

# Construction of the pond system

## Shape

For the anaerobic system to work efficiently, the pond should be oblong. The aerobic pond(s) can be any convenient shape to suit the site, provided the inlets and outlets are as far apart as possible, in order to maximise effluent flow through the pond. However, long narrow ponds are not recommended, as they are not efficient.

## Site preparation

Removal of all topsoil and organic material is necessary. This can be stockpiled for later dressing. Check the soil type and characteristics to establish its permeability. If the soils are not impermeable enough to seal the ponds, the ponds will need to be lined, either with clay, rubber lining or concrete.

Should it be necessary to build the pond fully or partly above ground, check that the characteristics of the soil to be used for banks are suitable. A keyway will be necessary directly under such banks to minimise seepage and erosion. The keys should cut into stable material, and be at least 1.0 m deep and 3.0 m wide, beneath the centre of the embankment. The banks should be at least 3.0 m wide at the top.

## Compaction

Insufficient compaction leads to bank erosion, which reduces pond depth, resulting in lowered efficiency and leakage of pond wastes to groundwater.

It is essential that the inside surfaces of the pond be well compacted. This should be carried out with heavy, rubber-tyred vehicles rather than tracked vehicles (tracked vehicle weight is spread over a large area and is not efficient in compacting).



## Machinery

Experience has shown that ponds must be built properly to minimise maintenance. Farm tractors with front-end loaders or drain digging machines cannot make a satisfactory job.

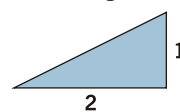
Larger, more specialised earth-moving machinery, takes less time, makes a better job and costs less in the long term. Local contractors have found that long-reach hydraulic excavators in combination with bulldozers are ideal.

## Bank gradients

Bank gradients (batter) are required as a safety measure should children or stock fall into the ponds. Within the Taranaki region battering of ponds is a recommended safety measure.

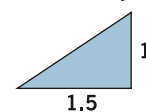
The internal banks of ponds must be no steeper than:

2 to 1 in light soils



Light soils

1.5 to 1 in heavy soils



Heavy soils

## Freeboard

There should be at least 0.5 metres of bank above the water level.

## Fencing

A secure perimeter fence is considered to be prudent by the Council for safety reasons. Such fencing can also be used to restrain any sheep, which may be used to control excessive grass and weeds.

## Sandtrap

A sandtrap should be constructed at the drainage point from the farm dairy shed. This serves to reduce the sand and stone input to the ponds, and the chance of solids blocking the pipes. When designing the sandtrap, consideration needs to be given to how it will be cleaned out. The most common option for new systems is a large sandtrap, which allows the removal of the solids by a tractor fitted with a back blade or bucket. When removed the solids need to be placed on land where they cannot enter a waterway and, ideally, worked back into the soil as fertiliser.

## Pipes

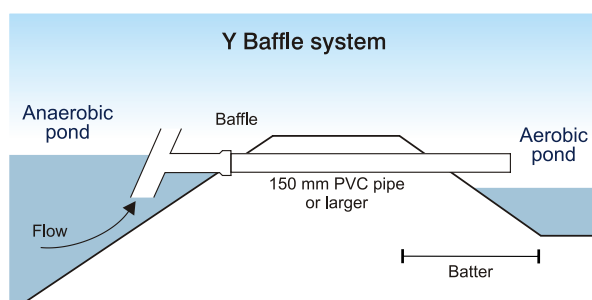
150 - 300 mm ultra violet resistant PVC piping has proved to be the most satisfactory and is recommended by the Council.

The greater the fall from the shed to the pond the better, but a minimum fall of at least 50 mm per 50 m should be allowed. Effluent from the dairy shed should be run through an open-ended pipe, discharging a maximum of 150 mm above the level of the anaerobic pond. In some situations open drains are not acceptable.

The positioning of the pipes impacts on the efficiency of the ponds. The inlet to a pond should be in the opposite end/corner to the outlet of that pond. It is sensible to fit an inspection opening into the pipes, so blockages can be easily located and removed. This is especially important for the pipe from the shed, and the pipe between the pond(s).

## Baffles

Baffle plates must be installed from the exit of the anaerobic ponds to prevent the transfer of floating solids from one pond to another. PVC 'Y' joints can be used to construct appropriate baffle plates. A 'Y' joint is easier to unblock from the pond edge than a 'T' joint.



## Overflow contingency

The outlet pipes of the ponds are likely to block from time to time. If this is not remedied quickly, the pond may overflow. To ensure the effluent does not enter a waterbody, a spillway should be constructed between the ponds, to ensure any overflowing effluent enters the next pond in the system. This spillway should preferably be lined to avoid scouring of the bank.

## Pond management

Ponds need to be operated so that they comply with the resource consent conditions. Consent conditions often vary between farms, and you are legally obliged to ensure your system operates within them. It is therefore essential that you read and understand your resource consent.

## Consent conditions

The most important consent conditions relate to the:

- **Volume to be discharged.** This is related to the number of cows you are milking, and whether or not you have a feedpad draining to the system.
- **Dilution rate in the receiving waterbody.** The waterbody needs to be able to dilute the effluent by 100:1 at all times to avoid adverse effects in that waterbody.
- **Physical impact.** Even with adequate dilution, the discharge is not to cause effects such as discolouration, foams, odour etc at the mixing zone. The length of the mixing zone differs between systems and the receiving environment.
- **Chemical Impact.** Even with adequate dilution, the discharge is not to cause the level of unionised ammonia and biological oxygen demand to exceed a certain level at the end of the mixing zone. The levels that are not to be exceeded are usually:
  - Unionised Ammonia 0.025 gm<sup>3</sup>
  - Filtered Carbonaceous BOD<sub>5</sub> 2.0 gm<sup>3</sup>.
- When the **number of cows milked** is increased, a larger volume of effluent will be discharged and a change of resource consent conditions will be required. The trigger point for this change is usually a twenty percent increase.

## Performance testing

It is possible to test the chemical performance of oxidation ponds to ascertain compliance with your resource consents. In addition, a visual assessment can be made of your system, as a rough guide to its condition. Indications that your system is not operating correctly are:

- Sludge build-up or excessive crusting
- Frequent blocking of discharge pipes
- Bubbling has stopped in the first pond
- A final discharge that is dark in colour, and/or has a strong odour
- Bacterial growths in the waterbody.

## Pond maintenance

Should the pond system not be operating correctly, one or more of the following steps may be required:

- **Desludging** - hire a contractor to pump out the ponds. Ensure the contractor holds a resource consent from the Taranaki Regional Council for this purpose. Never empty out the first pond completely or important bacteria will be lost (leave approximately 1/4 to 1/3 full).
- **Extend** - the size of your system may need to be increased, especially if you have started milking additional cows.
- **Wetland** - install a wetland to polish the discharge. There is additional information available from the Council regarding this system.
- **Change to spray irrigation** - this could be a suitable option when expensive improvements are required, or when the receiving waterbody is too small.

## Regular maintenance

During the year you will need to regularly check your ponds to make sure there are no problems. Regular maintenance involves:

- **Desludging** - desludge ponds regularly, as necessary. Never empty out ponds completely or important bacteria will be lost.
- **Grass growth** - encourage and maintain grass cover on the banks to prevent erosion, but keep plants short. No grass is to grow on the surface of any aerobic pond.
- **Tree growth** - do not allow trees or shrubs to grow on, or near to, embankments. Tree roots can pierce the embankment causing instability. If trees fall over, or roots die, the embankment may be breached.
- **Embankments** - examine embankments after heavy rain.
- **Pipe blockages** - a pipe needs to be unblocked as soon as it is noticed. Should effluent from the first pond enter a waterway due to a blockage, further action is likely to be taken by the Council.

## Compliance monitoring

Each farm that holds a resource consent to discharge dairy effluent is inspected annually by the Taranaki Regional Council. Advice and information is generally offered as the first response to compliance issues.

The inspection is to assess compliance with the resource consent conditions and it incurs a reasonable monitoring fee. In general, approximately 95% of farms are compliant each year.

Those farms in breach of their consent conditions are re-inspected to ensure any required improvements have been implemented. A fee applies to each re-inspection. An abatement notice is usually issued requiring actions to be undertaken by the consent holder in a specified period.

In cases of significant and/or repeated non-compliance, an infringement notice may be issued with associated monitoring costs or a prosecution may be undertaken.

## More information

A copy of this guideline and other information about dairyshed and waste management is available on the Council's website [www.trc.govt.nz](http://www.trc.govt.nz). The Council's Inspectorate Officers can be contacted for advice and information at:

**Taranaki Regional Council**  
Private Bag 713, Stratford  
Ph: 06 765 7127  
or 0800 736 222  
Email: [info@trc.govt.nz](mailto:info@trc.govt.nz)



For more information please contact:

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