

Proposal number:	E/1331/19
Date:	01/07/2019

Job Name:	Burndell Road, Yapton
Author:	AC

Site Elevations (m)		
Ground Level AOD	Max	7.02
	Min	6.80
Tank Level	Top	5.98
	Bottom	4.35
Membrane Level	Base	2.30
Cover Depth, z	Max, z_{max}	1.04
	Min, z_{min}	0.83

Soil/Fill Characteristics	
γ_{soil} (kNm^{-3})	19.00
ϕ ($^{\circ}$)	34.00
γ_{tank} (kNm^{-3})	0.55
$\gamma_{wet\ sand}$ (kNm^{-3})	19.00

VERTICAL

Area Due To Spread Of Point Load, A (m^2)		
Spread angle (degrees)		26.00
A (z_{max})		1.47
A (z_{min})		1.01

Load Area (m.m)	
0.20	0.20

Loading Case (Din 1072)		9.90
Surcharge, q	10.00	kNm^{-2}
Cover Fill, c Max/Min [$\gamma.z$]	19.76	kNm^{-2}
	15.68	kNm^{-2}
Point, w	10.00	kN

Factors, λ	
Surcharge	1.50
Cover	1.35
Point	1.50

Factored Vertical Loading, (kNm^{-2})	
Surcharge [$q_d=q.\lambda$]	15.00
Cover [$c_d=c.\lambda$]	26.68
	21.16
Point [$w_d=(w/A).\lambda$]	10.17
	14.86

Design Vertical Loading, $\sigma_{v,d}$		
$\sigma_{v,d}(z_{max})$	51.85	kNm^{-2}
$\sigma_{v,d}(z_{min})$	51.02	

LATERAL

Reference Depth	
h (m)	2.47

ϕ (rad)	0.59
$k_a [1-\sin\phi / 1+\sin\phi]$	0.28

Loading Case (Din 1072)		9.90
Surcharge, q	10.00	kNm^{-2}
Cover, c [$\gamma.h$]	46.84	kNm^{-2}

Factors, λ	
Lateral	1.35
Variable	1.50

Factored Lateral Loading, (kNm^{-2})	
Surcharge [$q_d=k_a.q.\lambda$]	4.24
Cover Fill [$c_d=k_a.c.\lambda$]	17.88

Design Lateral Loading, $\sigma_{l,d}$		
$\sigma_{l,d}(z_{max})$	22.12	kNm^{-2}

UPLIFT			
Water table elevation (m)	6.02	Depth of tank D_T (m)	4.72
Water displaced D_{dw} (m)	3.72	Factors λ	
		Permanent Uplift	1.0
		Permanent Resist press.	0.9
Case 1 $D_{dw} < D_T$ TRUE			
Design Uplift kNm^{-2}			
$U_d [D_{dw} \cdot \gamma_w \cdot \lambda]$	37.15	Satisfactory:	FALSE
Design Resisting Pressure $\sigma_{r,d}$			
Cover Fill $c_d [\gamma \cdot z \cdot \lambda]$	14.11		
Case 2 $D_{dw} > D_T$ FALSE			
Submerged Cover z_s (m)	-0.79		
Unsubmerged cover z_u (m)	1.04		
Design Uplift (kNm^{-2})			
$U_d [D_T \cdot \gamma_w \cdot \lambda]$	47.15	Satisfactory:	TRUE
Design Resisting Pressure (kNm^{-2})			
Submerge cover $c_{d,s} [\gamma' \cdot z_s \cdot \lambda]$	-6.36		
Tank blocks	0.80		
Wet Sand ballast	35.06		
Cover $c_{d,u} [\gamma \cdot z_u \cdot \lambda]$	17.78		
TOTAL	47.28		