

SITE NAME: Sefter Road, Bognor – Catchment 1 -
Rev1
JOB No. _4775
DATE: _22/06/2021

Buoyancy calculation check for potential uplift forces for Pond liner in Attenuation Basin 1 – during construction

The following calculations provide a check on the potential impact or risk of flotation of the Impermeable liner of the first attenuation basin in the south eastern corner of the site.

Based on the ground investigations and winter ground water monitoring carried out by RSK, the Maximum groundwater level is deemed at ground level in the area of the basin. Assuming that the existing ground level is 6.00m AOD, groundwater level is approximately 6.00mm AOD.

Base level of basin specified at 4.978m AOD.

Liner level under basin specified at 3.778m AOD.

Specific weight of water = 1000 kg/m³

Specific weight of wet Sand and Gravel = 2020kg/m³ (based on SPONS 30th Edition)

Potential uplift buoyancy forces per metre: $F_{\text{uplift}} = V \times W_g = 1.0 \times (6.00\text{m} - 3.778) \times 1000 = 2222\text{kg/m}$

Weight of wet Sand and Gravel on top of liner: $W_s = V \times W = 1.20\text{m} \times 2020 = 2424\text{kg/m}$

Therefore, resultant downforce per meter = $2424 / 2222 = (\text{FOS of } 1.1 \text{ which is deemed Acceptable})$

Buoyancy calculation check for potential uplift forces for pond liner in Attenuation Basin 2 – during construction

The following calculations provide a check on the potential impact or risk of flotation to the Impermeable liner of the second attenuation basin in the south eastern corner of the site.

Based on the ground investigations and winter ground water monitoring carried out by RSK, the Maximum groundwater level is deemed to be at ground level in the area of the basin. Assuming that the existing ground level is 6.00m AOD, groundwater level is approximately 6.00 AOD.

Base level of basin specified at 4.940m AOD.

Liner level below basin specified at 3.740m AOD.

Specific weight of water = 1000 kg/m³

Specific weight of wet Sand and Gravel = 2020kg/m³ (based on SPONS 30th Edition)

Potential uplift buoyancy forces per metre: $F_{\text{uplift}} = V \times W_g = 1.0 \times (6.00\text{m} - 3.740\text{m}) \times 1000 = 2260\text{kg/m}$

Weight of wet Sand and Gravel on top of liner: $W_s = V \times W = 1.2\text{m} \times 2020 = 2424\text{kg/m}$

Therefore, resultant downforce per meter = $2424 / 2260 = \text{FOS of } 1.1$ which is deemed Acceptable.

Buoyancy calculation check for potential uplift forces for pond liner in Attenuation Basin 3 – during construction

The following calculations provide a check on the potential impact or risk of flotation to the Impermeable liner of the third attenuation basin in the south eastern corner of the site.

Based on the ground investigations and winter ground water monitoring carried out by RSK, the Maximum groundwater level is deemed to be at ground level in the area of the basin. Assuming that the existing ground level is 6.00m AOD, groundwater level is approximately 6.00 AOD.

Base level of basin specified at 4.442m AOD.

Liner level below basin specified at 3.762m AOD.

Specific weight of water = 1000 kg/m³

Specific weight of wet Sand and Gravel = 2020kg/m³ (based on SPONS 30th Edition)

Potential uplift buoyancy forces per metre: $F_{\text{uplift}} = V \times W_g = 1.0 \times (6.00\text{m} - 3.762\text{m}) \times 1000 = 2238\text{kg/m}$

Weight of wet Sand and Gravel on top of liner: $W_s = V \times W = 1.2\text{m} \times 2020 = 2424\text{kg/m}$

Therefore, resultant downforce per meter = $2424 / 2238 = \text{FOS of } 1.1$ which is deemed Acceptable.

Buoyancy calculation check for potential uplift forces for pond liner in Attenuation Swale – during construction

The following calculations provide a check on the potential impact or risk of flotation to the Impermeable liner of the attenuation swale along the southern boundary of the site.

Based on the ground investigations and winter ground water monitoring carried out by RSK, the Maximum groundwater level is deemed to be at ground level in the area of the basin. Assuming that the existing ground level is 6.00m AOD, groundwater level is approximately 6.00 AOD.

Base level of basin specified at 4.676m AOD.

Liner level below basin specified at 3.076m AOD.

Specific weight of water = 1000 kg/m^3

Specific weight of wet Sand and Gravel = 2020 kg/m^3 (based on SPONS 30th Edition)

Potential uplift buoyancy forces per metre: $F_{\text{uplift}} = V \times W_g = 1.0 \times (6.00\text{m} - 3.076\text{m}) \times 1000 = 2924 \text{ kg/m}$

Weight of wet Sand and Gravel on top of liner: $W_s = V \times W = 1.6\text{m} \times 2020 = 3232 \text{ kg/m}$

Therefore, resultant downforce per meter = $3232 / 2924 = \text{FOS of } 1.1$ which is deemed Acceptable.