

Woldwide Two

Effluent Pond Supplementary Information

Background

On the 6th April 2017 I visited the Woldwide Two effluent pond to collect information for a structural review.

The pond was primarily storing wintering shed effluent and had been emptied in late spring 2016. Since then it had collected rainfall and was approximately one third full by height on 6th April 2017.

Mr Abe de Wolde accompanied me during the visit and provided background information on the pond construction.

The pond was constructed by Nightcaps Contracting who are an experienced earthmoving business who had access to a suitable range of equipment. A vibrating roller and plate compacter were used for compaction.

The pond site was stripped of topsoil along with a borrow area south of and adjacent to the pond. Subsoil was then harvested and stockpiled for lining the pond.

The pond banks were constructed of gravel and subsoil in varying ratios. The pond was built in 2005 and had 12 years use at the time of inspection.

Methodology

The pond structure was inspected including internal and external batters and bank crests. Scala penetrometer and shear vane testing were carried out. Auger holes were drilled into banks.

Results

The pond bank crests were 3.5m in width or more and were stable as were the external batters. They were covered in long grass. There were no signs of seepage from the external batters. Auger holes showed varying ratios of subsoil and gravel for bank construction. Scala penetrometer testing carried out on each bank indicated sufficient compaction, with all results at a minimum 3 blows per 100 mm depth; banks would not be expected to fail in shear. The core of the constructed banks was not saturated to a test depth of 1.8 m.

Shear vane testing of the internal batter lining indicated sufficient peak shear strength and residual shear strength. The clay lining was generally uniform in slope but with wave bands in it. The most significant loss of lining material was at about freeboard height. The north east corner also appeared to be somewhat eroded above normal freeboard height. Some isolated stones were evident in the clay lining on the north bank internal batter. They appeared to have been compacted in the clay layer at the time of construction.

The freeboard wave band was most likely created during stirring of the pond prior to emptying, given the nature of the effluent and the unlikely formation of wave action from wind. The material appeared to be largely resistant to slaking and was non-dispersive. Photos of the pond on the 6th April follow.

Conclusion

As at 6 April 2017, the pond had been in operation for 12 years during which time the clay lining, the banks and the external betterings have remained stable. The clay lining has been eroded in places due to the action of stirring the pond prior to pumping it out. It would be prudent to replace lost clay to maintain the integrity of the liner. Despite the loss of some clay, no leakage occurred during a drop test carried out in November 2017 supporting the conclusion that the pond is stable and is not leaking effluent.

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Note: All photos were taken on 6 April 2017



Figure 1. Photograph of Scala Penetrometer and material from auger hole.



Figure 2. Internal batter with shear vane.



Figure 3. East bank



Figure 4. South bank



Figure 5. East bank



Figure 6. West bank.

Drop Test

A drop test was carried out at the request of Council, knowing that the pond stored wintering shed effluent and that it had a crust on the surface, between 17-19 November 2017. The pond was stirred prior to the test, so there was floating organic material on the pond surface rather than a continuous thick crust. The drop test result was subsequently accepted by Council. The drop test showed a reduction in pond height of 2.4mm over a period of 50 hours, 23 minutes and 30 seconds, with an accuracy of plus or minus 0.2mm. All of this reduction in height could be attributed to evaporation, i.e. there was no leakage. The pond did not lose height at night when there was no evaporation. A graph showing this is also appended.