Application for Environmental Permit EPB3.5 (Version 4)

Buckles Farm, Kaber, Kirkby Stephen. Cumbria

Pre Application Ref.EPR/GP3001LP/A001

BF Appendix 10 Borehole

 Broxty Farm had a ‘well’ some years ago, recorded by BGS, which had now been abandoned.

More recently a borehole was drilled at approx. the highest point on the farmstead site so that water could gravitate to all outlets.

It not only serves the farm but also the farm house and all water needs for the poultry unit.

Analysis of early samples requires the water to be treated by UV light which occurs at the site of the borehole but no further treatment is required.

 Analysis

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| **Parameter** | **Analysis** |
| pH | 8.01 |
| Suspended Solids | <2 |
| BOD | <1 |
| COD | <7 |
| Ammonia | <0.2 |
| Nitrite  | 0.078 |
| Nitrate | 1.01 |
| Phosphate | <0.02 |
| Chloride | 8 |
| Conductivity mS/cm | 0.572 |

Comment:- All parameters are at a low level and compare with good quality drinking water criteria. Bacteriological levels are taken regularly but raw borehole water passes through UV light treatment for all flows, both farm house and poultry units. No Chlorine is added .

 Drawing below relates relative levels with strata determined during borehole drilling.

 Points to note are that :-

* The borehole is 63 m deep whilst the R. Belah is nominally 35m below well head.
* The pump at 30m is above the R. Belah and therefore no abstraction is from water table below the river.
* The 8m layer of sandstone above the pump from 20 to 28m is probably the water bearing layer.
* This layer is protected by all drift geology plus the 8 m shale and 6m of mudstone.
* The limit of just 6m of drift geology accounts for why there are no drift features on the surface geology maps . ie river has cut through this and through the mudstone , shale and sandstone layers of the solid geology.
* Yield is 6000 gals / hr ( 27m3 / Hr ) Daily use is approx.3.2m3 / house of 16,000 birds This equates to 13 M3 / day for 4 houses as proposed. There is sufficient water for all flock watering needs and wash –down after depletion.
* Water strike at 7.5m and 3 other levels below suggest there are separate strata that hold water but protected from each other by less permeable strata.

Bore hole Cross section

30m pump

35 m

Solid geology

Drift material

River Belah 210m AOD

245 AOD Ground level

58m water

51m water

40m water

7.5m water

61-63m shale

40 – 61m sandstone

28-40m shale

20-28m sandstone

12-20m shale

6-12m mudstone clay

3-6m clay

0-3m Boulder clay