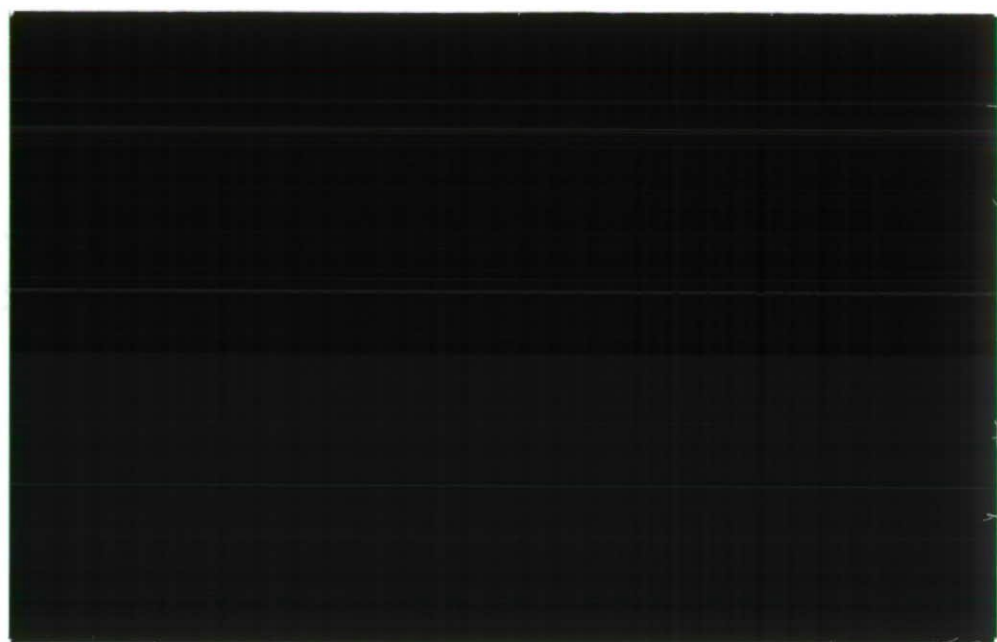


1995/058



**Institute of
Hydrology**



**Review of a proposed
Water Management Plan,
Pickeridge Farm Quarry,
Fulmer, Bucks**

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Review of Proposed Water Management Plan for Pickeridge Farm

1. Summary

It is recommended that :

- pumping directly on to the SSSI should cease immediately,
- the Water Management Plan as described, should be allowed to proceed immediately.

Used as an extension of the recharge trench, the drainage channels will assist restore depressed groundwater levels to the south of Pickeridge Farm Quarry. The drainage channels will reduce the risk of winter flooding problems, particularly if pumping to the SSSI is allowed to continue. The Water Management Plan will also assist in the control of long term rises in groundwater levels after sealing of Cells 8, 9 & 10.

- agreement to this Water Management Scheme should be coupled with a proviso that groundwater levels within the SSSI should be maintained within the agreed ranges.

2. Background

The development of the Pickeridge Farm quarry is nearing completion, and lining of the southern cells is well advanced in preparation for infilling. There is reportedly excessive water at the site which has resulted in a temporary discharge into, and flooding of the Stoke Poges SSSI. It is proposed to bring forward by 18 months the construction of surface drainage features as a solution to potential winter flooding and longer term elevated groundwater levels.

The proposed surface drainage scheme is described in a "Groundwater Management Scheme" prepared by Frank Graham , Consulting Engineers - dated October 1995.

The following background points are noteworthy :

2.1 It is understood that the terms of the Planning Permission is that the developer must:

- maintain a monitoring programme, and
- take measures to **ameliorate** the impact of dewatering upon groundwater levels within the SSSI.

Regarding the second point, the only requirement is for him to take some action, however ineffective. It would appear that he is not actually required to maintain water levels at any prescribed level. His subsequent verbal agreement to keep groundwater levels within the ranges defined by (six years of) historical records is thought to be unenforceable.

2.2 However since the developer has verbally agreed to maintain groundwater levels within the range of the plotted "windows" defined by historic monthly maxima and minima. Hence every attempt should be made to get him to abide by this agreement.

The plotted windows reflect the normal winter to summer and year to year fluctuations in maximum and minimum groundwater levels. Water levels at sites some distance away from the quarry face have remained within range throughout the summer of 1995. Where groundwater levels close to the quarry have been substantially reduced below their normal seasonal range this may be attributed to the effects of quarry dewatering.

- 2.3 While the southern face of the Pickeridge Quarry has been exposed during 1994/95, there has been and continues to be substantial drawdown of groundwater levels within the SSSI.
- 2.4 Despite the partial sealing of the southern face, groundwater levels continue to fall below of the agreed ranges. (13 October 1995 Report)
- 2.5 Those remedial actions the developer has been prepared to undertake have been ineffective in remedying the drawdown in groundwater levels.
- 2.6 The Hydrological Statement for the Week ending 13 October 1995 indicates that recent actions in discharging water to the surface of the SSSI has brought groundwater levels around P9 back within range. Elsewhere on the SSSI, groundwater levels in the SSSI affected by quarrying continue to fall outside the agreed ranges (P8, P10, SP11, SP12).
- 2.7 There have been failure to maintain the monitoring network and readings. These include two months operation of the chart recorder on P9, and erroneous and missing dip readings from SP6 and SP7.

The explanations provided by the developer for these failures have been inadequate. The replacement of the float connection on P9 should have been made within days of it being noted - not two months later. The fire around SP6 has made the collar pipe more visible - not less visible as claimed by the developer.

The developer should be invited to provide written explanation of these failures of his monitoring responsibilities.

3. Discussion

3.1 Previous Water Management Practice

The situation over the past twelve to eighteen months is that groundwater levels within the SSSI have been consistently and increasing drawn down below acceptable levels. There has been a number of requests by Buckinghamshire County Council to the developer to remedy this situation. Those actions which have been undertaken by the developer have provided only very localised and temporary relief to this problem. It is evident that the range of mechanisms to alleviate the effects of dewatering being used by the developer (recharge trench) have been inadequate. There has been no suggestions from the developer of alternative methods which would maintain groundwater levels within range (at their seasonally adjusted pre-quarrying levels).

The developer should be invited to suggest other mechanisms (in addition to the eastward extension of the recharge trench and excluding pumping onto the SSSI) which he might employ to maintain groundwater levels across the northern part of the SSSI.

3.2 The Present Situation

The developer maintains that he is encountering a problem with excessive water. These excesses have reportedly resulted in him overfilling the recharge trench causing erosion of the south face of the quarry. No explanation has been provided as to why water in excess of the recharge trench's holding capacity could not be pumped southward to discharge in streams which have historically received water from the site.

Pumping directly into the SSSI has only alleviated the depressed groundwater levels in the immediate vicinity of P9. This discharge to the SSSI is proving to be ineffective in maintaining groundwater levels within range elsewhere.

The current situation of discharge to, and flooding of parts of the SSSI is unnatural and, during winter storms, increases the risk of flooding of public roads to the south of the quarry.

There is the potential that the water being pumping into the SSSI could become contaminated with silts, clay, diesel fuel or other substances. Whereas previously this was discharged into the recharge trench from which it was regularly cleared, any such contamination will now be discharged directly onto the surface of the SSSI.

The developer should be immediately instructed to stop pumping directly on to the SSSI.

3.3 Proposed Water Management Plan

The proposal to bring forward the opening of drainage trenches to the east of the quarry will have the following effects.

3.3.1 Providing emergency relief from winter runoff and flooding should the pumping into the SSSI continue as requested by the developer.

If pumping continues to the SSSI then this drainage channel should be constructed as soon as possible.

There is a distinct possibility that these drainage channels may not be adequate to handle runoff from a local winter storm. The limiting feature will probably be the diameter of piping beneath the access road. The possibility of the drainage channels not handling local flood waters will be increased if any of this pipework becomes constricted with debris.

3.3.2 Increase groundwater recharge to the SSSI south east of the Quarry and particularly to the east of Cell 10.

This will be additional to recharge occurring from the trench between P8 and P10.

3.3.3 There is a risk that these channels could take away from the immediate area water

which should be recycled into the groundwater. The planned spur channels, and weir boards should be adequate to reduce this risk to acceptable levels. Any failure of the weir boards may require damming of the channels at a suitable distance from Cell 10 (say 100 metres to the east of P10).

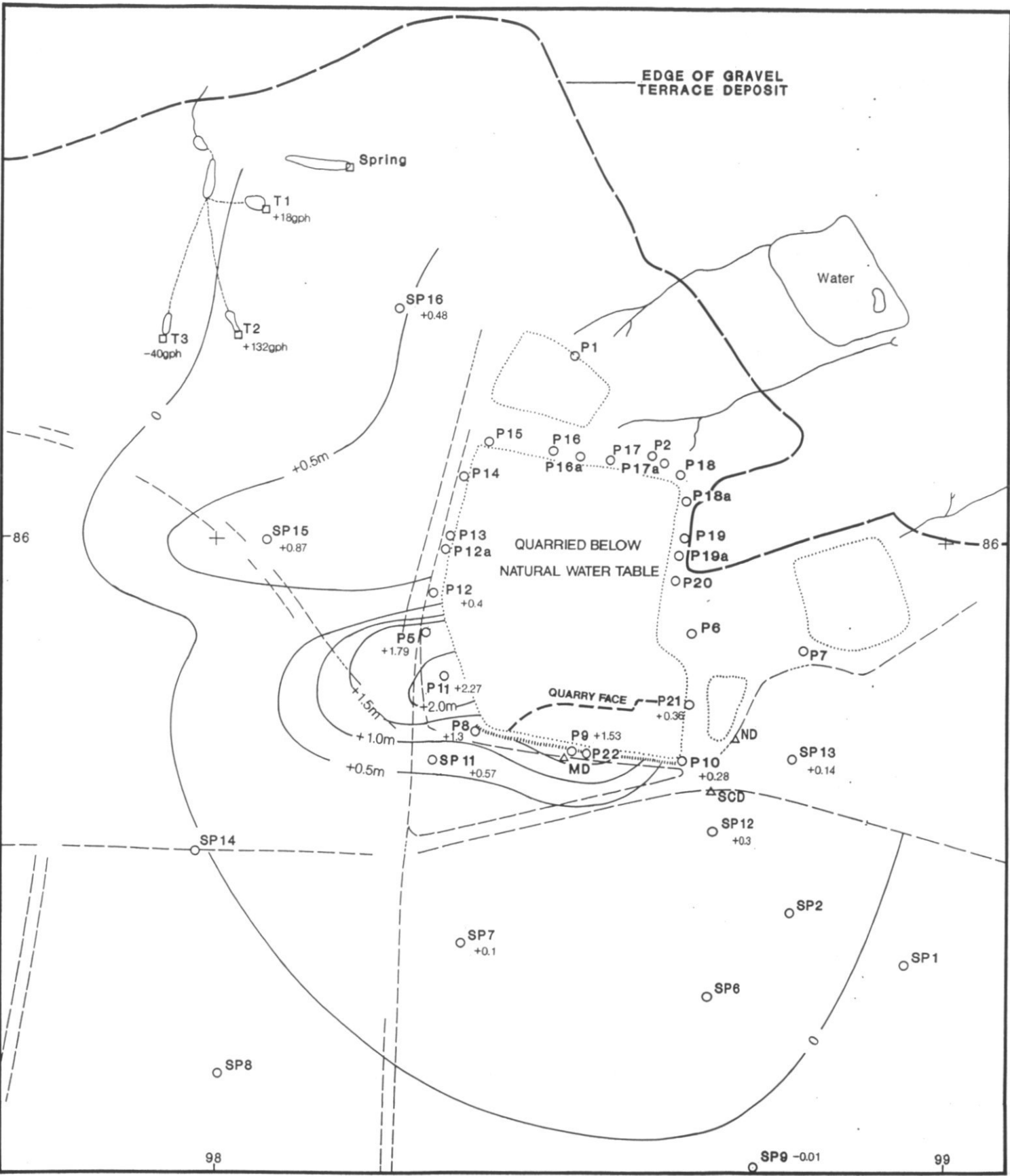
The scale of the problem does not warrant detailed calculations of optimal heights for any weir boards. The height proposed in the Plan should be adequate, and may be adjusted if required.

4. Conclusions

- 4.1 The hydrological regime of the SSSI has been affected by the quarrying and pumping regime at Pickeridge Farm. Groundwater levels are generally depressed over a wide area and surface flooding is occurring at one location. The actions taken by the developer to remediate groundwater drawdown continue to be ineffective.
- 4.2 The excess drawdown of groundwater is considered to remain the key issue while Cell 10 remains open (next 12-18 months). Pumping directly on to the SSSI is neither an effective, nor an appropriate method of remedying this situation.
- 4.3 The issue of overtopping of the recharge trench is a matter of the developer exercising adequate controls on his pump operations and water distribution around the site - it is not a justification for pumping on to the SSSI.
- 4.4 If pumping is allowed to continue to the SSSI there is a danger of road flooding during winter storms. The drainage channels as proposed in the Water Management Plan may not be adequate to prevent such flooding but should, in any case, be allowed to proceed immediately.

5. Recommendations

- 5.1 Pumping directly on to the SSSI should cease immediately
- 5.2 Permission should be granted immediately for the connection of the recharge trench to drainage trenches to the east of the site as described in the Water Management Plan.
- 5.3 The developer should be invited to suggest additional mechanisms / procedures which he will employ to ensure groundwater levels within the SSSI are maintained within range both before and after the connections described in item 5.3 above.
- 5.4 The developer should be requested to make provisions for the pump water in excess of the recharge trench capacity to historical discharge points to the north of the site.



LEGEND

- Borehole
- Spring (T=Tara 1-3)
- △ Ditch Reading
- MD= Monitor Ditch
- ND= New Ditch
- SCD= Stoke Common Ditch
- Recharge trench
- Piped ditch
- Limit of extraction
- Observed highway ditch system
(In other areas road-side gullies may discharge to culverts/soakaway drains, as in "Stoke Wood" for example.)



Frank Graham
Consulting Engineers
PICKERIDGE FARM
HYDROLOGICAL INVESTIGATION

WATER LEVEL CHANGE MAP
BETWEEN 21/03/94 and 20/03/95

CSG/930415/003

FIGURE 2