

4/6/2025
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Re: Enviroking Tank Farm Bunding calculations

Enviroking Pty. Ltd. has applied to the Depth of Planning for certain modifications to the bunded indoor tank farm at 843 John Renshaw Dr, Black Hill NSW that involves changes to tankage and addition of DAF equipment. This will involve changes to the bunding formulation. The purpose of this report is to recalculate the bunding and ensure that the EPA bunding requirements are met. The new layout of the tank farm is given as Plan 1. The total bunded area includes the main tank farm section 18 by 30 m plus the forward section of the sludge pit so the total of these areas is given in Table 1. The bund height at the main doors is 180 mm or 0.18m. The forward extension of the Sludge Pit is 3.5 m wide and 9 m long (Photo 1). It is assumed the sludge pit is fill when calculating bunding. A further complication is that the whole floor slopes toward the central drain by 50 mm adding further volume above the 180 mm accounted for by the bund depth.

Table 1. Total bunded area.

Bunded area	Length m	Width m	Depth m	Floor area m ²	Bund Volume m ³
Total floor area	30	18	0.18	540	97.2
50 mm slope to drain	30	18	0.05	540	27
Added Sludge pit	9	3.5	0.18	31.5	5.67
Total Bund Area				1111.5	129.87

Components inside the shed alienating bund volumes are-

- Tank plinths (Photo 2),
- Concrete footings of Secondary Receival tanks, Tanks 2 and 3 (Photo 3).
- Wheel ramps and chemical storage area (Photo 4).
- DAF unit (not yet installed)

The following changes are proposed.

- Remove the old centrifuge, the secondary oily/water tank No. 15, Wash-out tank No. 16 and Tanks 8 and 9.
- Relocate Tank No. 14 (Primary Oily Water Tank) to the rear of the Shed.
- Install the DAF Unit and the Pre-reaction tank toward the rear of the shed where access to a power board occurs.

Replace the tanks being removed with new tanks 9, 8, 15 and 16 to be placed in the centre of the building for easy access. These are to be 35 Kl each with conical bottom so as not to take up bunded volume. These tanks as well as the horizontal Primary receival tank (Tank 1) and Spare Sludge holding tank (Tank 12) are on metal stands and do not alienate bund volume. Tanks 2 and 3 are off the ground on 3 concrete footings so only the area of footings is calculated. The bund alienating volumes are calculated in Table 2.

Table 2 List of bund alienating equipment

Tanks	Volume	Position	Diameter	Height	No of items	Area m ²	Total Area m ²
1	25,000	Horizontal	off floor		1	15.00	15.00
2, 3,	35,000	Vertical	Conical		2		0.00
8, 9, 15, 16	35,000		Conical		4		0.00
4,5,6,7, 10,11,	22,000	Vertical	3.55	2.22	6	9.90	59.41
14	16,000		3	2.26	1	7.07	7.07
8, 9	25,000	Vertical	3.6	2.46	2	10.18	20.37
12	20,000	Conical	2	6.36	1	3.14	3.14
Tank + Pre-reaction	8 x 2	N/A			1	16	16.00
Other items	Height m	Width m	Length m	Volume m ³			
Plinth/foundation of primary tanks	0.18	0.9	3.8	0.6156	3	1.8468	1.85
2 Wheel ramps	0.18	0.9	3.5	0.567	1	0.567	0.57
Chemical store	0.18	0.9	3	0.486	1	0.486	0.49
Total exclusions							123.9
Depth							0.18
sloping floor factor							0.03
Effective average depth							0.21
Alienated Volume							25.4

The overall bunding calculations can now be done as in Table 3 using the largest tank which is 35,000 litres and in Table 4 using 25% of total tank storage volume.

Table 3. Overall bunding formula based on 110% of largest tank

Bunded area	Length m	Width m	Depth m	Floor area m ²	Bund Volume m ³
Total floor area	30	18	0.18	540	97.2
50 mm slope to drain	30	18	0.05	540	27
Added Sludge pit	9	3.5	0.18	31.5	5.67
Total Bund Area					129.87
Minus alienated volume					25.4
Effective volume					104.5
110% of biggest tank					38.5
Excess capacity					65.97
% over capacity					63.1%

Table 4. Overall bunding formula based on 25% total storage volume (all in m³ or kl)

Tanks	Volume	No of items	Total volume
1	25,000	1	25,000
2, 3,	35,000	2	70,000
8, 9, 15, 16	35,000	4	140,000
4,5,6,7, 10,11,	22,000	6	132,000
14	16,000	1	16,000
8, 9	25,000	2	50,000
12	20,000	1	20,000
		Total	453,000
		25%	113,250

The correct formula to apply is the 25% of total tank storage volume rule as this is larger than 110% of the largest tank. This demonstrates that the effective bund volume of 104.5 m³ is not quite sufficient to meet this 25% of total storage volume rule. It is 8.75 kl short of meeting it.

The solution to this is to increase the depth of the bund. The bare minimum increase in table 5

Table 5 Increased bund depth requirement

Total bund area m ²	1111.5
Alienated area m ²	123.89
Effective area m ²	987.61
Required volume increase m ³	8.75
Required increase in depth mm	8.9
Add 20% safety factor mm	10.6

This demonstrates the increase can be achieved relatively simply using standard 25 mm deep plastic or rubber rollover wheel bunding screwed and sealed to the floor across doorways and truck access rolla-doors and will not impede vehicle movement. This only needs to be done along the front of the building as bunds at the rear are significantly deeper already.

Conclusions

These calculations demonstrate that the new layout will not meet the largest criteria of 25% of the total storage volume without increasing the bund height by 10 mm which includes a 20% safety factor.

This can be achieved using standard 25 mm deep plastic or rubber rollover wheel bunding screwed and sealed to the floor across doorways and truck access rolla-doors along the front of the building and will not impede vehicle movement.



Simon Leake
 Director
 SESL Pty. Ltd



Photo 1. Sludge tank extension



Photo 2. Tank Plinths



Photo 3. Tank footings



Photo 4. Wheel ramps and chemical store.

Plan 1. New Tank Farm layout.

