)	18 - GL
SLOTTED (M)	30 - 18
LITRES PER MINUTE (Artesian)	30
WATER STRIKE (MBGL)	30
ACTUAL DEPTH (M)	35
PREDICTED DEPTH (M)	09

BENTONITE (MBGL)

17 - GL

DRILLING FOR: Commercial water supply

NAME: Jordan McVey (LEAD DRILLER)



## BGS ID: 20633028 : BGS Reference: SH97NE179 British National Grid (27700): 295470,375380

Report an issue with this borehole



< Prev Page 1 of 1 V Next >>





LOG NUMBER 3WB 386 DRAGON DRILLING (WATER & ENERGY) LIMITED
GRAIG LELO INDUSTRIAL ESTATE
BILLST GEORGIA SURVEY
CORWEN
LL21 9SD

SITE: Fford Cas Fawr, Abergele JOB REFERENCE: 1551 SITE BH NUMBER: 1 BGS No: SN18/238 GRID REF: SH95477538 DATE: 04/09/2018

OPERATION	SIZE (MM)	FROM DEPTH (M)	TO DEPTH (M)	TOTAL	DEPTH (M)	DESCRIPTION			MATERIAL & DEPTH (M)		
Set up				1							
					0 – 0.5	Soils					
Symmetrix Drilling	198	G.L	13.5	13.5	0.5 - 12	Large gravel				Solid casing size - 113	
					12 - 13	Fractured mudstone			₩ ₩		
Open Hole Drilling	180	13.5	107	93.5	13 - 25	Mudstone			- ₩ ₩	Bentonite type - Granules	
					25 - 34	Sandstone (red / b	rown)				
Mud Drilling					34 - 38	Wet sandstone				Slotted casing size - 113	
					38 - 40	Sandstone with gr	ey siltstone				
CFA Drilling					40 - 107	Grey siltstone wit	h occasional bands of sa	ndstone		Gravel pack size – 6mm	
					1 .					•	
Airlift Emish Geological S				5	Jaitiah Caalania	a Dunaman	ns - 35m, 75m, 100m	Delich		Glass media Size - /	
PREDICTED	ACTUAL		ATER STRI	KFS	LITRES PER	SLOTTED	PLAIN	Ulluali	GRAVEL/G	LASS   BENTONITE	
DEPTH (M)	DEPTH (M)	"	(MBGL)		MINUTE	CASING (M)	CASING (M)	END CAP	PACK (ME		
60	107		35, 75, 10	0	10+	74	33	Yes	107 - 32	2 32 – G.L	

(LEAD DRILLER) NAME: Mal Macdonald DRILLING FOR: Water supply

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Page 5 | Borehole SH97NW1 | Borehole Logs

Version 2.0.6.6

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Page 5 of 22 ✓ Next >

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Limestone with iron ore Limestone with streaks of shale Hard light blue limestone Limestone very jointy Cavity Limestone jointy  Cavity Limestone jointy						
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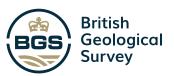
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SOUTH KE	HIS GEOGEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON,		G.S.M. Office File No.	Site marked on 1" map (use symbol)				
L	ondon, S.W.7.				(*11815) W A.& E.V	t,29051/O,869 '.Ltd. <b>Gp.686</b>	10,000 9/8	) 

scans.bgs.ac.uk/sobi scans/boreholes/641443/images/12237554.html

2/2



Version 2.0.6.6

BGS ID: 641443 : BGS Reference: SH97NW1 British National Grid (27700): 294777,376345 Report an issue with this borehole

<< | < Prev |

Page 2 of 22 ▼ | Next > | >>





Borning naited 24th Nov. 1901.

Bornj in Cabraiferons linestone unde by Toha Thom, Patricoft Lance. for the Manchesta Corporation for wales suffly for Panitornia.

Visit was unde in company with E. Neaveran Des of hiserport burearity, who is unppring & soning the hime tax Attin ana.

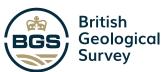
Geological Survey The cores was wear know his broken + the upper 250 feet morning hubooiliferous. The bonny appears to be put down on a fault, hot shown on the gestigical imaps, but Dr Meascoon was career of its existance.

Owing to the muchy & hoken waters of the cores, as well defined broil horzan was found in the appear fort, but the presence of Invailla langollensis at Dos fet indicates the land of D.I. - the vorest borgin kurm in this was.

fuice working this visit it has been decided to bre and they looket in water to port in an air left as the water contains to huch sand for ordinary pumps to be weed.

This additional bring will prose through the lineatais + provibly the broad construents also.

The prosent yell is love gullono for bour, but the presence of and is considered to indicate that the finite are not yet cleaned out and a larger yell is anticipated when this. has been achieved by futtor pumping



BGS ID: 641443 : BGS Reference: SH97NW1 British National Grid (27700): 294777,376345

Report an issue with this borehole

<<	

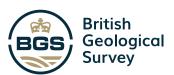
< Prev Page 3 of 22 V Next > >>



take.		. • •	-				0.5	10
•	· (D)		DD /II		G 4335	200	<b>9</b> 3	~
	(B) UNDERGE		,					<b>/</b>
Dritich Contented Cu	' (In each case pleas			and/o	r boring	is	in question.)	
Emish Geological Su	· ARÀ	British Geological Sur		ä	^		DINISH DEVINYILAH DUNYE	
1. Gen	ERAL.		16	1	y	1	NW	1
1.	Exact site of well or boring	,	,	_		_		-
	(A map or sketch showing p		e useful	.)		•••		
	Sanator	at Ty-gar ium, Aber h. (Plan	gele,	De	p <b>in</b> g nb <b>i</b> gh	Sta shi	tion, Childr ire. See Map	ens'
2.	Surface level of ground above	e Ordnance Da	itum					55.82m 183 ft.
British Geological Su	Date of construction	British Geological Sur	vey •••				<b>1928</b> Emisii Geological Surve	
WE	LLS.							
4.	Depth of well from surface le of well is below the surface le how much						None	ft.
5.	Depth of floor of galleries direction of galleries	at site of w	ell: also	dim 	ension :	and 	None	ft.
• British Geological Su	nente •							== ,
	INGS.						. Diliisii Oeologicai oulve	
DOK	,						B	
6.	Depth of boring from surface boring is in bottom of well,	level of groun state depth of	d (i.e., well		above).	Ιf	From level of of ground. (sunk)	no well
7.	(a) Diameter of top of boring	g					See Plan AS/ herewith	B <b>4</b> in.
	(b) Diameter of bottom of bo	ring	•••		•••		đo.	in.
8.	Tubed from top of boring t	o					đo.	ft.
British Geological <b>9</b> a	Lining tubes perforated at d	epths of logical Sur	Ve/				Not perforat	đ ft.
10.	Water struck during boring	at depths of					Not known	ft.
11.	What was rest level on con	mpletion of bo	ring?				60 :	feet 18.3m

VELL	S AND	BORINGS.
------	-------	----------

12. Is the water raised by pump or air lift?	 Pump
British Geologic 13 Depth from top of well or boring to bottom of suction pipe	 British Geological Survey <b>263ft</b> . 80 - 22 m
	The second section of the second section of the second section of the second section s



#### BGS ID: 641443 : BGS Reference: SH97NW1 British National Grid (27700): 294777,376345 Report an issue with this borehole

II. If systematic measurements of water levels are made, state whether these include:  None taken opposite Survey.					- · · · · · · · · · · · · · · · · · · ·
h Geologic (a) Pumping levels. None taken ological Sur(l					a On Care
	) Rest	levels		1	Tone atakemal Survey.
*					
(c) Time of recovery to rest level on cessation of	pumpi	ing		1	Not known
(d) Changes in pumping level, if rate of pumping is altered.				1	Not known
Also state: (e) at what intervals records are taken etc.)	(i.e.,	daily	, we	ekly,	Not taken
Please furnish a specimen graph of records taken over as long a period as available (up to					None taken
h Geological Survey.  British Geological Surve					British Geological Survey
III. If measurements are made only occasionally, please indicate what is, or has been, done in this respect and furnish examples of any graphs or figures available.				ľ	None taken
					. 9
IV. YIELDS.					
h Geologica (1) Number of gallons pumped per hour gire form	•••	•••			5,000 Salogical Surrey
(2) Is pumping continuous?					No.
(3) If not, how many hours pumping per day?					•
(4) Maximum daily yields available					
	Estin	nated			
•	Base	d on a	ctual	tests	65,000 gallons per day on continuous test (and possibly
h Geological Survey . British Geological Surve					more available).
V. If a section or record of strata can be given please attach to this form.				See	Plan AS/B4 herewith %
VI. (1) If a chemical analysis can be given please	•				

(2) If not state ha	ardness		•••	•••	• • •	•••	
(3) For what pur	rpose is the w	ater used?		•••	•	•••	Drinking oulinary and steam heating purposes.
British Geological Survey					,		British Geological Survey /63

SM97 NW/1

gallons per (with pump of capacity g.p.h.); depressing water level to feet

below top. Time of recovery hrs. Amount normally pumped daily g.p.h. for hours.

Sunk by Messrs. T. Thom for Mr. Abergele Sanatorium Date of well 1928

Lig Q A SE JE

Licenced to abstract 1:25 million gallons/day

Average abstraction 1973 15.5 million gallons/month

[ Supply to Hospital & associated cortages only]

D.J. LOWE

C 20 her 1949

Level of ground surface above sea-level (O.D.) ft. If well scarts below ground surface, state how far ft. Shaft ft., diameter ft. Bore ft. Diameter of bore: at top ins.; at bottom ins. Details of permanent lining tubes (internal diameters preferred) 20 112" tutes at surface; &

50-10" tubes at surface

Information from Messrs, John Thom, Patrioroft, Manohester.

MATURE OF STRATA

(and any additional remarks).

Rest-level of water below top of well feet. Suction at feet. Yield on

County Denbiguanire Six-inch quarte

THICKNESS

Feet. Inches.

Foot. Inches.

18

31

-46

120

1.80

189

266

276

286

**3**66 369

370

-466

RECORD OF WELL (SHAFT OR BORE)

in parish of....

Abergelé Sanatorium

Quality (attach copy of analysis if available)

(For Survey use only).
Gis LOGICAL
CLASSIFICATION.

BOULDER CLAY

DINANTIAN

LIMESTONE

WEATHERED AT

TOP )

DYSERTH

Exact site 5H 9477 7634

Water struck at depths of (feet)

Clay and stones

Limestone

Limestone.

Cavity

Clay and gravel

Small cavity

Broken limistons

Jointy limestone

Limestone with iron ore

Hard light blue limestone

Limestone with streaks of shale

Broken Thesetons

Limestone with iron ore

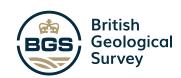
Limestone very jointy

Limestone jeinty

Town or Village

02/10/2022, 16:50

Version 2.0.6.6



BGS ID: 641443 : BGS Reference: SH97NW1 British National Grid (27700): 294777,376345 Report an issue with this borehole

CLWYD & DEESIDE HOSPITAL MANAGEMENT COMMITTEE

TEL .: RHYL 4806.

Our Ref: NF/AH. 705/3 Yr. Ref: WKS/MB/1174

15th October, 1968.

Mr. H. H. Crann, Chief Officer, Dee & Clwyd Diverauthority. 2 Vicar's Lane, CHESTER.

Dear Sir.

Water Resources Act 1963 Ecrobole at Abergela Chest Hospital (N.G.R. 948 763)

With reference to your letter of the 25th ultimo, I regret I have no information regarding the strate at various depths in respect of the above borehole which we constructed by Messrs. John Thor Ltd., Canal Works, Patricroft, Manchester.

Regarding the taking of measurements of the water level, this is a little difficult but I am informed by my Committee's Group Engineer that the levels have been checked over many years with very little variation.

The borehole is 400 ft. deep by 10" diameter and the standing level of water is approximately 100 ft. and the pumping level is 150 ft. at 5000 G.P.H. extraction.

Yours faithfully,

from Comentation Employation Std successors to John Thom Std.

Group Secretary.

02/10/2022, 16:54

Page 1 | Borehole SH97NW59 | Borehole Logs



Survey

Version 2.0.6.6

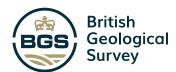




	ENVI	RONMENT A	SENCY										
Form WR – 38	Ref: betws le	odge, abergele	doc	Agency N	0.			]					
BOREHOLE RECORD				S	На	7/0	ih Geological I						
A. SITE DETAILS		00			· · · ·	II		•					
WELSH E.A Borehole drilled for:	Mr Crowther	95			SY	1971	MIS						
Location:	Betws Lodge, Ta	ın Y Gopa Roa	d, Abergele										
N.G.R.:	SH 925 765												
Ground Level (if known):	SURFACE												
Drilling Company:	W.B. & A.D. MOI	RGAN LTD., F	RESTEIGN	E, POWYS. L	D8 2UF								
Date of Drilling:	Commenced:	5/7/04	- 0	Completed:	8/7/0	)4							
B. CONSTRUCTION DETAILS													
Borehole datum (if not ground leve (Point from which all measurements			ne of chambe	er. etc.)				]					
Borehole drilled diameter			mm from	0	to	89	m/depth	Linvey					
			mm from		to -		m/depth						
			mm from		to —		m/depth						
Casing material: u.P.V.C	diameter	103	mm from	0	to	89	m/depth						
and type (e.g. plain steel, plastic slotte													
Plain	diameter	103	mm from	0	to	46.9	m/depth						
Slotted	diameter diameter	103	mm from mm from	46.9 52.7	to —	52.7 58.5	m/depth m/depth						
Slotted	diameter	103	mm from	58.5	to —	70.1	m/depth						
Plain	diameter		mm from	70.1	- to —	75.9	m/depth						
Slotted	diameter	103	mm from	75.9	to	87.5	m/depth						
Plain	diameter	103	mm from	87.5	to	89	m/depth						
Grouting details:		13m	to surface										
Water struck at:	Emish Geolog	7m, 73m, 75		elow datum -	,			UIVE)					
Rest water level on completion:		000		elow datum –	mbd)								
Estimated blowout yield: 900 Gallons per hour													
C. STRATA LOG  Description of Strata				Thickne	ss (m)	Depth	(m)	]					
Overburden – soft gravels & limes Medium/hard light brown/grey lime				86			9 89						
Other Comments								-					
(e.g. gas encountered, saline water Gravel Pack Quantity:	intercepted, etc.) 2,650kg			Steel Casing: and Diameter		9m x 22	0mm	-					
Cement:						75.14		LUBLOU					
Rig & Crew:	Tiger, D. Harner	, M. Turnbull						aurity 1					

1/2

scans.bgs.ac.uk/sobi\_scans/boreholes/13330435/images/17578030.html



Version 2.0.6.6

BGS ID: 13330435 : BGS Reference: SH97NW59 British National Grid (27700) : 292500,376500

Report an issue with this borehole

<<   < Prev   Page 1 of 1 >	Next >	>>
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	ENVI	RONMENT AG	NCY								
Form WR – 38	Ref: betws l	odge, abergele.d	ос	Agency No.				]			
BOREHOLE RECORD		SH	19:	7 /a	h Geological S W   S9						
A. SITE DETAILS		ae			2	$L^{\gamma}$		,			
WELSH E.A Borehole drilled for:	Mr Crowther	95			3/19	141	M/2/				
Location:	Betws Lodge, Ta	n Y Gopa Road	, Abergele								
N.G.R.:	SH 925 765										
Ground Level (if known):	SURFACE										
Drilling Company:	W.B. & A.D. MO	RGAN LTD., PR	ESTEIGNE	, POWYS. LD8	2UF						
Date of Drilling:	Commenced:	5/7/04	C	ompleted:	8/7/04						
B. CONSTRUCTION DETAILS		1		·							
Borehole datum (if not ground leve (Point from which all measurements			of chamber	, etc.)							
Borehole drilled diameter	British Geolog	ical Surv <b>e<b>200</b> - i</b>	mm from	0 to	)	89	m/depth	unej			
,		ı	mm from	to			m/depth				
			mm from	to			m/depth				
Casing material: u.P.V.C	diameter	103	mm from	0 to	·	89	m/depth				
and type (e.g. plain steel, plastic slotte	d) diameter	103	mm from	0 to	,	46.9	m/depth				
Slotted	diameter		mm from	46.9 to		52.7	m/depth				
Plain	diameter		mm from	52.7 to	_		m/depth				
Slotted	diameter		mm from	58.5 to		70.1	m/depth				
Plain	diameter	103	mm from	70.1 to	, —	75.9	m/depth				
Slotted	diameter		mm from	75.9 to		87.5	m/depth				
Plain	diameter	103	mm from	87.5 to		89	m/depth				
Grouting details:			to surface					Luniov			
Water struck at:	British Geolog			elow datum – mb				U175)			
Rest water level on completion: Estimated blowout yield:				elow datum – mb hour	u)			-			
C. STRATA LOG Description of Strata				Thickness (	m)	Depth	(m)				
Overburden – soft gravels & limes Medium/hard light brown/grey lime				9 80			9 89				
Other Comments (e.g. gas encountered, saline water			Toma	Steel Casing:		m x 220	Omm				
Gravel Pack Quantity:	2,650kg			steel Casing: and Diameter	"	111 X ZZ	JIIIII				
Cement:	T					- Britis	h fauninnin si s	HIRION			
Rig & Crew:	Tiger, D. Hamer	, M. Hurnbull				UIIII	III Geological a				



# BGS ID: 20808874 : BGS Reference: SH97NW89 British National Grid (27700): 291310,377650

Report an issue with this borehole





< Prev | Page 1 of 1 v | Next >



LOG NUMBER 3GS 347 DRAGON DRILLING (WATER & ENERGY) LIMITED GRAIG LELO INDUSTRIAL ESTATE

LL21 9SD TEL: 01824 707777

OPERATION	SIZE (MM)	FROM DEPTH (M)	TO DEPTH (M)	TOTAL	DEPTH (M)		DESCRIPTION	N			MATERIAL & DEPTH (M)
Set up	()	(==)	()	1							(4.2)
					G.L - 0.:	Boulders, soil ar	nd fractured limestone			Therr	nal Grout GL – 90m
Symmetrix Drilling	198	G. L	1.5	1.5	0.5 - 65	Dry, grey, hard	limestone				
					65 – 90	Very wet limest	one			Loop	installed to – 90m
Open Hole Drilling	152	1.5	90	88.5	1						
					1					Loop	diameter – 40mm
Mud Drilling					1						
					1						
CFA Drilling					1						
British Gonlanies (	iunren -				Aritieh Genin	Water strike dep	oths – 63m	British G		οv	
										7	
PREDICTED DEPTH (M)	ACTUAL DEPTH (M)	Loc	P INSTALI TO (M)	ED PR	ESSURE TESTED	LOOP WEIGHT	BENTONITE (KG)	TRANFER MEDIA (KG)	LOOP CA	APS	THERMAL GROUT (MBGL)
()	(111)										
90	90		90		Yes	1m	13 x 25kg	52 x 25kg	Yes		90 – G. L

DRILLING FOR: Ground source heating NAME: Mal Macdonald (LEAD DRILLER) 02/10/2022, 16:59



Page 1 | Borehole SH97NW91 | Borehole Logs

Version 2.0.6.6

BGS ID: 21296512 : BGS Reference: SH97NW91 British National Grid (27700): 292990,377370 Report an issue with this borehole



< Prev Page 1 of 1 V Next > >>







Dates on site: 26/05/2022 - 30/05/2022

LOG NUMBER 3WB 501 DRAGON DRILLING (WATER & ENERGY) LIMITED GRAIG LELO INDUSTRIAL ESTATE
CORWEN TEL: 01824 707777

SITE: Gwrych Castle JOB REFERENCE: 409 SITE BH NUMBER: 1 BGS No: SN22/160 GRID REF: SH92997737 DATE: 31/05/2022

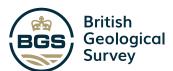
SITE. GWIYCH C	astre	JOE	KEFEF	CENCE. 4	109	2111	BH NUME	DER. I DUS	No. 51\22/100	GRID REF. SH	9299113	) D	ATE. 31/03/2022
OPERATION		SIZE (MM)	FROM DEPTH (M)	TO DEPTH (M)	TOTAL		DEPTH (M)		DESCRIPTION				MATERIAL & DEPTH (M)
Set up					1	7							
						1	G.L - 0.2	Made ground (gra	vel)		1 $\square$		
Symmetrix Drilling		198	G. L	1.5	1.5	1	0.2 - 91	Dry limestone				Solid	casing size - N/A
						1	91 – 100	Wet limestone					
Open Hole Drilling		152	1.5	100	98.5	1						Bento	onite type – N/A
						1		Borehole abandon	ed and backfilled due to	insufficient water.			
Mud Drilling						1						Slotte	ed casing size – N/A
						1							
CFA Drilling						1						Grave	el pack size – N/A
						1							
Airliftsh Geological	Summer				3	1	ritish Geologii	Water strike depth	ns -91 metres	British (		Glass	media Size – N/A
PREDICTED		WEST A W	1	ATEN OFFI	reno l		DEC DED	or owner	Dr. i Dr.	1 1	OD ALTE	E /OT 1 00	DELITOR HEE
PREDICTED DEPTH		TUAL EPTH	W	ATER STRI (MBGL)			RES PER INUTE	SLOTTED CASING	PLAIN CASING	END CAP		L/GLASS (MBGL)	BENTONITE (MBGL)
(M)		(M)						(M)	(M)				
100		100		91			>0.5	N/A	N/A	N/A	N	/A	N/A

DRILLING FOR: Water supply NAME: (LEAD DRILLER)

Date: 01/04/2019 R24 Issue:01

scans.bgs.ac.uk/sobi\_scans/boreholes/21296512/images/21296510.html

1/1



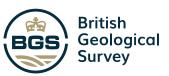
BGS ID: 696211 : BGS Reference: SJ07NW94 British National Grid (27700): 300500,375100

Report an issue with this borehole

Page 1 of 25 ➤ Next >

|--|

74	1.7)F	For Institute use only Licence No.	
	RECORD OF WELL	N	
British Geologi	At Lawther College  Mine Adit  Suney  Town or Village Bodelwyddan Geological Suney  County Flint	5507/24 British Geological Survey 107/53	
EXACT SITE	Six-inch National Grid sheet and reference	5J 005 751 SJO7NW	
OF WELL	For The Bursar, Low ther College		
	_	onsultant, etc.:	
	Address (if different from above)		
	Level of ground surface above sea level (O.D.)	ft (n	n)
*DELETE	If well top is not at ground level state how far abo	ve:*	n)
British Geologii <b>AS</b>	SHAFTft (	erft (British Geological Survey	
NECESSARY	HEADINGS (please attach details—dimensions and	d directions)	
	BOREft (m); di	ameter: at topin (mm	1);
	at bottomin (mm	)	
	Full details of permanent lining tubes (position,	, length, inner and outer diameters, plain slotted etc	.):
			•
			•
Barre Alleni	_	ft (m) below well to	
British Geology		ow well top. Suction atBillsh @edor(@UPPIr	
TEST	,	galls per ( l/s) wi	th s*
CONDITIONS	depression toft (m) belo		rs
	Capacity of pumpg.p.h. (	1/s)	
L	Date of measurements		
	DESCRIPTION OF PERMANENT PUMPING E		
NORMAL		Motive power	
CONDITIONS		nour. Suction at ft (r	
		galls (m³) per day. Estimate	ed
Base A. J.	consumptiongalls (		
British Geologia	·	Date of sinkingsh Geological Survey	••
	ADDITIONAL NOTES ANALYSIS (please at		
LOG OF	Licence No. 24/66/7/16/6, for 1230 gp	Received from . Dec. & Clayd .R.	•
STRATA			
OVERLEAF		Date . 5 · 8 · 6 b Observation well .	••



Version 2.0.6.6

BGS ID: 696211 : BGS Reference: SJ07NW94 British National Grid (27700): 300500,375100 Report an issue with this borehole





From: ENUIRONMENT AGENCY 01244541549 NATIONAL RIVERS AUTHORITY WATER RESOURCES SECTION, MOLD British Geological SAquifer/Borehole Test at Badelmyddan Costle Data Shoot for New Engine Shaff Monitoring Point (NGR SH 9977 7495 Date pumping commenced
Time pumping coased
Date pumping coased
Time pumping coased
Tim Radius metres Instrumentation manual dipper Description of Datum point gph 3.31 v220 12 728-2 1/sec 0.2 cap over mine shaft Time | Dip reading | Elevation of | Drawdown elapsed | below datum | water level | (metres) Date (gmt/ bst) (mins) | (metres) mAOD Pump of 26.00 m 1105 24 - 150 15 8 95 Pumping commenced 1115 24 150 0.5 1 1.5 2 2.5 3 3.5 4 24 150 24 150 24:150 sample taken for analysis 1120 24 150 24 · 152 24 · 152 24 · 153 24 · 153 24 · 153 24 · 154 9 10 12 14 16 18 20 25 30 35 40 45 50 55 60 75 90 24 156 24 15 7 24 15 7 24 15 7 24 15 7 Sample taken har analysis 1150 24 160 14 160 24 161 24 161 Pumping coased

Observer(s)	D. Barrow	=	Weder Save Services	
			BILLIAN GELILULLAN ALINEY	

120

f- parker Jing

Purpose of exercise was to chloin gw samples and to assist in Evaluating the potential of the resource

SJ07/24

### **ENVIRONMENT AGENCY - WELSH REGION**

CURRENT METER GAUGING DATE 19-05-98



ASIANTAETH YR AMGYLCHEDD ENVIRONMENT AGENCY

RIVER MINE ADIT SECTION & MAJS LOWERER MINE ADIT AGENCY

STAFF GAUGE DISCHARGE 0.0336 m3/s

START 1345 DISCHARGE 0.0336 m3/s

START 1345 O.170 AREA 0.1834 m²

FINISH 1415 0.170 MEAN VELOCITY 0.1823 m/s

C.M. No 73803-6 ZERO DISTANCE AT RIB DIS METHOD 0.50 WADING

			•	7 7	-			A) 2	
Hish Ge	<b>DIST</b> logical survey	DEPTH	Ť.	NO. OF REVS	REVS/SEC	VEL	MEAN VEL sh Geolo	<b>AREA</b> Ical Survey	VOLUME
νE	0.1	o					- 0.50	2 212 2	0.000
•	0.2	240	ıω	61	0.61	0 089	0 059	0 0120	
	0.3	-242	100	125	1.25	0.156	0.123	0.0241	0.0030
:	0.4	236	100	220	2 20	0 255	0 206	0.0239	0.0049
	0.5	.220	100	342	3 42	0.381	0.318	0 0 2 2 8	0 0073
,	0.6	200	100	309	3 09	0.347	0.364	0 0210	0.0076
	07	- 208		182	1.82	0 215	0281	0 0204	0.0057
			100	87	0.87		0 166	00196	0-0033
ah Ge	0.8	184	100	39	al .	0.116	0 092	0.0152	0.0014
	0.9	-120	100	1	0.39	0.067	0.069	0.0112	0.0008
	1-0	:104	100	42	0 42	0 0 70	0.052	0.0092	
	1-1	-080	100	6	0.06	0 033	0 022	1 :	0.0001
E,	1.2	0					0 0 2 2	0010	0000.
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٠.	aja harat	F34 1445 -715-	1.5	erindra e s	er eg e de e			* * * * * * * * * * * * * * * * * * *	-
	•						<u> </u>	<del> </del>	
	<del>logical Surrey</del>		<u> </u>	British Geological Sui	E <sup>n</sup>		British Geolo	gral Survey	0.0353
	, , , , ,							X0.953	
		-	-	-				TOTAL	0 0336
				1	1		]		

SAMPLE AND MEASUREMENT DETAILS WA1318 S EA WIMS

SYSTEM

. . .

Page 02-QCT-2001

Lab Ref: 214872

Sampling point: 3400 TEAM 3, RIVER SAMPLES Grid: SJ0000000000 Sampling Date: 15-AÚG-1995 Time: 1120

Sampler: Jason Liptrot

Point type: FZ FRESHWATER - UNSPECIFIED Mechanism: S SPOT

Purpose: UI UNPLANNED REACTIVE MONITORING (POLLUTION INCIDENTS)

Purpose: UI UNPLANNED REACTION IN Material: 2ZZZ ANY WATER Notes: MINE DISC 1 SH 9980 7500 9917 1495

Abstraction from New Engine Shaft

	Determinand	Unit	Result
0061 0062 0076 0085 0111 0116 0117 0118 0135 0153 0158	LEAD - AS PB PH - AS PH UNITS CONDUCTIVITY @20C TEMPERATURE WATER BOD ATU AMMONIA - AS N NITROGEN TOTAL OXIDISED - AS N NITRATE NITRATE SOLIDS SUSPENDED @105C ALKALINITY PH 8.3 HARDNESS TOTAL ALKALINITY PH 4.5	ug/l PHUNITS uS/cm CEL mg/l mg/l mg/l mg/l mg/l mg/l mg/l mg/l	11.80000 8.32000 528.00000 13.00000 -50000 -04000 1.68000 1.68000 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -00200 -002000 -00200 -00200 -00200 -00200
0172 0180 0193 0205 0209	CHLORIDE ION - AS CL ORTHO-PHOSPHATE CARBONATE - AS CO3 SODIUM DISSOLVED - AS NA POTASSIUM DISSOLVED - AS K	mg/l mg/l mg/l mg/l mg/l	44.60000 .02700 .62400 28.90000 1.67000
0237 0241 0245 0251 0356	ARSENIC - AS AS	mg/l mg/l mg/l mg/l mg/l mg/l	.00700 5.40000 88.20000 .62000 .00400 < .00200
0403 0421 6383 7375	MANGANESE - AS MN IRON - AS FE SOLIDS DISSOLVED @180C SILICA AS SI BICARBONATE - AS HCO3	mg/l mg/l mg/l mg/l mg/l	.00400 .01200 .01200 .02.00000 .01200 .00000 .00000

EA WIMS SAMPLE AND MEASUREMENT DETAILS WA1318 S SYSTEM

Page

Sampling point: 3400 TEAM 3, RIVER SAMPLES Grid: SJ0000000000

Sampling Date: 15-AUG-1995 Time: 1210

Sampler: Jason Liptrot Point type: FZ FRESHWATER - UNSPECIFIED

Mechanism: S SPOT

Purpose: UI UNPLANNED REACTIVE MONITORING (POLLUTION INCIDENTS)
Material: 2ZZZ ANY WATER
Notes: LOWER ADIT SJ 005 7510 - Mine adid discharge

		$\smile$		
	Determinand	Unit		Result
0050	LEAD - AS PB	ug/l		4.50000
0061	PH - AS PH UNITS	PHUNITS		8.38000
0062	CONDUCTIVITY @20C	uS/cm		623.00000
0076	TEMPERATURE WATER	CEL		13.00000
0085	BOD ATU	mg/1	<	.50000
0111	AMMONIA - AS N	mg/1		.07000
0116	NITROGEN TOTAL OXIDISED - AS N	mg/1		3.95000
100000000000000000000000000000000000000	o <b>NITRATE</b> British Geological Survey	mg/1		3.95000
	NITRITE	mg/1	<	.00200
	SOLIDS SUSPENDED @105C	mg/l	<	3.00000
	ALKALINITY PH 8.3	mg/l		.62000
	HARDNESS TOTAL	mg/l		244.00000
	ALKALINITY PH 4.5	mg/l		276.00000
	CHLORIDE ION - AS CL	mg/l		40.40000
	ORTHO-PHOSPHATE	mg/1		.01400
	CARBONATE - AS CO3	mg/1		.74400
0205		mg/1		28.70000
	POTASSIUM DISSOLVED - AS K	mg/1		1.57000
	COPPER - AS CU	mg/l	<	.00200
	MAGNESIUM - AS MG	mg/l		5.37000
0241		mg/1		88.70000
	ZINC - AS ZN	mg/1		.36000
	CADMIUM DISSOLVED - AS CD	mg/1	" "Newson" of the St. Sec. of	.00200
	ARSENIC - AS AS	mg/l	<	.00200
	CHROMIUM - AS CR British Geological Survey	mg/l	<b>€</b> ritish Geological Survey	.00050
	MANGANESE - AS MN	mg/1		.00800
0421		mg/1		.00900
6383	SOLIDS DISSOLVED @180C	mg/1		415.00000
	SILICA AS SI	mg/1		3.69000
9584	BICARBONATE - AS HCO3	mg/l		337.00000

	WEI	LSH	WA.	TER	ΑŪ	THO	RI	ľΥ	
	DEI	C A	ND	CLWY	D	DIV	IS.	ION	
	HY.	DRO	GEO	LOGY	S	ECI	IOI	N	
r	MD	WΑ	ਧਾਦਸ਼	QTTA	LT	ΤΥ	AN	LYS	ES

5507/24

Name of Site Low ther College Dramac	ge Tunnel
Gen D. C. D. Ref. No SJ . 97/5	N.G.R.
Analysis Group: Group 'A'	
Sampling Location and Other Details	

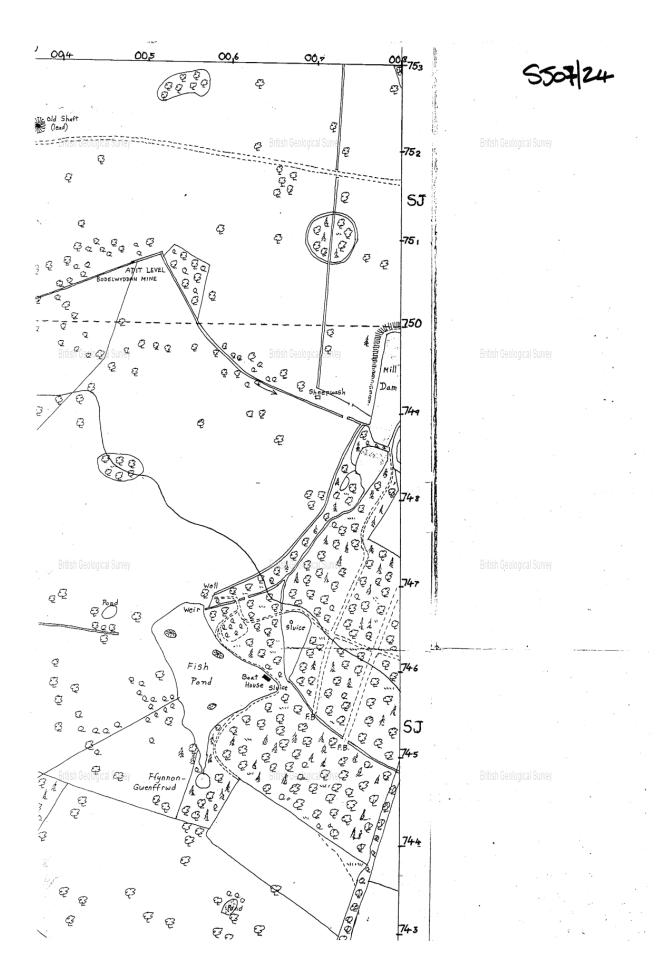
			(	 <del></del>	1	
	Date	21.7.77	14-9-82		-	
- 1	Time G.M.T.		1435			
	Water Level (m.A.O.D.)			 		
	Flow (g.p.h.)		C 0 5 mgd			:
	Temperature					
British Geolod	PH	7-2	7.33		Jri ala Caalaaisal Cus	
	Specific Conductivity		603			
	Total Dissolved Solids		377			
	Sodium	34.2	21-2			
	Potassium	4.48	2.63			
	Calcium (as CaO	106	106			
	Magnesium (as Ca	9.7	11.5			
. 1	Chlorides	37	36.9			
- 1	Sulphates	35	30.4			
	Carbonates		NIL			
İ	Bicarbonates		282			
Parent .	Nitrates os N		3.33			
British Geolog	Nitrites GA N	British Geologica	2001		British Geological Surve	Tituo.
	Tot. Ox. Nitrogen os N.	3.70	3.34			
Ì	Ammoniacal Nitrogen		∠ 0.05			
	Silicates		3.6			
	Orthophosphates		< 0.05			
	Suspended Solids		ND			
	Alkalinity (Total)	259	282			
	Iron (Total)	0.18	0.304			
	Manganese (Total)		0.0188			
	Hardness (Total)		312-2			
	Copper		0.015			
British Geolog	• •		0.309		Pritish Geninning Surv	
2111011 000100	Chromium	Empire Conduction	(0.010			

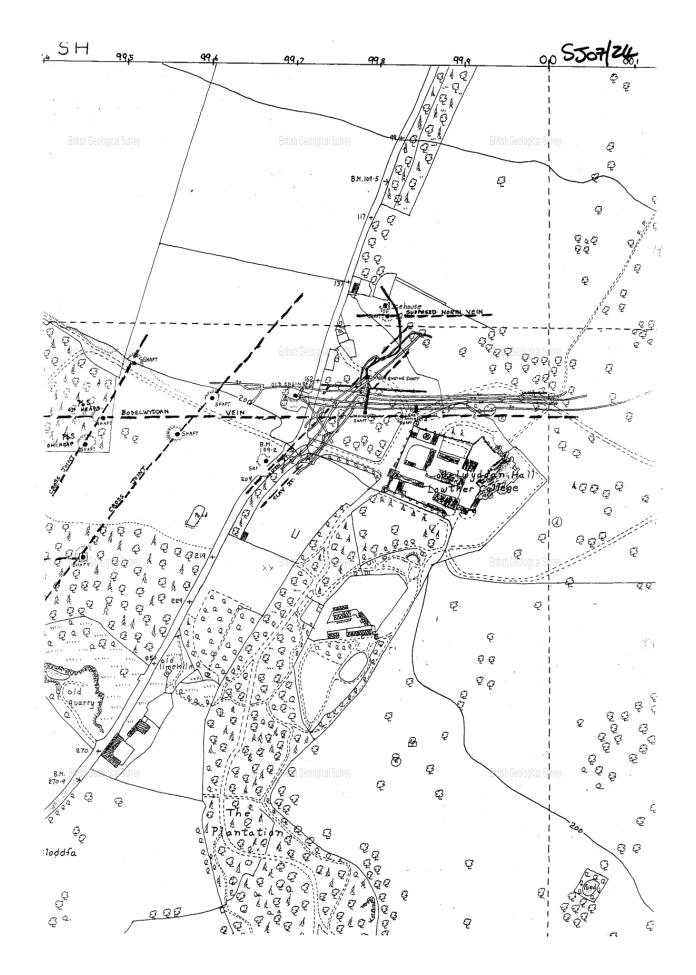
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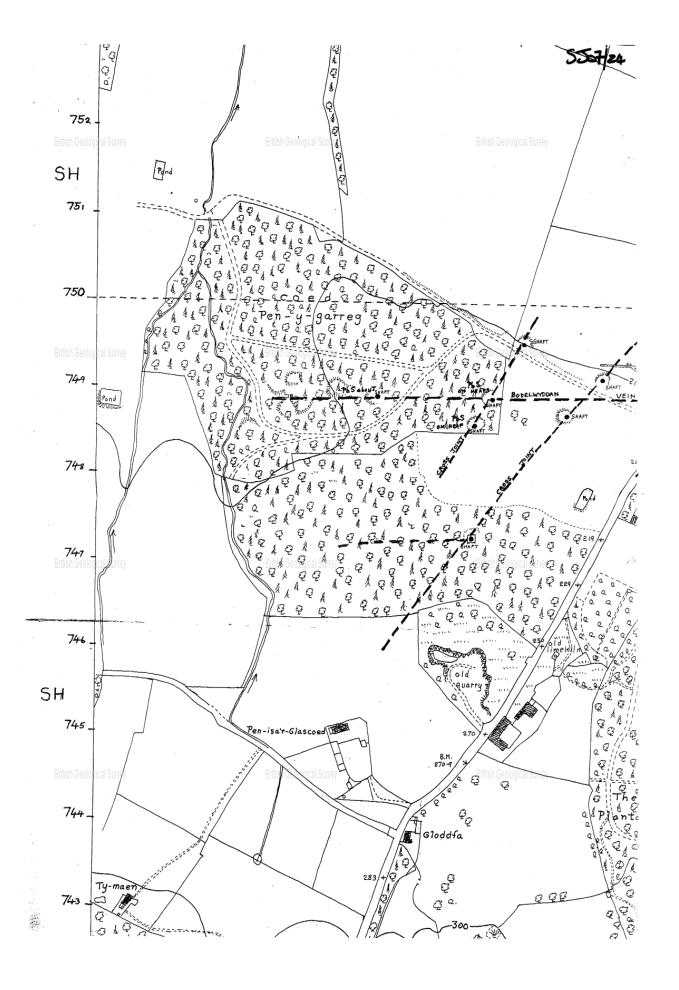
Sample

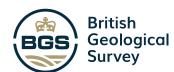
Comments:

· mother / litre	 	
J		





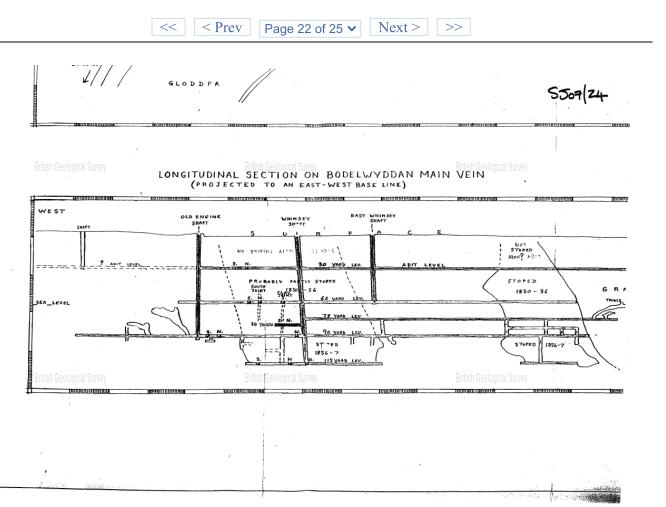


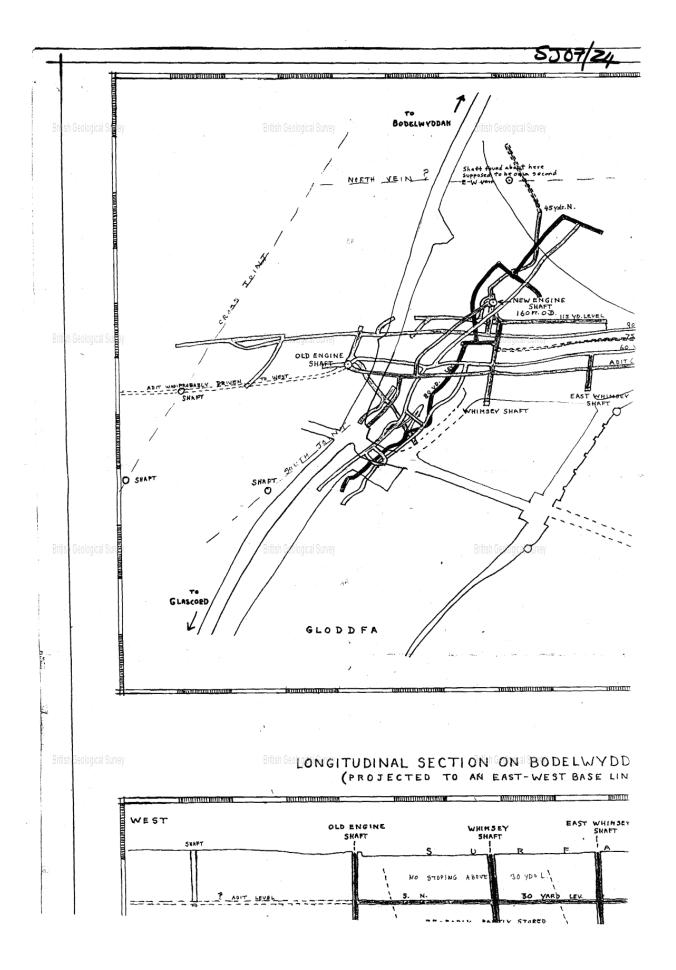


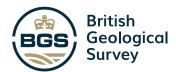
Version 2.0.6.6

## BGS ID: 696211 : BGS Reference: SJ07NW94 British National Grid (27700) : 300500,375100

Report an issue with this borehole





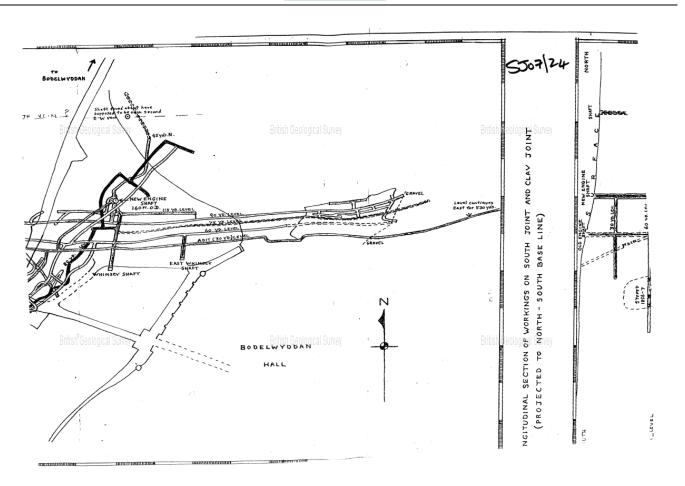


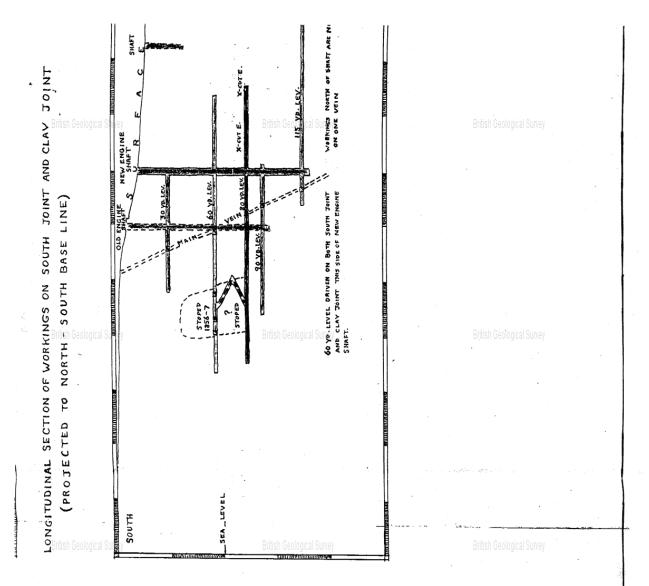
Version 2.0.6.6

BGS ID: 696211: BGS Reference: SJ07NW94 British National Grid (27700): 300500,375100

Report an issue with this borehole

<< | < Prev | Page 24 of 25 ▼ | Next > | >>





## PLAN AND SECTIONS BODELWYDDAN MINE

#### FLINTSHIRE

#### SCALE 100Ft. TO AN INCH

THIS PLAN AND SECTIONS ARE BASED UPON COPIES OF THE ORIGINAL PLAN AND SECTIONS DEPOSITED AT THE MINES DEPARTMENT (PLAN Nº R-301). THE ORIGINAL SURVEY WAS MADE BY THOMAS R. BUCKLEY, IN 1857., WHEN THE MINE WAS STILL AT WORK. THERE WAS NO SECTION MADE THEN ON SOUTH AND CLAY JOINTS, AND THIS SECTION IS PROJECTED FROM THE PLAN HERE. THE WORKINGS OF THE MINE ARE ALSO KNOWN TO HAVE BEEN EXTENDED BEYOND THE WESTERN END AS SHOWN HEREIN, BUT NO PLAN OR SECTION OF THESE WORKINGS IS NOW IN EXISTENCE; NOR IS THERE ANY RECORD OF WORKINGS ON OTHER VEINS WHICH ARE KNOWN IN THE IMMEDIATE AREA OF THE MINE.

42/2025

MIDDLETON-IN-TERSDALE.

5 JANUARY 1964. - JFS-

02/10/2022, 17:12

**British** Geological Survey

Page 4 | Borehole SJ07SW3 | Borehole Logs

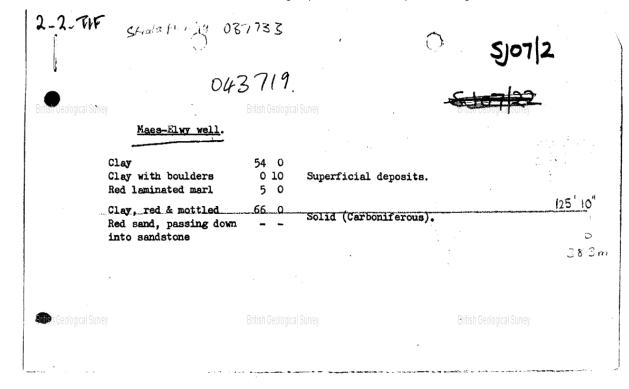
Version 2.0.6.6

BGS ID: 750877: BGS Reference: SJ07SW3 British National Grid (27700): 304300,371900 Report an issue with this borehole

Page 4 of 5 V Next >>

02/10/2022, 17:12

Page 4 | Borehole SJ07SW3 | Borehole Logs



**British** Geological Survey

Version 2.0.6.6 BGS ID: 750888: BGS Reference: SJ07SW14 British National Grid (27700): 303660,373120 Report an issue with this borehole

British Geological Survey Temporary Record Geological Survey.

Maes Elwy.

Map Ref: 043719

Drift Sandstone (? Upor. Carboniforms) 66

DJ.L. 22/6/77 Information from Dr. Neaverson. Dr. Wilson visited the site - the hole could not be found?

Information from Dr. C. DV. Wilson , University of diversity in Letter to g. V. Stevens (Manchester Office) dated 19.5.58

Sited in pencil on 1" Sheet 107 and rough sited on 6" map Denligh & NE 1E. 19.6.58 BN.

scans.bgs.ac.uk/sobi\_scans/boreholes/750877/images/14458148.html

Version 2.0.6.6



<<	< Prev	Page 19 of 25 <b>∨</b>	Next >	>>

#### 33\_2.TIF

GEOLOGICAL	NATURE OF STRATA		KNESS	<u></u>	DEPTH *		•	
CLASSIFICATION	If measurements start below ground surface, state how far.	Feet	Inches	Metres	Feet	Inches	Metr	
British Geological Survey	Atturism, grand and grandly day	67	5-81	sh Geologica	67	5		
Uppn Coal Measures	Red amudatine with some sandatane	426	7		494			
		ļ						
			1	 	<u> </u>		<u> </u>	
	British Geological Survey		Bi	ish Geologica	Guirey		ļ	
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	British Geological Survey			ish Geologica	Buivey			
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	British Geological Survey .	ļ		tsh Geologica	Survey			
	union oconogical outroy			on voneyles	. #41707		<b>.</b>	
		ļ			ļ			
	i	1	1	1	1	.l	.	

	(	Gravel with red clay	
	89		
:	B <b>E</b> n Geological Survey	Drillers log British Genlanical Sunsey	
	Drift,? all	Boulder clay	
1.	alluvial	Gravel	
	5	Boulder olay	

9	1 3-
Name of Shaft or Bore given by Geological Survey: 33_3.Tu- St. Asaph. (Wigfair Isaf). Borehole	SJ 07 SW/14 SJ07 33
Name and Number given by owner:	Nat. Grid Reference
For whom made I. G. S.	SJ 0366 7312

For whom made + ... Wa. St. Asaph. County

Exact site 1480yd. S. 18. W. of. St. Asaph. Attach a tracing from a map, or a sketchmap, if possible.

Isaf 107

Ground Level at shaft relative to O.D. about 60ft. If not ground level give O.D. of beginning of shaft bore Made by Foraky..... Date of sinking .July .1968...

Information from Drilling log and chippings to 70ft 5in, Date received.

Examined by D. Price cores below

SPECIMEN	NUMBERS	AND	ADDITIONAL	NOTE

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	-	 British Géol			 ,	 British Geological Survey
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(For Survey use only)	DESCRIPTION OF STREET		THICK	NESS	DEPT	H
GEOLOGICAL CLASSIFICATION	DESCRIPTION OF STRATA	Pr.	IN.	PT.	IN.	
	Chippings					
	Gravel		•••••		5	0
	Gravel			ļ	10	0
eological Sûrvey	Gravelly clay-ological Super			h Geolo	cal 81115	0
	Gravelly clay	-			20	0
	Clayey gravel			1	25	0
	Clayey gravel		************		30	0
	Gravel				35	0
	Gravel			ļ	40	l o
	Gravel				45	<u>  0</u>
	Gravel				50	0
	Sandy gravel (grey)				55	<u>  0</u>
	Sandy gravel				60	
	Sandy gravel		*		65	0
(	Gravel with red clay				70	<u></u>
						<u> </u>
	Drillers log Rutish Genlarical Survey			h Genin	ing Survey	<u> </u>
Drift,? all	Boulder clay	li li	14	6	14	6
alluvial	Gravel	a a	8	0	22	6
	Boulder clay	ll ll	8	6	31	0
	Gravel		36	5	67	5
U.C.M.	Soft red sandstone		3	0	70	5

BGS ID: 750888 : BGS Reference: SJ07SW14

British National Grid (27700): 303660,373120

Version 2.0.6.6



BGS ID: 750888 : BGS Reference: SJ07SW14 British National Grid (27700): 303660,373120 Report an issue with this borehole

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# Survey

<< | < Prev | Page 23 of 25 ▼ | Next > | >>

Version 2.0.6.6

Report an issue with this borehole

**British** 

Survey

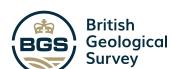
Geological

ATER RESOURCES BOAF	D	W.R.B. REF NO.	J 07/32
WELL RECORD	SHEET 2		
. HYDROGEOLOGY	DIIII3II Geniofiral adilek		i denindical onivek
ocal depression, Flat su	rface, Hill top, H	illside, Valley	bottom, Terrace
AJOR AQUIFER		Lithology	
epth to top of aquifer	Thickness p	enetrated	
op of aquifer	<del>8XX</del> Total thick	ness of aquifer	
pefficient of storage	Transmissibility	ame	m²/day* galls/day/ft.
INOR AQUIFER (a)	Dilian Verious a variet	Lithology	n veelegisal entry
enth to ton of aquifer.		enetrated	
op of aquifer	ft. BOD Total thick	ness of aquifer	m. ft.
		i11ty	m²/day* galls/day/ft.
		Lithology	
### HYDROGEOLOGY  Topography AT WELL SITE  Local depression			
## HYDROGEOLOGY Topography AT WELL SITE  Local depression   Flat surface   Hill top   Hillside   Valley bottom   Terrace    MAJOR AQUIFER   Lithology  Depth to top of aquifer   M.   Thickness penetrated   M.    Top of aquifer   M.   M.   M.    Top of aquifer   M.   Thickness of aquifer   M.    Top of aquifer   M.   Thickness penetrated   M.    Top of aquifer   M.   Lithology    Depth to top of aquifer   M.    Top of aquifer   M.   M.    Top of aquifer			
DITIONAL NOTES: SJ 036 Ulwimm - growel gra Oper Coal Measures Recl mudstone mainly	b 7312 Dee + velly clay. 67'5" , some sandstene to 49	Clwyd R.A.	
4" core 80 to 120 fe 25 core below 120 fe	et. t.		
ogical survey Not much water, loss	eirculation in Coal M	Brits Lasutes,	n Geological Survey
Information from MR Felephoned by Di	Price, 1.G.S. Leeds.		

Michelbert and self, mulestore, people and green 3 5 87  Sendertone, aft, people and people-golf 3 6 91  Mendelbert and self, mulestore, people, red 3 6 91  Mendelbert and self, mulestore, people of 14 3 65  Southertone, grey to people  Southertone, grey to people of 11 169  Mellectore, people grey and green 1 11 169  Mellectore, people grey and green 3 7 182  Seatterth, people and green 3 7 182  Seatterth, people and green 3 7 182  Mellectore, port ally, people to 192/3 and 22 0 208  Statistic people grey sold to 192/3 and 22 0 208  Seatistic people grey 53 1 264  Southertone and ally mulestore, red, people 53 1 264  Southertone, part investigated 3 0 20  Mellectore, part investigate, mainly tell 6 7 335  Southertone and ally mulestore, mainly tell 6 10 347;  Southertone and ally mulestore, grey, red and grey 37 4 302  Mellectore and ally mulestore, grey, red and grey 37 4 302  Mellectore and ally mulestore, grey, red and 6 10 347;  Southertone and allettore, grey, red and 6 10 347;  Southertone and allettore, grey, red and 6 10 347;  Southertone and allettore, grey, red and 6 10 347;  Southertone, red, people and red  Southertone, red, people and green; spiroths and 5 8 362 8  Thorizon of realized cool. 5 8 362 8  Thorizon of realized cool. 5 8 362 8  Thorizon of realized cool. 5 8 362 8	th Geological Survey	British Geological Survey	Тніск		ological S <b>pey</b> m	B,
Description of the marketine people and gran 3 5 87  Sendertown, people and red mercions in parts 1.7 0 54  Mishelita and selly marketine, people and gran 3 6 91  Mushelita and selly marketine, people, red  Mushelita people gran all people to the sell of 7  Mushelita people gran and gran 1.11 169  Mushelita, people, red and gray plant infrared 1.2 7 182  Thought on orally all sells red and gran;  Thought people gran and gran 3 1 86  Mushelita per sell, people red and gran;  Plant impractive 190/6 to 192/3 and 22 0 208  Their on orally and selly mushelite, red, people 53 1 264  Sententh, people gray  Sententh, people gray  Sententh and selly mushelite, mainly tell 6 7 335  Mushelita and selly mushelite, mainly tell 6 7 335  Sententh and selly mushelite, mainly tell 6 7 335  Sententh and selletine, gray, red and gray  Sententh and selletine, gray, red and 9  Sententh gray, gram and red 5 8 362 8  Mashelita and selletine, gray, red and 5 10 347  Sententh gray, gram and red 5 8 362 8  Thought and shifled bads, gray to people 3 1 350 0  Sententh, gray, gram and red 5 8 362 8  Thoughton, red, purple and gram; flinders and 5 8 362 8  Sententh, gray gram and red 5 8 362 8  Thoughton, all husbelier and sellation, mainly  polant cross 2 29 0 394 9  Sententh, gray graps and graps; spinoles and 2 0 396 9  Sententh, gray graps and graps; spinoles and 2 0 396 9  Sententh, gray graps and graps; spinoles and 2 0 396 9  Sententh, gray gray and sent and sellation, mainly  polant cross 2 29 0 394 9  Sententh, gray gray and and sellation, mainly		DESCRIPTION OF STRATA	Fr	In.	Ft	I
Michelota and ally muchelous, purple and grain 3 5 87  Sandictoria, apt, purple and purple get 3 6 91  Michelota and ally muchelous, purple, all and great perfect purple to the and gray for the and self muchelous  Sandictoria, gray to purple, red and gray plant impression 12 7 182  Therefore, purple, red and gray plant impression 12 7 182  Therefore, part of and gray plant impression 12 7 182  Therefore, part of and gray plant in forestion 12 7 182  Sections, purple and grain 3 7 186  Michelota, part acht, purple red and gray, plant impression 190/6 to 192/3 land  20 208  Sections, part of muchelous, red, purple  Sections and self, muchelous, red, purple  Sections and purple gray  Sendictoria, part muchelous, mainly tell  Sendictoria, part muchelous, mainly tell  Sendictoria and self-tone, gray, red and gray 37 4 302  Michelota and self-tone, gray, red and 6 10 347;  Sendictoria, part muchelous, gray, red and 6 10 347;  Sendictoria, part and self-tone, gray, red and 6 10 347;  Sendictoria, part and self-tone, gray, red and 6 10 347;  Sendictoria, red, purple and red  Michelous, red, purple and red  Michelous, red, purple and red  Michelous, red, purple and allestone, mainly  tell, purple and allestone, mainly  tell, purple and allestone and allestone, mainly  tell, purple and and allestone, mainly  tell, purple and purple gray; scattered  plant trans	Recent	Grand and gravely clay	67	5	6.7	5
Sentestore, soft, purple and purple golf 3 6 91  Mushotist and self, mushorist, jurgles, sell 74 3 765 7  Mushotist purples gray and subjected between 182 3  Sentestore, gay to mush the purple between 182 4 167  Mushotist, gay to mush the gay for an 182 3  Sentestore, purple, sell and gay, popul surpression 12 7 182  Thorogon of onely all solds, gray and such gets; plant surpressions 190/6 to 192/3 buil 3 7 180  Mushotist port sells, pulpe sold to 192/3 buil 22 0 208  This on of onely a sold mushotist, purple 53 1 264  Sentestore, part such mushotist, purple 53 1 264  Sentestore, part such mushotist, mainly tell and gay gray  Sentestore, part surpression, purple 6 7 338 1  Shifed bells gay  Selly mushotist and sellatore, gray, red and 6 10 347; selly mushotist and sellatore, gray, red and 6 10 347; selly mushotist and sellatore, gray, red and 6 10 347; selly mushotist, mush tell 3 1 350 6  Sentestore and schifel bells, gray to purple 3 1 350 6  Sentestore gray gram and red 3577  Mushotist, red, purple and granis spinotists and 3 1 350 6  Sentestore, pray gram and red 3 1 350 6  Sentestore, pray gram and red 3 1 365 9  Mushotist, ally hundribore and sellables, mushotist, ally further and granish gray; sentend 190, purple and party gray; sentend 190, purple and party gray; sentend 190, purple and party gray; sentend 190, purple and 190, purple 200, 394 9  Sentestore, pray gullow and and 200, 394 9  Sentestore, pray gullow and and 200, 394 9  Sentestore, pray gullow and 200, 394 9	U. C. M.	Sondstone, purple and red, muracious in parts	1.7	0	54	5
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Version 2.0.6.6

BGS ID: 751075: BGS Reference: SJ07SW201 British National Grid (27700): 304870,371720 Report an issue with this borehole





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ritish Geological Survey	Town or Village Llanerch, Trefor	ant.	British Geological Survey
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