A HYDROGEOLOGICAL ASSESSMENT OF WYBUNBURY MOSS

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INTRODUCTION

This technical report has been produced as the 'appropriate assessment' to inform the Stage 3 Review of Consents under the Habitats Directive for Wybunbury Moss, a National Nature Reserve and Special Area of Conservation in Cheshire.

In the Stage 2 Review of Consents (Appendix 1) one groundwater licence (25/68/001/217), which was believed to be just within the potential groundwater catchment of Wybunbury Moss, could not be clearly assessed as having no 'significant impact' and so was taken forward to Stage 3 for 'appropriate assessment' in accordance with the Habitats Directive technical guidance.

The Stage 2 Review assessed the nominal groundwater catchment for the Moss as being bounded in the north by Swill Brook, in the south by Checkley Brook (known as Wybunbury Brook near Wybunbury) with the remaining boundary formed by a 3km screen from the site boundary.

Further work has been carried out by the Environment Agency to refine the understanding of groundwater flow and the extent of the actual groundwater catchment of Wybunbury Moss. This work has involved the drilling of three observation boreholes (Figure 1) adjacent to the Moss, the monitoring of the groundwater levels in the boreholes by data-loggers for more than 18 months and the sampling and analysis of the groundwater from the boreholes.

From this work a geological cross-section and Conceptual Model has been produced (Figure 2) and a map showing the revised understanding of the groundwater catchment of Wybunbury Moss has been produced (Figure 3).

WYBUNBURY MOSS

The area of the National Nature Reserve and SAC is shown on Figure 3. Details of the physical characteristics of the Moss together with information on the ecology and conservation objectives are included in Appendix 2.

Wybunbury Moss is considered to be one of the finest schwingmoors in the country. The moss lies in a basin with a central raft of peat surrounded by fen and mixed woodland. The floating peat raft varies from 1m thick (information from the Nature Reserve site information noticeboard) to 3-7m thick in the centre of the moss (Appendix 2) and overlies up to 13m of water (Appendix 2).

Wybunbury Moss is thought to have developed in a basin formed by solution and subsidence of salt beds in the underlying Wilkesley Halite Formation.

There is no inflow stream entering the moss. Appendix 2 notes that the majority of the influx of water to the moss will occur from overland flow or rainfall. However the

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work carried out as part of the Agency's hydrogeological assessment shows that the contribution from groundwater inflow is likely to be significant, particularly from groundwater flowing from the sand deposits lying on the north side of the moss (see below).

There is an outfall drainage ditch which drains the eastern end of the moss. Appendix 2 refers to sluice gates which can be closed to hold back water on the moss. Water in the ditch flows southwards and enters Wybunbury Brook close to the road bridge over the brook on Bridge Street (Figure 3).

One of the main threats to the moss has been eutrophication caused by sewage pollution from septic tanks serving properties on the north side of the basin (Appendix 2). All the effluent now flows into a collection tank near Moss Nook Farm and is thence pumped into the main sewer serving the village of Wybunbury (Appendix 2). However the sampling of the groundwater from the EA's new observation boreholes shows that groundwater in the sand deposits on the north side of the basin is high in nitrate, possibly from sewage pollution or from agricultural practices (see below).

GEOLOGY

The solid geology of the area is shown on Figure 4. The site is underlain by the Wilkesley Halite Formation, with the Wych Mudstone Formation lying to the north and west. The boundaries between the two formations are faulted; an east-west fault has been mapped just to the north of the site and a north-south fault just to the west.

The Wilkesley Halite Formation consists of interbedded halite and mudstone. The formation also contains sandstones, some of which are over 1m thick (Rees and Wilson, 1998). Due to solution of salt, the near-surface beds of the formation consist of a collapse breccia composed of mudstones (and sandstones) that originally overlaid or were interbedded with the halite (Rees and Wilson, 1998).

It is possible that the presence of the faults adjacent to Wybunbury Moss facilitated groundwater movement and lead to a deep zone of solution and brecciation with marked subsidence of the overlying strata (see Conceptual Model, Figure 2).

The superficial deposits are shown on Figure 5. The pink areas are fluvioglacial sand and gravel deposits, the pale blue is boulder clay and the brown areas are peat. A small area of lacustrine clay deposits has been mapped just to the south east of Wybunbury Moss. River Terrace deposits and alluvium occur along Wybunbury/Checkley Brook (Figures 2 and 5).

RESULTS FROM AGENCY BOREHOLES

The locations of the Agency's boreholes is shown in Figure 1 and the geological and drillers logs together with details of the well installations for the three boreholes are included in Appendix 3.

Borehole A encountered Boulder Clay to 14.70m depth overlying weathered sandstone/mudstone of the Wilkesley Halite Formation. Borehole B encountered sand to 1.60m and then Boulder Clay to 16.70m overlying weathered sandstone/mudstone of the Wilkesley Halite Formation. Borehole C encountered sand to 8.45m and Boulder Clay to 16m.

Results of the particle size analysis for the sand in Boreholes B and C are included in Appendix 4, together with the results of laboratory falling head permeability tests on the sand from Borehole C.

The groundwater hydrographs from the three boreholes are included as Appendix 5.

HYDROGEOLOGICAL CONCEPTUAL MODEL

Figure 2 is a north-south geological cross-section and hydrogeological conceptual model for Wybunbury Moss.

The results from the EA drilling show that there is a marked difference in the superficial deposits on the north and south sides of the moss.

On the south side of the moss Boreholes A and B show that there is only a thin capping of sand deposits overlying Boulder Clay. The BGS geological map (Figure 5) shows sand and gravel deposits covering the north-facing slope on the south side of the moss, but the drilling has found this to be incorrect as the slope mainly consists of Boulder Clay.

On the north side of the moss Borehole C showed that sand deposits occur to 8.45m depth underlain by Boulder Clay. The boundary between the sand deposits and underlying Boulder Clay is therefore at 43.03m above OD in Borehole C, whereas in Borehole B on the south side of the moss the boundary between the sand deposits and underlying Boulder Clay is at 57.47maOD, a difference of 14.4m.

It is possible that the difference in elevation of 14.4m in the Fluvioglacial Sand/Boulder Clay boundary on the north and south sides of the moss represents the amount of post-glacial subsidence.

Groundwater in the sand deposits on the north side of the moss is in hydraulic continuity with the moss, with the groundwater flowing southwards towards the moss.

The south side of the moss consists mainly of Boulder Clay, as described above and therefore it is expected that there will be negligible groundwater contribution from the superficial deposits. However there is likely to be groundwater inflow from the underlying Wilkesley Halite Formation, as shown in Figure 2.

The groundwater levels in Boreholes A and B are at approximately 57maOD. This is believed to represent the piezometric level in the Wilkesley Halite Formation, which the boreholes intersected. Groundwater was struck at the boundary between the Boulder Clay and underlying Wilkesley Halite Formation in Borehole B and rose 1.6m in 20 minutes (Appendix 3).

Groundwater in the sand deposits on the north side of the moss was intersected in Borehole C at approximately 49maOD, which is slightly above the water level in the moss.

The approximate groundwater catchment for Wybunbury Moss is shown on Figure 3.

GROUNDWATER ABSTRACTIONS

Figure 6 shows the locations of the licensed groundwater abstractions within a 3km radius of Wybunbury Moss. There is a licence for a small abstraction from a well at Hough Mill Farm and a licence for a larger abstraction from a quarry lagoon further south, close to Forge or Checkley Brook. There is an error in the original abstraction licence records for the well at Hough Mill. The licence records give the grid reference as SJ 696 495. In fact the grid reference of the well (from the Crewe and Nantwich Council register of private water supplies) is at SJ 7032 4926. Although the licence for the quarry lagoon abstraction is still current, the company is in receivership and the site hasn't been used for 2 years (pers. comm., Steve Kelly, Regulatory Officer (Water Resources)).

In order to assess the radius of influence of these abstractions, recharge circles have been drawn relating the annual licensed quantity to the theoretical area of recharge required to satisfy the abstraction, i.e. the theoretical catchment areas.

The average rainfall has been taken from the Audlem (Mere Farm) rain gauge (EA ref. 552375, SJ692410), which gives long term average rainfall as 695mm (Appendix 2).

The estimated annual recharge has been estimated as 40% of average rainfall. This is based on the work carried out for the Environment Agency by Water Management Consulants on the Delamere Sand Sheet, further north in Cheshire (Water Management Consultants, 2003).

The average recharge to groundwater in the sand deposits has therefore been estimated as 40% of 695mm, i.e. 278mm/annum.

The radius of influence for the small abstraction from the well at Hough Mill has been calculated as 17m, while the radius of influence for the quarry lagoon abstraction has been calculated as 426m. For the quarry lagoon this is a worse case scenario as in fact most of the abstracted water was re-circulated and only 4-8% of the abstracted quantity was lost from the system (pers. comm., Steve Kelly).

From Figure 6 and Figure 3 it can be seen that the calculated potential radii of influence for these licensed groundwater abstraction are a significant distance (approximately 1km) outside of the groundwater catchment for Wybunbury Moss. Therefore the abstractions will have no impact on groundwater levels in the vicinity of Wybunbury Moss.

GROUNDWATER QUALITY

Groundwater was sampled from Boreholes B and C on 7th July 2003. Prior to sampling, each borehole was purged using a small 'Whale' electric (12 volt) submersible pump. Two samples were taken from each borehole and the results are included in Appendix 6.

The analytical results from Borehole B show that the groundwater contains relatively high levels of metals. Lead, barium, arsenic, copper, zinc, strontium, iron and manganese are all elevated. Calcium is high, but, surprisingly, chloride and sodium are low. Borehole B is screened through the Boulder Clay and just into the underlying Wilkesley Halite Formation. Groundwater was encountered at the junction of the Boulder Clay and Wilkesley Halite Formation, as discussed above. It is believed that the groundwater quality represented by the analyses from Borehole B represents the groundwater quality at least in the uppermost part of the Wilkesley Halite Formation. The water is very hard and highly mineralised but is not however high in sodium chloride. It is probable that saline water would be encountered at greater depth.

The analytical results of the water samples from Borehole C represent the groundwater quality in the glacial sand deposits on the north side of the moss. The total dissolved solids are far less than in Borehole B and the pH is also lower. However the nitrate levels are very high (20mg/l as N or 88mg/l as NO3) and the chloride levels are also elevated. This is the result of anthropogenic pollution and may be due to leaking sewers or possibly as the result of agricultural activities e.g. fertiliser application.

CONCLUSIONS

Wybunbury Moss is partially dependent on groundwater flowing to the moss, particularly from the sand deposits on the north side of the moss. However the licensed groundwater abstractions within a 3km radius of Wybunbury Moss will have no impact on groundwater levels in the vicinity of the moss and therefore on the conservation features of interest.

The groundwater quality in the vicinity of Wybunbury Moss is poor. The groundwater in the sand deposits is enriched with nitrate, possibly as a result of leakage from sewers or from agricultural practices, while the groundwater in the Wilkesley Halite Formation is naturally rich in metals. The nitrate enrichment in the groundwater could contribute to eutrophication and impact on the integrity of the SAC. However, there are no Consents to Discharge in the vicinity of the moss and therefore the problem is not the result of Agency-permitted activities.

REFERENCES

Rees, J.G. and Wilson, A.A., 1998. Geology of the country around Stoke-on-Trent. Memoir of the British Geological Survey, Sheet 123. Water Management Consultants, 2003. A Hydrogeological Assessment of the Delamere Sand Sheet and Environs. Report prepared for Environment Agency, North West Region.

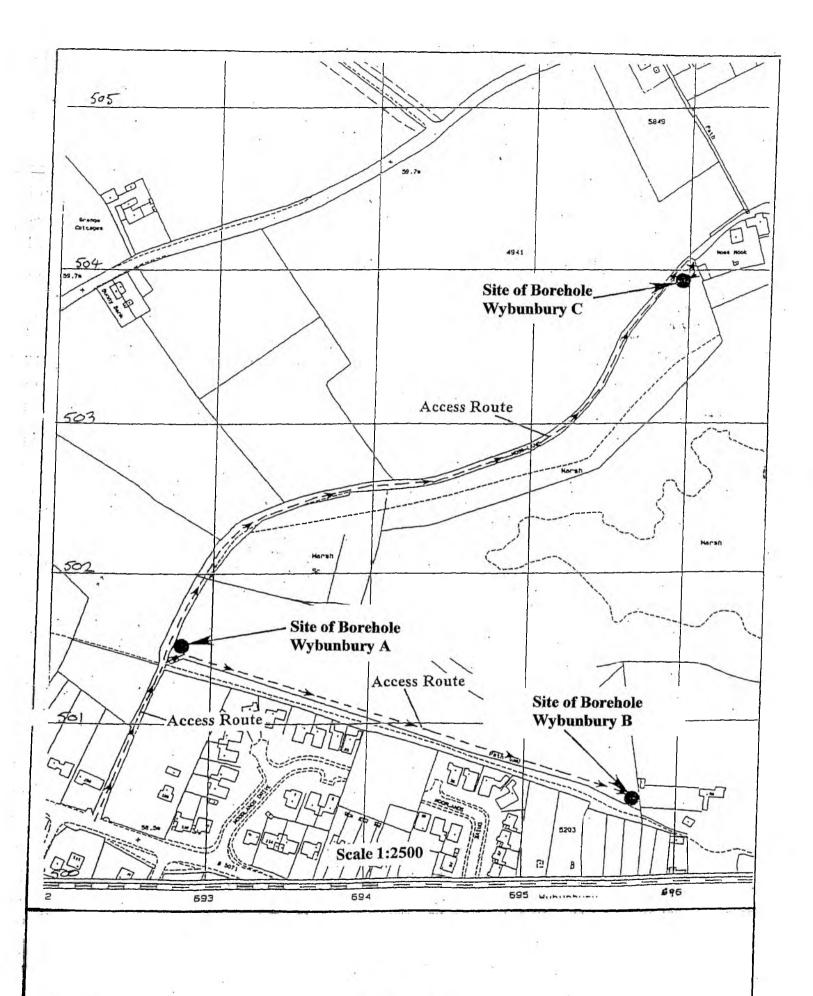
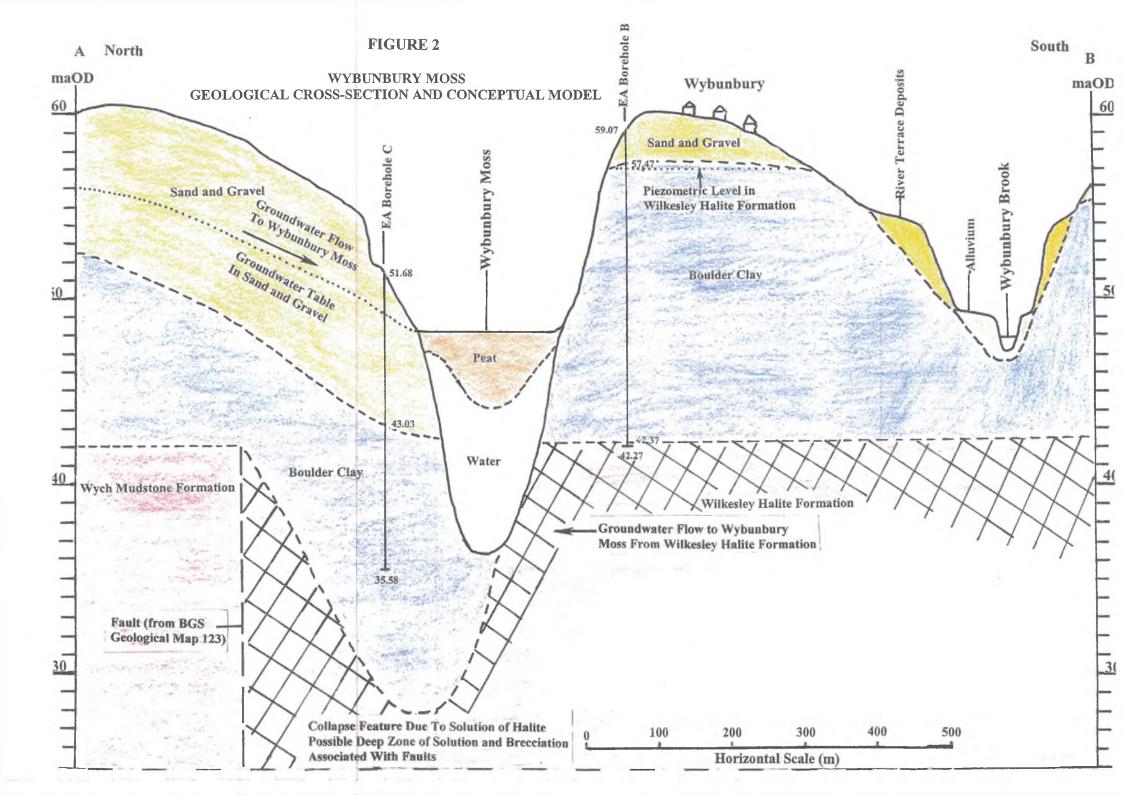
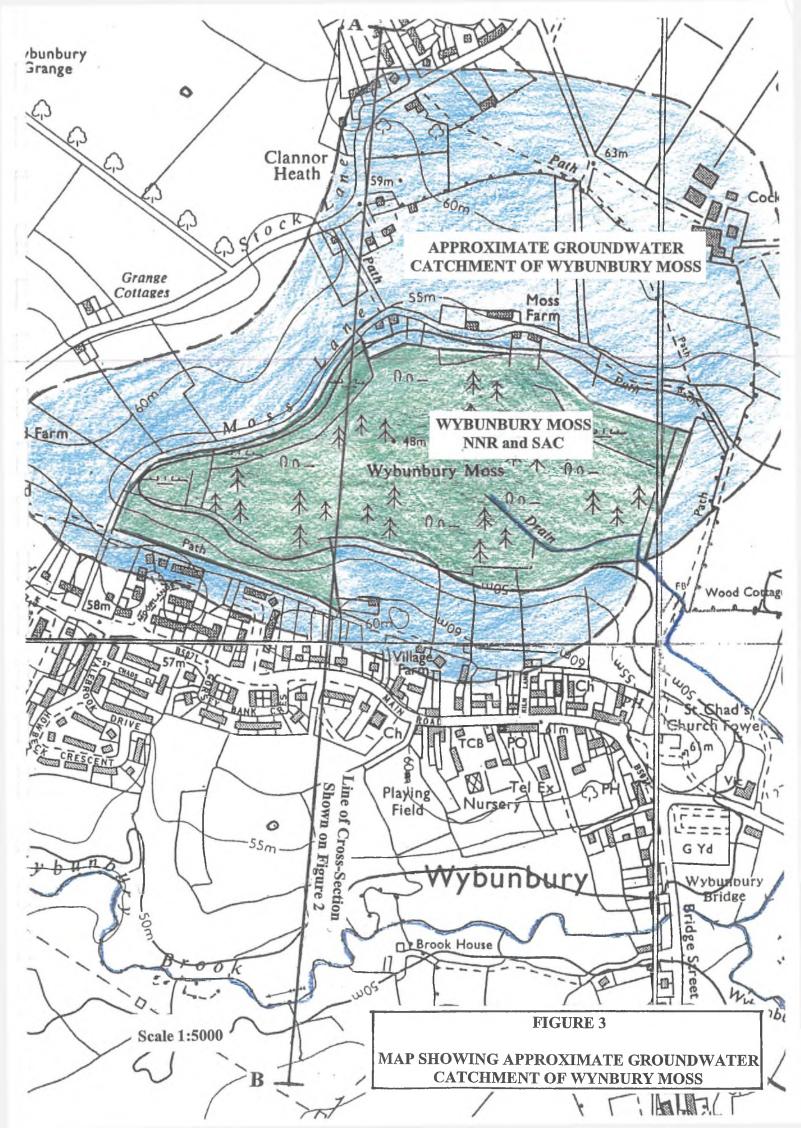


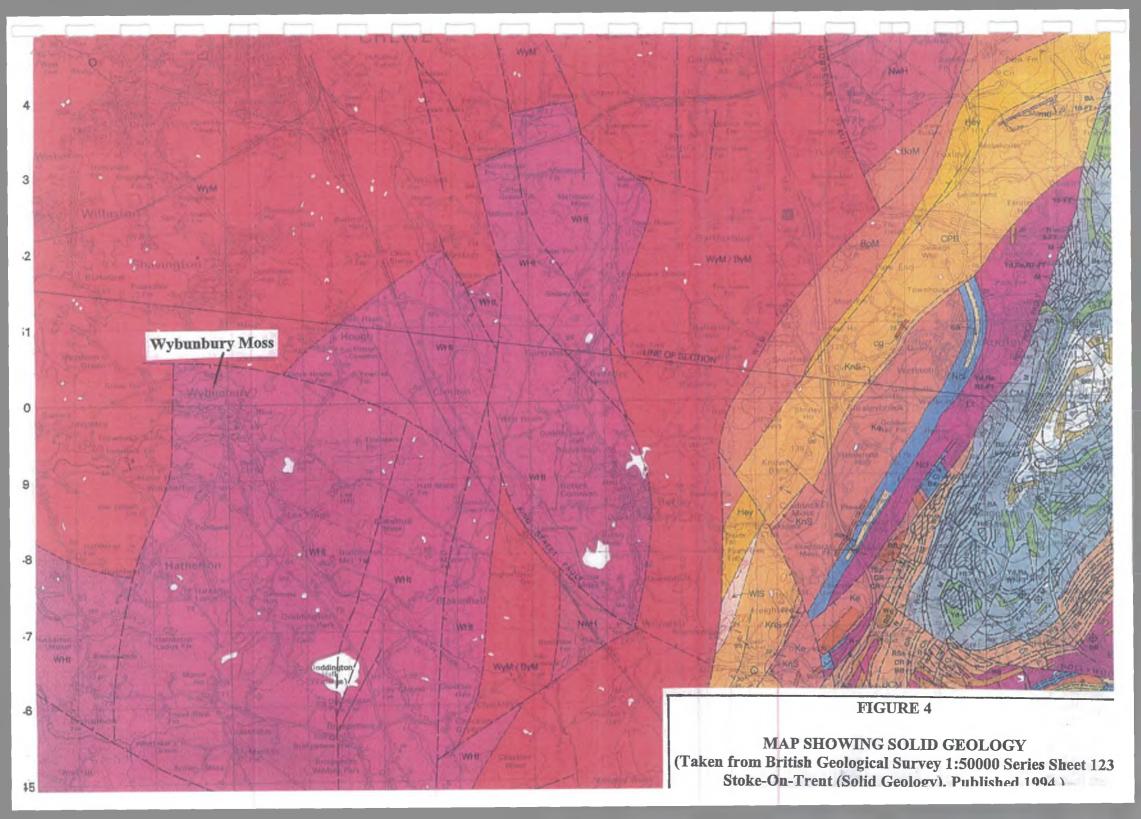
FIGURE 1

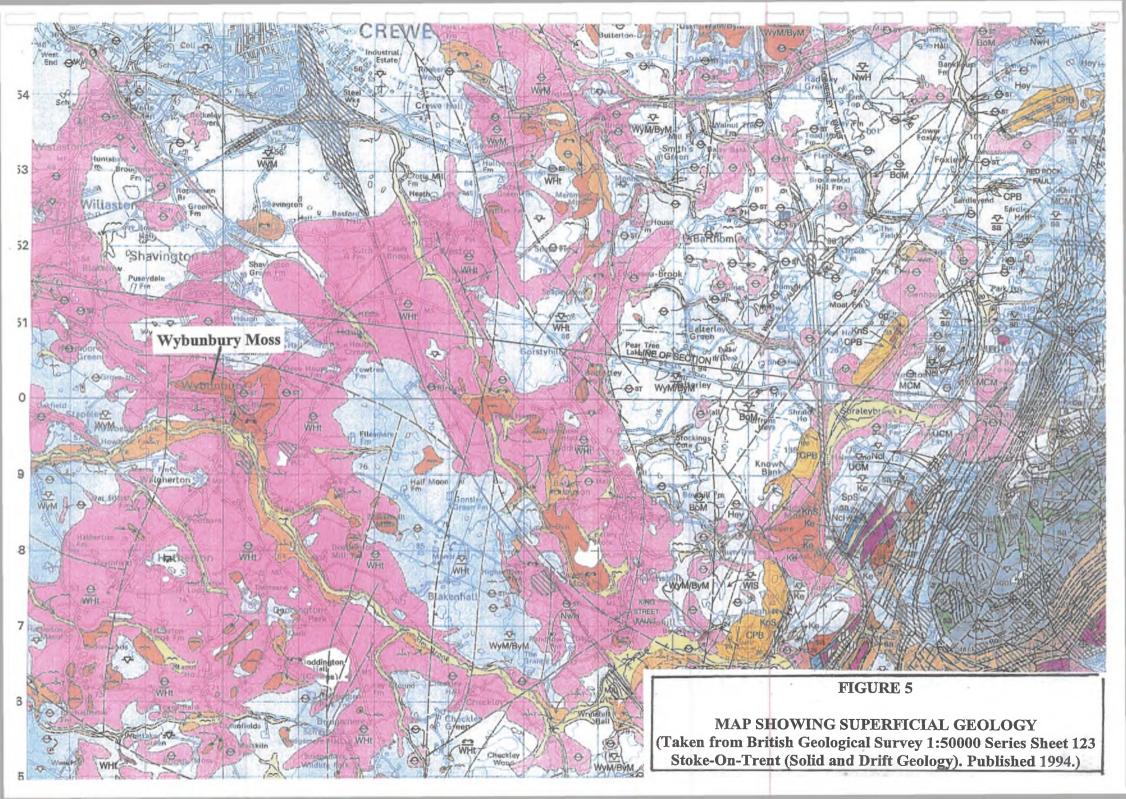
PLAN SHOWING ENVIRONMENT AGENCY BOREHOLES WYBUNBURY A, B & C

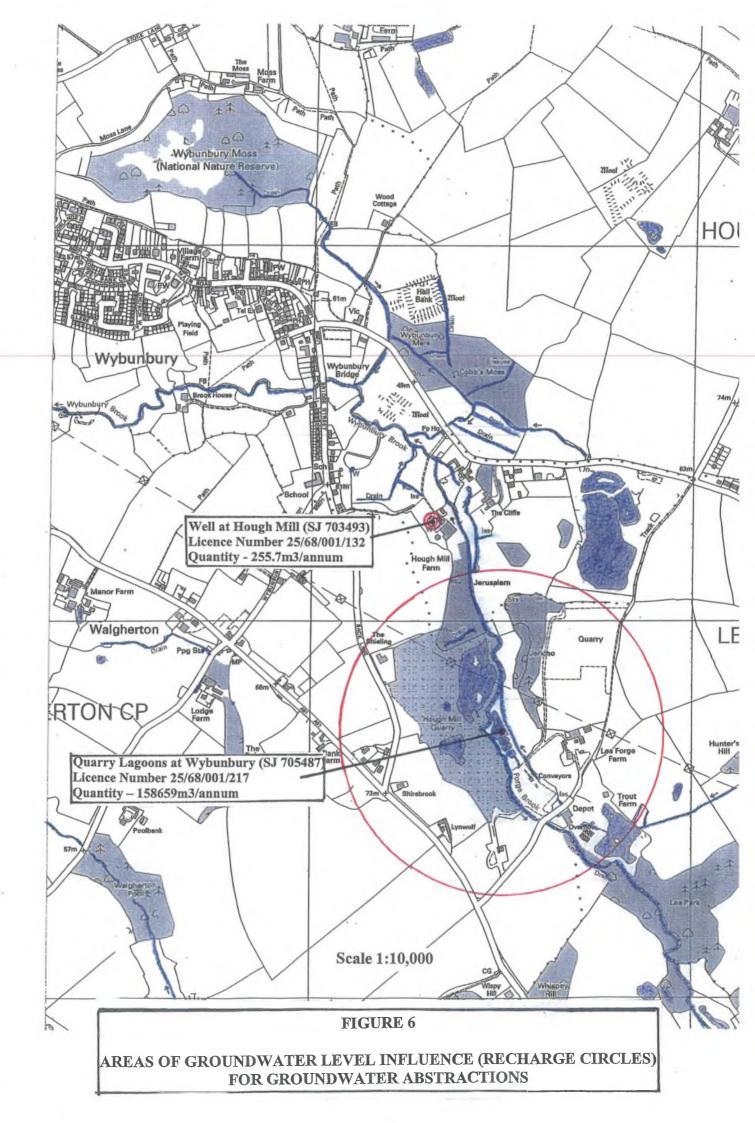
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APPENDIX 1

WYBUNBURY MOSS – PROFORMA FOR STAGE 2 OF THE REVIEW OF CONSENTS UNDER THE HABITATS DIRECTIVE

PROFORMA FOR STAGE 2 OF THE REVIEW OF CONSENTS UNDER THE HABITATS DIRECTIVE

STAGE 2 - ABSTRACTION LICENCES - WYNBUNBURY MOSS

C1. Are any of the features present identified as vulnerable to impacts from abstraction in Appendix 3? If so, list them: (See section 6, step I)

1.2 Bogs and Wet Habitats (sensitive to acidification) Transition mires and quaking bogs.

1.4 Standing Waters (sensitive to acidification) Natural dystrophic lakes and ponds

C2. Are there any known abstraction problems on the site? If so briefly describe them: (See section 6, step II)

| C3. What is the initial judgement of significance fo | r the abstraction licences identified under |
|--|---|
| SECTION A? (See section 6, step I, II and IV) | the second second |

| Agency reference | NGR | Likely to have a significant effect? - yes or no | Initial judgement made under step I or II or IV? - specify |
|------------------|------------|---|--|
| 25/68/001/132 | SJ 696 495 | Ν | IV – Ground water licence outside the defined ground water catchment. |
| 25/68/001/217 | SJ 705 487 | Y | IV can not yet be clearly assessed as having 'significant impact' or not. |
| 25/68/001/213 | SJ 707 483 | N | No interaction between this surface water and the site. |
| 25/68/001/188 | SJ 692 470 | N | IV – Ground water licence outside the defined ground water catchment. |

C4. Describe the supporting case for the judgements given in C3:

Surface Water:

The surface water catchment is relatively large, extending over 1.5km to the east of the site. However there are no inflow streams to the site, so surface water inputs are largely from direct precipitation and diffuse overland flow from surrounding agricultural land. Therefore there is no need to take the surface water impoundment licence on Checkley Brook (25/68/001/213) any further that Stage 2.

Ground Water:

The site is located on a minor aquifer of type (I)2, indicating fractured or potentially fractured rocks which do not have a high permeability, or other formations of variable permeability including unconsolidated deposits. These rarely produce quantities large enough for abstraction, but are important for local supplies and for base flow supply to rivers.

The hydro-geological boundary of Wynbunbury Moss is depicted in the attached geology map and GIS output. To the south, the boundary is the course of Checkly Brook, as any groundwater to the south of the brook will discharge into it. To the north-east side, the boundary is another watercourse named Swill Brook, which flows north-west to join the river Weaver. The remaining boundary is formed by a 3km screen from the site perimeter.

Two of the groundwater licences identified in stage 1 are located outside this defined ground water catchment area. With this in mind, they need not be taken forward to stage 3. The remaining licence, 25/68/001/217 is located just within the ground water catchment area. Abstracted water is used for sand and gravel washing and dust suppression. Although the licensed quantity is large at 159144m³ per year, only 10% of the licensed amount has been used since 1994. Even so, this licence is to be taken forward to Stage 3 for 'appropriate assessment' in accordance with the Habitats Directive technical guidance.

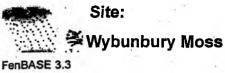
C5. Does internal consultation support this initial assessment? (yes or no)

Yes

C6. If not what is the new assessment? (See section 6, step V)

APPENDIX 2

WYBUNBURY MOSS - SITE INFORMATION



West Midlands Wetlands

Background

NGR: SJ696503

Compiled by: MG

Status during: 1999

Description

Considered to be one of the finest schwingmoors in the country, Wybunbury Moss is situated south of Crewe. It lies in a basin with a central floating peat raft surrounded by fen and mixed woodland.

Administration

| District: Crewe and N | lantwich | Natural Area: | Mosses & Meres |
|-----------------------|------------------------------------|----------------|----------------|
| EA Region: North We | est | Character Area | 1: |
| Planning Authority: | Cheshire CC, Crewe and Nantwich BC | Water Authorit | y: |
| County: Cheshire | | Vice County: | Cheshire |

Conservation Status

| | | Area (ha |) Notes |
|-----------------|---------|--------------|---------------|
| National Nature | Reserve | 15.25 | |
| SSSI / ASSI | | 23.3 | 1951, 1986 |
| Ramsar | | | Proposed 1993 |
| SAC | · · . · | | 1995 |
| NCR Site | | | Grade ? |
| | | - C | |

Natura 2000 Site

Owners, Occupiers and User Groups:

Wybunbury Moss NNR is owned by English Nature. The remaining parts of the SSSI are under six different ownerships and some of the field are occupied by tennant farmers. Access to the NNR is by permit only. Public footpaths surround the SSSI on all sides.

Physical Characteristics

Geology and Soils: Substratum Category Triassic mudstones (inci. "Keuper Marl", with Rhae Triassic wilkesley halite underlying the surface catchment and to north, east, and south. Wych mudstone to west. Organic deposits Peat directly underlies the SSSI. Glaciofluvial Deposits (undiff.) **Glacial Deposits** under c. 25% of the nominal groundwater catchment. **Glaciofluvial Sheet Deposits Glacial Deposits** under c. 25% of the nominal groundwater catchment. River terrace deposits (numbered) Fluvial deposits second river terrace deposits under less than 25% of the nominal groundwater catchment. Fluvial deposits Alluvium less than 25% of the nominal groundwater catchment. Glacial Deposits тш under c. 25% of the nominal groundwater catchment. Lacustrine Deposits Lacustrine Deposits in east of nominal groundwater catchment (less than 25% of area). Earthy Eu-fibrous Peat Altcar 1 Soils under most of the SSSI. Typical Brown Sands Newport

[Background]

Wybunbury Moss

surrounds the SSSI and extends to the south-west.

Substratum notes: 1022a Altcar 1.

A soil that occurs mainly on fen peat, and is a eu-fibrous soil. It is permanently waterlogged almost to the surface. The land tends to be rush infested with patches of semi-natural woodland.

551d Newport 1.

A mainly well-drained medium soil, formed in glaciofluvial and river terrace deposits. It is characterised by free drainage and summer droughtiness. The topsoil commonly has a weak structure

Geology notes:

A fault runs from north to south, bisecting the western side of the moss.

Saliferous beds underlie large areas of drift in this area, and the natural subsidence of the drift surface as a result of local wet head solution of buried salt has long been recognised. It has been suggested that this could account for the step-like terracing beneath the surface of Wybunbury Moss (Reynolds et al. 1979).

NOT IN REFERENCE

The Wilkesley Halite formation, previously known as keuper marl is a rock salt with thin red mudstone partings. This and the wych mudstone formation form a wide thick sheet extending over much of this area. Some beds of rock salt and gypsum probably occur, but it is difficult to assess exactly where (Evans et al. 1968). — IN REFERENCES

Glacial sands and gravels have been found to attain a great thickness in this area and are finely laminated, being free of boulders. The river terraces, alluvium, till, and lacustrine deposits were laid when a river was dammed by a grit barrier at the time of the last ice age (Gibson and Wedd 1902). $- \lambda DT$ IN REFERENCES

Peat underlies the SSSI and the surrounding area. It has been suggested that peat formation occurred where most of the sediment is composed of fluid peat directly overlying lake muds. Successive Sphagnum rafts will have settled through the mud in a manner similar to the present day schwingmoor structures (Reynolds 1979).

Full explanation of geology to be found in Gibson and Wedd (1902).

Hydrolological Characteristics

Water Supply Notes:

[Summary to be added]

The majority of the influx of water to the moss will occur from overland flow or rainfall due to the position of the moss within a hollow, and the lack of an inflow stream.

The Environment Agency does not indicate any consents to discharge in the immediate vicinity.

There has been considerable discussion in the past of concerns regarding pollution sources causing enrichment of the mire (EN file notes). Much of the correspondence in the English Nature files dates from 1988/9, when a white scum was identified in the overflow ditch. North West Water analysed a sample from the ditch before pumping and reported that it equated to 'a very good final effluent'.

In January 1991 a letter from NCC to the Department of Transport (EN file notes) explained how foul and storm water had been pumped from the properties on the north side of the basin, giving rise to grave concern that the entire moss surface would break up under the influence of eutrophication and oxidation. As a result, all effluent was collected into a tank near Moss Nook Farm and thence pumped into the main sewer serving the village of Wynbunbury. Further management was undertaken to close and control the sluice gates to hold back water on the moss, allowing the Sphagnum carpet to rise above the more eutrophic waters.

Colin Hayes (EN file notes) suggested that the flushing time of the moss is quite long, given the slight evidence for any inflows and the sluggish flow in the outfall ditch, but noted that the direction and speed of any lateral groundwater movement were unknown. The preponderance of springs along the northern side may be taken to suggest a north-south movement at just below moss surface level.

There are two very small licences to abstract water for agricultural/irrigation purposes within a 1 km radius of the SSSI. Two large abstractions are licensed within 2km of the site. 68/001/217 is for groundwater for sand and gravel extraction and dust suppression but less than 10% of the licensed amount (of 159.144 MI per annum) has been used since 1994. Licence 68/001/237 is rather larger at 3600 MI per annum and is from surface water for fish farming. This is likely to lead to relatively low losses of quantity but may have implications for water quality. It is judged as 'critical' by the Environment Agency, requiring

Wybunbury Moss

annual inspection, and its location needs to be investigated to assess any likely impact on the SSSI.

The Audlem (Mere Farm) rain gauge (Environment Agency ref 552375, SJ692410) gives long term annual rainfall as 695mm, with 682mm computed for 1969 to date.

Groundwater Catchment: Area:

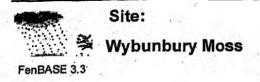
[Summary to be added]

The aquifer is of the 'minor (I)2' type. These are fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability including unconsolidated deposits. Although these aquifers will seldom produce large quantities of water for abstraction, they are important both for local supplies and in supplying base flow to rivers.

Soils which can possibly transmit non or weakly adsorbed pollutants and liquid discharges but are unlikely to transmit adsorbed pollutants (Groundwater Vulnerability Map for Staffordshire and East Shropshire, Sheet 22, Scale 1:10,000. Environment Agency).

Surface water Catchment: Area:

The surface catchment is relatively large and extends to the east for over 1.5 kilometres. Most of the catchment is intensive farmland.



West Midlands Wetlands Ecology and Conservation

Vegetation:

The open area of the Moss is a wet mire with small pools (M2a and M2b). Sphagnum recurvum is dominant in the wetter areas and Erica tetralix, Eriophorum angustifolium, and Vaccinium oxycoccos are frequent. In the eastern part the vegeataion becomes more fen-like with Juncus effusus and Carex species and a patch of Phragmites australis. The open mire grades into scrub and then birch and alder woodland (W4a) which contains a large amount of Pinus syslvestris in places. Strips of fen and marshy grassland (M23a and MG10a/MG13) are found along the edges of the NNR.

The fields to the north and south of the NNR are mostly improved or semi-improved, but there is an area of unimproved pasture at the eastern end with Deschampsia cespitosa, Holcus lanatus, Angelica sylvestris, and Juncus effusus.

Developmental History:

Wybunbury Moss is thought to have developed in a basin deepened by solution and subsidence of the underlying salt-bearing strata. The central floating peat raft is 3 - 7m thick and overlies up to 13m of water.

Management:

Land Use: The eastern half of the catchment is mainly agricultural, but it includes a part of the village of Hough and the busy A500 road. Most of the fields are improved pasture but there is some arable. A few sheep-grazed fields nearer to the NNR are less improved.

The western half is again a mixture of improved pasture and arable fields with a strip including part of Wybunbury village. There is a recent development of industrial units and a stables and showground at Cockshades Farm. The small pool to the east of the Farm is used for private fishing.

Vegetation: Scrub and trees have been cleared from the Sphagnum lawn, creating a greater area of open mire. The two fields to the south-east of the Moss itself are grazed by cattle. The field at the eastern end of SSSI (not part of the NNR) is topped in late summer. The other surrounding fields all appear to be grazed or mown.

Water: Effluent from foul and storm sources has caused eutrophication on the bog. Several sewers were redirected and connected to the mains sewer to take polluted water away from the Moss. Water levels were raised by sluices to force up the peat keeping it away from polluted water and encouraging movement of enriched water out of the site.

Past Use: None recorded.

Conservation Interest:

Wybunbury Moss is an excellent example of a schwingmoor. The wet mire communities support locally rare plants such as Andromeda polifolia, Carex limosa, Narthecium ossifragum, and Drosera rotundifolia. The wet woodland contains the Nationally Scarce Thelypteris palustris.

Notable Plants: Andromeda polifolia, Carex limosa, Cladium mariscus, Rhynchospora alba

Invertebrates: The site is extremely rich in invertebrates: 307 species of moth and 47 of spider have been recorded. The Nationally Rare invertebrates recorded are the beetle

FenBASE 3.3

Wybunbury Moss

Cryptocephalus decemmaculatus, the fly Atylotus plebeius, and the sider Sitticus floricola. It is also the only known British locality for the money-spider Carorita limnaea.

Other notable insects include Idaea muricata (Purple-bordered Gold) and Lampyris noctiluca (Glow-worm).

There are former records of Leucorrhina dubia (White-faced Darter) but this is now extinct at the site.

Birds: No specific interest recorded.

Other Verts: No specific interest recorded.

Conservation Objectives:

General objectives:

a. Maintain, and where relevant improve, water quality of all surface inflows.

- b. Maintain water levels within current range of climatic and seasonal fluctuations.
- c. Maintain the condition of the internationally important schwingmoor.
- d. Maintain open bog carpets.
- e. Maintain and increase populations and assemblages of rare invertebrates.
- f. Ensure a continuity of refugia for rare and characteristic invertebrates.
- g. Minimise recreational impact and disturbance.

h. Reinstate grazing on cpmt. 0013 and utilize the field to connect existing grazing to the NE of the Moss (cmpt. 0029) with an area requiring light grazing to its SE (part cmpt 8700).

i. Ensure that activities within the site and around the site (especially water abstraction and mineral working) do not adversely affect the habitats for which the site is a candidate SAC. j. Maintain surrounding fields as a buffer zone to core area of Moss.

Conservation Features:

| ID . | Name Status | | | 1.5 | |
|------|---|---------|--------|------|--|
| | Schwingmoor | | | | |
| | Includes M2 Sphagnum cuspidatum/recurvum bog pool commu | nity. | | | |
| 2.0 | Invertebrate assemblages | | | | |
| | Includes 4 Nationally Rare species and 18 Nationally Notable sp | pecies. | G. | ar Đ | |

| * | | | | | 1.4.0 | | 13 | 4 | 141 - 141 141 - 141 |
|---|-------------------------------------|--|---|----------------------------|--------------------------|----------------------------|------------------------------|----------------------|------------------------|
| | | | | | | | | | • |
| | Site: | 4 4 | ġ. | | | We | st Midl | ands | Wetlan |
| <u> </u> | Wybunbu | ry Moss | | | | | S | ite | Issues |
| FenBASE 3.3 | | | | | | 121 | | | |
| Source: JJ | | Year: | 1999 | · · ; | 12 | | | | |
| Issue | | Impact | 94 | ÷. | Effect [1-5] | Area (ha) | On Site | Off Site | Priority |
| WATER MANAG | EMENT | Not know | vn | | | | | ۲ | • • • |
| aquifers could groundwater of make recomm applications e | | sed. This shou he conservatio well-targetted | ld be couple n features fo monitoring p | d with a mo r which the | re detaile site is no | d ecologic tified. It w | al assessr | nent of possibl | the e to |
| Main Water Sour | 1 | 1. I. | enrichment | | | | 0 | . 🔘 | ÷ * |
| 1. Discharge f Sewage work: | from septic tanks s have removed | s has been a p the main sourc | roblem in the ces of polluti | e past, and on, and wat | led to fen er level c | vegetation | n developii lp to 'flush' | ng on th 'out the | e mire. e site. |
| Roads | | Not know | n . | | | | 0 | ۲ | |
| 2. The Hough- | -Shavington by-p | oass was plann | ed to pass v | very close to | the site. | The road | could still | pose a | threat. |
| uccession | • | Scrub end | roachment | | | | | 0 | |
| 3. Scrub and p help stop succ | oine encroachme ession. | ent on the mire | A lot of sci | rub has bee | n remove | d, and hig | her water | levels n | nay |
| egetation Manag | 1 | Derelictio | n | 2 C | | | 0 | \bigcirc | |
| 4. The meadow | w to the east of t | he NNR would | benefit from | n grazing. | 2 | | _ | | 12.1 |
| otes | | 4 - E + | | • | | | | | |
| nere are 21 farms | surrounding the | catchment. | | • | 6 A | | ÷ . | | |
| her issues, as ide problems in the fi | entified on map. | | thought to t | threaten the | site at th | e momen | t but they (| could b | e the source |
| New industrial an ge lorries, and co | d business units uld be a source | s have been bu of pollutants. | ilt at Cocksl | nades Farm | . This an | ea feature | s parking | facilitie | s for several |
| New stables and | showground at | Cockshades F | arm. | Q.E | | | | | |
| | bog probably t | the result of ea | rlier pollutio | n · | · · · · | | 5 | ÷. | |
| Area of ten on the | | | inor ponato | | | | 1. | | |
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| 1 E . | 0 T T T | | ÷., | | | | | | |
| Young conifer pla | ntation. | | 1 . 1 | | 4.6 | | | | |
| Young conifer plan Private fishing poo | ntation. | the site and ca | rrvina murky | v water in N | lovember | 1999. | | | ÷ |
| Young conifer plan Private fishing poo | ntation. | the site and ca | rrying murky | y water in N | lovember | 1999. | | | * *** |
| Young conifer plan Private fishing poo | ntation. | the site and ca | rrying murky | y water in N | lovember | 1999. | | | |
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| Young conifer plan Private fishing poo | ntation. | the site and ca | rrying murky | y water in N | lovember | 1999. | | | |
| Area of fen on the Young conifer pla Private fishing poo | ntation. | the site and ca | rrying murk) | y water in N | lovember | 1999. | | | |

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| | Wybur | nbury Moss | | | | Sito | . Im | pacts |
| | FenBASE 3.3 | | <i></i> | | • | | 5 111 | ipacis |
| | issue | Impact | | Effect [1-5] | Area (ha) | On Site | Off Site | Priority |
| | WATER MANAGEME | | | [1-0] | (114) | Site | Sile | 4 |
| | A more detailed hydrog supplying water to the v aquifers could then be a groundwater dependence | eological assessment is recomvetiand. The vulnerability of th assessed. This should be coup cy of the conservation features well-targetted monitoring progr | e wetland to develo bled with a more de for which the site i | opment and o tailed ecolog | other op Jical ass | eration: essme | s that nt of t | affect he |
| | Effects on Conservation F | eatures: | - | | | | | |
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| | Work Required: | | | | | - | | |
| | Operation: Investigat | ion | | | | | | |
| | Agency: | a de la come | | Permissio | | | | |
| | Mechanism: | | | Time Fram | | 2 | ÷. | |
| | Likelihood of Success ?: | | Popular | Requirement | | ÷ . | - | ę. |
| | Notes: | - | nesource | nequirement | (5 : | ÷ | | 4 |
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| | Issue | Impact | | Effect [1-5] | Area (ha) | | Off Site | Priority |
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| • | Main Water Sources En 1. Discharge from septic ta | nriched Nutrient enric | e past, and led to t | [1-5] | (ha) | Site : | Site | |
| · • • | Main Water Sources En 1. Discharge from septic ta Sewage works have remov | nriched Nutrient enric anks has been a problem in the ved the main sources of polluti | e past, and led to t | [1-5] | (ha) | Site : | Site | |
| · · · · | Main Water Sources En 1. Discharge from septic ta Sewage works have remov Effects on Conservation Feat | nriched Nutrient enric anks has been a problem in the ved the main sources of polluti | e past, and led to l ion, and water leve | [1-5] | (ha) | Site : | Site | |
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| | Main Water Sources En 1. Discharge from septic ta Sewage works have remove Effects on Conservation Feat ID Name Schwingmoor Enrichment leads to Rare invertebrate Loss of habitat. | anks has been a problem in the wed the main sources of polluti tures: to loss of bog communities as s | e past, and led to f ion, and water leve Status | [1-5] | (ha) | Site : | Site | |
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| enBASE 3.3 | West Midlands | Wetlands | | | | | [Site Issue |
| Wybunbury Moss | | 4 | | | * | 2 | |
| | | <u></u> | Ff | fect A | rea On | Off | |
| issue | Impact | e e | | | ha) Site | Site | Priority |
| Roads | Not know | 1 | | | | | 2 |
| 2. The Hough-Shavington | n by-pass was planned to | pass very close | to the site. | The road | could still p | ose a í | threat. |
| Effects on Conservation Fe | eatures: | 75. | • | ÷ | | | 4 |
| D Name | 9. | Status | 2 | | | | ~ |
| Schwingmoor | 11 A. | | | | | | |
| If built, runoff from | m the road could carry poll | ution to the site | and damag | e the schv | vingmoor. | | |
| Vork Required: | | | | | | | 1 A A |
| Operation: Investigation | on | | | | | i | |
| Agency: | - V | | Pe | rmission: | · • | | 4 |
| Mechanism: | | | Tim | e Frame: | | | |
| Likelihood of Success ?: | | Res | ource Requi | irements: | 21 | - | 1 |
| Notes: | | •• | | | | | - a - a |
| | | | Eff | | | | |
| sue | Impact | | [1- | | ea On na) Site | Off Site | Priority |
| uccession | Scrub encr | oachment | | 1 2 | ۲ | 0 | - |
| 10000 | | | no removed | | | | |
| 3. Scrub and pine encroact | hment on the mire. A lot o | of scrub has been | sn iemoveu, | , and high | er water lev | /els ma | iy help |
| 3. Scrub and pine encroact stop succession. | | of scrub has bee | an lemoved. | , and high | er water lev | vels ma | ay help |
| 3. Scrub and pine encroact stop succession. | | of scrub has bee | an lemoved, | , and high | er water lev | veis ma | ay help |
| 3. Scrub and pine encroach stop succession. fects on Conservation Feat Name | | of scrub has bee Status | en removed, | , and high | er water lev | vels ma | ay help |
| 3. Scrub and pine encroact stop succession. fects on Conservation Feat Name Schwingmoor | tures: | Status | | | er water lev | vels ma | ay help |
| 3. Scrub and pine encroach stop succession. fects on Conservation Feat Name Schwingmoor Scrub takes over se | tures: chwingmoor and leads to | Status | | | er water lev | vels ma | ay help |
| 3. Scrub and pine encroact stop succession. fects on Conservation Feat Name Schwingmoor Scrub takes over se Rare invertebrates | tures: chwingmoor and leads to s | Status losss of Sphag | num commi | unities. | er water lev | vels ma | ay help |
| 3. Scrub and pine encroact stop succession. fects on Conservation Feat Name Schwingmoor Scrub takes over se Rare invertebrates Loss of habitat for s | tures: chwingmoor and leads to | Status losss of Sphag | num commi | unities. | er water lev | vels ma | ay help |
| 3. Scrub and pine encroach stop succession. fects on Conservation Feat Name Schwingmoor Scrub takes over so Rare invertebrates Loss of habitat for s | tures: chwingmoor and leads to s species requiring open mi | Status losss of Sphag | num commi | unities. | er water lev | vels mž | ay help |
| 3. Scrub and pine encroach stop succession. fects on Conservation Feat Name Schwingmoor Scrub takes over se Rare invertebrates Loss of habitat for s ork Required: Operation: Open Scrub (| tures: chwingmoor and leads to s species requiring open mi | Status losss of Sphag | num commu ecies requir | unities. e scrub. | er water lev | vels ma | ay help |
| 3. Scrub and pine encroact stop succession. fects on Conservation Feat Name Schwingmoor Scrub takes over su Rare invertebrates Loss of habitat for s ork Required: Operation: Open Scrub (Agency: | tures: chwingmoor and leads to s species requiring open mi | Status losss of Sphag | num commu ecies requir Per | unities. e scrub. mission: | er water lev | vels má | ay help |
| 3. Scrub and pine encroach stop succession. fects on Conservation Feat Name Schwingmoor Scrub takes over se Rare invertebrates Loss of habitat for s ork Required: Operation: Open Scrub (| tures: chwingmoor and leads to s species requiring open mi | Status losss of Sphag re, but other sp | num commu ecies requir Per | unities. e scrub. mission: e Frame: | er water lev | vels mž | ay help |

| FenBASE 3.3 Wybunbury Moss | | 97 979 | West Midlands Wetl | ands | e sector | | ·* | | [Site Issues] |
|-------------------------------|------------|------------|------------------------|-----------------|-----------------|--------------|------------|-------------|---------------|
| Issue | | ÷. | Impact | - . | Effect [1-5] | Area (ha) | On Site | Off Site | Priority |
| Vegetation Ma | anagem | ent | Dereliction | | | | 0 | ۲ | |
| 4. The meado | w to the e | ast of the | NNR would benefit from | n grazing. | | | 24 | | • |

Effects on Conservation Features:

Work Required:

| Operation: | Grazing | | | 3 |
|-----------------|-----------------------|--------|-------------------------------|---|
| Agency: | Owners/occupiers | - e | Permission: | |
| Mechanism: | SSSI management agree | ements | Time Frame: | 4 |
| Likelihood of (| Success ?: | | Resource Requirements: | |
| Notes: | | | | |

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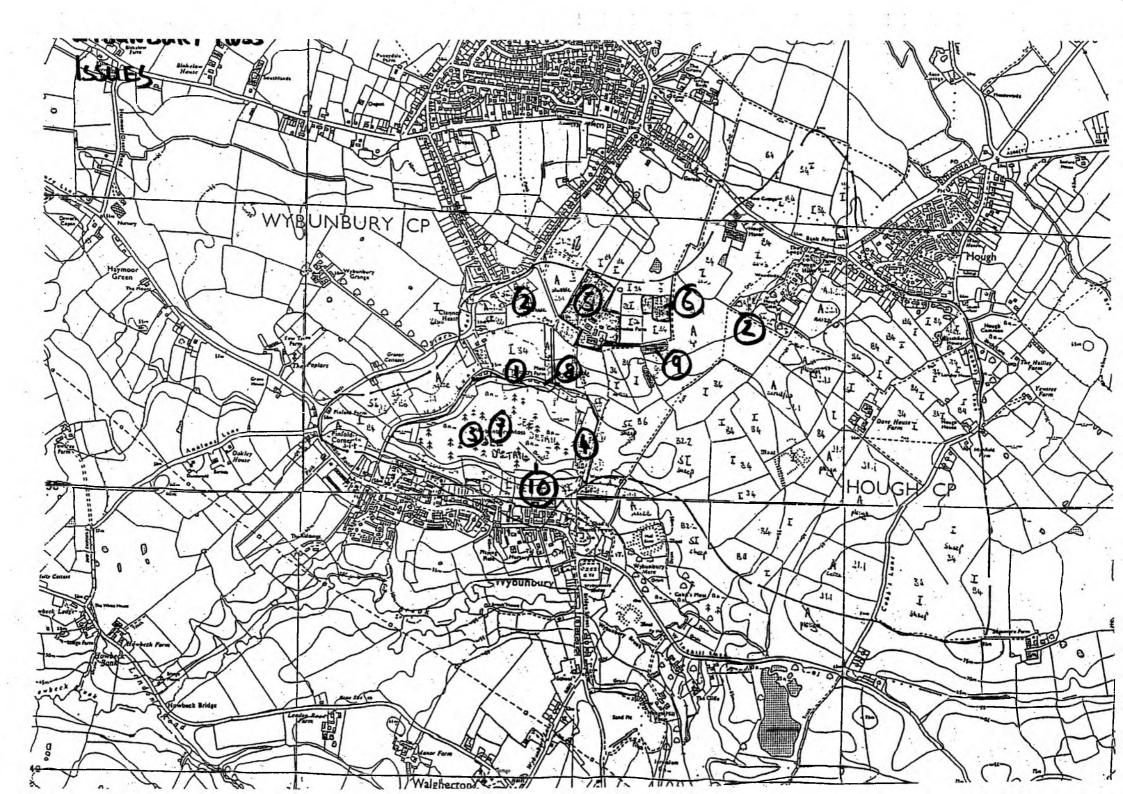
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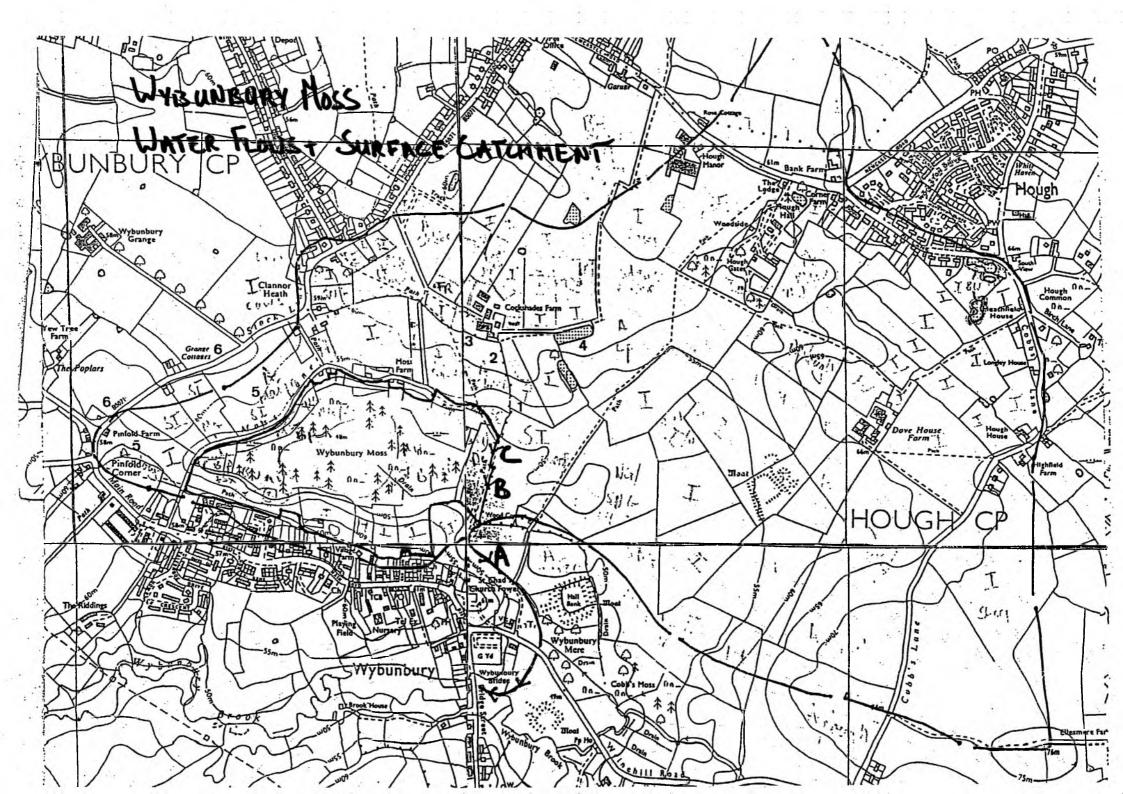
Wybunbury Moss

Surface water regime (rate and depth of water flow on day of field visit). A = Outflow ditch/ drain, c. 0.5 m wide with distinct flow.

B = Ditch c. 0.25 - 0.4 m wide with slow flow in a southerly direction.

C = Piped flow from underground clay pipe, diameter c. 0.15 m wide. Source possibly from Cockshades Farm. Water flows into ditch B.

There is no direct inflow to the moss, but a distinct outflow is to be found at (A).



APPENDIX 3

WYBUNBURY MOSS – ENVIRONMENT AGENCY BOREHOLES GEOLOGICAL LOGS AND DRILLERS LOGS

Borehole Log: WYBUNBURY Moss OBH, "A"



| Samples | and Test | S | | | Strata | | | 1. T. T. T. | | | |
|--------------------|------------|---|--------------------|---------------|---|-----------------|---------------------------|--------------------|----------------------------|---|-----|
| Depth | Type & No. | Records | Date Casing | Time Water | | Descri | ption | | Depth,Level (Thickness) | Lege | nd |
| | | | 08/10/200 | 51 | Turf over TOPS (Driller's descrip | OIL: Soft brow | n sandy CLAY | · · · · · · | (0.40) | | P |
| 0.50 - 1.50 | B1 | | 1 | | (Dimers descrip | Bony. | | | 0.40 | | G |
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| | | · | 09/10/2001 4.50 | 4.40 | Firm dark brown Gravel is angular | to subrounde | y sandy CLA d fine and | ř. | (14.40) | | |
| ÷ | | | | | medium. | | | 1. | 1 | | |
| | | | 1.1 | 2.1 | | | | | | | |
| | - 61 | | | · · · · | | | | 1.4.4 | 3 | · • • • • | |
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| undwater | | | | R | emarks | 1.5.5 | 1.2.2.2 | | | line of the second s | |
| Struck Behavio | | | | pr | ble backfill : 0.00m to (otection : Lockable To | p Cap | | | | nite (b). Sur | fac |
| 5,00m Overnig | ht inflow | | -1. | SU | andpipe installed, 75n | ım diameter, re | sponse zone fre | om 1.50m to 14.80n | ю . | | |
| WRE | 3 Nº | SJ65 | 122 | 2 | 4 | | | | 4 A. | | |
| s : For explanatio | | 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - | roject | 1 | INBURY | | | | Borehole | | - |

Borehole Log: WYBUNBURY Moss OBH, "A"



| Drilled by A ogged by G Checked by | H D | Equipment and Met See sheet 1 DATUM VA | thods LUE ≠ | 58.4 | | SJ69278 | 50148 | Ground Lo National C Coordinat | 201 | |
|--|-----------------|--|--------------------|---------------|--|--|---------------------------------------|--------------------------------------|--|-----|
| Samples a | and Test | 5 54 | | | Strata | 1 | | | | 4 |
| Depth | Type & No. | Records | Date Casing | Time Water | | Description | | Depth,Lev (Thickness | | br |
| | | | | | 17 18 an 14 | | 1. 1. T | Ξ. | | |
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| | | | 7 | | As sheet 1 | | |] (14.40pe | m) | |
| 12.50 - 13.00 | 87 | | | | | | | - | | 1.7 |
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| A | | | 1.1 | | | 1 A | | | | |
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| | 1 1 | 4.1°, | 001101000 | | Weathered | grey SANDSTONE/ | MUDSTONE | A | | |
| | | | 09/10/2001 7.50 | dry | (Drillers de | scription) | | 14.70 | | - |
| S | 1 | | | | EXPLORATORY H | OLE ENDS AT 14.80 m. | | 14.80 | | |
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| | | | - | | B. west | | | | ······································ | |
| Indwater | | • | | | Remarks Chiselling : 14.70m | to 14.80m 60minutes | | | | |
| Struck Behav | lour | all and and | / | | | | | | | |
| 1 1- | DN | Jº STG | 5/2 | 2 | | 74 | | | • | |
| WK | D.I | № SJ6 | -/~ | ~ | | | | | | |
| . Fee evelope | tion of symbols | and | Project | in the second | YBUNBURY | | | Bore | | |
| | HULL OF SAUDORS | | | | | | | | A | |
| | | | Project no. | 12 | 10433 | | | | Sheet 2 o | |

Borehole Log: WYBUNBURY Moss OBH, "A"

וווגעוטו וטינטיאא באנאנטלעביוו



| Drilled by AH Equipment and Methods Logged by GD. Inspection Pit from 0.00m to 1 Checked by DATUM VALUE | | | LUE = 5 . | Percussion 150 mm diameter from 1.20m to 14.80m. H2MAOD. SJ69278 • 50148 * | Ground Level 58-122 National Grid Coordinates M. A. O. J | | | | | | |
|---|------------------------------------|---|---|--|--|------------------|--|--|--|--|--|
| Samples a | and Tests | | | Strata | | | | | | | |
| Depth | Type & No. | Records | Date Time | Description | Depth,Level | Legend | | | | | |
| · · | | | Casing Water 08/10/2001 | Turf over TOPSOIL: Soft brown sandy CLAY | (Thickness) | | | | | | |
| | | | | (Driller's description). | (0.40) | | | | | | |
| 0.50 - 1.50 | B1 | | | | 0.40 | | | | | | |
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| 2.50 - 3.00 | 82 | | 1 | | - | | | | | | |
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| 4.50 - 5.00 | B3 | | · · · | | - | | | | | | |
| A.S. | | | 08/10/2001 4.50 dry | | Ξ | | | | | | |
| | | · . · · · · · · · · · · · · · · · · · · | 09/10/2001 4.50 4.40 | Firm dark brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine and | (14.40) | | | | | | |
| | | | 4.50 4.40 | medium. | = | | | | | | |
| | | 1 | | | | | | | | | |
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| 6.50 - 7.00 | B4 | | · · · · · | | E | | | | | | |
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| 8.50 - 9.00 | B5 | | - | | | | | | | | |
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| | | | | the second s | 1 | | | | | | |
| ndwater Itruck Behaviou | uř. | | н | emarks ole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Grout (g), 1 | 00m to 1.50m Benton | ite (b). Surface | | | | | |
| 5.00m Overnigh | nt inflow | - 3 | , pr | otection : Lockable Top Cap andpipe installed, 75mm diameter, response zone from 1.50m to 14.80 | | | | | | | |
| IN/D D | 10 | SJ65 | 22 | | | | | | | | |
| the second s | | | | · · · · · | . Bautata | | | | | | |
| : For explanation | of symbols and heet. All depths | Pri | oject WYB | UNBURY | Borehole | A | | | | | |

Borehole Log: WYBUNBURY Moss OBH,"A"

1 1 7A.BODOCI ON



| Drilled by AH Equipment and Methods Logged by GD See sheet 1 Checked by DATUM VALUE = 58.4 | | | 412 MAOD. | 5569278.5014 | 0 | National Grid | 58122 Maod. | | | |
|--|--------------------|---------------------------------------|------------------------|--------------------------------|--------------------------------------|---------------------------------------|----------------|--------------|----|--|
| Samples a | nd Test | | | Strata | | 1. 1. 1. | | | | |
| | | Records | Date Time | | Description | - T | Depth, Level | Legend | | |
| Depth | Type & No. | · | Casing Water | | | | (Thickness) | | | |
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| 10:50 - 11.00 | 86 | | | 1 | · · · · · · | Ξ | A 4 | | | |
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| | | | | As sheet 1 | | · · · · · · · · · · · · · · · · · · · | (14.40pen) | | | |
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| | | 14. T. | 09/10/2001 | Weathered | grey SANDSTONE/MUDSTON scription) | E A | 1. A. | | - | |
| | | | 09/10/2001 7,50 dry | (Drillers de | escription) | | 14.70 | | - | |
| 45. | V | 4 | | EXPLORATORY H | OLE ENDS AT 14.80 m. | | | | 1 | |
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| | | | · · · | 7.14 | | | | 1 - 1 | | |
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| oundwater | | | | Remarks Chiselling : 14.70m | to 14.80m 60minutes | 1 | 1. A | | | |
| . Struck Behavi | our . | | . / | Grasenary . 14.70m | | | | | | |
| WR | BI | Vº SJE | 5/22 | | , | | | | | |
| to a Francisco de Constitución | ion of symbols | hine | | WYBUNBURY | | | Borehole | P | | |
| | | oths and reduced | | 210433 | | | | A | | |
| ala lit ineues. Sua | inter a morti leda | | | invironment Agency | | | 1 5 | sheet 2 of 2 | 4 | |

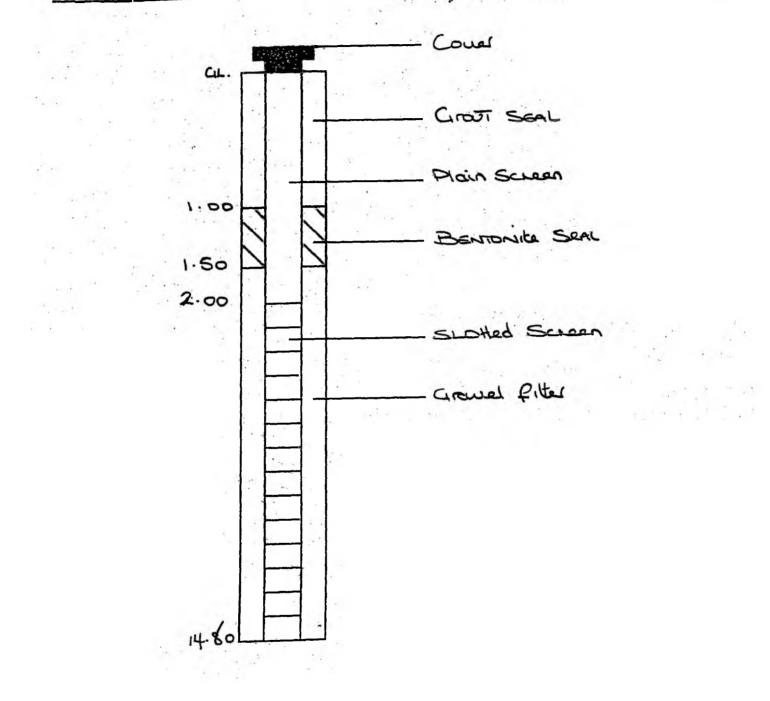
| ⁿ ^N | YBUNBLRY. Foreman's Description | | | | Loc. No | 12 | 140 | 3. | 1. | : | · · ·] | Day / | Yon | hai | | | Date s | 3.10. | 01 | Sheet | 1 01 | 1 |
|---------------------------|--|-----------------|---------------|------------|-----------|------|-------|---------|-------------|--------|---------|----------|-------------------|----------|---------|----------|------------------------------------|------------|----------|-----------|-----------|----------|
| Depth metres | Foreman's Description | Sample /Test | Sample No: | Dep | oth (m) | US | ample | 1.4 | 22. | Standa | rd Per | netratio | on Testa | 1 | e 1 e . | Time | Casing | Water | BH | | ISELLIN | |
| GL . | | B | 1 | From | To . | Blow | Rec | SW pen | 75 | 75 | Pen | 75 | 75 | 75 7 | 75 Pe | n · · | Depth | Level | Diam. | From | To | T |
| | Tuel any Salt Bar | B | 2 | 2.50 | 1.24 | | | | | | | | - | | | | NIL | DR.1 | SOm | | | |
| ki | Crenula Soft Brown | B | 3 | 4.50 | | | | 19 | 1.2 | it in | | | | | | | 11 | | | 17.14 | | Ē |
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| 3.40 | Firm Brown hammal | | | | • . | | | · · · | and the | 20 | 1.4 | - | 0 | - | | · · · | 1. 17 | | de st | . inter | 14 . 14 M | 1.0 |
| ¥* 3 | Boilder Claup. | 1 | 1. | | • | 1. | | | | 1 | | 33 | • | ••• | s. 1 3 | | 10 | 6 | 1000 | | | |
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| | | 1 | 5 | | 12.4.4 | 1 | | | 4.00 m | 4 | 7 | ** | | | 2.0 | | 1411 1946 - 1946 1946 - 1946 | | | WAT | ER ENT | TRI |
| | | | <u> </u> | | | | | 1 495 - | | · . · | | • . | : | | _ | | | | 1 10 | Hole | Water. | 3 |
| 30 - 1 1 | | | | <u></u> | ÷ | | - | | | 1 | | · | | _ | 1 | | 212 | - | | 57 N | | |
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| " and | Carl a state and a state of the | | | | | | | | | | , | 1 | | | | | | | 15 1 | 1.0 | | |
| | | × 11 | | | | | | | 4 | | 19.0 | · · · | | | | | | | 2 240 | :1 | | ╞ |
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| | END OF SHIFT IN LOMDete . | | | 1 | | | | 124 | | 1. | | | 1.1 | - | ÷. | | 14.So | ber | SON | Same. | A | |
| A KEY | U Undisturbed 100mm NR. No recovery | P Pistor | B B | ik D · | Disturbed | tyb | W Wa | ter Sam | ple | S SP | r Oper | h Shoe | C SF | T Soli | d Cone | V Vane T | est k Pe | rmeability | test | i. | | • |
| | Swipen Penetrationsunder self weight (mm) anding time, hourly rated work, in situ to TO S.G. Set P OK | Pen Pe | services | , visitors | etc. | (mm) | * . | 41 | م أشعر ا | | | | The second second | man | A.H. | EICHI . | | Fore | man's S | ignature | | |
| | | | | | | | | | | | | | Rig Addi | | Pile | 2 | 000 | Engli | neer's S | Signatyre | | |

| on | NY | BUNBLRY. | | 1999 - A. | | Loc. No. | 12 | 140 | 3. | | * 11 | | Day- | Tue | (hay | | 9 | 1 | Date C | . 10.0 | 54. | Sheet | r of | 1 |
|----|--|---|-----------------|---------------|---------------------|------------|-------|------|--|---------|--------|--------|---------|---|---------|-----------|------|----------------|---------------|------------|----------|------------------|------------|------------|
| Ł | Depth . metres | Foreman's Description | Sample /Test | Sample No. | | th (m) | USa | mple | SW pen | | Standa | ard Pe | netrati | on Tes | ts | | - | Time | Casing | Water | BH | | ISELLIN | - |
| +- | _ | START OF SHIFT | B | 4 | 650 | | BIOW | Hec | Sw beu | . /5 | 75 | Pen | 75 | 75 | 75 | 75 | Pen | 1 | Depth | Level | Diam. | From | To | Tir |
| | | FIRM SUP Brown | 0 | | 8.50 | | | | | | | | _ | | | | | *1' : 51: | 450 | 4.40 | SUme | 14.70 | 14.80 | . 14 |
| ſ | <u></u> | Lominaled Clary with | B | | 10.50 | | | (7) | | | | | • | | | | | | | | | 1. 1. | | |
| ľ | | Some Ballober claus | B | 7 | 12.50 | | | | | 1° | 1 | | | | | | | * 5 1 | | · · · | | | 1. 11 | 1 |
| T | | Brands | | | 12:00 | Sico | | | | · · | ÷ | | · · | 1 | | 2 -5 s | | | • | | - | | 1 | <u>.</u> |
| | 1.6 | | | | | | ÷ | | | | | | | | 1.2 | | | - 1 | 14 (M) (A) | | | · 1 | <u> </u> | <u>.</u> |
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| Ī | | mudstone. | . 8 | 12 | + | ÷ . | | - | 1 | 1 | | - | | | | | | | | 4 | | | | |
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| | • | | F. | | $ \sigma _{\sigma}$ | 1.1 | | 4 | | NE . : | 4. | | 1 | 1 | | | | | | | | - 1.80-7 1.3g | | + |
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| | | | 1. A. C. | 1 | | | . • | | | - | | 1 | | 1 | | | | | i | 1.4 | - | | • • | \uparrow |
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| 1 | | | | 1 | 3.5 | | | | ta: | 1 | - | 3.54 | -e ? | | | | | | | * | · | 4 | the second | |
| ł | | | 3 | - | 1.2 | 1.4 | | | 1.4.1 | | | 1.1 | ÷., | | ŧ | | | | | 1 4 | 1 | | | |
| - | 14.60 | END OF SHIFT | - | | 1 | 1 | | 1.5 | 1 144 | | 1 4 | · · · | | - | 28. | | | | 7.50 | 1.201 | SOm | 1 . 3 | · | |
| | the second division of | J Undisturbed 100mm NR No recovery | P: Piston | BB | ulk ; D | Disturbed | tub | W.W | ter Sam | ple | S SP | T Ope | n Shoe | C S | PT Sol | id Co | ne V | Vane Te | st. k Pe | meability | test | 1.15 | | • 1 |
| | 1 | SW pen Penetration under self weight (mm) | Pen Pe | netration | n for last in | ncrement (| mm) : | | | - | | | | | eman | | | | 1 | Forer | nan's S | Ignature | 1. | |
| | | nding time, hourly rated work, in situ t | esting, s | services | s, visitors | elc. | | | | * | | | 11 | and the second se | - 4.1. | | Him | Qu | | - · D | 11 | 1 | | 1.4.4.4 |
| T | UNDI | ny Water Level Am | 14.40 | Dm. | • • • | | ** * | r: | . 1 | | - 5 | 1.1. | | Hig | Crew | SH | LLIC | HT: | | 1 | 1. 4 | Rin | | |
| 1 | | | 1 | | ÷ . | | 1 | | 2.4 | · | 1.1 | 1 | 27 | Rig | Туре | 21. | - | 200 | | Engir | neer's S | Ignature | 1.1.1 | |
| | | | | • | | 1 | ¥: | | | | 43 | - 7 | | Add | litiona | | | Grou | 1 | <u>,</u> • | | 1 | | |
| 4 | | is a site log only and the data are subj | | - 4 | | | 1 1 | | | 1 | ·* | · · · | | | · . · | | • | | • | - | | | | - |

| ion | NY | BUNBUR- | | | | Loc. No | . 12 | 140 | 3 | 14 | | - 1 | Day | No | - | -100 | N | | Dateio | .10. 1 | ٥ï | Sheet | I of | 1. |
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| • | Depth metres | Foremah's Description | Sample /Test | Sample No. | | th (m) | US | ample | | 6 | | ard Per | netrati | on Test | 8 | | 12 | Time | Casing | Water | BH | | ISELLIN | - |
| | 4 ¹ | START OF SHIFT | 1100 | 110. | FIOIN | 10 | - IUW | LIAC | ow bett | 75 | /5 | Pen | /5 | 75 | /5 | 75 | Pen | e | Depth | Level | Diam. | From | To | Tir |
| t | 1.1.1 | | | ÷ | | | | | | | | | - | | ••• | | | 41 A. | | · · · · | | | 1 | <u> </u> |
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| | | | | | * • | | | | 15 | | 1.14 | | | | | - | - | 200 - | | 5.4 | | 1. 1. | | · · · · |
| | : | | 4. C. A. | | | 1. | | | 1 | | | | 1.0 | ** | | | 4.4 | | | | | | | I. |
| | | | 2. P | ÷., | · • | | -64 | | | | 4.57 | | | | | - | | 19. | 1. | | | | | 1 |
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| 4 | 2.00 | | - | <u> </u> | 5 | | | | 1, | • | • * | | 190 | | | | 4 | | | E. | | | 5 | - |
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| | | END OF SHIFT | - | | T | | | | · 8 | - | · · . | | 4 | | • • | | 1 | to a | 10 | 1. 1 | 1 | | ÷. * | - |
| - | KEY: U | U Undisturbed 100mm NR No recovery | P Pisto | n B Bu | lk D | Disturbed | tub | WW | ater Sam | ple | 'S SI | PT Oper | n Sho | e C S | PT Sol | lid Co | ùe A | Vane Te | st k Per | meability | test | 1 | • • • • | ľ |
| | ·. · | SW pen Penetration under self weight (m | m) Pen P | enetration | n for last in | ncrement | (mm) | | | 4- | | | 1 | For | man | A | il. | | | Forer | nan's S | Ignature | 1 | |
| alla | s of sta | nding time, hourly rated work, in site | l testing, | Services | 11 1 | C | | | R | 1 | 1. | . A.* | | | Crew | H | н, | mely | | | 11. | 1 | | - |
| 1 | Ait | for Well PIPE 2 ABBOHS MOSS 2425 | 2-123. | , u | DIGCI | 5 | ~~ | | J | | | | | | 2 | D | He | rept | | Facil | tu | Signature | <u> </u> | + |
| 0 | m | ABBOK Moss 2425 | | 1811 | inste | Illahi | in | 2-1 | 25. | 15 | | | - | . Rig | Туре | PI | Lon | 1200 | 5 ··· | Engi | 1001 5 6 | | | 1 |
| | ••• •• | | | | | 4 | , i | | 1.1 | 12 | | 1. | 5. | Add | litiona | al Pla | nt | | | • | | | | • |
| | | is a site log only and the data are su | | | | 3.3 | • | | - 4 A A | | · int. | 5.1 | | · | | | | | | lat | - 11 - 12 - 12 - 12 - 12 - 12 - 12 - 12 | 1.11 M | 64 | |

Site NYBUNBURY Job no 121 HO3 BH no A

WELL INSTALLATION



Borehole Log: WYBUNBURY Moss OBH "B"



| ogged by hecked by | GD | | | | ercussion 150 mm diameter from 1.20m to 16.80m. 99 MA OD. SJ 69562 • 50057 < | | 59.06 MA.OD |
|------------------------|------------|----------------|--|---------------|--|----------------------------|-------------------|
| amples | and Test | | | | Strata | | |
| Depth | Type & No. | Records | Date Casing | Time Water | Description | Depth,Level (Thickness) | Legend |
| <u></u> | | 1 | 10/10/200 | 100 | | | |
| 4. 24 | | | | | | 2 | |
| 0.50 - 1.50 | B1 | | | | | - | |
| • • | | | | | Turf over pale brown and dark brown slightly clayey fine SAND. | (1.60) | - - - |
| | | | ÷ | | Abundant rootlets up to 2mm. | - | ·+:-: |
| | | | - | | | 2. | · |
| 4 | 5 a. | | · · · | | | = | |
| | | | | . 1 | · · · · · · · · · · · · · · · · · · · | 1.60 | |
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| 2.50 - 3.00 | 82 | | 1993 (1997 (19 | | | - | |
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| | | | | | | Ξ | |
| 4.50 - 5.00 | 83 | the set of the | | | | - | |
| | | 1 * | 10/10/2001 | | a | - | |
| . + S. | 1 | | 10/10/2001 4,50 | dry | | 3 | |
| | | | 11/10/2001 4.50 | dry | | Ξ. | |
| | | | | 1 | | - | |
| | | | | | Firm dark brown very sandy CLAY. Sand is fine | 3 | |
| | | 14 A. | | ¢ | to coarse. | (15.20) | |
| • | 10 | | | | | - | |
| | 100 | | 1. J | | | Ξ | |
| 5.50 - 7.00 | 84 | | | | | 1 | |
| | | | | 1.44 | | - | |
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| | | | ÷. | | | - | |
| - | | 6 A | • | | | 3 | |
| | 11 | | | 21. | | 3 | |
| 1 | | 19 1 1 1 1 T | 3. 6. 1 | | | - | |
| | | · · · · | | | Between 6.50m-11.00m: With occasional pockets of fine to | Ξ | |
| 50 - 9.00 | B5 | | | • | coarse sand up to 30mm. | 3 | |
| | | 7. | | ÷ [] | | 7 | |
| ÷., | 11 A | | | | | - | |
| | | | 10 | | | - | |
| | | | | | | = | |
| | 1 | | | | | - | |
| | | 844 J | · · | | | 3 | |
| - | | 1 | | - | | | |
| dwater ruck Behavie | | ₽ SJ 65 | 5/23 | Hop | marks le backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Grout (g), 1.0 stection : Lockable Top Cap Indpipe installed, 75mm diameter, response zone from 1.50m to 16.80n | | nite (b), Surface |
| VVI | | | 1 | 1. | | Borehole | |



Borehole Log: WYBUNBURY MOSS OBH, "B"

| ogged by G hecked by | | DATUM VA | LUE-39 | | SJ69562.5 | | Coordinates | M.A. O. |
|-------------------------|----------------|----------|-----------------------|---|---|---|----------------------------|-----------|
| Samples a | and Tests | S . | | Strata | • | | | 1.00 |
| Depth | Type & No. | Records | Date Tir Casing Wa | ne ater | Description | | Depth,Level (Thickness) | Legend |
| 6. 6. 1 | | | 1 | 1 | | | · · · · | |
| | | | - 4 | - 10 C | Between | 6.50m-11.00m: With | 3 | |
| 10.50 - 11.00 | 86 | | | 5 m 1 | - occasion | nal pockets of fine to | | |
| | 4 | | | | | = | | |
| | 2. | | | | | <u>-</u> | | |
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| 5 S. 1 | · · · · · | | - | 3 | | · · · · · · · · · · · · · · · · · · · | | |
| 12.50 - 13.00 | 87 | | | | 1.000.000 | | | |
| | | | | Carlo de la | Between 12 ban | 2.50m-13.00m: With so of slightly gravely | · · · · | |
| | | | 1.1 | 1.2 | 1 1 | sandy clay. | | |
| 1. 1. 1 | | - | | 1 | | | | 111 |
| 4 | · • | | -1-1 | As sheet 1 | | | (15.20pen) | |
| | Q. 61 K | C A | | 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1 | | | | |
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| | 1.00 | | · 8 | | | · · · | | |
| dwater | | | | Remarks | | | | |
| ruck Behaviou | | | | Chiselling : 16,70m to | 16.80m 60minutes | | •• | 20.0 |
| 6.70m Rising to | 15.10m after 2 | 20 mins. | 1 | | + | | 1. | |
| NRE | Nº | 5565/ | 23. | | | 1.1 | | |
| | | | | ** | 1.56 | | | |
| For explanation | of sumbole and | Proj | 14/ | YBUNBURY | | | Borehole | |

| Depth | BUNBURY. | | an an | - | Loc. No | 12 | 140 | 3. | | 2.5 | 1 | Day | 100 | SNE | sbay | 0 | | Date IC | 0.10. | 01 | Sheet | 1 01 | 1 |
|---------|-----------------------|-----------------|---------------|------|--------------|--------------|-------|--------|-------|-------|----------|----------|--------|-----|-------|-----|--------------------|---------------------------------------|------------------|-------------|-------|------------|------------|
| metres | Foreman's Description | Sample /Test | Sample No. | Dep | th (m) To | U Sa Blow | Rec | SW pen | 75 | | rd Per | netratio | n Test | 8 | 75 P | Ti | nę, | Casing Depth | Water . Level | BH Diam. | CH | ISELLIN | IG Time |
| GL: | START OF SHIFT | B | | | 1.50 | | 1184 | | | 15 | - OII | 10 | 15 | | /5 P | | ÷1 | | DR./ | son | From | То | 11110 |
| CIL | | B | | 2.50 | | | * | 1 | | 3 | | (*) | -+ | -+ | 10 | -1- | 24 | Nic | DK-/ | in | | 1 | · · · |
| 4 * * K | Tuel and Loose | B | | 4.50 | | | | - | 2. | 4-1-1 | . 1 | | - | - | | | 1. | | 2.2.1 | 1.1. | 1 1 | 1. 1. 4 | 1 |
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| | Sond. | | | | - | | 1 | | N. 4 | | | | | | | | | | | | | | |
| | | | 1.1 | | | 1 | | - | | | | | | | - | | | | 1 | | WAT | ERENT | RIES |
| 4.40 | Fram Brown Kinned | | | | | ÷ | 19 | e 1 | | | 7.44 | | | • | | - 0 | | | | | Hole | Water | Sec. 23 |
| 4 | Clay. | | 1 | | • | | | | | | 1 | | | 3 | | | | ÷ | | | . 1 | | |
| 1. 19 | C | | | 1 | - | | ÷ | | 1 | 194 | | • | ř. | | 5.1 | 12 | 4 | · • | | 1.1 | | | |
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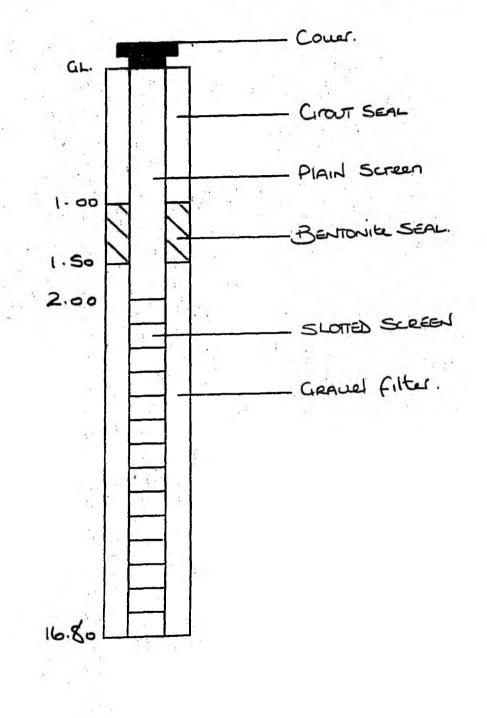
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| n W | YBUNGURY. | | ¥. | | Loc. No | 12- | 140 | 3. | 1. P. | | | Day | Web | NES | bail. | | Date | 0.10. | 01 | Sheet | .1 01 | 1:1 |
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| Depth metres | Foreman's Description | Sample /Test | Sample No. | | oth (m) To | U Sa Blow | mple | | | | rd Pe | netrati | on Tests | | | Time | Casing | Water . | BH | | ISELLIN | 1 1 1 |
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| CIL. | | B | 2 | 2.50 | | | ** | | - | | | | | 1 | | 30 | P-21 6 | DR.1 | in | | -, | 1 |
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| | Sond. Marine mile | 1. | | 1 | | 41 | | 2 . * | 2010 | | • | | | | 4.15 | 14 | · · · · | e | | | 4 | 1 |
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| Ko | O END OF SHIFT | 3 A. | 1.8 ¹ | 1 | T | | 1 | A. | 1 | | | | * • | | | | | DR. | And in case of the local division of the loc | 194. Cal | 1. 10 1 | |
| S-O | O END OF SHIFT U Undisturbed 100mm NR No recovery | P Pistor |), B B | ulk D | Disturbed | tub | W Wa | | pie | S SP1 | Oper | n Shoe | C SP | r Solid | Cone | V Vane T | | | And in case of the local division of the loc | | | |
| is of sta | sw pen Penetration under eef weight (min) anding time, hourly rated work, in situ t | esting, | services | s, visitors | etc. | - 3 | P | INR | | | · · · · · | | Foren |) | 4.H | indy | | 7 | il. | ignature | | · · · · · · |
| | | | | | | | | | | | ess. | | Rig T Áddit | ype Ional I | | <u>.</u> H. | .000 | Engi | neer's S | Ignature | | c |

| n | 14B | UNBURY. | | | | 100 | Loc. No. | 12 | 140 | 03. | | | 2 | Day_ | THU | ash | 44. | | 1. i. | Date | 1.10 | 01 | Sheet | . 1 0 | 1 |
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| Dept | 1 . | Foreman' | s Description | Sample | Sample | | th (m) | | mple | | | | ard Per | otrati | on Tes | S | | | Time | Casing | Water | BH | | ISELLI | N |
| The second value of the se | | TART OF SHIF | 14 | /Test | No 4 | From | - | Blow | Rec | SW pen | 75 | 75 | Pen | 75 | 75 | 75 | 75 | Pen | · . | Depth | Level | Diam. | From | To | - |
| | | | Brown | B | 5 | | | | | 1.247 | | | <u>x v</u> | | | - | | - | 5. K | 450 | De. | 150~ | 1670 | 16.80 | ų |
| 0.0 | | | | B | 5 | 8.50 | | • | | | ** | | i. | _ | | • | | | · 91. | | | | 1 | · · · | - |
| | F |) and an | Clay Nip | B | 7 | 10.50 | | | | - 44.4 | 5. 9° | 1 | | | - | •. • | | 4 | 55 | | i in the | 14 N . | | | 1 |
| | 1 | lau h | 1 | B | 8 | | 13.00 | | - | | | 1 | | | | | - | | | · · · | | | 1.1 | <u>.</u> | - |
| 4.35 | | Clay ha | <u>~~</u> | D | D | 4.00 | 15.00 | | | | -7-7 - | 1.10 | - | | | | | | 13 | 1. | • | · · · · | <u></u> ; | [| 1 |
| 16. | La L | Leen it | 1 F | | | 1 | | | - | - | • | 12 | - | | | | | | | - | | 3. ···· | | | - |
| | V C | and | Cuy - | 100 | | | - | | | * | | | | | | | | | - An | : | | | - | 1 | |
| 1.2 | | mici Sibru | Imadsiou. | 1.3 | | | | | | | 3 . 4 | | 5 · · | | | | | | 12 | 1.1.1 | | | <u> </u> | | |
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| - | | | | - | | | · · · | | | 14 | 4 | • • | | | | | - | | 4 | - | 1 | | Hole | Water | |
| | | | | 1 6.2 | | | ·. · | | - | | | 15 | | 1. | | :** | - | | | | 1 1 | | 1610 | 160 | |
| - 14 | | | | | | | | | | 2. | 1 . | 19 ja | - | 1. | | - <u>-</u> . | | | | | | | * 1 | 15.70 | |
| | | | | | | | | | | | _ | | • | | - | | 12 | | | | | - | 4 | 15.5 | |
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Site HYBUNBURY Job no 121403 BH no B.

WELL INSTALLATION



Borehole Log: WYBUNBURY Moss OBH, "C"



| Checked by Samples a | and Test | the second s | | 28 MA OD. SJ 69590 • 50387 - Strata | | MAOD |
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| Depth | Type & No. | Records | Date Time | Description | Depth, Level | Legend |
| Pabu | Type of 140. | | Casing Water | | (Thickness) | relatio. |
| 2 e | 3.4 | | 11/10/2001 | Turf over TOPSOIL: Loose brown SAND (Driller's description). | (0.40) | c |
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| | 4 | | | Between 0,50m-1,50m: Sand is pale brown and dark brown. | | |
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| - | | and a | 144 - C. | Pale crance brown find to control CAND | 1.1.1.1.1. | |
| 4.50 - 5.00 | B3 | | 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1 | Pale orange brown fine to coarse SAND, With occasional very clayey pockets up to 40mm. | (8.05) | |
| and the second | | | | | | |
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| | 19.15 | | | Stiff dark brown slightly gravelly slightly | | |
| | | | | sandy CLAY. Gravel is subrounded to rounded and | (7.55) | |
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| truck Behaviou | | - Contractor | · pro | ble backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Grout (g), 1.00m blection : Lockable Top Cap | to 1.50m Bentoni | ite (b). Surface |
| 70m Rising lo | 3.60m after 20 | mins. Sealed 10.50. | Sta | andpipe installed, 75mm diameter, response zone from 1.50m to 16.00m. | | |
| WR | BNº | SJ 65/ | 24. | | ai. | |
| | | | | | Borehole | |

Borehole Log: WYBUNBURY Moss OBH, "C"



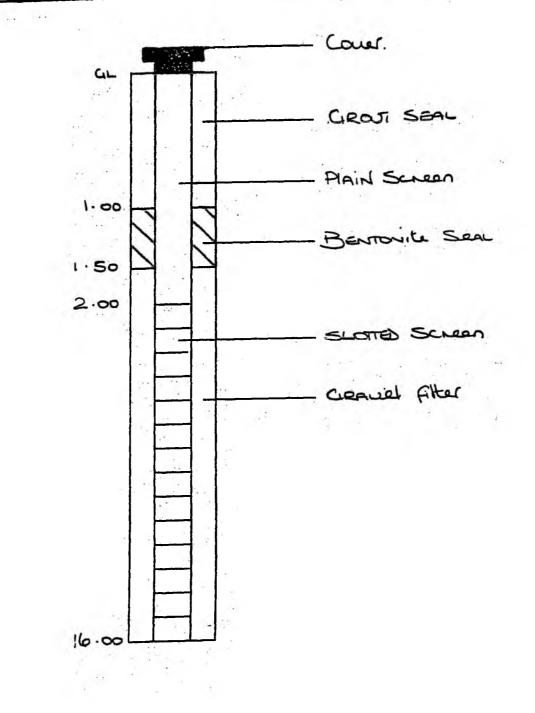
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Site NYBUNBURY Job no 121403 BH no C

WELL INSTALLATION



APPENDIX 4

WYBUNBURY MOSS – ENVIRONMENT AGENCY BOREHOLES PARTICLE SIZE ANALYSES AND LABORATORY PERMEABILITY TESTS

| Sam | ples | | | | Cla | ssifi | catio | | , | | ength | 1 | Other Tests |
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| Samples | | | Classification | | | Strength | | | Other Tests | | | |
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| | | | to coarse ship | | ĺ | | | | | 4 V. | | |
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| Laboratory - Results Summary | Project WYBUNBURY | Contract 1210433 |
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| Exploration Associates | | |

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Sleve Sizes μm mm 150 300 600 1.18 2 63 20 37.5 75 5 10 100 100 I -П Ш 90 90 $\frac{1}{1}$ 80 80 70 70 Percentage Finer ш 60 60 50 50 40 40 30 30 Ĩ И 11 20 20 T ПП . 111 10 10 11 łH -Ш 11 11 0 0 0.0002 0.002 0.02 0.2 2.0 20 200 Particle Size (mm) Silt Sand Gravel Cobbles Clay Fine Medium Coarse Fine Medium Coarse Fine Medium Coarse

| Particle Size | % Passing | Particle Size | % Passing |
|---------------|-------------------|-------------------|------------|
| 14 mm | 100 | 63 μm | 18 |
| 10 mm | 100 | 20 µm | 16 |
| 6.3 mm | 99 | 6 µm | 12 |
| 5 mm | 99 | 2 µm | 7 |
| 3.35 mm | 98 | | |
| 2 mm | 98 | | |
| 1.18 mm | 97 | | |
| 600 µm | 96 | | |
| 425 µm | 94 | 2 m | |
| 300 µm | 90 | · · | |
| 212 µm | 62 | | 1.4.1 |
| 150 µm | 39 | | |
| Hole | Description | | |
| 8 | Pale brown and | dark brown sligh | tly clayey |
| Depth | | lly silty fine to | |
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Laboratory - Particle Size Plot Project

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Sieve Sizes μm mm 150 300 600 1.18 2 20 37.5 75 63 10 5 100 100 E 90 9.0 80 80 70 70 Percentage Finer 60 60 50 50 40 40 30 30 20 20 111 П 10 10 11 0 0 0.02 0.2 0.0002 0.002 2.0 20 200 Particle Size (mm) Silt Sand Gravel Cobbles Clay Medium Fine Medium Fine Medium Coarse Fine Coarse Coarse

| Particle Size | % Passing | Particle Size | % Passing | |
|----------------|------------------|---------------------------------------|------------|------|
| 10 mm | 100 | 20 µm | 14 | |
| 6.3 mm | 100 | 6 µт | 10 | |
| 5 mm | 100 | 2 μm | 6 | |
| 3.35 mm | 100 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | | |
| 2 mm | 99 | | | |
| 1.18 mm | 99 | | | |
| 600 µm | 97 | | | 1 |
| 425 µm | 94 | | | - 14 |
| 300 µm | 86 | | | |
| 212 µm | 57 | | | |
| 150 µm | 36 | · · | | |
| 63 µm | 15 | | | |
| Hole | Description | | | |
| C | Pale brown and o | dark brown slight | tly clayey | |
| Depth | silty fine to co | arse SAND | | ł. |
| 0.50 -1.50 | | | | |
| Туре | | | | |
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| Test Performed | Uniformity Coe | fficient = 37 | | |
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Laboratory - Particle Size Plot

Exploration Associates

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Project WYBUNBURY Environment Agency Form 25/4

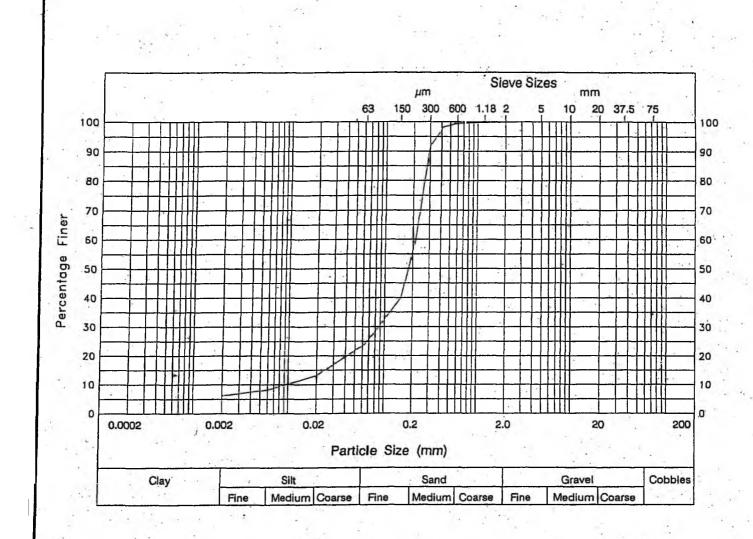
Contract 1210433 Sheet L2/2

Sieve Sizes μm mm 150 300 600 1.18 2 20 37.5 75 63 5 10 . 100 100 90 90 80 80 70 70 Percentage Finer 60 .60 50 50 40 40 Ш 30 30 20 20 10 10 Π 0 0 0.2 2.0 0.0002 0.002 0.02 20 200 Particle Size (mm) Clay Silt Sand Gravel Cobbles Medium Coarse Fine Medium Coarse Medium Coarse Fine Fine

| Particle Size | % Passing | Particle Size | % Passing |
|--|----------------|---|------------------|
| 6.3 mm | . 100 | 6 µm | 9 |
| 5 mm | 100 | 2 μm | 7 |
| 3.35 mm | 100 | | 2 |
| 2 mm | 100 | × | 2 8 |
| 1.18 mm | 99 | | |
| 600 µm | 99 | 14 C | |
| 425 µm | 98 | | |
| 300 µm | 93 | | |
| 212 µm | 45 | | |
| 150 µm | 28 | | |
| 63 µm | 15 | | |
| 20 µm | 13 | 1 | |
| lole | Description | | |
| C | | wn silty fine and | medium SAND |
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| est Performed | Uniformity Coe | efficient = 29 | |
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 Laboratory - Particle Size Plot
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 L2/3



| Particle Size | % Passing | Particle Size | % Passing |
|----------------|----------------|--------------------|---------------------------------------|
| 3.35 mm | 100 | | 1 |
| 2 mm | 100 | | |
| . 1.18 mm | 100 | | |
| 600 µm | 100 | | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 |
| 425 µm | 98 | | |
| 300 µm | 92 | | |
| 212 µm | 59 | | |
| 150 µm | 40 | 1 | |
| 63 µm | 24 | | т. |
| 20 µm | 13 | | |
| 6 µm | 8 | | • • |
| 2 µm | 6 | | |
| Hole | Description | | |
| C | Pale orange br | own silty fine and | d medium SAND |
| Depth | | | Construction of A |
| 4.50 -5.00 | | | |
| Туре | | | |
| iype | | | |
| fest Performed | · | | |
| Wet | Uniformity Co | pefficient = 22 | |

Laboratory - Particle Size Plot

Exploration Associates

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Project WYBUNBURY Environment Agency Form 25/4

L2/4

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Sieve Sizes μm mm 150 300 600 1.18 2 10 20 37.5 75 63 5 100 100 11-111 11: 90 90 80 80 T TI 111 70 70 П Percentage Finer Ш 11 1 -60 60 11 Ш 111 . 1 50 50 Ш 111 ¢. 40 40 $^{\dagger \dagger}$ H Ш T 111 30 30 Π П П 20 20 Ш 1 ΤĦ Ħ T 10 10 TT Π 0 0 0.002 0.02 0.2 2.0 20 0.0002 200 Particle Size (mm) Clay Silt Sand Gravel Cobbles Medium Coarse Medium Medlum Coarse Fine Fine Coarse Fine

| Particle Size | % Passing | Particle Size | % Passing |
|-----------------------|---------------------------------|---|----------------|
| 5 mm 3.35 mm | 100 100 | | |
| 2 mm | 1.00 | | |
| 1.18 mm | 100 | | |
| 600 µm | 99 | | |
| 425 µm | 98 | 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - | |
| 300 µm | 90 | | 1 |
| 212 µm | 47 | 100 | - ¹ |
| 150 µm | 28 | | |
| 63 µт | 12 | 1 a. | |
| • | | · · · | |
| Hole | Description Pale orange brow | n silty fine and | d medium SAND |
| Depth 6.50 -7.00 | | | |
| Туре в | | - | |
| Test Performed Wet | Uniformity Coe | fficient not app | olicable. |

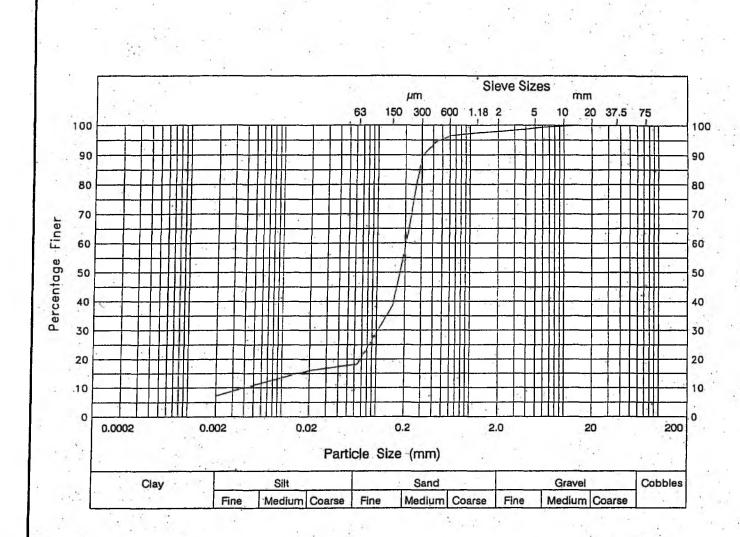
Laboratory - Particle Size Plot

Project WYBUNBURY Environment Agency Form 25/4 Contract 1210433

L2/5

Sheet

Exploration Associates



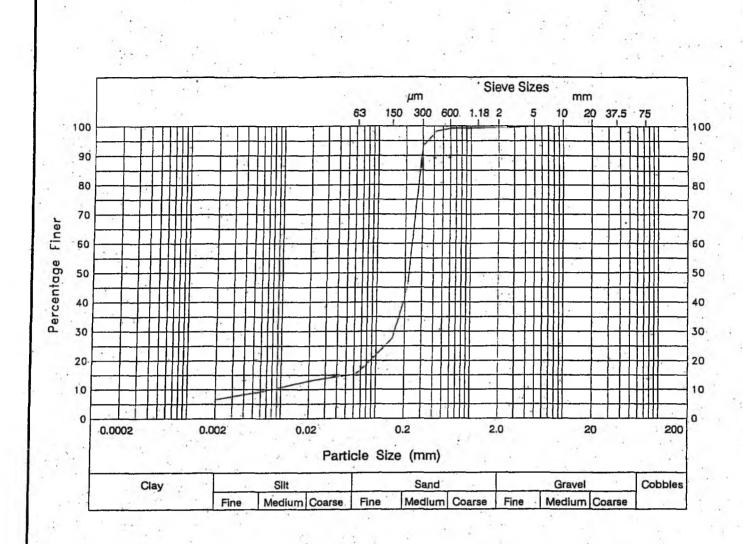
| Particle Size | % Passing | Particle Size | % Passing |
|-----------------------|--|------------------|------------|
| 14 mm | 100 | 63 μm | 18 |
| 10 mm | 100 | 20 µm | 16 |
| 6.3 mm | .99 | 6 µm | 12 |
| 5 mm | 99 | 2 µm | 7 |
| 3.35 mm | 98 | | |
| 2 mm | 98 | | |
| 1.18 mm | 97 | | · · · · · |
| 600 µm | 96 | | |
| 425 µm | 94 | ÷ | 4 |
| 300 µm | 90 | | |
| 212 µm | 62 | | |
| 150 µm | . 39 | | |
| Hole | Description | | |
| B | | dark brown sligh | tly clayey |
| Depth | The second se | ly silty fine to | |
| 0.50 -1.50 | originity state | | |
| Туре | | | |
| Type | | | |
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| Test Performed Wet | Uniformity Co | efficient = 50 | 4 |

Laboratory - Particle Size Plot

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Project WYBUNBURY Environment Agency Form 25/4 Contract 1210433 Sheet L2/1

Exploration Associates



| Particle Size | % Passing | Particle Size | | % Passir | g |
|----------------|---------------|------------------|--------|----------|-------|
| 6.3 mm | 100 | 6 µm | | 9 | |
| 5 mm | 100 | 2 μm | | 7 | 4 |
| 3.35 mm | 100 | 1 4 Y 1 1 1 | | 6°. | |
| 2 mm | 100 | | | | |
| 1.18 mm | 99 | | - | | |
| 600 µm | 99 | | | | |
| 425 µm | 98 | | - | | |
| 300 µm | 93 | | | | |
| 212 µm | 45 | 1.1 | | | |
| 150 µm | 28 | | | | |
| 63 µm | 15 | | | | |
| 20. µm | 13 | | < | | С. ж. |
| Hole | Description | | | | |
| C | | own silty fine a | and me | dium SA | ND |
| Depth | | | | | |
| 2.50 -3.00 | 2 | 1 A. 1 | | | |
| Type | | | | | |
| в | | ** | 1 - 1 | | 1.8 |
| Test Performed | Uniformity Co | oefficient = 29 | Т. | | |
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 Laboratory - Particle Size Plot
 Project WYBUNBURY Environment Agency
 Contract 1210433

 Exploration Associates
 Sheet

Sieve Sizes mm μm 150 300 600 1.18 2 20 37.5 75 63 5 10 100 100 111 111 90 90 111 1111 111 80 80 70 70 Percentage Finer 60 60 111 50 50 11 Ł1 TI П 11 40 40 Π 11 30 30 Ш 111 111 20 20 TH 111 111 1111 10 10 0 0 0.2 0.02 2.0 20 0.002 200 0.0002 Particle Size (mm) Cobbles Clay Silt Sand Gravel Fine Medium Coarse Fine Medium Coarse Fine Medium Coarse

| Particle Size | % Passing | Particle Size | % Passing |
|-----------------|---------------|---|---|
| 3.35 mm 2 mm | 100 100 | - | |
| 1.18 mm | 100 | | ·*** |
| 600 µm | 100 | 1 A A A A A A A A A A A A A A A A A A A | 1. J. |
| 425 µm | 98 | and the second | |
| 300 µm | 92 | | |
| 212 µm | 59 | | · · · · · |
| 150 µm | 40 | | |
| 63 µm | 24 | | |
| 20 µm | 13 | | |
| 6 µm | 8 | | |
| 2 µm | 6 | and a second | |
| Hole | Description | | |
| C | | wn silty fine and | medium SAND |
| Depth | | | |
| 4.50 -5.00 | - 120 | | ÷ |
| Туре | | | |
| B | 100 (e.e.s.) | | |
| Test Performed | Uniformity Co | efficient = 22 | |
| Wet | | | Ψ. |

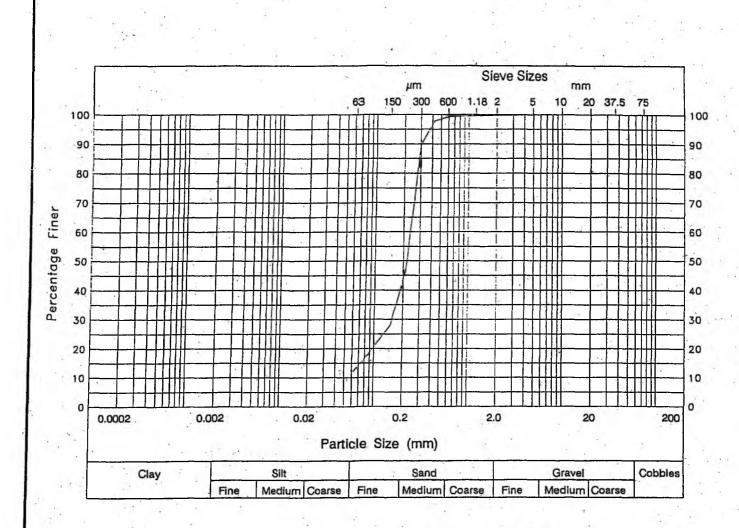
Laboratory - Particle Size Plot

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Project WYBUNBURY Environment Agency

Form 25/4 Contract 1210433 Sheet L2/4

Exploration Associates



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| Particle Size | % Passing | Particle Size | % Passing |
| 5 mm . | 100 | | |
| 3.35 mm | 100 | | |
| 2 mm | 100 | | |
| 1.18 mm | 100 | | and the second |
| 600 µm | 99 | 1. 14 | |
| 425 µm | -98 | | |
| 300 µm | 90 | | |
| 212 µm | 47 | | |
| 150 µm | 28 | | |
| 63 µm | 12 | 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | |
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| | | t a the | |
| Hole | Description | | |
| C | | wn silty fine and | medium SAND |
| Depth |] | | |
| 6.50 -7.00 | | | |
| Туре | | | |
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| Test Performed | Uniformity Cos | efficient not app | licable |
| Wet | on ion and y coe | | |

 Laboratory - Particle Size Plot
 Project WYBUNBURY Environment Agency
 Contract 1210433

 Exploration Associates
 L2/5

FALLING HEAD PERMEABILITY TEST RESULTS

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| REHOLE | DEPTH | INI | TIAL | FINAL | FALLING HEAD | TEMPERATURE | TARGETED |
|---------------|--------------------------------|----------------------------|------------------|---------------------|---|-------------|--|
| No. | | BULK DENSITY | MOISTURE | MOISTURE CONTENT | PERMEABILITY | | MOISTURE / DENSITY |
| с | m 6.50-7.00 | Mg/m3 | % 0.3 | [%] 27 | m/sec -5 2.5 x 10 | •c 18 | -20mm material. Recompacted to minimum dry density at 0% moisture |
| с | 6.50-7.00 | 1.93 | 10 | 14.3 | -7 5.4 x 10 | 18 | -20mm material. Recompacted to maximum dry density at 10% moisture |
| · . | | | | | | | |
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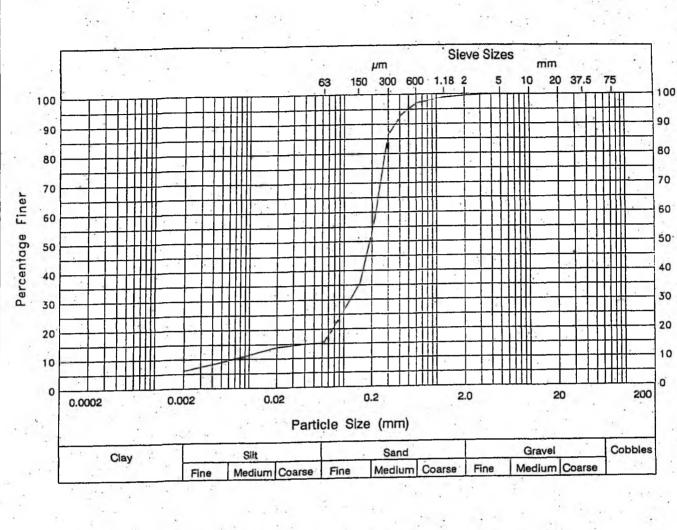
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| Particle Size | % Passing | Particle Size | % Passing |
|-----------------|-----------------|------------------|-------------|
| 10 mm | 100 | 20 µm | 14 |
| 6.3 mm | 100 | 6 µm | 10 |
| 5 mm | 100 | 2 µm | 6 |
| 3.35 mm | 100 | | 4 4 4 4 |
| 2 mm | 99 | ÷ . | |
| 1.18 mm | 99 | | |
| 600 µm | 97 | | |
| 425 µm | 94 | | |
| 300 µm | 86 | | |
| 212 µm | 57 | · · · · | 10 A |
| 150 µm | 36 | | |
| 63 µm | 15 | 1973 | |
| Hole | Description | | an ennet |
| C | Pale brown and | dark brown sligh | ntly clayey |
| Depth | silty fine to c | oarse SAND | |
| 0.50 -1.50 | | | |
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| est Performed | Uniformity Co | efficient = 37 | |
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Laboratory - Particle Size Plot

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Exploration Associates

Project WYBUNBURY Environment Agency Form 25

| Contract | 1210433 | |
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| Sheet | L2/2 | |
| a construction of the | L2/2 | |

FALLING HEAD PERMEABILITY TEST RESULTS

| REHOLE | DEPTH | INF | TIAL | FINAL | FALLING HEAD | TEMPERATURE | TARGETED |
|------------|------------------------------|-----------------------------|---------------------|---------------------|----------------|----------------|--|
| No. | | BULK DENSITY | MOISTURE CONTENT | MOISTURE CONTENT | PERMEABILITY | na interioria. | MOISTURE / DENSITY |
| 4 | m | Mg/m3 | % | % | m/sec | •c | |
| C | 6.50-7.00 | 1.38 | 0.3 | 27 | -5 2.5 x 10 | 18 | -20mm material. Recompacted to minimum dry density at 0% moisture |
| С | 6.50-7.00 | 1.93 | 10 | 14.3 | -7 5.4 x 10 | 18 | -20mm material. Recompacted to maximum dry density at 10% moisture |
| , . | | | | | | | |
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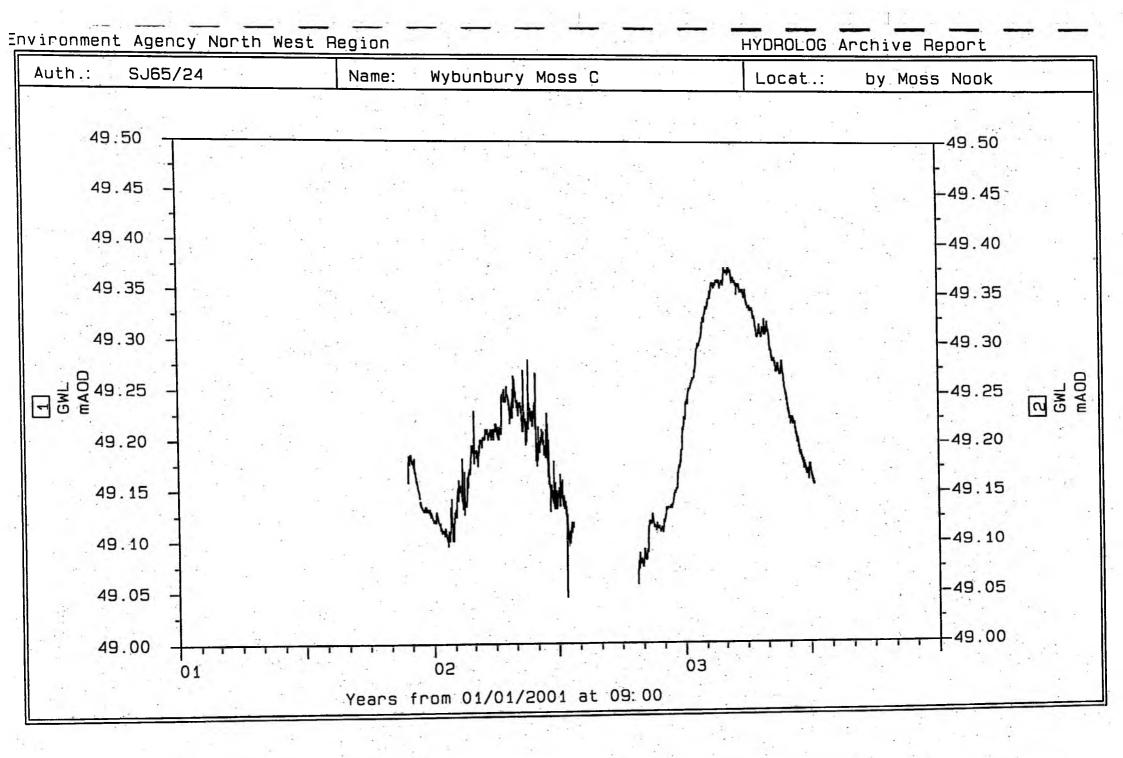
APPENDIX 5

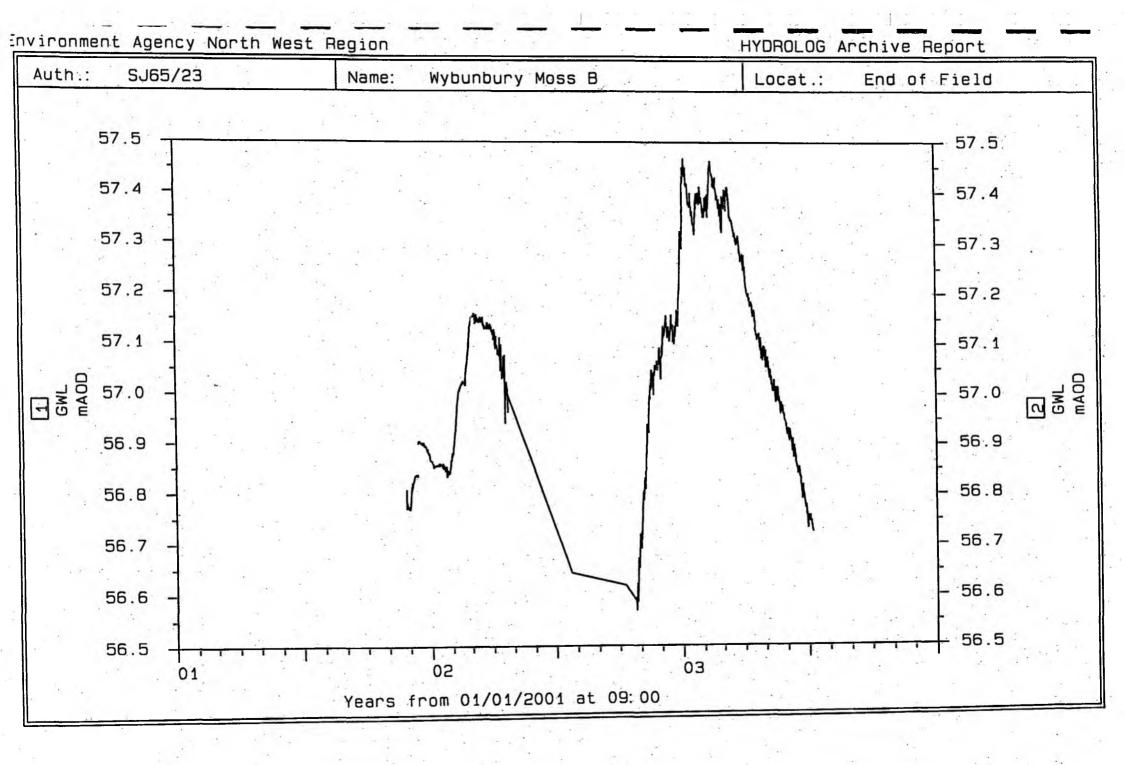
WYBUNBURY MOSS – ENVIRONMENT AGENCY BOREHOLES GROUNDWATER LEVEL HYDROGRAPHS

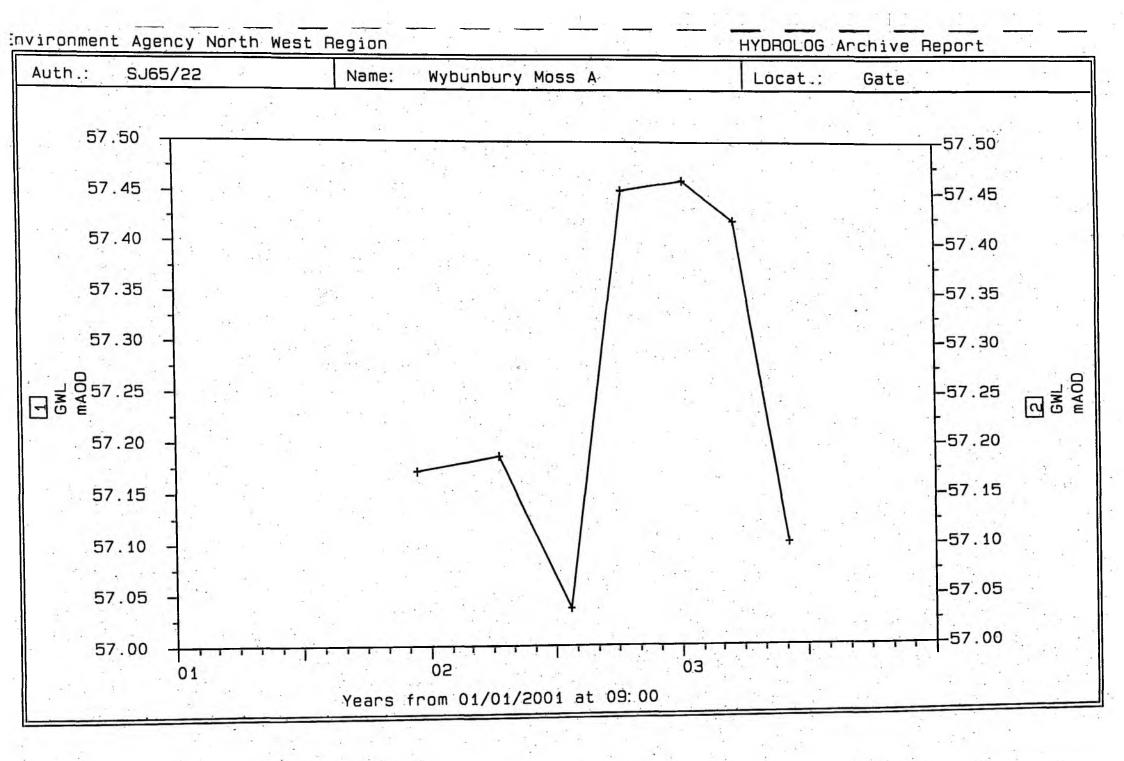
Instrument Monitoring



| Hole No | Inst Type | Tip Depth (m BGL) | Observa | ation | Depth to Water (m BGL) | Head Above Tip (m) | Rem | arks |
|---|---|--------------------------------|--------------|----------|------------------------------|--------------------------|---------------------------------------|---------------------------------------|
| . NO | .,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | (m BGL) | Date | Time | (m BGL) | (m) | | |
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| C | SP | 16.00 | 17/10/2001 | | 2.47 | | ÷ | |
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| s : SP - Standpipe, SPIE - S HPIE - Hydraulic Piezom EPIE - Vibrating Wire Pie | | | | TOUNGURY | | | | Sheet 1 |







APPENDIX 6

WYBUNBURY MOSS – ENVIRONMENT AGENCY BOREHOLES GROUNDWATER QUALITY DATA

| | 74. 2 | | | | • • • | |
|--------------|---------------------------|-------------------------------|------------|------------|--------------|-----------------------|
| WIMS STEM | SA | MPLE AND MEASUREM | ENT DETAI | LS WA13 | 18_S | Page 3 17-SEP-2003 |
| | | 0 DUMMY SITE NO1 | FOR GROUN | DWATER | SAMPLES | |
| id: NW9100 | | | | | | - 1 |
| | | 003 Time: 1445 | 2.2 | 4 | | Lab Ref: 392841 |
| | BZ GROUNDWA | TER - UNSPECIFIED | | 1 | | |
| chanism: S | | ESTIGATION (OPERA | | אד ת חידוא | · م) | |
| | ZZ GROUNDWA | | IIONAL MO. | | GĮ | |
| | | END OFFIELD SJ65 | 123 SAMPL | E ONE | | |
| | | | | - 0112 | | |
| Determin | nand | | | Unit | | Result |
| | | | | | | |
| 50 LEAD - A | | | | ug/l | a . | 126.00000 |
| 61 PH - AS | PH UNITS | the second second | 1. A | PHUNIT | 5 | 7.21000 437.00000 |
| | IVITY @20C | | • | uS/cm | | |
| 92 COD - AS | | | 4 | mg/1 | < | 89.00000 |
| D8 CADMIUM | | | | ug/1 | | 2.31000 |
| 11 AMMONIA | | | | mg/1 | < | .50000 • |
| | | ISED - AS N | · | mg/1 | | 8.97000 |
| 17 NITRATE | | | | mg/ I | | 8.89000 |
| 18 NITRITE | - as N | | | mg/l | | .07900 |
| 58 HARDNESS | TOTAL - as TY PH 4.5 - | CACO3 | | mg/l | | 3070.00000 |
| 62 ALKALINI | TY PH 4.5 - | as CACO3 | | mg/l | *** | 131.00000 |
| | ION - AS BR | | ÷ | mg/l | < | .05000 |
| | ION - AS C | Lite and a set | | mg/l | 43 | 16.90000 |
| 77 FLUORIDE | | · | N | mg/1 | | .10000 |
| | SPHATE - as | | а. | mg/l | < | .50000 |
| | | ISSOLVED - AS SIC | 02 | mg/l | | 8.15000 |
| 83 SULPHATE | | | | mg/l | · · · | 64.20000 |
| 07 SODIUM - | | | • | mg/l | | 11.30000 |
| 11 POTASSIU | | | | mg/1 | | 20.80000 |
| 37 MAGNESIU | | | | mg/l | | 330.00000 |
| 41 CALCIUM | | | | mg/l | | 684.00000 |
| | | OLVED - AS C | t she w | mg/l | | 10.30000 |
| 64 CHROMIUM | | | | ug/l | | 30.80000- |
| 46 ARSENIC | - AS AS | | | ug/l | | 50.0000- |
| 50 MANGANES | E - AS MN | | | ug/l | | 4280.00000 |
| 51 IRON - A | S FE | | | ug/l | 4 A A | 40500.000007 |
| 57 ALUMINIU | M - AS AL | - | | ug/l | | 71700.00000 |
| 59 BORON - A | AS B | | | ug/l | < | 100.00000 |
| 52 BARIUM - | AS BA | 1 | | ug/l | - | 3020.00000 |
| 53 STRONTIUN | 1 - AS SR | | | ug/l | | 429.00000 |
| 52 COPPER - | AS CU | the state of the state of the | | ug/l | | 246.000001 |
| 55 ZINC - AS | | - | | ug/l | | 765.00001 |
| 52 NICKEL - | | | | ug/l | N | 72.40000 |
| | | Y OMR SAMPLE NUM | | NO. | | 442613.00000 |
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| 27) | | 1 A. | 1.1.1 | | | · · · |
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|--|-------------------|---|
| WIMS SAMPLE AND MEASUREMEN | T DETAILS WA1318_ | - |
| :STEM | | 17-SEP-2003 |
| | | · · · · · |
| mpling point: 88009650 DUMMY SITE NO1 FO | R GROUNDWATER SAM | IPLES |
| id: NW9100091000 | | 4 - A - A - A - A - A - A - A - A - A - |
| mpling Date: 07-JUL-2003 Time: 1446 | 4 | Lab Ref: 392842 |
| mpler: JOHN INGRAM | | |
| Sint type: BZ GROUNDWATER - UNSPECIFIED | | |
| chanism: S SPOT | | E+ |
| rpose: PI PLANNED INVESTIGATION (OPERATIO | ONAL MONITORING) | |
| terial: 2EZZ GROUNDWATER | | |
| tes: WYBUNBURY MOSS B END OFFIELD SJ65/2 | 3 SAMPLE TWO | |
| D. t | The State | D 1. |
| Determinand | Unit | Result |
| 50 LEAD - AS PB | ug/l | 160 00000 |
| 51 PH - AS PH UNITS | PHUNITS | 160.00000 7.12000 |
| 62 CONDUCTIVITY @20C | uS/cm | 429.00000 |
| 192 COD - AS 02 | mg/1 | |
| D8 CADMIUM - AS CD | ug/1 | 3.15000 |
| 11 AMMONIA - AS N | | < .5000 |
| 16 NITROGEN TOTAL OXIDISED - AS N | mg/l | 9.17000 |
| 17 NITRATE - as N | mg/1 | 9.09000 |
| 18 NITRITE - as N | mg/l | .08000 |
| 58 HARDNESS TOTAL - as CACO3 | mg/l | 3920.00000 |
| 62 ALKALINITY PH 4.5 - as CACO3 | mg/1 | 126.00000 |
| 71 BROMIDE ION - AS BR | - / - | < .05000 |
| 72 CHLORIDE ION - AS CL | mg/l | 17.50000 |
| .77 FLUORIDE - AS F | mg/1 | .09700 |
| 80 ORTHOPHOSPHATE - as P | | < .50000- |
| 82 SILICATE REACTIVE DISSOLVED - AS SIO2 | mg/1 | 8.33000 |
| 83 SULPHATE - AS SO4 | mg/1 | 71.20000 |
| 07 SODIUM - AS NA | mg/l | 11.80000 |
| 11 POTASSIUM - AS K | mg/1 | 22.90000 |
| 37 MAGNESIUM - AS MG | mg/l | 419.00000 |
| M1 CALCIUM - AS CA | mg/l | 881.00000 |
| 01 CARBON ORGANIC DISSOLVED - AS C | mg/l | 10.50000 |
| 64 CHROMIUM - AS CR | ug/l | 39.40000 |
| 46 ARSENIC - AS AS | ug/l | 49.80000 |
| 50 MANGANESE - AS MN | ug/l | 6640.00000- |
| 51 IRON - AS FE | ug/l | 46100.00000 |
| 57 ALUMINIUM - AS AL | ug/l | 48600.00000 |
| 59 BORON - AS B | ug/l | 100.00000 |
| 62 BARIUM - AS BA | ug/1 | 4240.00000 |
| 63 STRONTIUM - AS SR | ug/l | 608.00000 |
| 52 COPPER - AS CU | ug/l | 329.00000 |
| 55 ZINC - AS ZN | ug/l | 998.00000 |
| 62 NICKEL - AS NI | ug/l | 93.40000 |
| 92 NOTTINGHAM LABORATORY OMR SAMPLE NUMBER | R NO. | 442612.00000 |
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|--|---|-------------------|------------|------------------------|
| WIMS | SAMPLE AND MEASUREM | ENT DETAILS WA13: | 18_S | Page 5 |
| STEM | - x* | | | 17-SEP-2003 |
| | OCCCC DIMMO CIME NO1 | | CANDI EG | |
| id: NW910009100 | 8009650 DUMMY SITE NO1 | FOR GROUNDWATER 3 | SAMPLES | |
| | -JUL-2003 Time: 1630 | 1 | · · · · · | h Dof. 202044 |
| mpling Date: 07 | | | Lic | b Ref: 392844 |
| | OUNDWATER - UNSPECIFIED | | | |
| chanism: S SPOT | | | | • |
| | ED INVESTIGATION (OPERA | TTONAL MONTTOPING | -) | · |
| terial: 2EZZ GR | | TIONAL MONTIORING | <u>,</u> | 1.00 |
| | MOSS C NEAR HOUSESJ65/2 | | | |
| Les: WIBONBORI | JOBB C MEAN HOUSEBUODY 2 | 4 SHIFTE INO | · | |
| Determinand | | Unit | | Result |
| Decerminana | | | | Rebui |
| 50 LEAD - AS PB | | ug/l | | 12.0000 |
| 61 PH - AS PH U | ITTS | PHUNITS | 3 | 6.6200 |
| 62 CONDUCTIVITY | | uS/cm | | 850.0000 |
| P2 COD - AS O2 | GAUC | mg/1 | | 39.0000 |
| D8 CADMIUM - AS | സ | ug/1 | | .4500 |
| 11 AMMONIA - AS | | mg/1 | < | .5000 |
| | L OXIDISED - AS N | mg/1 | | 20.1000 |
| 17 NITRATE - as | | mg/l | | 20.1000 |
| 18 NITRITE - as | | mg/l | | .0660 |
| 58 HARDNESS TOTA | | mg/1 | | 343.0000 |
| SO MARDNESS IOIF | $\mathbf{H} = \mathbf{a} \mathbf{B} \mathbf{C} \mathbf{C} \mathbf{C} \mathbf{C} \mathbf{C} \mathbf{C} \mathbf{C} C$ | mg/l | | 139.0000 |
| 71 BROMIDE ION - | I 4.5 - as CACO3 | mg/l | | .0950 |
| 72 CHLORIDE ION | | mg/1 | | 117.0000 |
| 72 CHLORIDE ION 77 FLUORIDE - AS | | mg/1 | | .0630 |
| 80 ORTHOPHOSPHAT | | | | .5000 |
| | TIVE DISSOLVED - AS SIC | mg/1 | < | 5.0900 |
| 1. | | | | |
| 83 SULPHATE - AS | | mg/l | | 84.3000 63.4000 |
| 07 SODIUM - AS N | | mg/1 | 5 A . | 3.1200 |
| 11 POTASSIUM - A | | mg/l | | |
| B7 MAGNESIUM - A | | mg/1 | | 25.5000 95.3000 |
| 41 CALCIUM - AS | | mg/l | | 8.0600 |
| 54 CHROMIUM - AS | C DISSOLVED - AS C | mg/1 | | 14 C |
| | | ug/1 | | 5.6300 4.2600 |
| 16 ARSENIC - AS | | ug/1 | . 1 ° . 1 | |
| 50 MANGANESE - A | | ug/l | | 402.0000 3420.0000 |
| 51 IRON - AS FE 57 ALUMINIUM - A | CAT | ug/l | · · · | |
| | 5 AL | ug/l | | 3060.0000 |
| 59 BORON - AS B | λ | ug/l | | 100.0000 |
| 52 BARIUM - AS B | | ug/l | | 217.0000 |
| 53 STRONTIUM - A | | ug/l | | 167.0000 |
| 2 COPPER - AS C | ji v Transford i Alexandri i Alexandri i Alexandri i A | ug/l | | 22,7000 |
| | ALC: ALC: ALC: ALC: ALC: ALC: ALC: ALC: | ug/l | | 39.3000 |
| | | | | |
| 55 ZINC - AS ZN 52 NICKEL - AS N | I BORATORY OMR SAMPLE NUM | ug/l BER NO. | | 16.6000 442615.0000 |

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| WIMS SAMPLE AND MEASUREMENT | DETAILS WA1318_S | Page 6 17-SEP-2003 |
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| mpling point: 88009650 DUMMY SITE NO1 FOR id: NW9100091000 | GROUNDWATER SAMPLES | |
| mpling Date: 07-JUL-2003 Time: 1631 | | Lab Ref: 392852 |
| mpler: JOHN INGRAM | | |
| int type: BZ GROUNDWATER - UNSPECIFIED | | |
| chanism: S SPOT | | |
| pose: PI PLANNED INVESTIGATION (OPERATION | AL MONITORING) | |
| terial: 2EZZ GROUNDWATER | | 2 · · |
| tes: WYBUNBURY MOSS C NEAR HOUSESJ65/24 SA | MPLE ONE | |
| | | |
| Determinand | Unit | Result |
| · · · · · · · · · · · · · · · · · · · | | |
| 50 LEAD - AS PB | ug/l | 13.80000 |
| 51 PH - AS PH UNITS | PHUNITS | 6.63000 |
| 62 CONDUCTIVITY @20C | uS/cm | 850.00000 |
| 92 COD - AS O2 | mg/l | 42.00000 .45700 |
| D8 CADMIUM - AS CD 11 AMMONIA - AS N | ug/l | .50000 |
| 16 NITROGEN TOTAL OXIDISED - AS N | mg/l < mg/l | 20.90000 |
| 16 NITROGEN TOTAL OXIDISED - AS N 17 NITRATE - as N | mg/l | 20.80000 |
| 18 NITRITE - as N | mg/l | .06600 |
| 58 HARDNESS TOTAL - as CACO3 | mg/1 | 351.00000 |
| 52 ALKALINITY PH 4.5 - as CACO3 | mg/1 | 137.00000 |
| 71 BROMIDE ION - AS BR | mg/1 | .09100 |
| 72 CHLORIDE ION - AS CL | mg/1 | 116.00000 |
| 77 FLUORIDE - AS F | mg/l | .05900 |
| 80 ORTHOPHOSPHATE - as P | mg/1 < | |
| 82 SILICATE REACTIVE DISSOLVED - AS SIO2 | mg/l | 5.09000 |
| 83 SULPHATE - AS SO4 | mg/l | 83.10000 |
| 07 SODIUM - AS NA | mg/1 | 63,70000 |
| 11 POTASSIUM - AS K | mg/l | 3.70000 |
| 37 MAGNESIUM - AS MG | mg/l | 26.60000 |
| 41 CALCIUM - AS CA | mg/l | 96.80000 |
| 01 CARBON ORGANIC DISSOLVED - AS C | mg/l | 7.96000 |
| 64 CHROMIUM - AS CR | ug/l | 8.14000 |
| 46 ARSENIC - AS AS | ug/l | 3.77000 |
| 50 MANGANESE - AS MN | ug/l | 401.00000 |
| 51 IRON - AS FE | ug/l | 5230.00000 |
| 57 ALUMINIUM - AS AL | ug/l | 4860.00000 |
| 59 BORON - AS B | ug/1 < | 100.00000 |
| 62 BARIUM - AS BA | ug/l | 228.00000 |
| 63 STRONTIUM - AS SR | ug/l | 166.00000 |
| 52 COPPER - AS CU | ug/l | 25.30000 |
| 55 ZINC - AS ZN | ug/l | 46.10000 |
| 62 NICKEL - AS NI | ug/l | 20.60000 442614.00000 |
| 92 NOTTINGHAM LABORATORY OMR SAMPLE NUMBER | NO. | 442014.00000 |
| | | |