



**BEING
BOLD**

Facing our challenges

New Zealand
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INSTITUTE OF PUBLIC WORKS
ENGINEERING AUSTRALASIA

IPWEA NZ CONFERENCE 2020 DUNEDIN

How Many Deaths Does it Take?

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Beca Ltd



Oxidation, Effluent and Water Storage Ponds





But how Many Deaths Does it Take?



A Moment's Silence for a decades loss (2009 – 2020)



What is the magnetic force that attracts?

- Being inquisitive
- Splashing water
- Decoy ducks
- Still waters
- Stone skimming
- Model boats
- Dog walking
- Short-cut route
- Photography
- Bird watching
- Adjacent to tracks
- Swimming
- Wind surfing
- Work

All unaware of the invisible dangers!



- Seven pre-schoolers
- A teenager trapped in a water storage Pond
- Two workers who lost their balance on a pontoon
- A farmer who slipped into a PE lined oxidation pond
- A tanker driver who slipped into a steep-sided concrete-lined pond
- Seven who drowned when their tractors/quad bikes went into ponds



Access

The most at risk being pre-schoolers it would appear

- They can't read / understand signs
- They can't swim
- They don't know that they need to save themselves
- They can't climb up slippery batter slopes
- Unlikely to recognise any egress options
- Their cries for help are less likely to be heard





How did they get access?

By climbing



Ladder Gate



Large Mesh Netting



Going through gaps



Squeezing between wires





Crawling under the bottom



Stock-proof fence not necessarily child or small animal-proof





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They were at work





Fence Standards

- Ponds are not swimming pools
- There are no standards for pond fencing

What Guidelines exist?

- Water NZ 2017 (Oxidation Ponds)
 - In many cases the “front entrance” to ponds is security fenced, with the “back door” being normal 7 or 8 wire stock fence.
 - Deer fencing can provide additional security



IPENZ Practice Note 21 – 2017 (Farm Ponds)

- At very least a secure 5-wire fence with an electric fence hot-wire. In some locations, a higher fence such as deer fencing will be appropriate.

Worksafe 2017 (Farm Ponds)

- Fence the pond and put up warning signs



Dairy NZ

- All ponds should be fenced off with a netting fence
- Warning signs can be used to keep people out

These guidelines have little substance and how effective have they been in the prevention of death?



What might Best Industry Practice look like?

- 1800 mm high
- 100 mm max line-wire spacing in lower portion
- 100mm maximum stay-wire spacing
- Barbed tension wire top and bottom clipped to netting
- Install with less than 100 mm clearance beneath



Solutions

- Cyclone 16/1900 HT Tightlock deer fawning netting
- Mesh size 240W x 89H in lower 800mm
- Tensioned bottom wire clipped to netting
- Deer netting accepted by Worksafe in Gore
- Summit Steel 19/1800 XTM fence forged knot MT security netting
- Mesh size 50W x 100H over full height
- Cyclone HT Reverse Twist 1.6 x 100 barbed tension wire top and bottom clipped to netting
- Being adopted by some other Council's
- Gates similar

16 / 1900			13 / 1900		
202			178		
191			178		
191			178		
191			178		
165			178		
139			178		
114			178		
89			165		
89			139		
89			127		
89			114		
89			114		





Once in the pond, what is the means of Egress?

Are there any?

Slippery Batter Slopes (sludge and biomass)





Steep Batter Slopes



Sludge layer in invert



PE batter Slopes



Floating pontoons

- How do you get out?
- How can rescuers assist?



What Egress Guidelines are there?

- Water NZ 2017 (Oxidation Ponds)
 - Silent
- IPENZ Practice Note 21-2017 (Farm Ponds)
 - Working around water requires a minimum of two people with one always available for support and rescue.
- Worksafe 2017 (Farm Ponds)
 - Ponds with synthetic liners should have exit devices (and) have rescue lines and a lifebuoy close to the pond.
- Dairy NZ (Farm Ponds)
 - Ponds should have at least one permanent....means of escape in case a person falls in.
 - You can have a lifebuoy available in the area too
 - Pontoons should have anchor points to improve stability



Egress Solution – Sheet Lined Ponds

- PE Ladder



Viking Geoladder



AEL Hi-vis Safety Ladder



Egress Solution – Earth / Stone / Concrete Batters

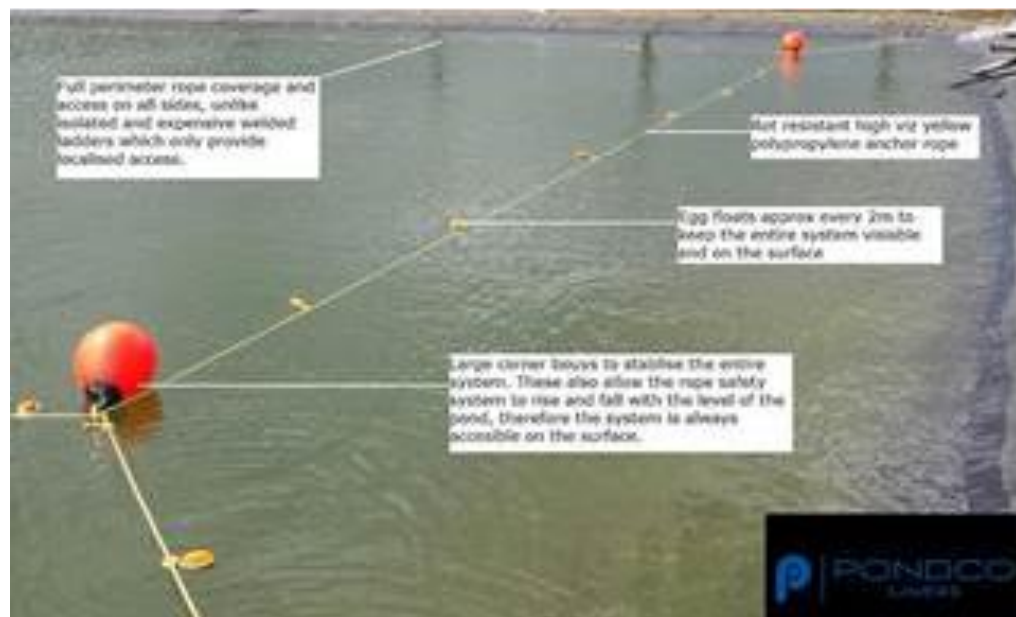
- Tyre Ladders



- Spacing / Location
- At each corner of pond, Worksafe precedent minima (Gore DC)
- At inlets and outlets
- At sampling/monitoring locations
- At maintenance locations, eg pumps, aerators
- Maximum spacing between ladders 50m recommended, based on water safety and marine guidelines



Egress Assistance – Float and Buoy Line (Recommended by Dairy NZ)



Pondco Liners



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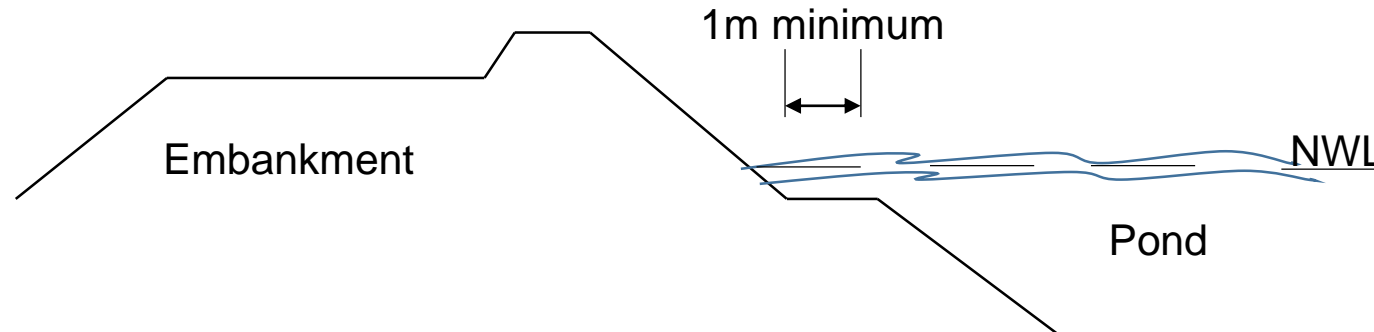


Courtesy of Dairy NZ – <https://www.dairynz.co.nz/effluent/effluent-storage/effluent-pond-safety/>



What else can you do to assist self rescue?

- Incorporate a bench in the batter at 300mm below normal water level to swim on to. This can also be useful for maintenance access.





Employee Safety at Ponds

- Is Grazing separated from ponds?
- Access/Security Control Procedures
- Working Alone Procedures
- Make sure all workers can swim
- What tasks require two person attendance?
- Monitoring Procedures
- Maintenance Procedures
- Safety Equipment



Some Batter SiD Items

- Slope
 - Safety vs earthworks volumes
- Profile
 - Bench 300 below NWL
 - Maintenance access
- Finish
 - Grass / stones / concrete
- Embankment vehicle access
 - Width
 - Location
 - Not a transit route
 - Mound on top edge of crest pond-side



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Some Access/Egress SiD Items

- Access control and details
- Landscaping that discourages access
- Grazing controls
- Access procedures
- Maintenance procedures
- Egress provisions and locations



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**May the lives of those
who have drowned in
ponds not been in vain**