

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

Job Name:	Burndell Road
Author:	AC

Site Elevations (m)		
Ground Level AOD	Max	6.700
	Min	6.520
Tank Level	Top	6.000
	Bottom	5.000
Cover Depth, z	Max, z_{max}	0.700
	Min, z_{min}	0.520
Ground water table depth AOD	z_w	5.700

Soil/Fill Characteristics	
γ (kNm^{-3})	19.00
ϕ ($^{\circ}$)	38.00

VERTICAL

Area Due To Spread Of Point Load, A (m^2)		
Spread angle (degrees)		26.00
A (z_{max})		1.13
A (z_{min})		0.78

Load Area (m.m)	
0.20	0.60

Loading Case (Din 1072)	60/30.	
Surcharge, q	10.00	kNm^{-2}
Cover Fill, c Max/Min [$\gamma.z$]	13.30	kNm^{-2}
	9.88	kNm^{-2}
Point, w	100.00	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 [$c_d = c.\lambda$]	17.96
	13.34
Point [$w_d = (w/A).\lambda$]	132.45
	191.55

Design Vertical Loading, $\sigma_{v,d}$		
$\sigma_{v,d}(z_{max})$	165.4	kNm^{-2}
$\sigma_{v,d}(z_{min})$	219.9	

LATERAL (no ground water included)

Reference Depth	
h (m)	1.50

ϕ (rad)	0.66
$k_a [1 - \sin\phi / 1 + \sin\phi]$	0.24

Loading Case (Din 1072)		60/30.
Surcharge, q	10.00	kNm ⁻²
Cover, c [γ.h]	28.50	kNm ⁻²

Factors, λ	
Permanent	1.35
Variable	1.50

Factored Lateral Loading, (kNm^{-2})	
Surcharge [$q_d = k_a \cdot q \cdot \lambda$]	3.57
Cover Fill [$c_d = k_a \cdot c \cdot \lambda$]	9.15

Design Lateral Loading, $\sigma_{l,d}$		
$\sigma_{l,d}(z_{\max})$	12.7	kNm^{-2}

UPLIFT

Water table elevation (m)	5.70
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Depth of tank D_T (m)	1.00
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Water displaced D_{dw} (m)	0.70
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Factors λ	
Permanent Uplift	1.0
Permanent Resist press.	0.9

Case 1 $D_{dw} < D_T$	TRUE
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Design Uplift kNm^{-2}	
$U_d [D_{dw} \cdot \gamma_w \cdot \lambda]$	7.00

Satisfactory:	TRUE
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Design Resisting Pressure $\sigma_{r,d}$	
Cover Fill $c_d [\gamma \cdot z \cdot \lambda]$	8.89

Case 2 $D_{dw} > D_T$	FALSE
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Submerged Cover z_s (m)	-0.30
Unsubmerged cover z_u (m)	0.82

Design Uplift (kNm^{-2})	
$U_d [D_T \cdot \gamma_w \cdot \lambda]$	10.00

Satisfactory:	TRUE
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Design Resisting Pressure (kNm^{-2})	
Submerge cover $c_{d,s} [\gamma' \cdot z_s \cdot \lambda]$	-2.43
Cover $c_{d,u} [\gamma \cdot z_u \cdot \lambda]$	14.02
TOTAL	11.59