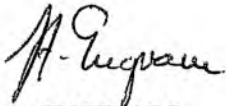


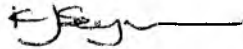
**A HYDROGEOLOGICAL ASSESSMENT
OF WYBUNBURY MOSS**

Prepared by:



**J.A. INGRAM
Technical Specialist
Groundwater and
Contaminated Land**

Checked by:



**K.J. SEYMOUR
Senior Technical Specialist
Hydrogeology**

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A HYDROGEOLOGICAL ASSESSMENT OF WYBUNBURY MOSS

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

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 fluvio-glacial 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 Fluvio-glacial 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 Consultants 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.

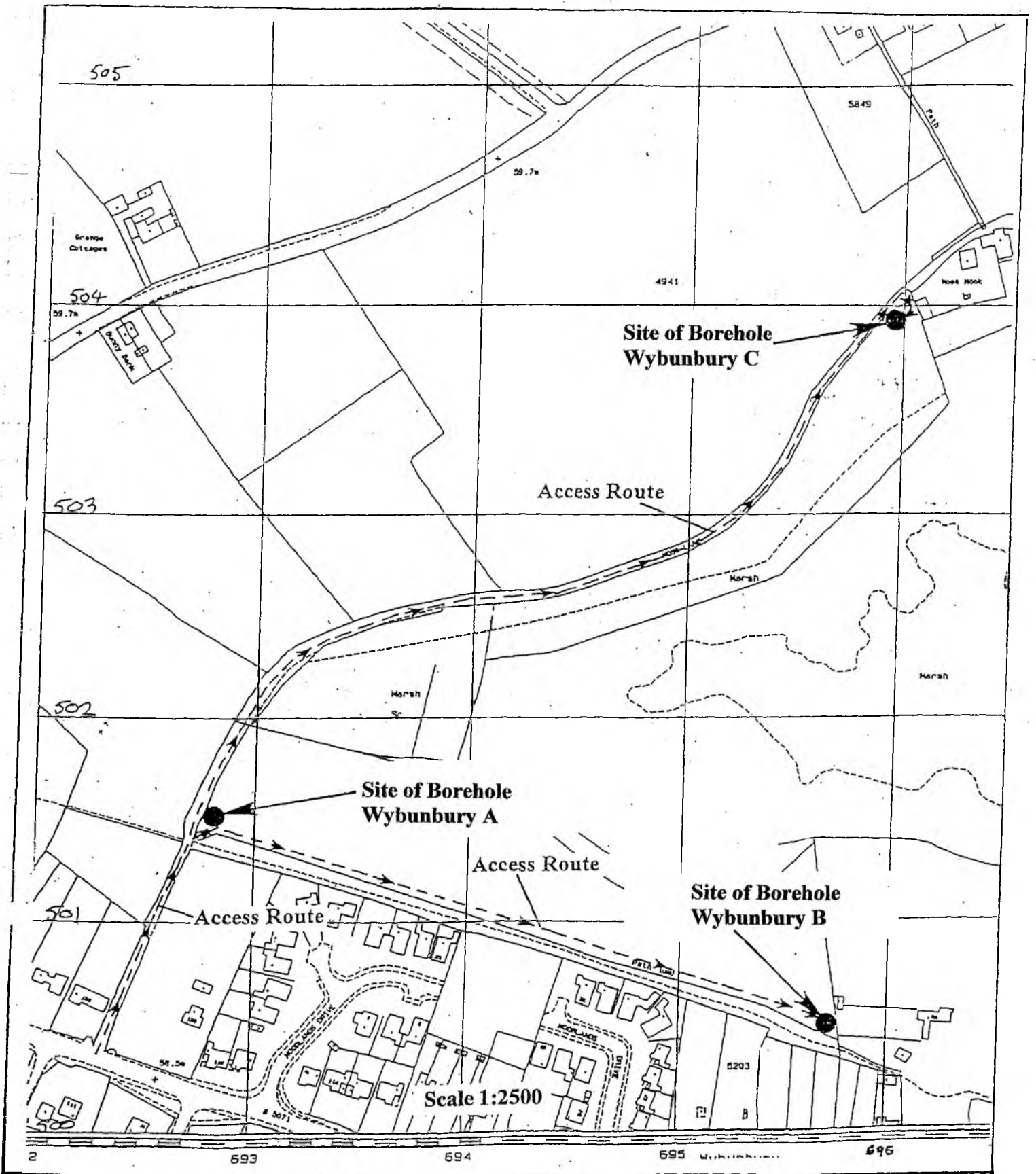


FIGURE 1

**PLAN SHOWING ENVIRONMENT AGENCY BOREHOLES
WYBUNBURY A, B & C**

FIGURE 2

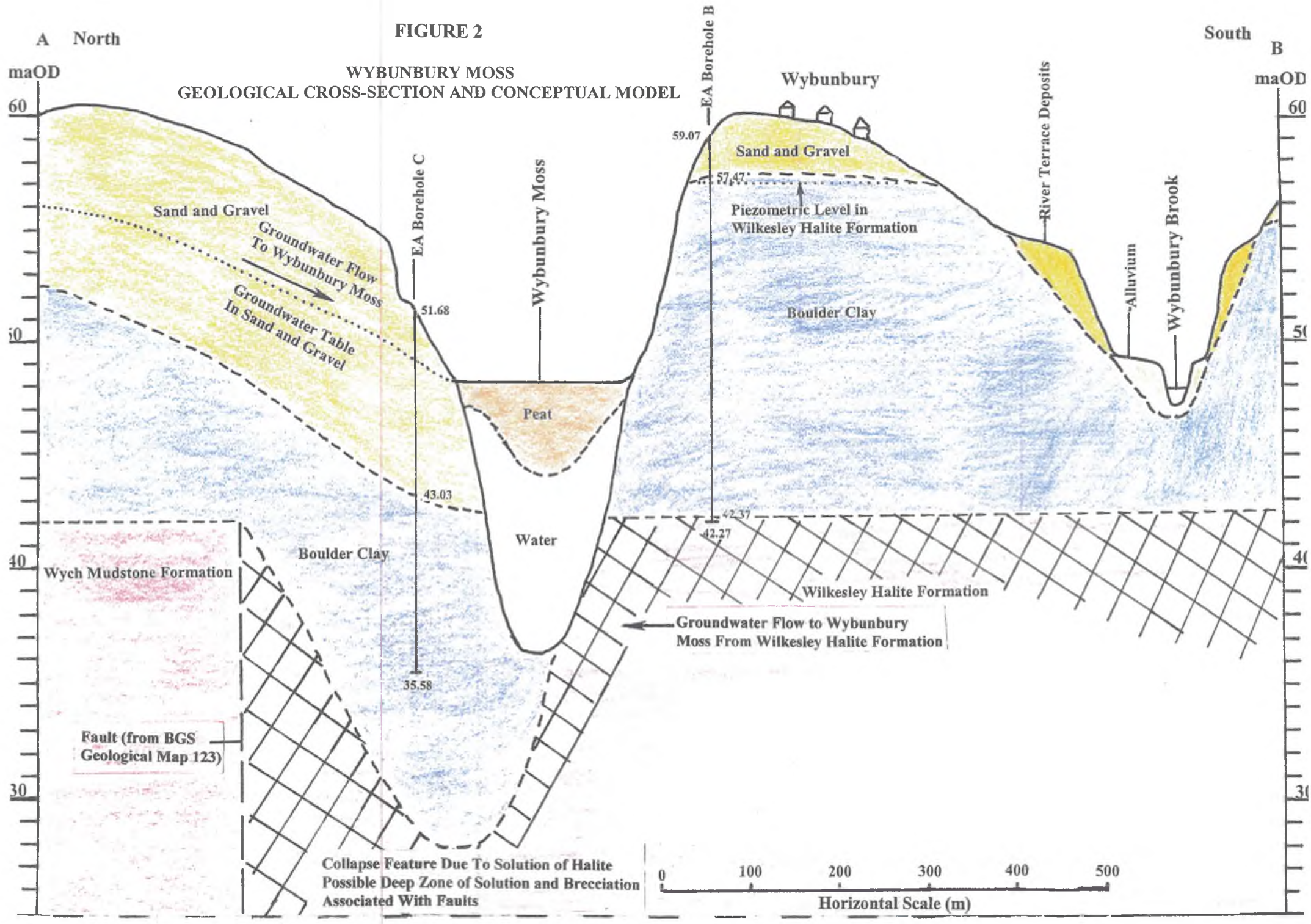




FIGURE 3
MAP SHOWING APPROXIMATE GROUNDWATER CATCHMENT OF WYNBURY MOSS

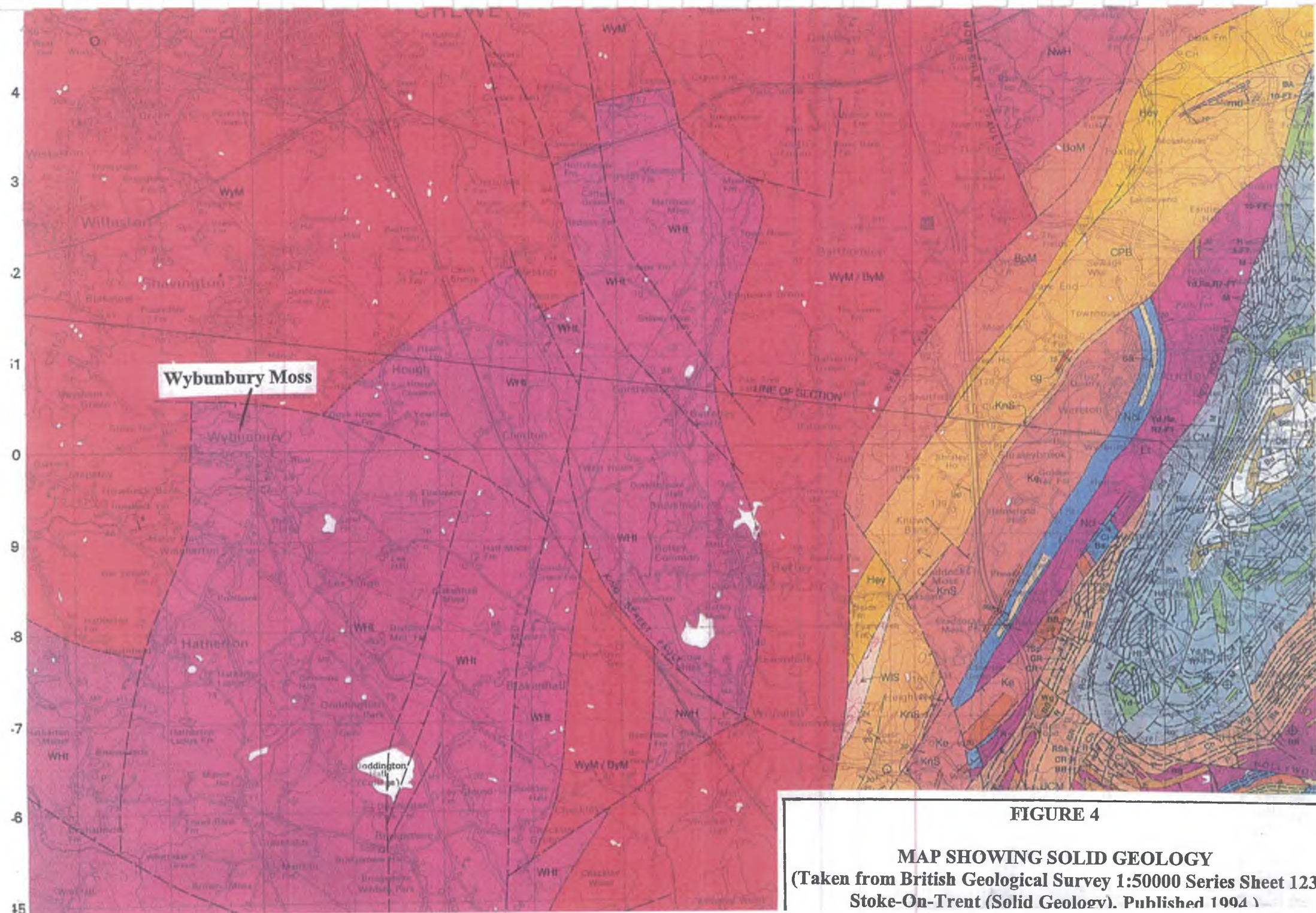


FIGURE 4

MAP SHOWING SOLID GEOLOGY
 (Taken from British Geological Survey 1:50000 Series Sheet 123
 Stoke-On-Trent (Solid Geology). Published 1994)

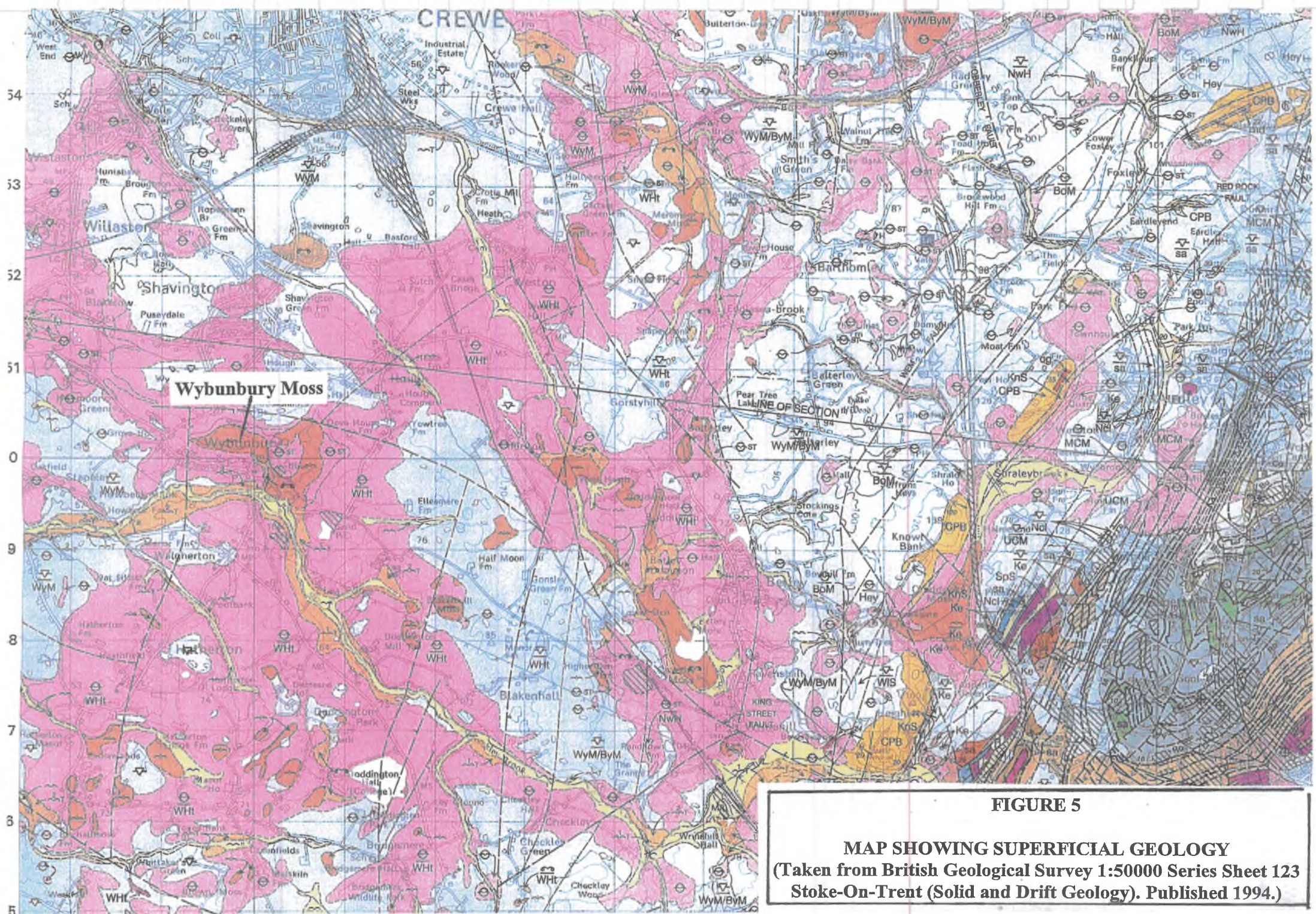


FIGURE 5
MAP SHOWING SUPERFICIAL GEOLOGY
 (Taken from British Geological Survey 1:50000 Series Sheet 123
 Stoke-On-Trent (Solid and Drift Geology). Published 1994.)



FIGURE 6
AREAS OF GROUNDWATER LEVEL INFLUENCE (RECHARGE CIRCLES)
FOR GROUNDWATER ABSTRACTIONS

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 for the abstraction licences identified under SECTION A? (See section 6, step I, II and IV)

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	N	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 than 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 Checkley 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



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 Nantwich

Natural Area: Mosses & Meres

EA Region: North West

Character Area:

Planning Authority: Cheshire CC, Crewe and Nantwich BC

Water Authority:

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 ?
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 tenant 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 wilkesley halite underlying the surface catchment and to north, east, and south. Wych mudstone to west.	Triassic
Peat directly underlies the SSSI.	Organic deposits
Glaciofluvial Deposits (undiff.) under c. 25% of the nominal groundwater catchment.	Glacial Deposits
Glaciofluvial Sheet Deposits under c. 25% of the nominal groundwater catchment.	Glacial Deposits
River terrace deposits (numbered) second river terrace deposits under less than 25% of the nominal groundwater catchment.	Fluvial deposits
Alluvium less than 25% of the nominal groundwater catchment.	Fluvial deposits
Till under c. 25% of the nominal groundwater catchment.	Glacial Deposits
Lacustrine Deposits in east of nominal groundwater catchment (less than 25% of area).	Lacustrine Deposits
Altcar 1 under most of the SSSI.	Earthy Eu-fibrous Peat Soils
Newport	Typical Brown Sands

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 REFERENCES*

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). *NOT 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). *NOT 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).

Hydrological 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 Wybunbury. 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.



Site:
Wybunbury Moss

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 vegetation 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 sylvestris* 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

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 (cpmt. 0029) with an area requiring light grazing to its SE (part cpmt 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
	Schwingmoor	
	Includes M2 Sphagnum cuspidatum/recurvum bog pool community.	
	Invertebrate assemblages	
	Includes 4 Nationally Rare species and 18 Nationally Notable species.	



Site:
Wybunbury Moss

West Midlands Wetlands
Site Issues

FenBASE 3.3

Source: JJ

Year: 1999

Issue	Impact	Effect [1-5]	Area (ha)	On Site	Off Site	Priority
WATER MANAGEMENT	Not known			<input checked="" type="radio"/>	<input checked="" type="radio"/>	
<p>A more detailed hydrogeological assessment is recommended to establish the importance of groundwater in supplying water to the wetland. The vulnerability of the wetland to development and other operations that affect aquifers could then be assessed. This should be coupled with a more detailed ecological assessment of the groundwater dependency of the conservation features for which the site is notified. It will then be possible to make recommendations for a well-targetted monitoring programme to assist EN and EA in considering licence applications etc.</p>						
Main Water Sources Enriched	Nutrient enrichment			<input type="radio"/>	<input checked="" type="radio"/>	
<p>1. Discharge from septic tanks has been a problem in the past, and led to fen vegetation developing on the mire. Sewage works have removed the main sources of pollution, and water level controls help to 'flush' out the site.</p>						
Roads	Not known			<input type="radio"/>	<input checked="" type="radio"/>	
<p>2. The Hough-Shavington by-pass was planned to pass very close to the site. The road could still pose a threat.</p>						
Succession	Scrub encroachment			<input checked="" type="radio"/>	<input type="radio"/>	
<p>3. Scrub and pine encroachment on the mire. A lot of scrub has been removed, and higher water levels may help stop succession.</p>						
Vegetation Management	Dereliction			<input type="radio"/>	<input checked="" type="radio"/>	
<p>4. The meadow to the east of the NNR would benefit from grazing.</p>						

Notes

There are 21 farms surrounding the catchment.

Other issues, as identified on map. These are not thought to threaten the site at the moment but they could be the source of problems in the future:

5. New industrial and business units have been built at Cockshades Farm. This area features parking facilities for several large lorries, and could be a source of pollutants.
6. New stables and showground at Cockshades Farm.
7. Area of fen on the bog, probably the result of earlier pollution.
8. Young conifer plantation.
9. Private fishing pool.
10. Inflow joining main outflow from the site and carrying murky water in November 1999.



Site:
Wybunbury Moss

West Midlands Wetlands

Site Impacts

FenBASE 3.3

Issue	Impact	Effect [1-5]	Area (ha)	On Site	Off Site	Priority
WATER MANAGEMENT	Not known			<input checked="" type="radio"/>	<input checked="" type="radio"/>	

A more detailed hydrogeological assessment is recommended to establish the importance of groundwater in supplying water to the wetland. The vulnerability of the wetland to development and other operations that affect aquifers could then be assessed. This should be coupled with a more detailed ecological assessment of the groundwater dependency of the conservation features for which the site is notified. It will then be possible to make recommendations for a well-targetted monitoring programme to assist EN and EA in considering licence applications etc.

Effects on Conservation Features:

Work Required:

Operation: Investigation

Agency:

Mechanism:

Likelihood of Success ?:

Notes:

Permission:

Time Frame:

Resource Requirements:

Issue	Impact	Effect [1-5]	Area (ha)	On Site	Off Site	Priority
Main Water Sources Enriched	Nutrient enrichment			<input type="radio"/>	<input checked="" type="radio"/>	

1. Discharge from septic tanks has been a problem in the past, and led to fen vegetation developing on the mire. Sewage works have removed the main sources of pollution, and water level controls help to 'flush' out the site.

Effects on Conservation Features:

ID	Name	Status
	<i>Schwingmoor</i>	
	Enrichment leads to loss of bog communities as fen develops.	
	<i>Rare invertebrates</i>	
	Loss of habitat.	

Work Required:

Operation: Investigation

Agency:

Mechanism:

Likelihood of Success ?:

Notes: Monitor water quality on the site and the response of the vegetation. Ensure existing solutions are still working. There are still potential sources of pollution from arable fields, farms, and industrial units.

Permission:

Time Frame:

Resource Requirements:

Issue	Impact	Effect [1-5]	Area (ha)	On Site	Off Site	Priority
Roads	Not known			<input type="radio"/>	<input checked="" type="radio"/>	
2. The Hough-Shavington by-pass was planned to pass very close to the site. The road could still pose a threat.						
Effects on Conservation Features:						
ID	Name	Status				
	<i>Schwingmoor</i>					
If built, runoff from the road could carry pollution to the site and damage the schwingmoor.						
Work Required:						
Operation: Investigation						
Agency:			Permission:			
Mechanism:			Time Frame:			
Likelihood of Success ?:			Resource Requirements:			
Notes:						

Issue	Impact	Effect [1-5]	Area (ha)	On Site	Off Site	Priority
Succession	Scrub encroachment			<input checked="" type="radio"/>	<input type="radio"/>	
3. Scrub and pine encroachment on the mire. A lot of scrub has been removed, and higher water levels may help stop succession.						
Effects on Conservation Features:						
ID	Name	Status				
	<i>Schwingmoor</i>					
Scrub takes over schwingmoor and leads to loss of Sphagnum communities.						
<i>Rare invertebrates</i>						
Loss of habitat for species requiring open mire, but other species require scrub.						
Work Required:						
Operation: Open Scrub Clearance						
Agency:			Permission:			
Mechanism:			Time Frame:			
Likelihood of Success ?:			Resource Requirements:			
Notes: Continue to remove invading scrub if necessary. Beware need of invertebrates (including <i>Cryptocephalus decemmaculatus</i>) for some scrub to remain.						

Issue	Impact	Effect [1-5]	Area (ha)	On Site	Off Site	Priority
Vegetation Management	Dereliction			<input type="radio"/>	<input checked="" type="radio"/>	

4. The meadow to the east of the NNR would benefit from grazing.

Effects on Conservation Features:

Work Required:

Operation: Grazing

Agency: Owners/occupiers

Mechanism: SSSI management agreements

Likelihood of Success ?:

Notes:

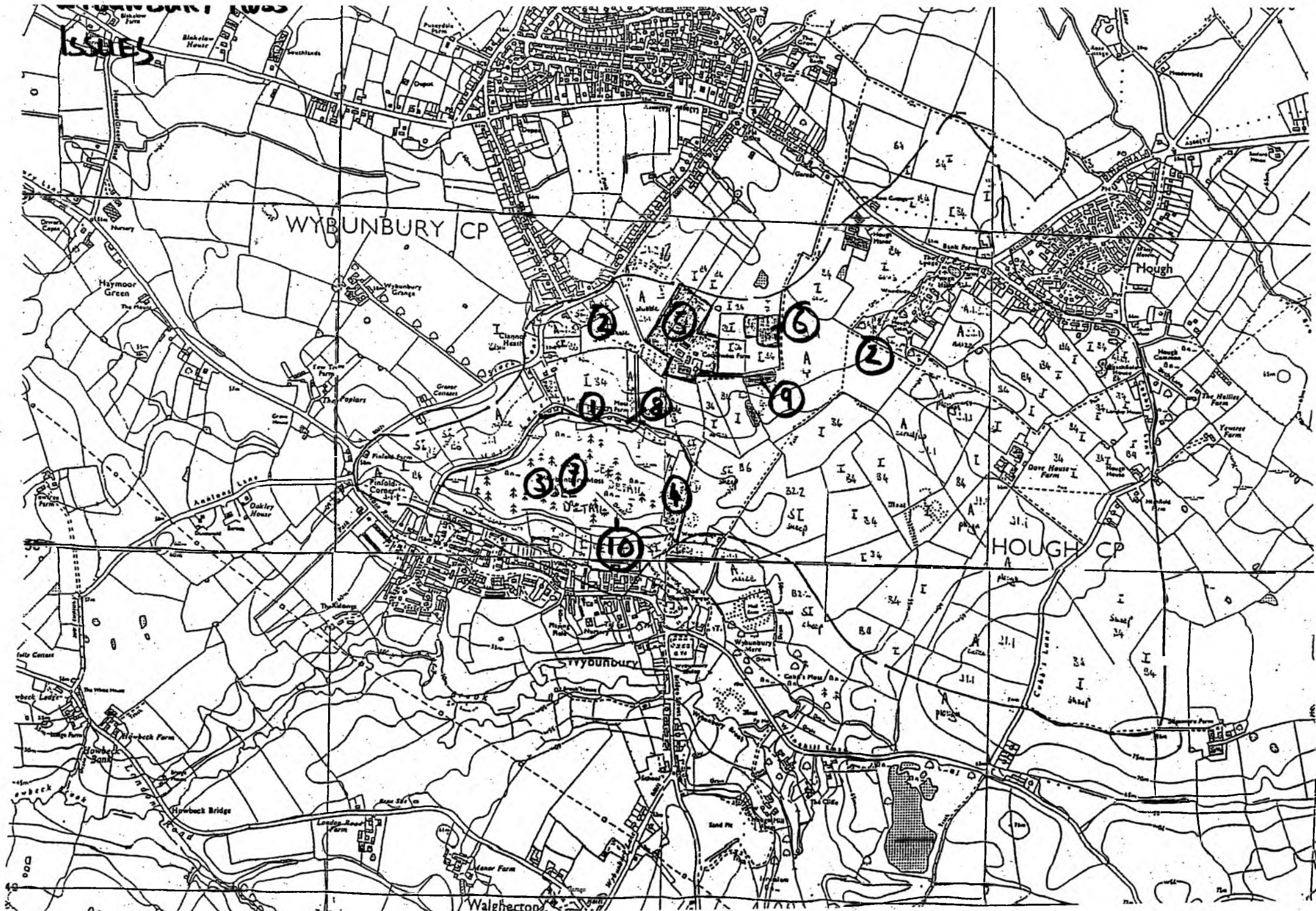
Permission:

Time Frame:

Resource Requirements:

References Wybunbury Moss

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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).

WYBUNBURY MOSS

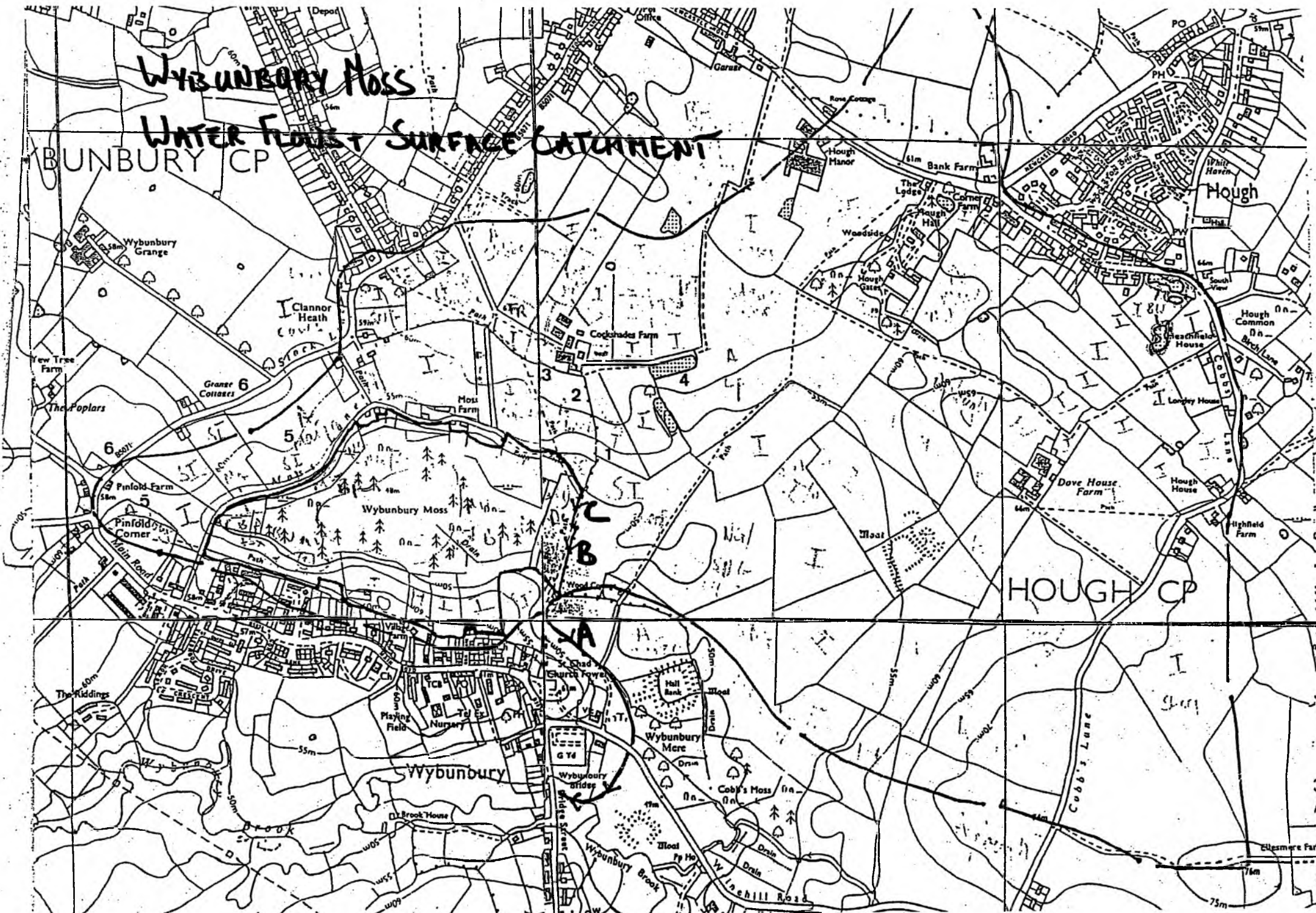
WATER FLOWS + SURFACE CATCHMENT

BUNBURY CP

Hough

HOUGH CP

Wybunbury



APPENDIX 3

**WYBUNBURY MOSS – ENVIRONMENT AGENCY BOREHOLES
GEOLOGICAL LOGS AND DRILLERS LOGS**

Borehole Log: WYBUNBURY Moss OBH, "A"



Exploration Associates

Drilled by AH Logged by GD Checked by	Equipment and Methods Inspection Pit from 0.00m to 1.20m. Cable Percussion 150 mm diameter from 1.20m to 14.80m. DATUM VALUE = 58.412 MAOD. SJ69278.50148	Ground Level 58.122 National Grid Coordinates M. A. O. D.
---	--	---

Samples and Tests				Strata			
Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
0.50 - 1.50	B1		08/10/2001		Turf over TOPSOIL: Soft brown sandy CLAY (Driller's description).	(0.40)	c
2.50 - 3.00	B2					0.40	b
4.50 - 5.00	B3		08/10/2001 4.50	dry			b
6.50 - 7.00	B4		09/10/2001 4.50	4.40	Firm dark brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine and medium.	(14.40)	a
8.50 - 9.00	B5						a

Groundwater No. Struck Behaviour 1 5.00m Overnight inflow WRB No SJ65/22	Remarks Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Grout (g), 1.00m to 1.50m Bentonite (b). Surface protection : Lockable Top Cap Standpipe installed, 75mm diameter, response zone from 1.50m to 14.80m.
--	--

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.
Scale 1 : 50

Project **WYBUNBURY**
 Project no. **1210433**
 Carried out for **Environment Agency**

Borehole **A**
 Sheet 1 of 2

1/10/2001 15:35:43 ESGLog v2.11

Borehole Log: WYBUNBURY Moss OBH, "A"



Exploration Associates

Drilled by AH Logged by GD Checked by	Equipment and Methods See sheet 1 DATUM VALUE = 58.412 MAOD.	SJ69278.50148. ←	Ground Level 58.122 National Grid Coordinates MAOD.
---	---	-------------------------	--

Samples and Tests				Strata			
Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
10.50 - 11.00	B6						
12.50 - 13.00	B7				As sheet 1	(14.40pen)	
			09/10/2001 7.50	dry	Weathered grey SANDSTONE/MUDSTONE (Drillers description) ----- EXPLORATORY HOLE ENDS AT 14.80 m.	14.70 14.80	

Groundwater No. Struck Behaviour WRB. N° SJ65/22	Remarks Chiselling : 14.70m to 14.80m 60minutes
---	--

Borehole Log: WYBUNBURY Moss OBH, "A"



Exploration Associates

Drilled by AH
 Logged by GD
 Checked by

Equipment and Methods
 Inspection Pit from 0.00m to 1.20m. Cable Percussion 150 mm diameter from 1.20m to 14.80m.

Ground Level 58.122
 National Grid Coordinates M.A.O.D.

DATUM VALUE = 58.412 MAOD. SJ69278.50148

Samples and Tests				Strata			
Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
0.50 - 1.50	B1		08/10/2001		Turf over TOPSOIL: Soft brown sandy CLAY (Driller's description).	(0.40) 0.40	c g
2.50 - 3.00	B2						b
4.50 - 5.00	B3		08/10/2001 4.50	dry			
			09/10/2001 4.50	4.40	Firm dark brown slightly gravelly sandy CLAY. Gravel is angular to subrounded fine and medium.	(14.40)	
6.50 - 7.00	B4						
8.50 - 9.00	B5						

Groundwater
 No. Struck Behaviour
 1 5.00m Overnight inflow

Remarks
 Hole backfill: 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Grout (g), 1.00m to 1.50m Bentonite (b). Surface protection: Lockable Top Cap
 Standpipe installed, 75mm diameter, response zone from 1.50m to 14.80m.

WRB No SJ65/22

Notes: For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.

Project WYBUNBURY
 Project no. 1210433
 Carried out for Environment Agency

Borehole A
 Sheet 1 of 2

10/001 13:53:43 ES(3)09TZ.11

Borehole Log: WYBUNBURY Moss OBH, "A"



Exploration Associates

Drilled by AH Logged by GD Checked by	Equipment and Methods See sheet 1 DATUM VALUE = 58.412 MAOD.	SJ69278.50148. ←	Ground Level 58.122 National Grid Coordinates MAOD.
---	---	-------------------------	--

Samples and Tests				Strata			
Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
10.50 - 11.00	B6						
12.50 - 13.00	B7				As sheet 1	(14.40open)	
			09/10/2001 7.50	dry	Weathered grey SANDSTONE/MUDSTONE (Drillers description)	14.70 14.80	
EXPLORATORY HOLE ENDS AT 14.80 m.							

Groundwater No. Struck Behaviour <div style="font-size: 2em; font-family: cursive;">WR.B. N^o SJ65/22</div>	Remarks Chiselling : 14.70m to 14.80m 60minutes
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Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1 : 50	Project WYBUNBURY Project no. 1210433 Carried out for Environment Agency	Borehole A Sheet 2 of 2
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11 7A Borehole Log

Soil Mechanics

Cable Tool Borehole Journal

Borehole No. A.

A.

Location NY BUNBURY. Loc. No. 121403. Day TUESDAY. Date 9.10.01 Sheet 1 of 1

Piezo-meter	Depth metres	Foreman's Description	Sample /Test	Sample No.	Depth (m)		U Sample		Standard Penetration Tests							Time	Casing Depth	Water Level	BH Diam.	CHISELLING		
					From	To	Blow	Rec	SW pen	75	75	Pen	75	75	75					75	Pen	From
	5.00	START OF SHIFT	B	4	6.50	7.00											4.50	4.40	50mm	14.70	14.80	1HR.
	5.00	Firm/slip Brown laminated clay with some Boulder clay Bands	B	5	8.50	9.00																
			B	6	10.50	11.00																
			B	7	12.50	13.00																
	14.70	Leaned clay Sandstone mudstone																				
	14.60	END OF SHIFT															7.50	50mm				

WATER ENTRIES

Hole Water Time

KEY: U Undisturbed 100mm NR No recovery P: Piston B Bulk D Disturbed tub W Water Sample S SPT Open Shoe C SPT Solid Cone V Vane Test k Permeability test
 SW pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Details of standing time, hourly rated work, in situ testing, services, visitors etc.

STANDING WATER LEVEL Am 14.40m.

Foreman A. Hines
 Rig Crew D. Hines
 Rig Type Piston 2000
 Additional Plant

Foreman's Signature
A. Hines
 Engineer's Signature

Borehole No. 4

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

Location <u>NY BUNBURY</u>					Loc. No. <u>121403</u>					Day <u>Wednesday</u>					Date <u>10.10.01</u>				Sheet <u>1</u> of <u>1</u>				
Piezo- meter	Depth metres	Foreman's Description	Sample /Test	Sample No.	Depth (m)				U Sample								Time	Casing Depth	Water Level	BH Diam.	CHISELLING		
					From	To	Blow	Rec	SW pen	75	75	Pen	75	75	75	75					Pen	From	To
		START OF SHIFT																					
		END OF SHIFT																					

KEY: U Undisturbed 100mm NR No recovery P Piston B Bulk D Disturbed tub W Water Sample S SPT Open Shoe C SPT Solid Cone V Vane Test k Permeability test
 SW pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

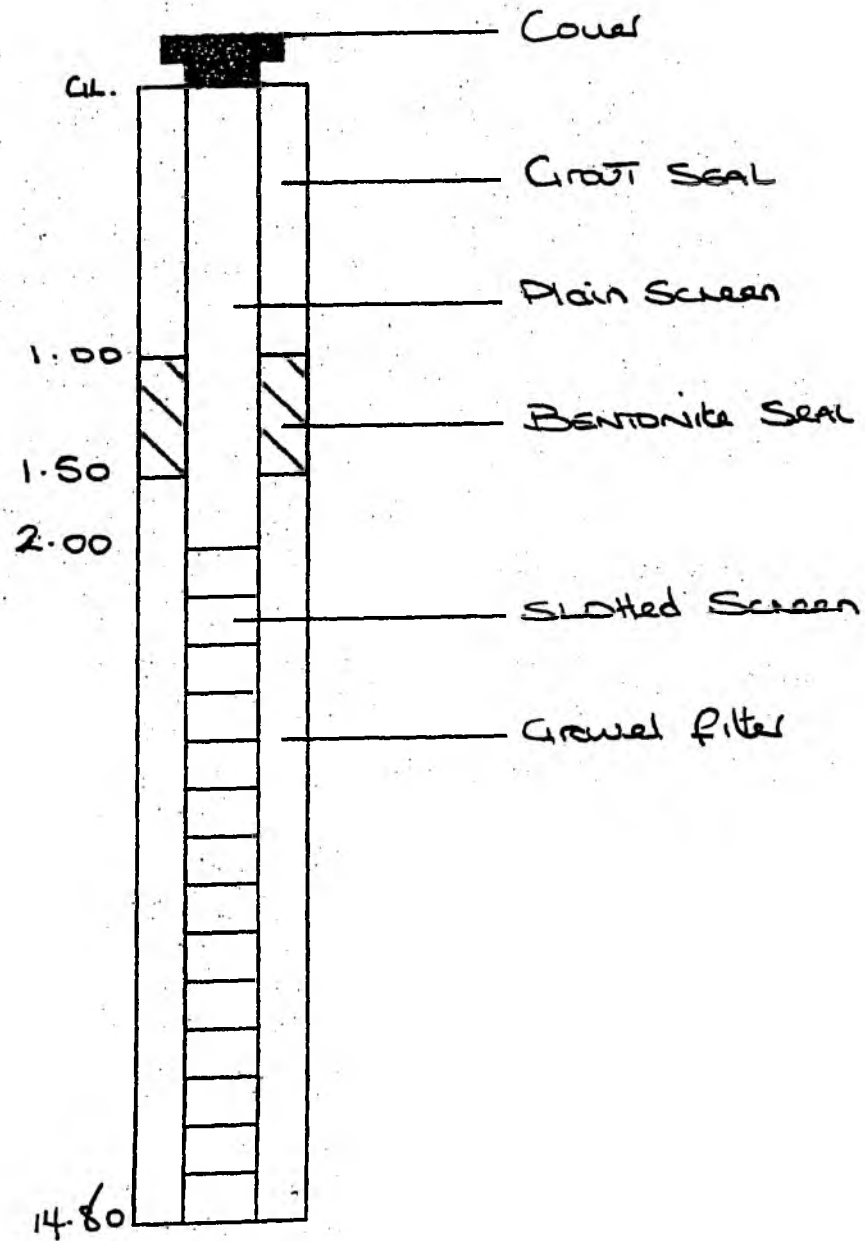
Details of standing time, hourly rated work, in situ testing, services, visitors etc.
WAIT FOR WELL PIPE 2hrs. Colled Sand + Bentonite
from ABBOTS MASS 2hrs. Well installation 2hrs.

Foreman <u>A. Henney</u>	Foreman's Signature <u>[Signature]</u>
Rig Crew <u>D. Height</u>	
Rig Type <u>Piston 2000</u>	Engineer's Signature
Additional Plant	

Borehole No. A

Site WYBUNBURY
Job no 121403
BH no A

WELL INSTALLATION



Borehole Log: WYBUNBURY MOSS OBH "B"



Exploration Associates

Drilled by Logged by Checked by	AH GD	Equipment and Methods Inspection Pit from 0.00m to 1.20m. Cable Percussion 150 mm diameter from 1.20m to 16.80m. DATUM VALUE = 59.299 MAOD. SJ 69562.50057 ←	Ground Level National Grid Coordinates	59.069 MAOD.
---------------------------------------	----------	---	--	-----------------

Samples and Tests				Strata			
Depth	Type & No.	Records	Date Casing Time Water	Description	Depth, Level (Thickness)	Legend	
0.50 - 1.50	B1		10/10/2001	Turf over pale brown and dark brown slightly clayey fine SAND. Abundant rootlets up to 2mm.	(1.60)	c g b	
2.50 - 3.00	B2				1.60		
4.50 - 5.00	B3		10/10/2001 4.50 dry 11/10/2001 4.50 dry				
6.50 - 7.00	B4			Firm dark brown very sandy CLAY. Sand is fine to coarse.	(15.20)		
8.50 - 9.00	B5			Between 6.50m-11.00m: With occasional pockets of fine to coarse sand up to 30mm.			

Groundwater No. Struck Behaviour	Remarks Hole backfill : 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Grout (g), 1.00m to 1.50m Bentonite (b). Surface protection : Lockable Top Cap Standpipe installed, 75mm diameter, response zone from 1.50m to 16.80m.
WRB N° SJ 65/23.	

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1 : 50	Project WYBUNBURY Project no. 1210433 Carried out for Environment Agency	Borehole B Sheet 1 of 2
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Borehole Log: WYBUNBURY MOSS OBH, "B"



Exploration Associates

Drilled by Logged by Checked by	AH GD	Equipment and Methods See sheet 1 DATUM VALUE = 59.299 M.A.O.D.	SJ69562.50057	Ground Level National Grid Coordinates	59.069 M.A.O.D.
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Samples and Tests				Strata			
Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
10.50 - 11.00	86				Between 6.50m-11.00m: With occasional pockets of fine to coarse sand up to 30mm.		
12.50 - 13.00	87				Between 12.50m-13.00m: With bands of slightly gravelly sandy clay.		
14.50 - 15.00	88				As sheet 1	(15.20open)	
			11/10/2001 7.50	15.10	Weathered grey SANDSTONE/MUDSTONE (Drillers description)	16.70 16.80	
						EXPLORATORY HOLE ENDS AT 16.80 m.	

Groundwater
No. Struck Behaviour
1 16.70m Rising to 15.10m after 20 mins.
WRB N^o SJ65/23.

Remarks
Chiselling : 16.70m to 16.80m 60minutes

11 ZA Borehole Log 01/10/07

Location WYBUNGERY. Loc. No. 12-1403. Day WEDNESDAY. Date 10-10-01 Sheet 1 of 1

Table with columns: Piezo-meter, Depth metres, Foreman's Description, Sample /Test, Sample No., Depth (m) From To, U Sample Blow Rec, Standard Penetration Tests (SW pen, 75, 75, Pen, 75, 75, 75, Pen), Time, Casing Depth, Water Level, BH Diam., CHISELLING (From, To, Time), WATER ENTRIES (Hole, Water, Time).

KEY: U Undisturbed 100mm NR No recovery P Piston B Bulk D Disturbed tub W Water Sample S SPT Open Shoe C SPT Solid Cone V Vane Test k Permeability test
SW pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Details of standing time, hourly rated work, in situ testing, services, visitors etc.

Move & set up on BH Position, inspection Pit. etc.

Foreman A. Hardy
Rig Crew D. Haight
Rig Type Pilon 2000.
Additional Plant
Foreman's Signature [Signature]
Engineer's Signature

Borehole No. 3

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

Soil Mechanics

Cable Tool Borehole Journal

Borehole No. **3**

Location **WYBUNGERY.**

Loc. No. **12-1403**

Day **WEDNESDAY.**

Date **10-10-01**

Sheet **1 of 1**

Piezo-meter	Depth metres	Foreman's Description	Sample /Test	Sample No.	Depth (m)		U Sample		Standard Penetration Tests							Time	Casing Depth	Water Level	BH Diam.	CHISELLING																				
					From	To	Blow	Rec	SW pen	75	75	Pen	75	75	75					75	Pen	From	To	Time																
	0.0	START OF SHIFT	B	1	0.50	1.50																																		
	0.5	TUFF and loose	B	2	2.50	3.00																																		
	1.0	Brown granulated	B	3	4.50	5.00																																		
		Sub soil																																						
	1.60	medium dense fine																																						
		Grained Brown																																						
		Sand.																																						
	4.40	Fine Brown laminated																																						
		Clay.																																						
	5.00	END OF SHIFT																																						

KEY: U Undisturbed 100mm NR No recovery P Piston B Bulk D Disturbed tub W Water Sample S SPT Open Shoe C SPT Solid Cone V Vane Test k Permeability test
 SW pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Details of standing time, hourly rated work, in situ testing, services, visitors etc.

Move & set up on BH position, inspection Pit. 1:10.

Foreman **A. Hardy**
 Rig Crew **D. Height**
 Rig Type **Piston 2000.**
 Additional Plant

Foreman's Signature
[Signature]
 Engineer's Signature

Borehole No. **3**

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

Soil Mechanics

Cable Tool Borehole Journal

Borehole No. **B**

Location **WYBUNBURY.**

Loc. No. **121403.**

Day **THURSDAY.**

Date **11.10.01**

Sheet **1** of **1**

Piezo-meter	Depth metres	Foreman's Description	Sample /Test	Sample No.	Depth (m)		U Sample		Standard Penetration Tests							Time	Casing Depth	Water Level	BH Diam.	CHISELLING			
					From	To	Blow	Rec	SW pen	75	75	Pen	75	75	75					Pen	From	To	Time
	5.00	START OF SHIFT	B	4	6.50	7.00											4.50	12.1	150	16.70	16.80	1hr	
	5.00	firm/shiff Brown	B	5	8.50	9.00																	
		laminated clay with	B	6	10.50	11.00																	
		Occasional Boulder	B	7	12.5	13.00																	
		Clay bands.	B	8	14.50	15.00																	
	16.70	Heard clay																					
		Sandstone / mudstone.																					
	16.80	END OF SHIFT Complete																					

WATER ENTRIES

Hole	Water	Time
16.70	16.00	✓
..	15.70	5m
..	15.50	10m
..	15.10	15m
..	15.10	20m

KEY: U Undisturbed 100mm NR No recovery P Piston B Bulk D Disturbed tub W Water Sample S SPT Open Shoe C SPT Solid Cone V Vane Test k Permeability test
SW pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Details of standing time, hourly rated work, in situ testing, services, visitors etc.
Well installation 2hrs.

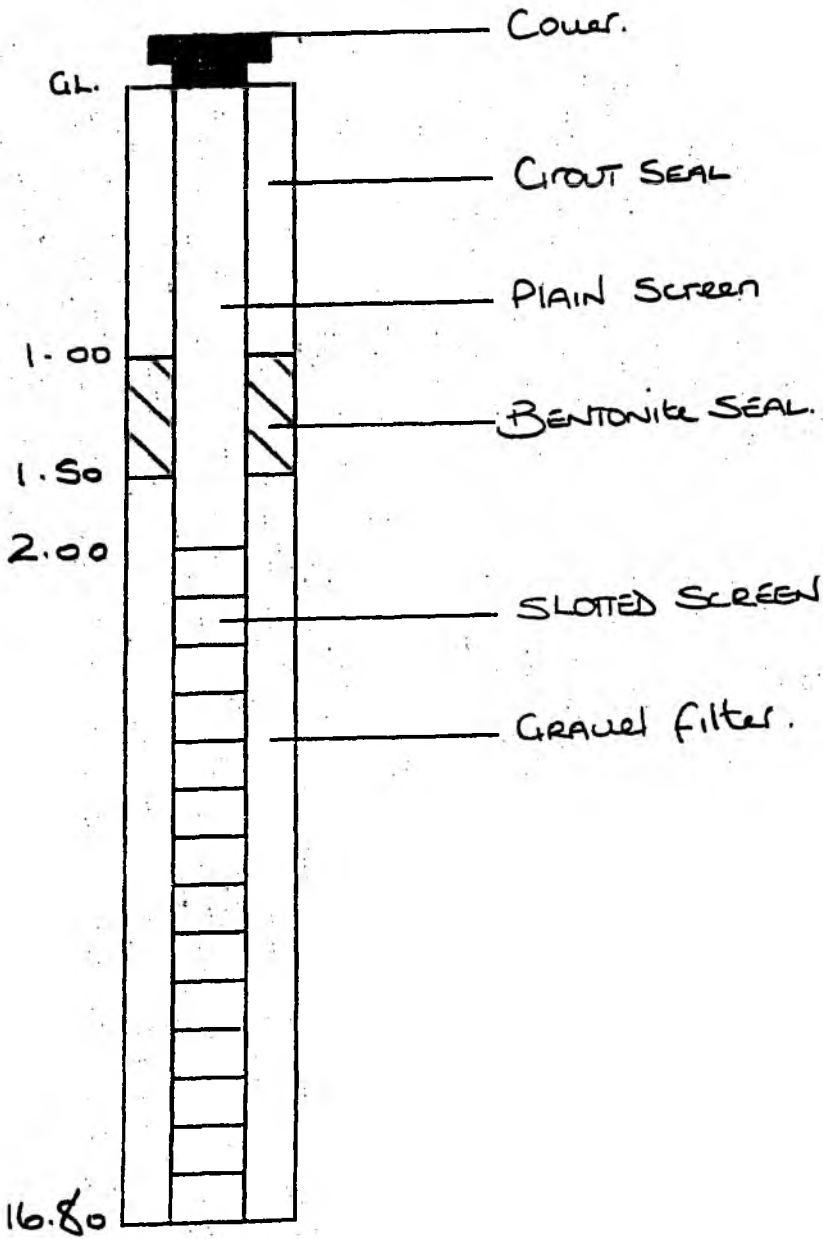
Foreman **A. Hume**
Rig Crew **D. Hume**
Rig Type **Piston 2000**
Additional Plant

Foreman's Signature
A. Hume
Engineer's Signature

Borehole No. **B**

Site NYBUNBURY
Job no 121403
BH no B.

WELL INSTALLATION



Borehole Log: WYBUNBURY Moss OBH, "C"



Exploration Associates

Drilled by AH Logged by GD Checked by	Equipment and Methods Inspection Pit from 0.00m to 1.20m. Cable Percussion 150 mm diameter from 1.20m to 16.00m. DATUM VALUE = 51.928 MA OD. SJ 69590.50387 ←	Ground Level 51.678 National Grid Coordinates MA OD
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Samples and Tests Strata

Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
0.50 - 1.50	B1		11/10/2001		Turf over TOPSOIL: Loose brown SAND (Driller's description). Between 0.50m-1.50m: Sand is pale brown and dark brown.	(0.40)	
2.50 - 3.00	B2						
4.50 - 5.00	B3				Pale orange brown fine to coarse SAND. With occasional very clayey pockets up to 40mm.	(8.05)	
6.50 - 7.00	B4		11/10/2001 7.00	6.55			
			12/10/2001 7.00	5.70			
8.50 - 9.00	B5				Stiff dark brown slightly gravelly slightly sandy CLAY. Gravel is subrounded to rounded and fine.	8.45 (7.55)	

Groundwater
No. Struck Behaviour
1 4.70m Rising to 3.60m after 20 mins. Sealed 10.50.

Remarks
Hole backfill: 0.00m to 0.30m Concrete (c), 0.30m to 1.00m Grout (g), 1.00m to 1.50m Bentonite (b). Surface protection: Lockable Top Cap
Standpipe installed, 75mm diameter, response zone from 1.50m to 16.00m.

WRB N° SJ 65/24.

Borehole Log: WYBUNBURY Moss OBH, "C"



Exploration Associates

Drilled by AH Logged by GD Checked by	Equipment and Methods See sheet 1 DATUM VALUE = 51.928 MAOD	SJ69590-50387 A	Ground Level 51.678 National Grid Coordinates M.A.O.D.
---	---	-----------------	---

Samples and Tests				Strata			
Depth	Type & No.	Records	Date Casing	Time Water	Description	Depth, Level (Thickness)	Legend
10.50 - 11.00	B6						
12.50 - 13.00	B7				As sheet 1	(7.55pen)	
14.50 - 15.00	B8				Between 14.50m-15.00m: Gravel is absent.		
			12/10/2001 10.50	dry			
EXPLORATORY HOLE ENDS AT 16.00 m.						16.00	

Groundwater No. Struck Behaviour WRB N ^o SJ65/24.	Remarks
---	---------

Notes : For explanation of symbols and abbreviations see key sheet. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1 : 50	Project WYBUNBURY Project no. 1210433 Carried out for Environment Agency	Borehole C Sheet 2 of 2
---	--	--------------------------------------

Soil Mechanics

Cable Tool Borehole Journal

Borehole No. C

Location NYBUNBUR-I Loc. No. 121403 Day THURSDAY Date 11-10-01 Sheet 1 of 1

Piezo-meter	Depth metres	Foreman's Description	Sample / Test	Sample No.	Depth (m)		U Sample		Standard Penetration Tests								Time	Casing Depth	Water Level	BH Diam.	CHISELLING																
					From	To	Blow	Rec	SW pen	75	75	Pen	75	75	75	75					Pen	From	To	Time													
	0.0	START OF SHIFT	B	1	0.50	1.50																															
	0.1	Turn over loose Brown Gravel Sub soil.	B	2	2.50	3.00																															
	0.2		B	3	4.50	5.00																															
	0.40	Medium Dense fine (medium) sand																																			
		Brown sand																																			
	7.00	END OF SHIFT																																			

WATER ENTRIES

Hole	Water	Time
4.70	4.30	✓
..	4.10	5m
..	3.80	10m
..	3.60	15m
..	3.60	20m

KEY: U Undisturbed 100mm NR No recovery P Piston B Bulk D Disturbed tub W Water Sample S SPT Open Shoe C SPT Solid Cone V Vane Test k Permeability test
 SW pen Penetration under self weight (mm) Pen Penetration for last increment (mm)

Details of standing time, hourly rated work, in situ testing, services, visitors etc.
 Set up on BH Position, inspection P, NR.

Foreman A. Hiney
 Rig Crew M. Height
 Rig Type Piston 2000
 Additional Plant

Foreman's Signature [Signature]
 Engineer's Signature

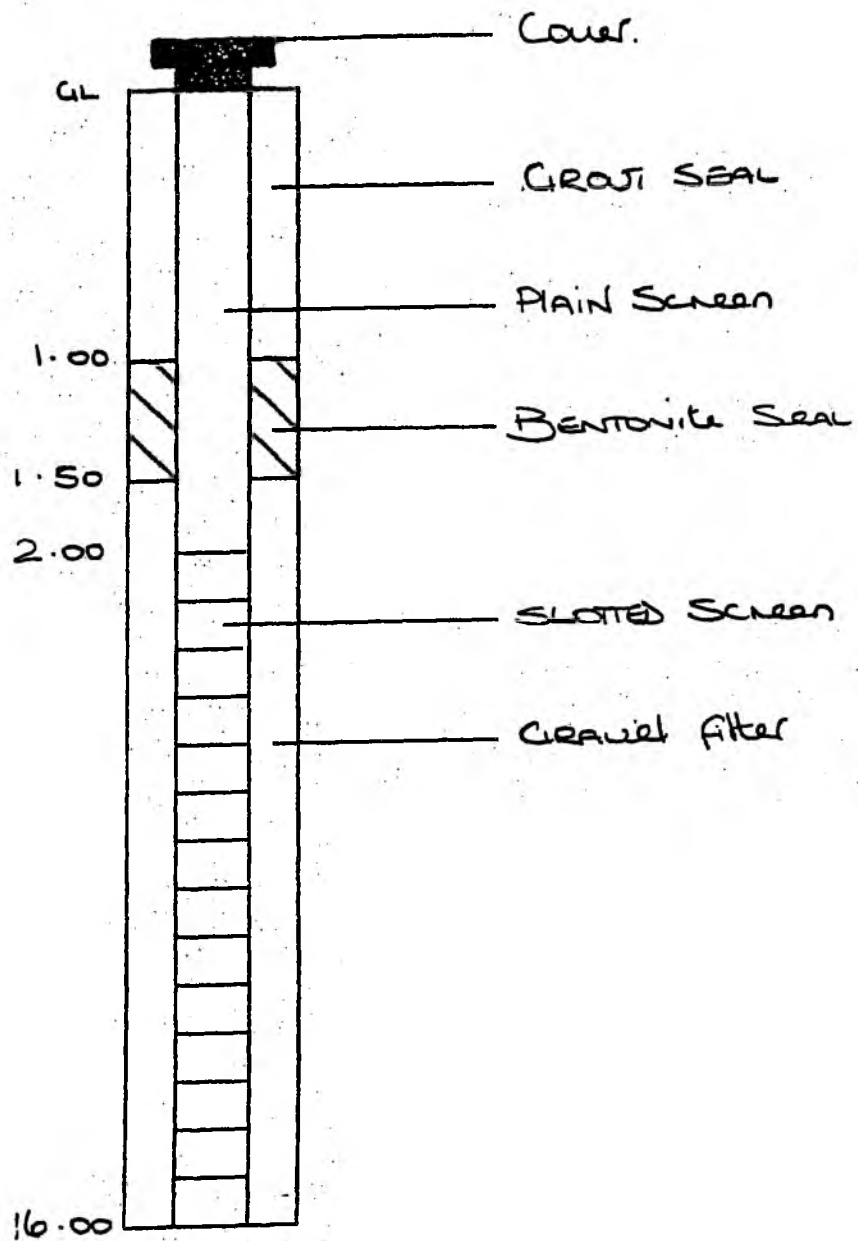
Borehole No. C

This is a site log only and the data are subject to amendment after checking and sample description by or under the supervision of an engineer or geologist

© Soil Mechanics

Site NYBUNBURY
Job no 121403
BH no C

WELL INSTALLATION



APPENDIX 4

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

Samples				Classification					Strength			Other Tests
Hole	Depth	Type	Description	<425 I _p	Prep w _L	w _p	Water %	γ _b Mg/m ³	Test	σ ₃ kPa	C kPa	
B	0.50 - 1.50	B	Pale brown and dark brown slightly clayey slightly gravelly silty fine to coarse SAND									Particle Size analysis
C	0.50 - 1.50	B	Pale brown and dark brown slightly clayey silty fine to coarse SAND									Particle Size analysis
C	2.50 - 3.00	B	Pale orange brown silty fine and medium SAND									Particle Size analysis
C	4.50 - 5.00	B	Pale orange brown silty fine and medium SAND									Particle Size analysis
C	6.50 - 7.00	B	Pale orange brown silty fine and medium SAND									Particle Size analysis

Remarks

Form 10/2

Laboratory - Results Summary

Project


WYBUNBURY
Environment Agency

Contract

1210433

Sheet

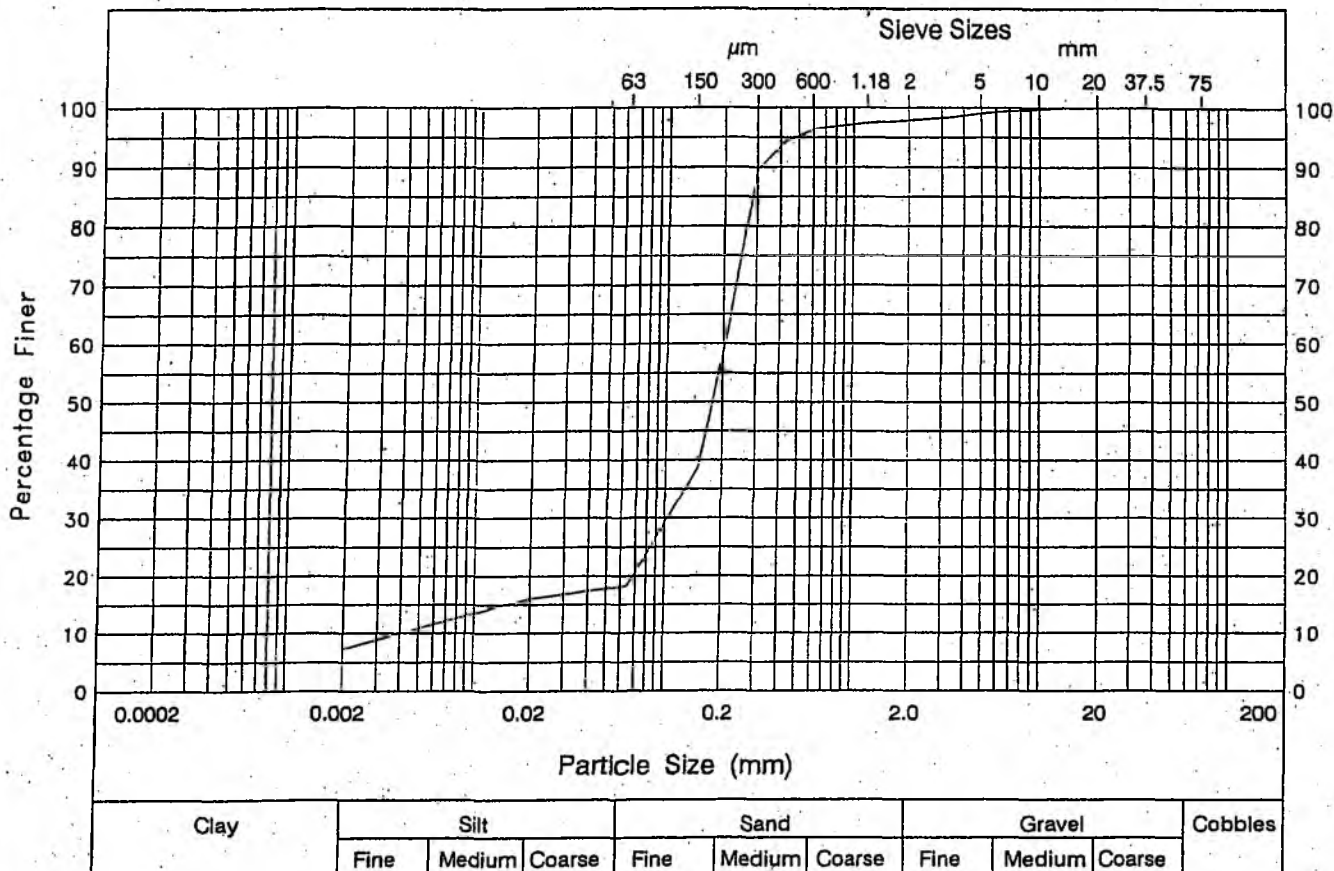
L1/1

 Exploration Associates

Samples				Classification					Strength			Other Tests
Hole	Depth	Type	Description	<425 Ip	Prep wL	wp	Water %	γ_{b3} Mg/m	Test	σ_3 kPa	C kPa	
B	0.50 - 1.50	B	Pale brown and dark brown slightly clayey slightly gravelly silty fine to coarse SAND									Particle Size analysis
C	0.50 - 1.50	B	Pale brown and dark brown slightly clayey silty fine to coarse SAND									Particle Size analysis
C	2.50 - 3.00	B	Pale orange brown silty fine and medium SAND									Particle Size analysis
C	4.50 - 5.00	B	Pale orange brown silty fine and medium SAND									Particle Size analysis
C	6.50 - 7.00	B	Pale orange brown silty fine and medium SAND									Particle Size analysis


Remarks Form 10/2

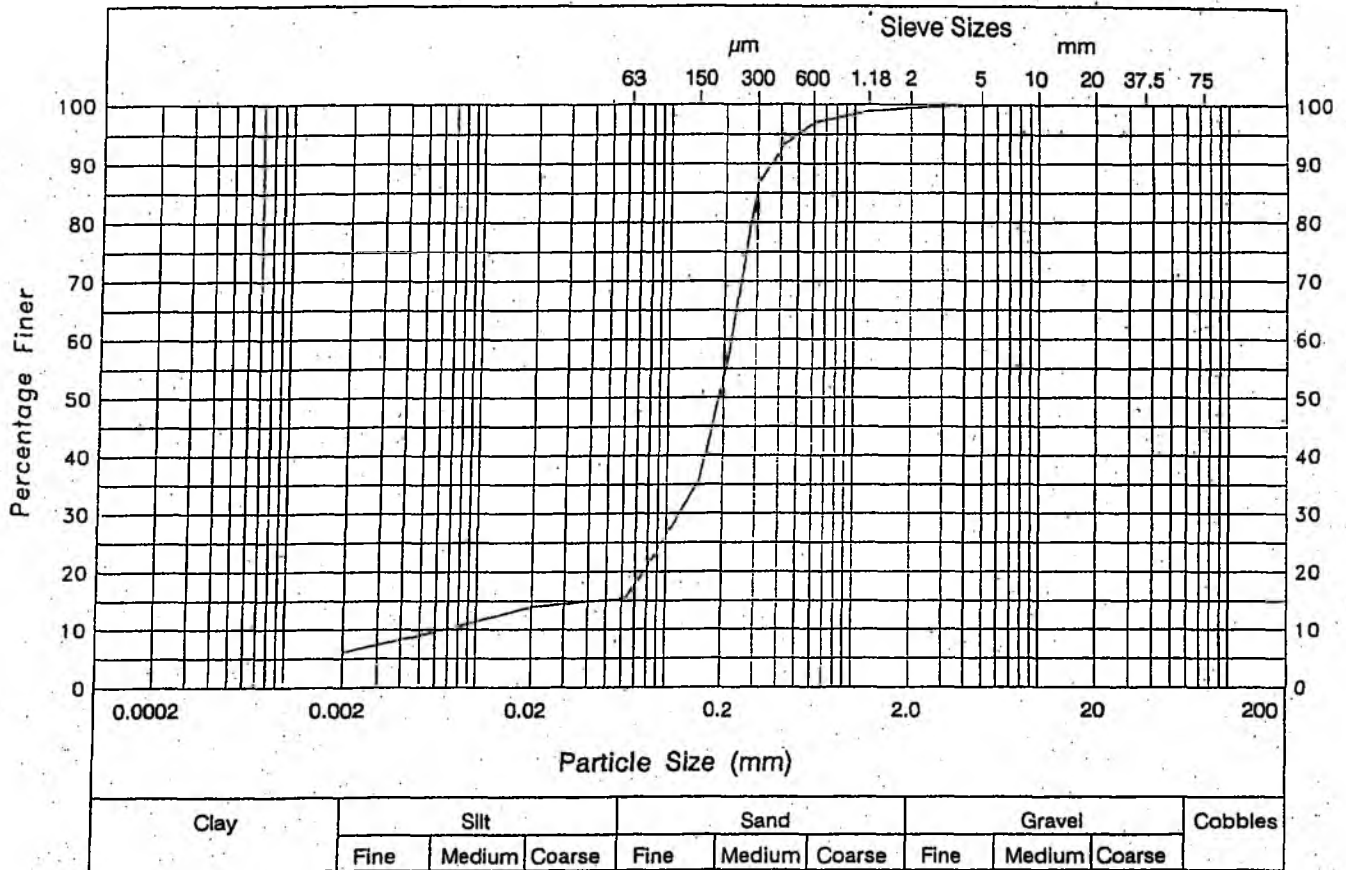
Laboratory - Results Summary Exploration Associates	Project WYBUNBURY Environment Agency	Contract 1210433
		Sheet L1/1



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		
300 μm	90		
212 μm	62		
150 μm	39		
Hole B	Description Pale brown and dark brown slightly clayey slightly gravelly silty fine to coarse SAND		
Depth 0.50 -1.50			
Type B			
Test Performed Wet	Uniformity Coefficient = 50		

Form 25/4

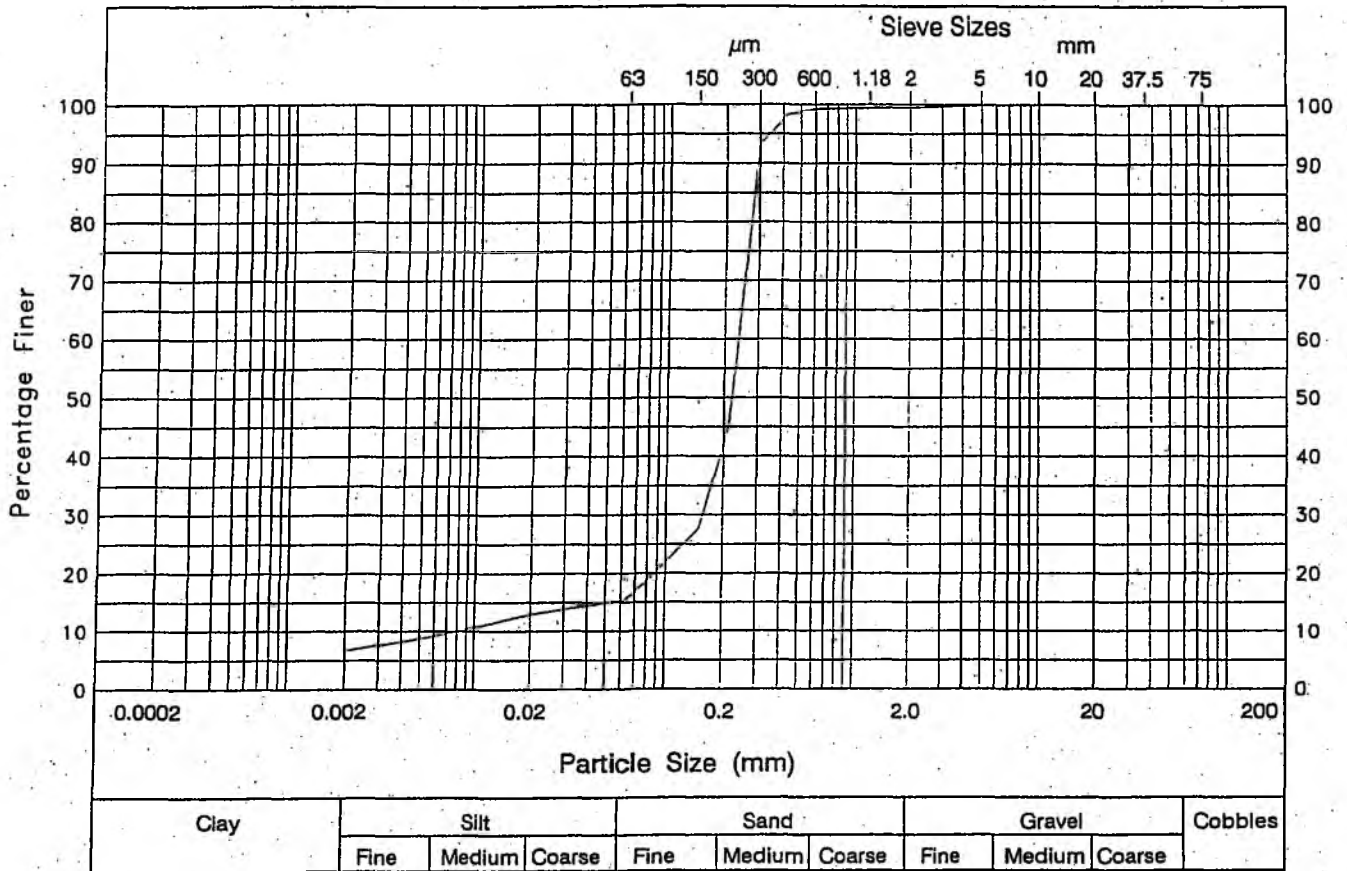
Laboratory - Particle Size Plot  Exploration Associates	Project WYBUNBURY Environment Agency	Contract 1210433
		Sheet L2/1



Particle Size	% Passing	Particle Size	% Passing
10 mm	100	20 μ m	14
6.3 mm	100	6 μ m	10
5 mm	100	2 μ m	6
3.35 mm	100		
2 mm	99		
1.18 mm	99		
600 μ m	97		
425 μ m	94		
300 μ m	86		
212 μ m	57		
150 μ m	36		
63 μ m	15		
Hole C	Description Pale brown and dark brown slightly clayey silty fine to coarse SAND		
Depth 0.50 -1.50			
Type B			
Test Performed Wet	Uniformity Coefficient = 37		

Form 25/4

Laboratory - Particle Size Plot Exploration Associates	Project WYBUNBURY Environment Agency	Contract 1210433

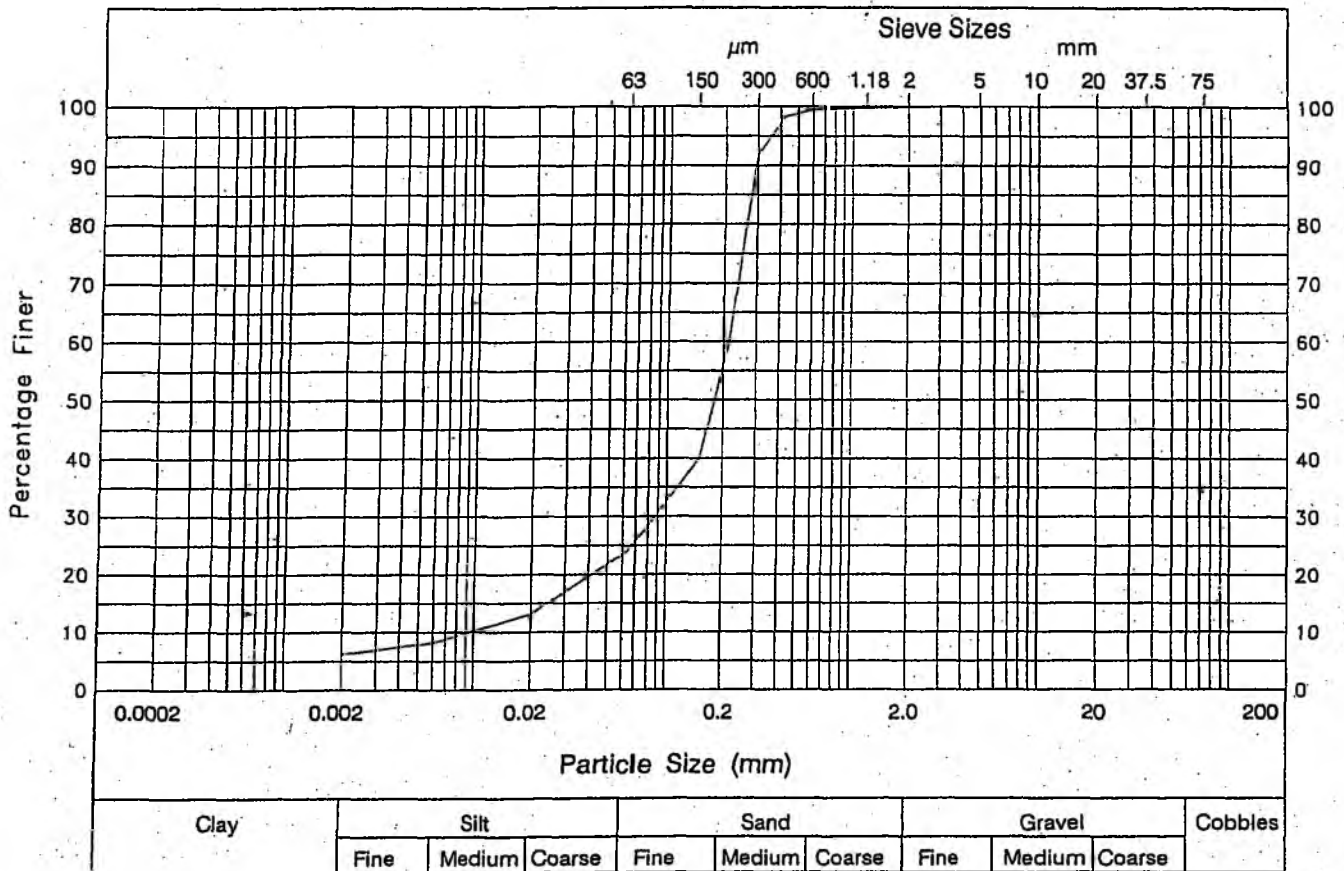


Particle Size	% Passing	Particle Size	% Passing
6.3 mm	100	6 μm	9
5 mm	100	2 μm	7
3.35 mm	100		
2 mm	100		
1.18 mm	99		
600 μm	99		
425 μm	98		
300 μm	93		
212 μm	45		
150 μm	28		
63 μm	15		
20 μm	13		

Hole C	Description Pale orange brown silty fine and medium SAND
Depth 2.50 -3.00	
Type B	
Test Performed Wet	Uniformity Coefficient = 29

Form 25/4

Laboratory - Particle Size Plot 	Project WYBUNBURY Environment Agency	Contract 1210433
		Sheet L2/3

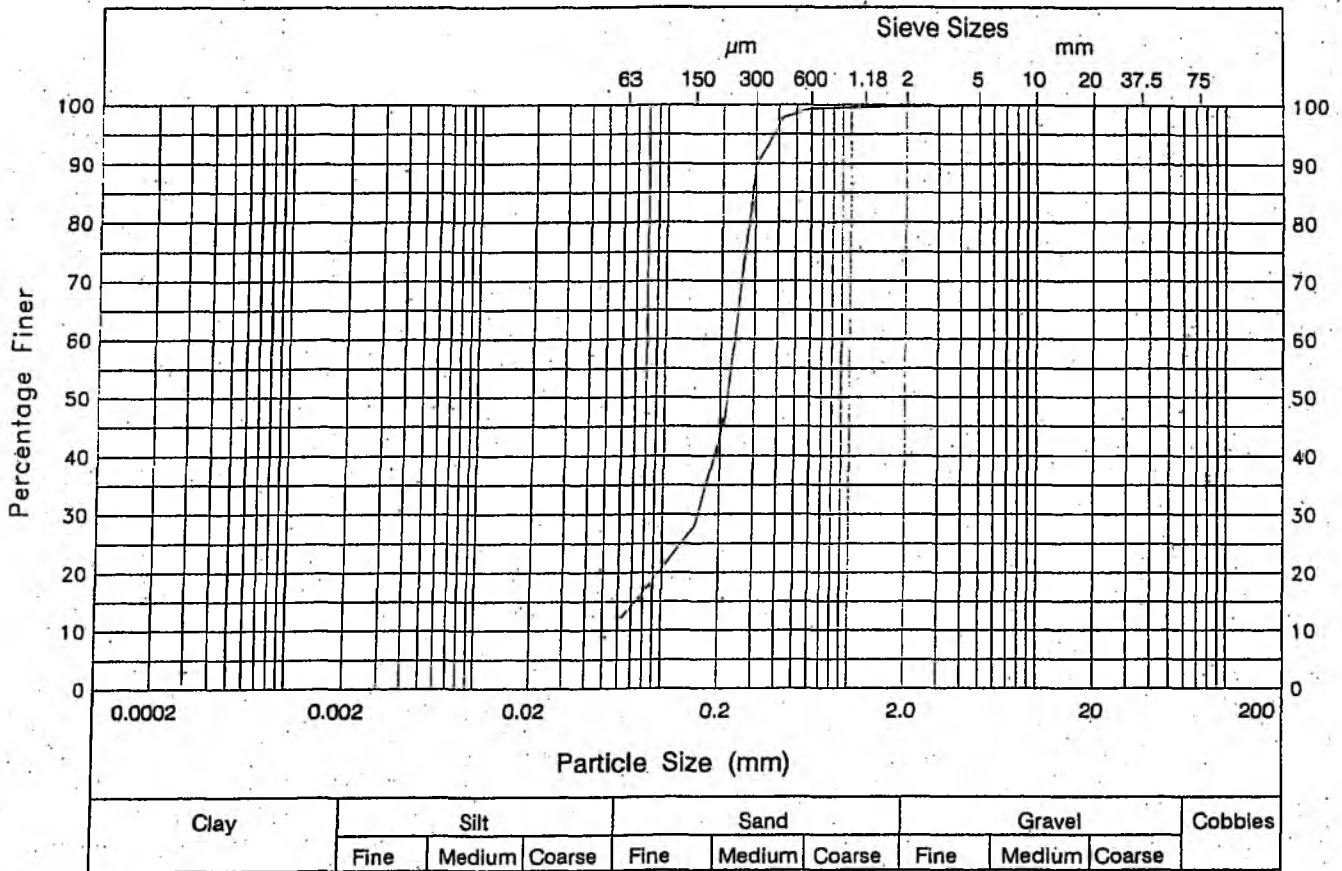


Particle Size	% Passing	Particle Size	% Passing
3.35 mm	100		
2 mm	100		
1.18 mm	100		
600 μm	100		
425 μm	98		
300 μm	92		
212 μm	59		
150 μm	40		
63 μm	24		
20 μm	13		
6 μm	8		
2 μm	6		

Hole C	Description Pale orange brown silty fine and medium SAND
Depth 4.50 -5.00	
Type B	
Test Performed Wet	Uniformity Coefficient = 22

Form 25/4

Laboratory - Particle Size Plot 	Project WYBUNBURY Environment Agency	Contract 1210433
		Sheet L2/4



Particle Size	% Passing	Particle Size	% Passing
5 mm	100		
3.35 mm	100		
2 mm	100		
1.18 mm	100		
600 μm	99		
425 μm	98		
300 μm	90		
212 μm	47		
150 μm	28		
63 μm	12		
Hole C	Description Pale orange brown silty fine and medium SAND		
Depth 6.50 -7.00			
Type B			
Test Performed Wet	Uniformity Coefficient not applicable.		

Form 25/4


Laboratory - Particle Size Plot

Project

WYBUNBURY
Environment Agency

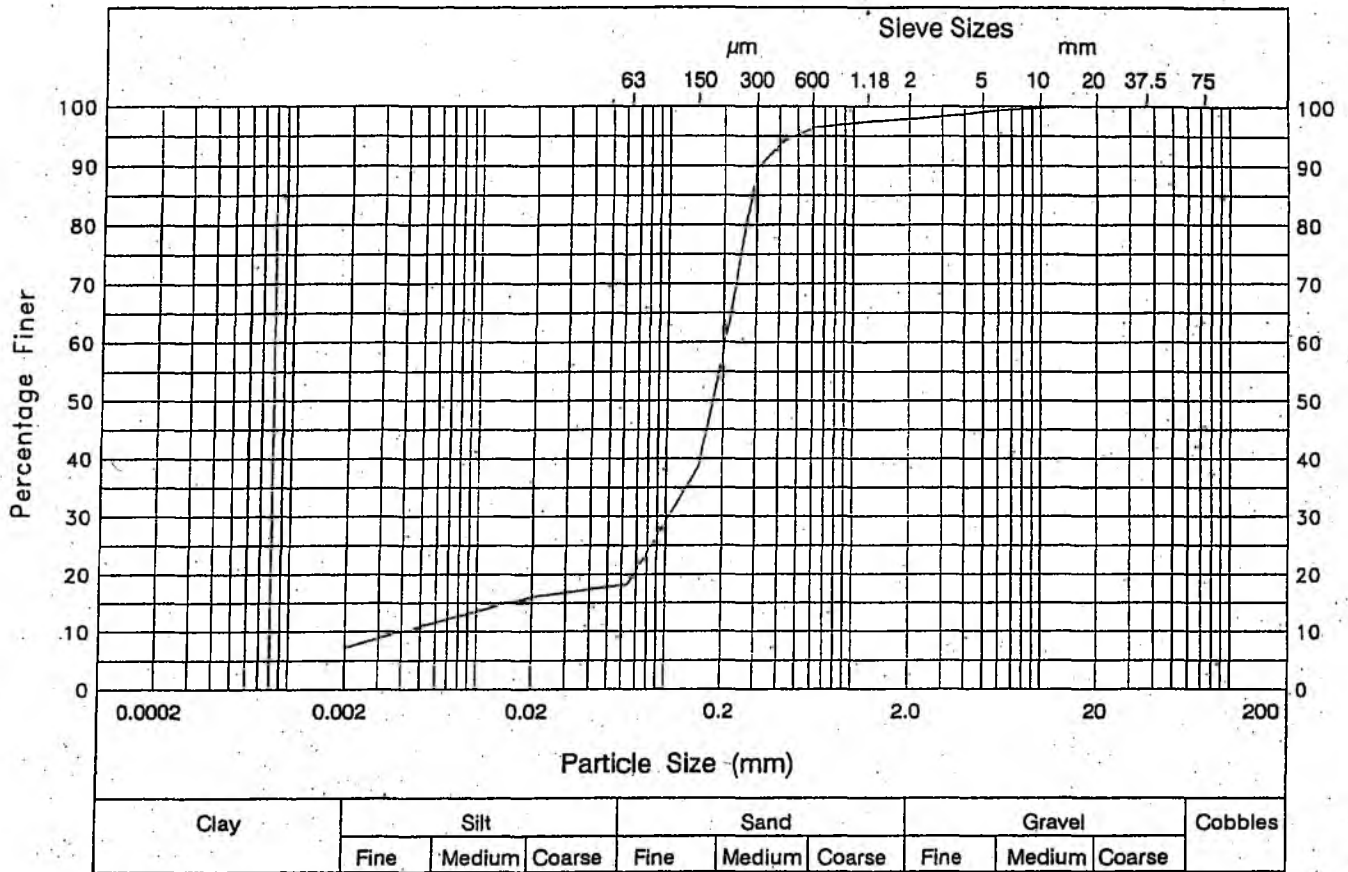
Contract

1210433

 Exploration Associates


Sheet

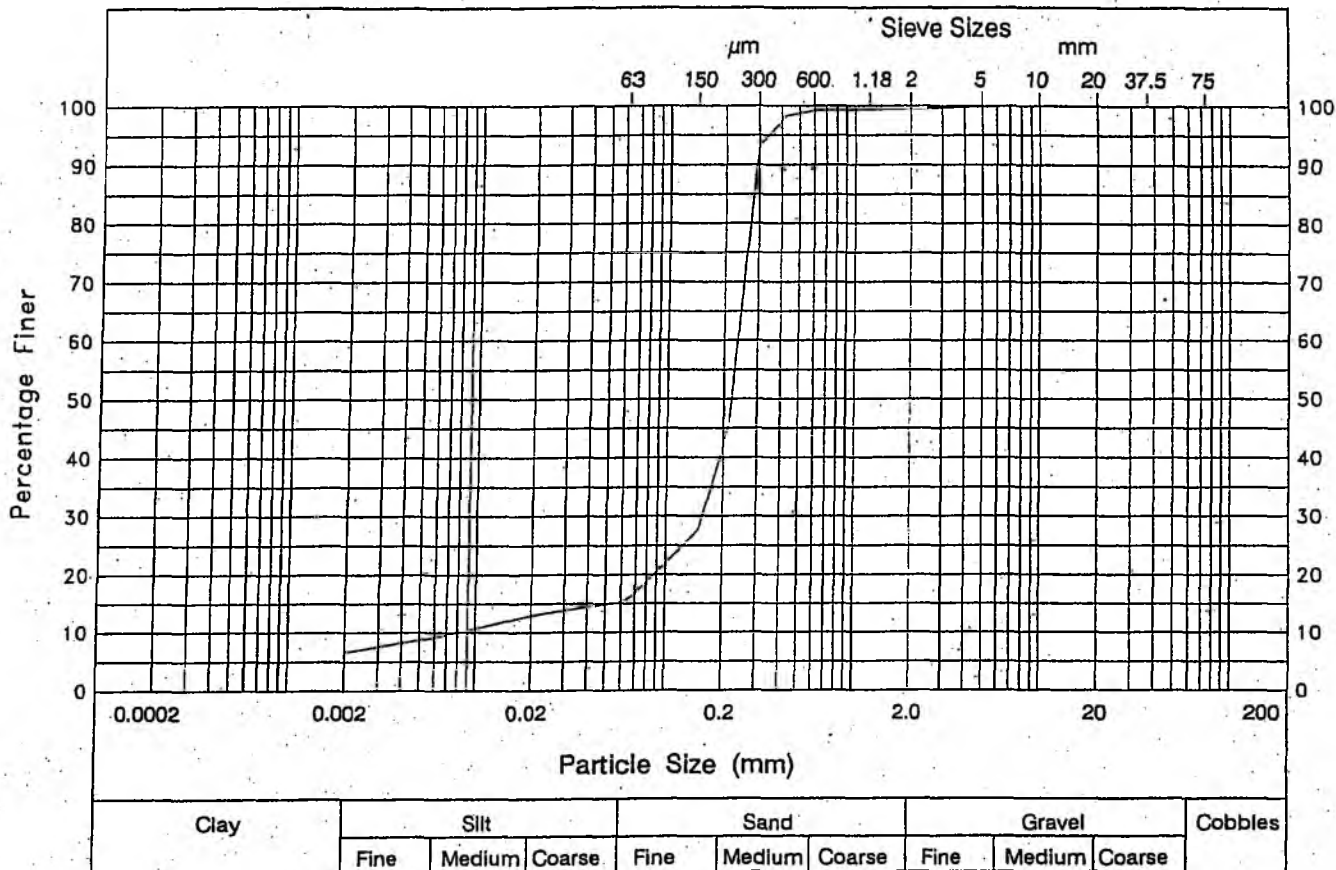
L2/5



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		
300 μm	90		
212 μm	62		
150 μm	39		
Hole B	Description Pale brown and dark brown slightly clayey		
Depth 0.50 -1.50	slightly gravelly silty fine to coarse SAND		
Type B			
Test Performed Wet	Uniformity Coefficient = 50		

Form 25/4

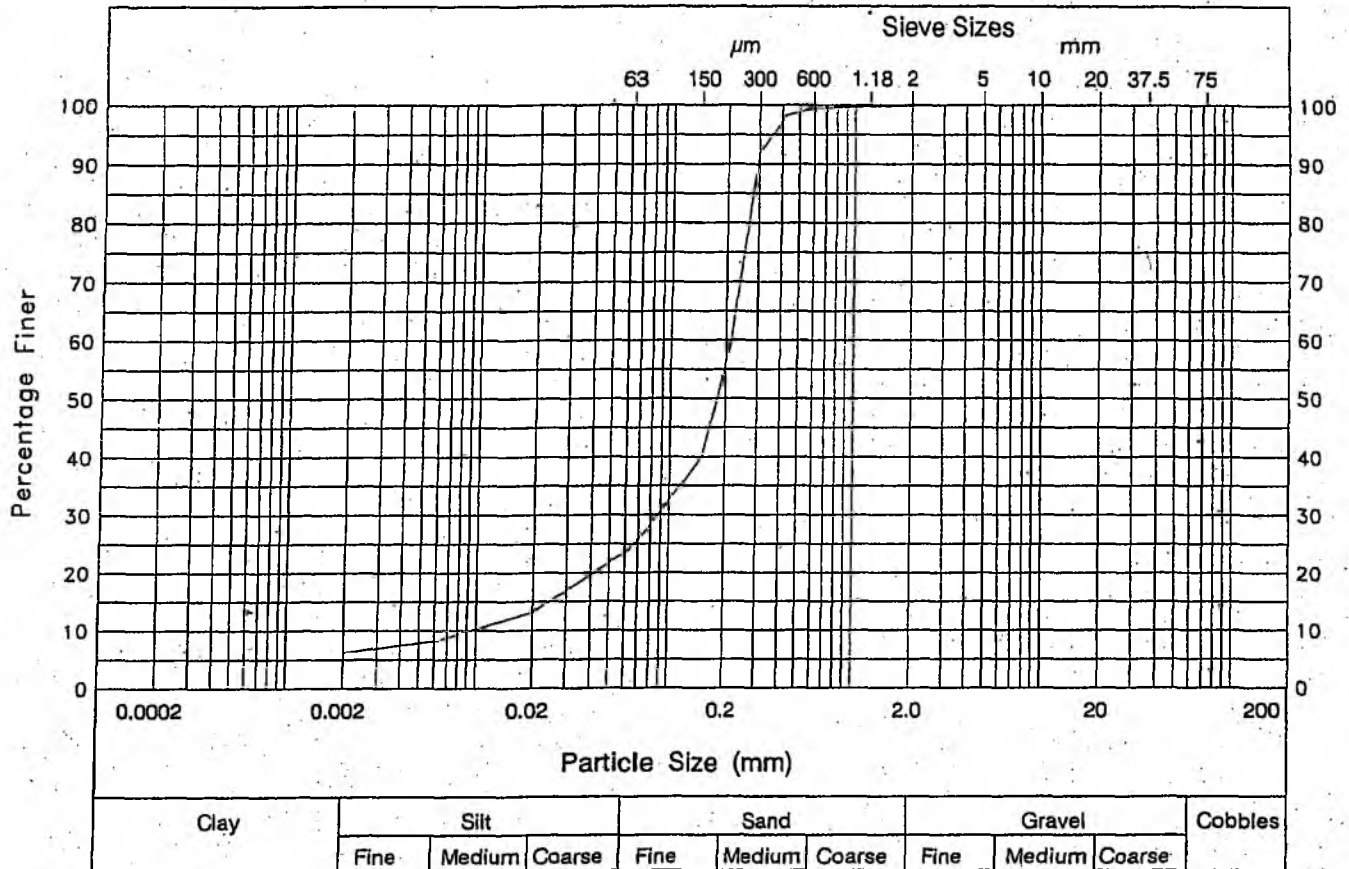
Laboratory - Particle Size Plot  Exploration Associates	Project WYBUNBURY Environment Agency	Contract 1210433
		Sheet L2/1



Particle Size	% Passing	Particle Size	% Passing
6.3 mm	100	6 μ m	9
5 mm	100	2 μ m	7
3.35 mm	100		
2 mm	100		
1.18 mm	99		
600 μ m	99		
425 μ m	98		
300 μ m	93		
212 μ m	45		
150 μ m	28		
63 μ m	15		
20 μ m	13		
Hole C	Description Pale orange brown silty fine and medium SAND		
Depth 2.50 - 3.00			
Type B			
Test Performed Wet	Uniformity Coefficient = 29		


Form 25/4

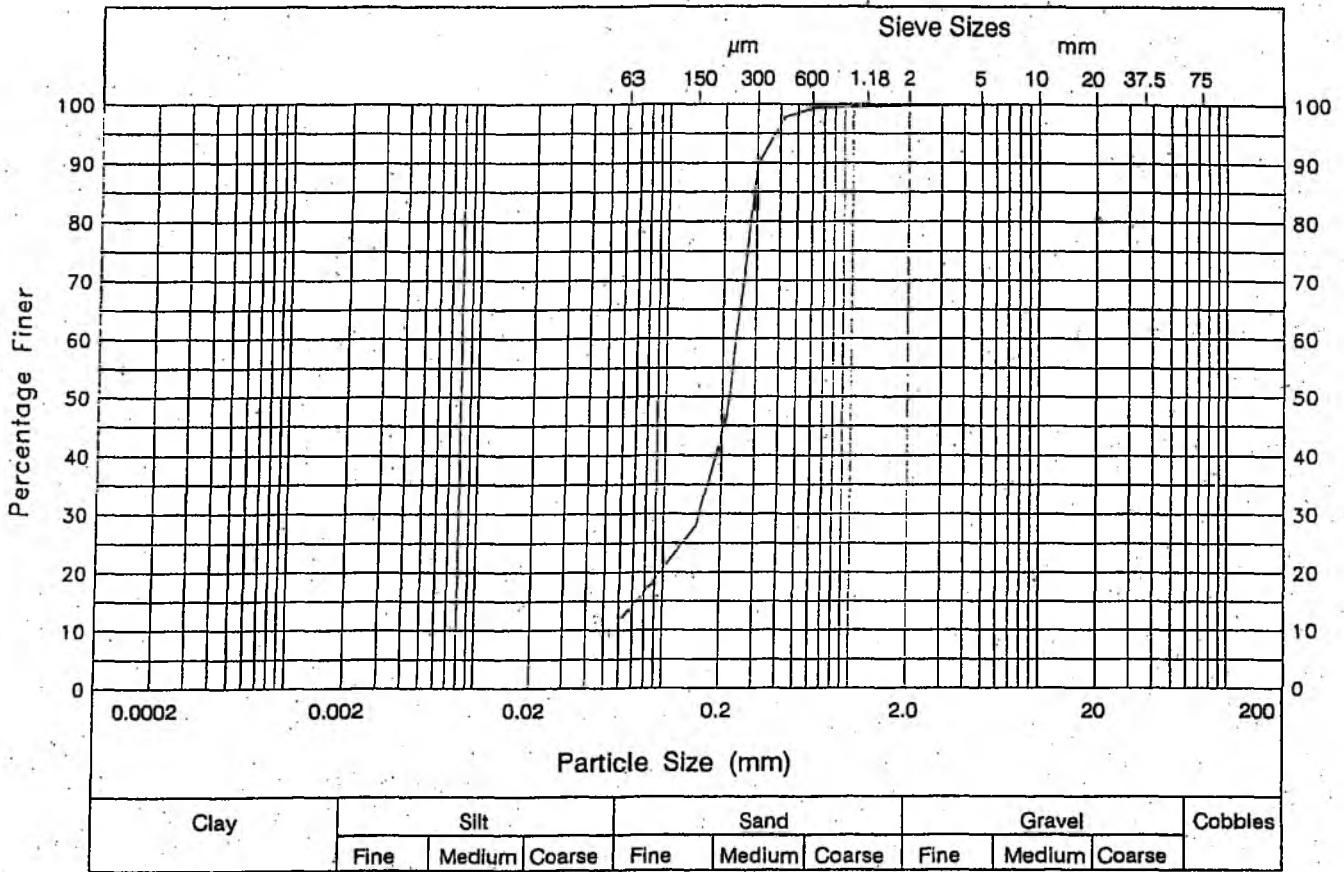
Laboratory - Particle Size Plot	Project WYBUNBURY Environment Agency	Contract 1210433
		Sheet L2/3
Exploration Associates		



Particle Size	% Passing	Particle Size	% Passing
3.35 mm	100		
2 mm	100		
1.18 mm	100		
600 µm	100		
425 µm	98		
300 µm	92		
212 µm	59		
150 µm	40		
63 µm	24		
20 µm	13		
6 µm	8		
2 µm	6		
Hole C	Description Pale orange brown silty fine and medium SAND		
Depth 4.50 -5.00			
Type B			
Test Performed Wet	Uniformity Coefficient = 22		

Form 25/4

Laboratory - Particle Size Plot  Exploration Associates	Project WYBUNBURY Environment Agency	Contract 1210433
		Sheet L2/4



Particle Size	% Passing	Particle Size	% Passing
5 mm	100		
3.35 mm	100		
2 mm	100		
1.18 mm	100		
600 μm	99		
425 μm	98		
300 μm	90		
212 μm	47		
150 μm	28		
63 μm	12		

Hole C	Description Pale orange brown silty fine and medium SAND
Depth 6.50 -7.00	
Type B	
Test Performed Wet	Uniformity Coefficient not applicable.

Form 25/4

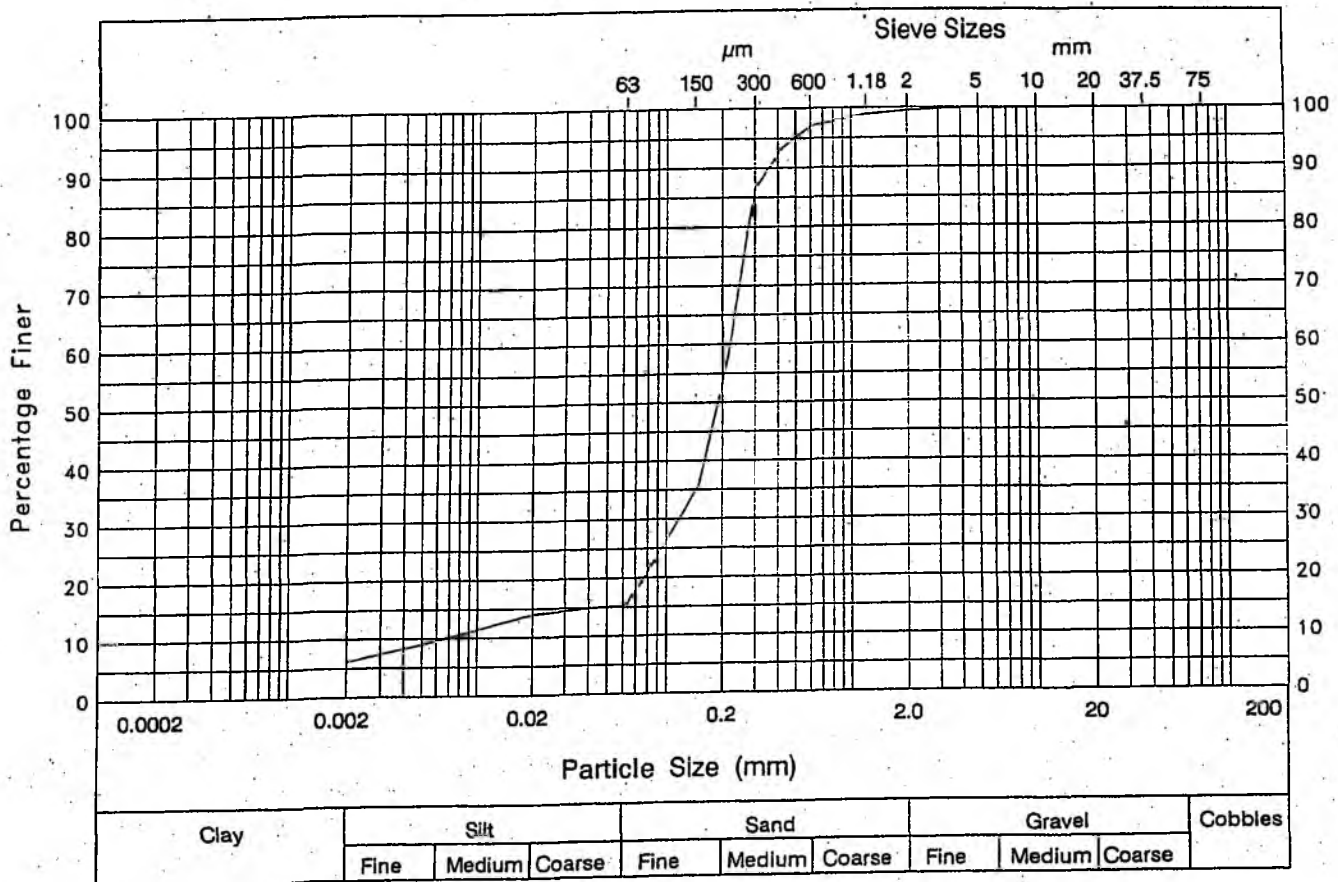
Laboratory - Particle Size Plot 	Project WYBUNBURY Environment Agency	Contract 1210433
		Sheet L2/5

FALLING HEAD PERMEABILITY TEST RESULTS

BOREHOLE No.	DEPTH m	INITIAL		FINAL MOISTURE CONTENT %	FALLING HEAD PERMEABILITY m/sec	TEMPERATURE °C	TARGETED MOISTURE / DENSITY
		BULK DENSITY Mg/m ³	MOISTURE CONTENT %				
C	6.50-7.00	1.38	0.3	27	2.5×10^{-5}	18	-20mm material. Recompacted to minimum dry density at 0% moisture
C	6.50-7.00	1.93	10	14.3	5.4×10^{-7}	18	-20mm material. Recompacted to maximum dry density at 10% moisture

1. Tests carried out in accordance in house method IHM 1 and generally to
K.H. Head "Manual of Soil Laboratory Testing", Volume 2, Section 10.7.2

2. Permeabilities lower than 1.0E-10 and greater than 1.0E-04 may be outside the
appropriate range for this testing method.




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		
2 mm	99		
1.18 mm	99		
600 µm	97		
425 µm	94		
300 µm	86		
212 µm	57		
150 µm	36		
63 µm	15		
Hole C	Description Pale brown and dark brown slightly clayey silty fine to coarse SAND		
Depth 0.50 -1.50			
Type B			
Test Performed Wet	Uniformity Coefficient = 37		

Form 25/4

Laboratory - Particle Size Plot

Project
WYBUNBURY
Environment Agency

Contract
1210433

 Exploration Associates

Sheet
L2/2

FALLING HEAD PERMEABILITY TEST RESULTS

BOREHOLE No.	DEPTH m	INITIAL		FINAL MOISTURE CONTENT %	FALLING HEAD PERMEABILITY m/sec	TEMPERATURE °C	TARGETED MOISTURE / DENSITY
		BULK DENSITY Mg/m ³	MOISTURE CONTENT %				
C	6.50-7.00	1.38	0.3	27	2.5 x 10 ⁻⁵	18	-20mm material. Recompacted to minimum dry density at 0% moisture
C	6.50-7.00	1.93	10	14.3	5.4 x 10 ⁻⁷	18	-20mm material. Recompacted to maximum dry density at 10% moisture

1. Tests carried out in accordance in house method IHM 1 and generally to K.H. Head "Manual of Soil Laboratory Testing", Volume 2, Section 10.7.2
2. Permeabilities lower than 1.0E-10 and greater than 1.0E-04 may be outside the appropriate range for this testing method.

APPENDIX 5

**WYBUNBURY MOSS – ENVIRONMENT AGENCY BOREHOLES
GROUNDWATER LEVEL HYDROGRAPHS**

Instrument Monitoring



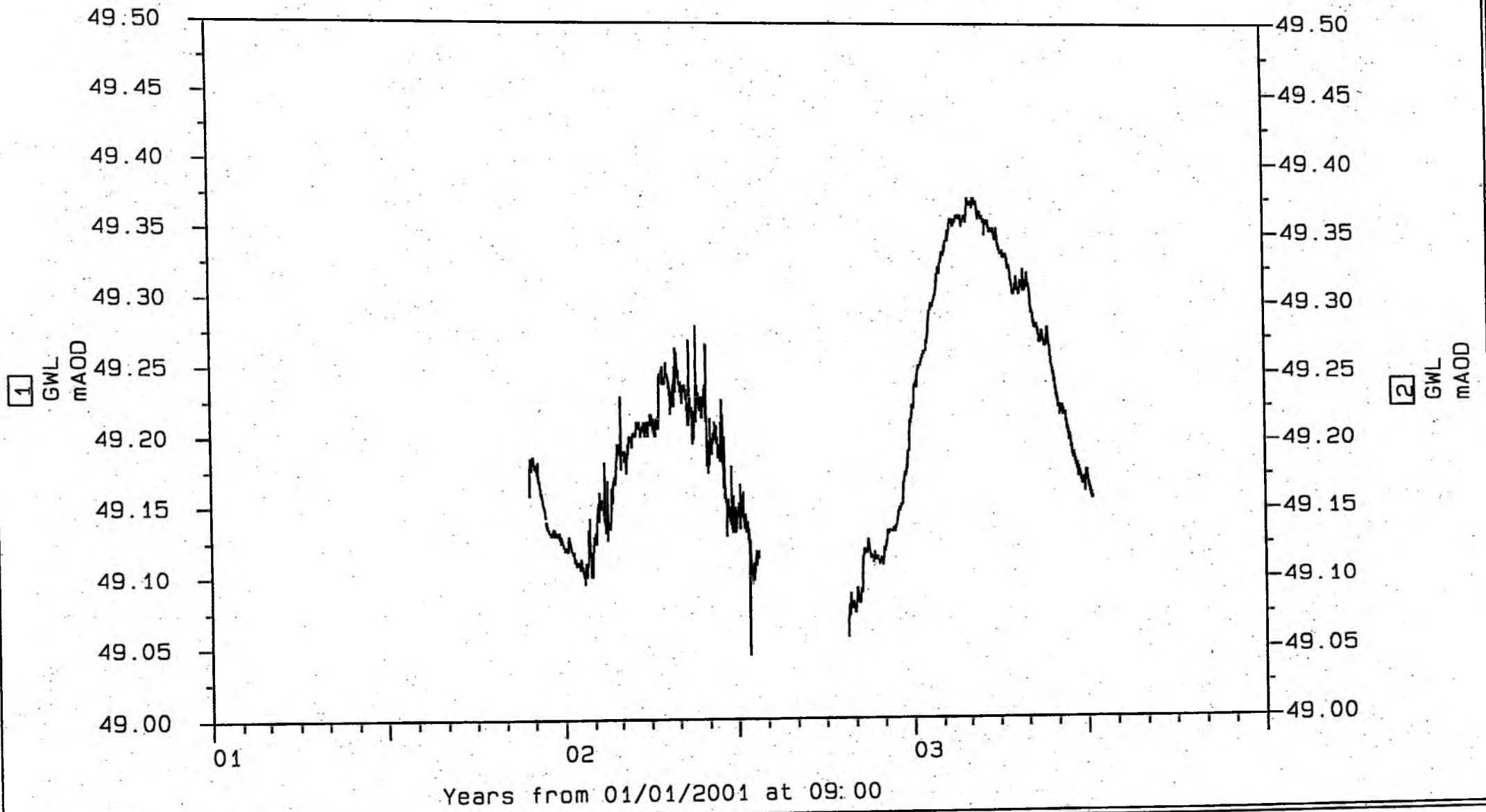
Exploration Associates

Hole No	Inst Type	Tip Depth (m BGL)	Observation		Depth to Water (m BGL)	Head Above Tip (m)	Remarks
			Date	Time			
A	SP	14.80	17/10/2001		1.15		
B	SP	16.80	17/10/2001		3.47		
C	SP	16.00	17/10/2001		2.47		

Auth.: SJ65/24

Name: Wybunbury Moss C

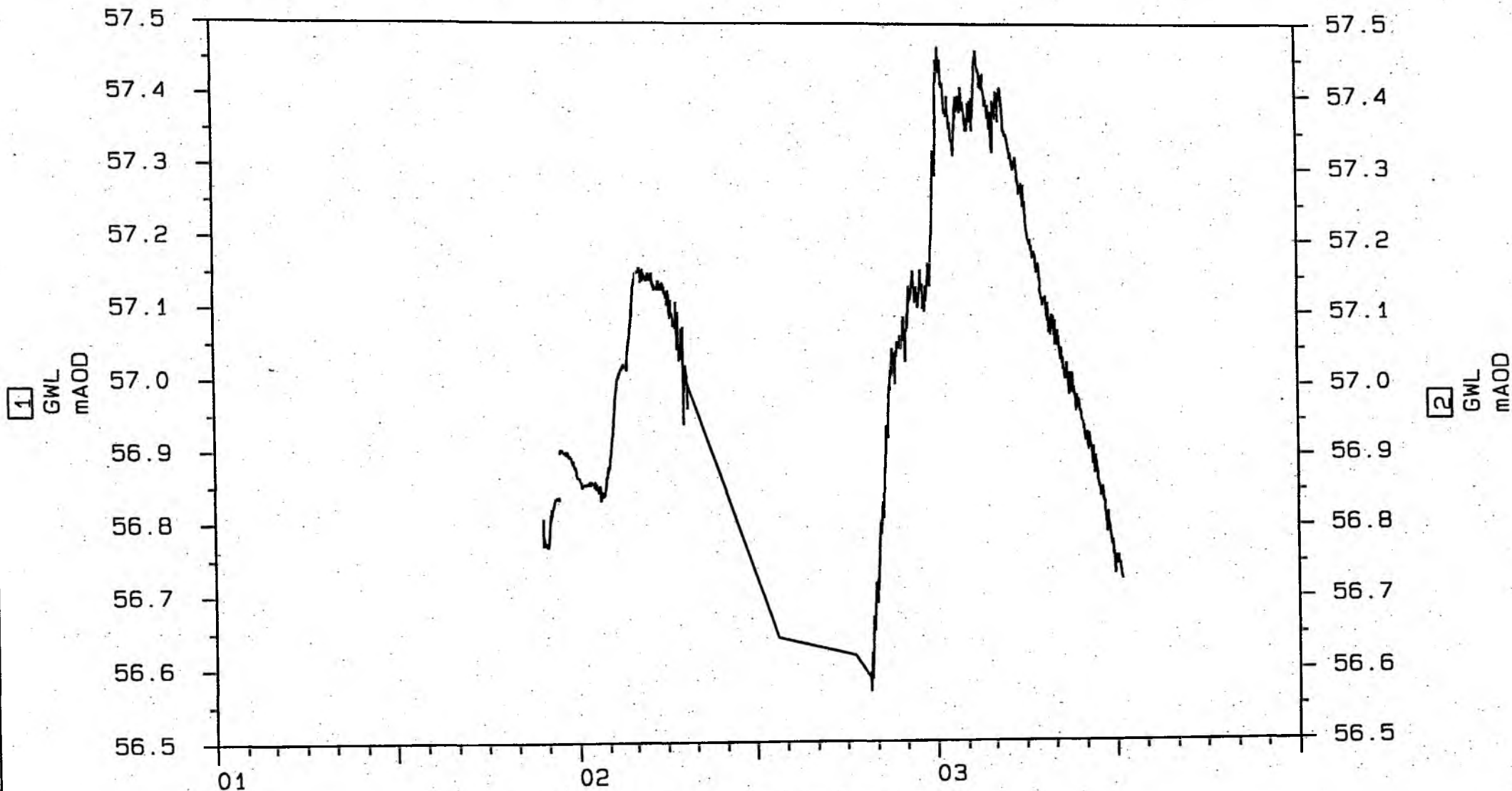
Locat.: by Moss Nook



Auth.: SJ65/23

Name: Wybunbury Moss B

Locat.: End of Field

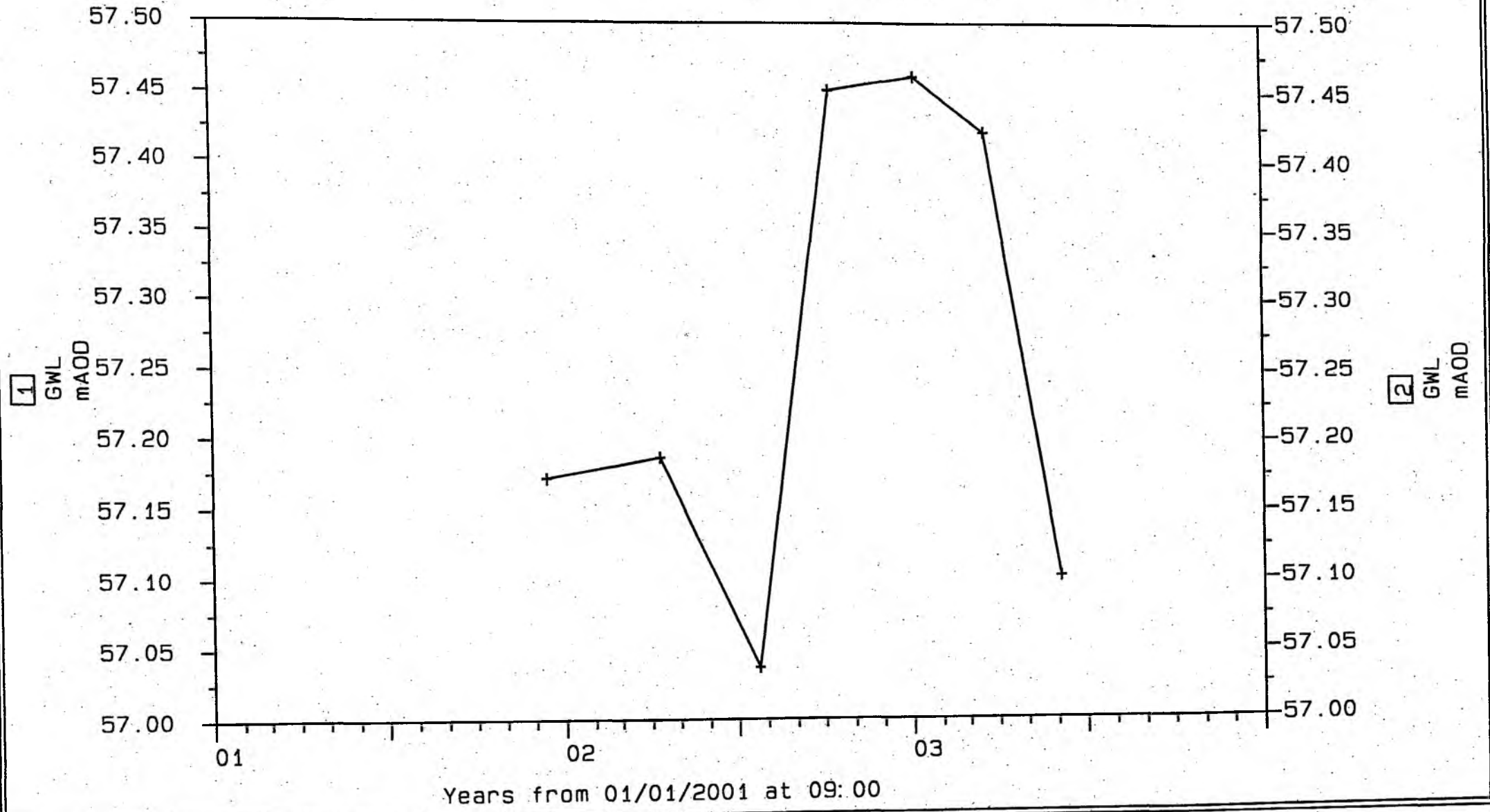


Years from 01/01/2001 at 09:00

Auth.: SJ65/22

Name: Wybunbury Moss A

Locat.: Gate



APPENDIX 6

**WYBUNBURY MOSS – ENVIRONMENT AGENCY BOREHOLES
GROUNDWATER QUALITY DATA**

Sampling point: 88009650 DUMMY SITE NO1 FOR GROUNDWATER SAMPLES

id: NW9100091000

Sampling Date: 07-JUL-2003 Time: 1445

Lab Ref: 392841

Sampler: JOHN INGRAM

Point type: BZ GROUNDWATER - UNSPECIFIED

Mechanism: S SPOT

Purpose: PI PLANNED INVESTIGATION (OPERATIONAL MONITORING)

Material: 2EZZ GROUNDWATER

Notes: WYBUNBURY MOSS B END OFFIELD SJ65/23 SAMPLE ONE

Determinand	Unit	Result
50 LEAD - AS PB	ug/l	126.00000
61 PH - AS PH UNITS	PHUNITS	7.21000
62 CONDUCTIVITY @20C	uS/cm	437.00000
92 COD - AS O2	mg/l	89.00000
08 CADMIUM - AS CD	ug/l	2.31000
11 AMMONIA - AS N	mg/l	< .50000
16 NITROGEN TOTAL OXIDISED - AS N	mg/l	8.97000
17 NITRATE - as N	mg/l	8.89000
18 NITRITE - as N	mg/l	.07900
58 HARDNESS TOTAL - as CaCO3	mg/l	3070.00000
62 ALKALINITY PH 4.5 - as CaCO3	mg/l	131.00000
71 BROMIDE ION - AS BR	mg/l	< .05000
72 CHLORIDE ION - AS CL	mg/l	16.90000
77 FLUORIDE - AS F	mg/l	.10000
80 ORTHOPHOSPHATE - as P	mg/l	< .50000
82 SILICATE REACTIVE DISSOLVED - AS SiO2	mg/l	8.15000
83 SULPHATE - AS SO4	mg/l	64.20000
07 SODIUM - AS NA	mg/l	11.30000
11 POTASSIUM - AS K	mg/l	20.80000
37 MAGNESIUM - AS MG	mg/l	330.00000
41 CALCIUM - AS CA	mg/l	684.00000
01 CARBON ORGANIC DISSOLVED - AS C	mg/l	10.30000
64 CHROMIUM - AS CR	ug/l	30.80000
46 ARSENIC - AS AS	ug/l	50.00000
50 MANGANESE - AS MN	ug/l	4280.00000
51 IRON - AS FE	ug/l	40500.00000
57 ALUMINIUM - AS AL	ug/l	71700.00000
59 BORON - AS B	ug/l	< 100.00000
62 BARIUM - AS BA	ug/l	3020.00000
63 STRONTIUM - AS SR	ug/l	429.00000
52 COPPER - AS CU	ug/l	246.00000
55 ZINC - AS ZN	ug/l	765.00000
62 NICKEL - AS NI	ug/l	72.40000
92 NOTTINGHAM LABORATORY OMR SAMPLE NUMBER	NO.	442613.00000

Sampling point: 88009650 DUMMY SITE NO1 FOR GROUNDWATER SAMPLES
 id: NW9100091000
 Sampling Date: 07-JUL-2003 Time: 1446
 Sampler: JOHN INGRAM
 Point type: BZ GROUNDWATER - UNSPECIFIED
 Mechanism: S SPOT
 Purpose: PI PLANNED INVESTIGATION (OPERATIONAL MONITORING)
 Material: 2EZZ GROUNDWATER
 Notes: WYBUNBURY MOSS B END OFFIELD SJ65/23 SAMPLE TWO

Lab Ref: 392842

Determinand	Unit	Result
50 LEAD - AS PB	ug/l	160.00000
61 PH - AS PH UNITS	PHUNITS	7.12000
62 CONDUCTIVITY @20C	uS/cm	429.00000
92 COD - AS O2	mg/l	100.00000
08 CADMIUM - AS CD	ug/l	3.15000
11 AMMONIA - AS N	mg/l	< .50000
16 NITROGEN TOTAL OXIDISED - AS N	mg/l	9.17000
17 NITRATE - as N	mg/l	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/l	126.00000
71 BROMIDE ION - AS BR	mg/l	< .05000
72 CHLORIDE ION - AS CL	mg/l	17.50000
77 FLUORIDE - AS F	mg/l	.09700
80 ORTHOPHOSPHATE - as P	mg/l	< .50000
82 SILICATE REACTIVE DISSOLVED - AS SiO2	mg/l	8.33000
83 SULPHATE - AS SO4	mg/l	71.20000
07 SODIUM - AS NA	mg/l	11.80000
11 POTASSIUM - AS K	mg/l	22.90000
37 MAGNESIUM - AS MG	mg/l	419.00000
41 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/l	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
02 NOTTINGHAM LABORATORY OMR SAMPLE NUMBER	NO.	442612.00000

Sampling point: 88009650 DUMMY SITE NO1 FOR GROUNDWATER SAMPLES

id: NW9100091000

Sampling Date: 07-JUL-2003 Time: 1630

Lab Ref: 392844

Sampler: JOHN INGRAM

Point type: BZ GROUNDWATER - UNSPECIFIED

Mechanism: S SPOT

Purpose: PI PLANNED INVESTIGATION (OPERATIONAL MONITORING)

Material: 2EZZ GROUNDWATER

Location: WYBUNBURY MOSS C NEAR HOUSESJ65/24 SAMPLE TWO

Determinand	Unit	Result
50 LEAD - AS PB	ug/l	12.00000
61 PH - AS PH UNITS	PHUNITS	6.62000
62 CONDUCTIVITY @20C	uS/cm	850.00000
92 COD - AS O2	mg/l	39.00000
08 CADMIUM - AS CD	ug/l	.45000
11 AMMONIA - AS N	mg/l	.50000
16 NITROGEN TOTAL OXIDISED - AS N	mg/l	20.10000
17 NITRATE - as N	mg/l	20.00000
18 NITRITE - as N	mg/l	.06600
58 HARDNESS TOTAL - as CaCO3	mg/l	343.00000
62 ALKALINITY PH 4.5 - as CaCO3	mg/l	139.00000
71 BROMIDE ION - AS BR	mg/l	.09500
72 CHLORIDE ION - AS CL	mg/l	117.00000
77 FLUORIDE - AS F	mg/l	.06300
80 ORTHOPHOSPHATE - as P	mg/l	.50000
82 SILICATE REACTIVE DISSOLVED - AS SiO2	mg/l	5.09000
83 SULPHATE - AS SO4	mg/l	84.30000
07 SODIUM - AS NA	mg/l	63.40000
11 POTASSIUM - AS K	mg/l	3.12000
37 MAGNESIUM - AS MG	mg/l	25.50000
41 CALCIUM - AS CA	mg/l	95.30000
01 CARBON ORGANIC DISSOLVED - AS C	mg/l	8.06000
64 CHROMIUM - AS CR	ug/l	5.63000
46 ARSENIC - AS AS	ug/l	4.26000
50 MANGANESE - AS MN	ug/l	402.00000
51 IRON - AS FE	ug/l	3420.00000
57 ALUMINIUM - AS AL	ug/l	3060.00000
59 BORON - AS B	ug/l	100.00000
62 BARIUM - AS BA	ug/l	217.00000
63 STRONTIUM - AS SR	ug/l	167.00000
52 COPPER - AS CU	ug/l	22.70000
55 ZINC - AS ZN	ug/l	39.30000
62 NICKEL - AS NI	ug/l	16.60000
92 NOTTINGHAM LABORATORY OMR SAMPLE NUMBER	NO.	442615.00000

Sampling point: 88009650 DUMMY SITE NO1 FOR GROUNDWATER SAMPLES

id: NW9100091000

Sampling Date: 07-JUL-2003 Time: 1631

Lab Ref: 392852

Sampler: JOHN INGRAM

Point type: BZ GROUNDWATER - UNSPECIFIED

Sampling Mechanism: S SPOT

Purpose: PI PLANNED INVESTIGATION (OPERATIONAL MONITORING)

Material: 2EZZ GROUNDWATER

Location: WYBUNBURY MOSS C NEAR HOUSES J65/24 SAMPLE 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
08 CADMIUM - AS CD	ug/l	.45700
11 AMMONIA - AS N	mg/l	< .50000
16 NITROGEN TOTAL OXIDISED - AS N	mg/l	20.90000
17 NITRATE - as N	mg/l	20.80000
18 NITRITE - as N	mg/l	.06600
58 HARDNESS TOTAL - as CaCO3	mg/l	351.00000
62 ALKALINITY PH 4.5 - as CaCO3	mg/l	137.00000
71 BROMIDE ION - AS BR	mg/l	.09100
72 CHLORIDE ION - AS CL	mg/l	116.00000
77 FLUORIDE - AS F	mg/l	.05900
80 ORTHOPHOSPHATE - as P	mg/l	< .50000
82 SILICATE REACTIVE DISSOLVED - AS SiO2	mg/l	5.09000
83 SULPHATE - AS SO4	mg/l	83.10000
07 SODIUM - AS NA	mg/l	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/l	< 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
92 NOTTINGHAM LABORATORY OMR SAMPLE NUMBER	NO.	442614.00000