



Fact Sheet 8:

Constructing a Pond – Soil Testing

Key messages

- A geotechnical assessment is an important part of designing and constructing a new pond.
- A geotechnical assessment provides the detailed information earthmoving contractors need before they can properly quote for the job.
- There are standard tests which should be carried out to ensure that the pond does not leak. The permeability standard is 1×10^{-9} m/s.

Once a new pond site is selected, the next step is to have a geotechnical site assessment done. This will provide two critically important pieces of information:

1. Firstly, recommendations about construction requirements including:
 - suitable batter slopes,
 - any limitations to the pond depth,
 - the level of compaction required, and
 - the optimum soil moisture content.

All earthmoving contractors need to know this information before they can consider the job.

2. Provided that the specified level of compaction is achieved during construction, the pond will be impermeable and won't leak. It's better to know in advance whether or not the soils types are suitable for the job before getting started on construction.

What is involved in a geotechnical assessment?

- This is a specialist area. While there will be a cost in accessing professional services, that cost is minor compared to the costs incurred in getting it wrong. If you can't afford the geotechnical testing, then you should reconsider your plans – it is that important.
- An excavator or drill rig is used to dig a series of test pits or bores across the footprint of the area that the pond will occupy. Soil conditions can vary widely so a number of pits should be checked, to understand any underlying restrictions.
- Selected samples of the subsoil are then sent to the laboratory where they need to be put through a range of tests. These tests are used to produce the construction recommendations that the contractor needs before they can provide you with a quote for construction.



The geotechnical engineer will be able to guide you as to which tests are required, but they are likely to include:



A Particle-size Analysis, or how much clay, silt and sand there is in the soil. The clay content is required for the pond to seal.



The Atterberg Test, determines the clay's plasticity.



The Emerson Aggregate Test, to see how dispersive or prone to erosion the soil is.



The Proctor Compaction Test, to find the range of moisture contents over which the required level of compaction can be achieved.

Sometimes a permeability test may also need to be carried out. However, unless the soil is marginal in terms of suitability, it is more common to just use the four basic tests as indicators that the soil is going to be suitable for the task.

During construction:

It is recommended that you consider using the geotechnical engineer to supervise construction. Their experience will quickly identify if the soil conditions encountered vary beyond the specifications for the job, and direct the contractor about any changes. It is also strongly recommended that you get the geotechnical engineer to conduct density checks as the job progresses. Being able to document that you achieved the required level of compaction gives you peace of mind if there is ever any concern about whether the pond is leaking.

References:

Effluent and Manure Management Database for the Australian Dairy Industry, 2008. Section 2.4 Pond site investigation. Dairy Australia
www.dairyingfortomorrow.com.au/index.php?id=48

[View Constructing an effluent pond \(and soil testing\) on dairy farms video](#)

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