

Project	Sefter Road
Project ref	10768
Revision	Ponds - Anti-Flotation Calculation
	V2 - 18.5.22

Assumed dry (liner below ballast)

Pond ref:	Pond 1	Pond 2	Pond 3	Pond 4	Pond 6	Pond 7
Pond Area at base (m2)	569.840	311.150	271.030	756.670	69.000	166.190
Pond Area at highest GW level (m2)	1089.050	589.940	689.860	2488.020	186.140	324.300
Average Pond area (m2)	829.445	450.545	480.445	1622.345	127.570	245.245
Top GW level(m AOD)	6.112	6.112	6.112	6.112	5.052	5.052
Pond base (m AOD)	4.985	4.945	4.870	4.650	4.185	4.190
Depth GW- Base (m)	1.127	1.167	1.242	1.462	0.867	0.862
Ballast thickness (m)	1.100	1.150	1.040	1.100	0.720	0.840
Topsoil depth	0.150	0.150	0.150	0.150	0.150	0.150
Overall depth (m)	2.377	2.467	2.432	2.712	1.737	1.852
Volume for buoyancy (m³)	1971.591	1111.495	1168.442	4399.800	221.589	454.194
Buoyancy uplift (kN)	19341.3	10903.8	11462.4	43162.0	2173.8	4455.6
Ballast construction depth (m)	1.100	1.150	1.040	1.100	0.720	0.840
Ballast downward force (kN)	22329.88	12645.95	13373.35	51014.36	2498.15	5077.76
Topsoil depth (m)	0.150	0.150	0.150	0.150	0.150	0.150
Topsoil downward force (kN))	1341.97	732.76	638.28	1781.96	162.50	391.38
Downward forces (kN)	23671.85	13378.71	14011.63	52796.32	2660.64	5469.14
Net Buoyancy Force	4330.55	2474.95	2549.21	9634.29	486.85	1013.50
Factor of safety	1.2	1.2	1.2	1.2	1.2	1.2
	OK	OK	OK	OK	OK	OK

Calculate the area of the pond at the highest GW level
average of area at highest GW level & area at base
Obtain groundwater level from soil report

Start with an assumed ballast depth, then adjust if FoS is less than 1.1

Bottom of ballast to top groundwater level

9.81kN/m³ for water. Positive figure denotes uplift force, negative figure denotes downward force
Note: If a negative figure is shown above for pond buoyancy then no ballast is required

Unsaturated Clay = 1900Kg/m3 or 18.64kN/m3 - Saturated Clay = 2300Kg/m3 or 22.56kN/m3(Engineeringtoolbox.com)

Density of Dry Topsoil = 1600 Kg/m3 = 15.7kn/m3

Negative figure denotes uplift force, positive figure denotes downward force
minimum acceptable value: 1.1

Ponds 1-3: Related boreholes: BH208 / BH3 . BH3 highest groundwater level recorded at 6.112mAOD. **Pond 4:** Related boreholes: BH4. * as the trench extends close to the other 3 ponds a more conservative approach to be adopted and should be checked against water rising to similar level to BH3. Highest groundwater level recorded 5.536mAOD (BH4) and 6.112mAOD (BH3). **Ponds 6&7:** Related boreholes BH203 (area between boreholes BH202 and BH203). Highest groundwater level recorded 5.052.