

Buoyancy Calculator for a Sealed Geocellular Storage Tank per 1 square metre unit area

#18 West View Drive Yapton BN18 0JR -- Planning Application Reference Number -- Y/56/24/HH

One Newton is the amount of force needed to accelerate a one kilogram mass at a rate of one metre per second per second

This is for a unit 1 metre square of Sealed Geocellular Storage Tank

Cover Depth	400	mm
Full Height of Geocellular Tank Structure	400	mm
Calculated Depth to the Base of Geocellular Tank	800	mm BGL
Peak Groundwater Recorded	685	mm BGL
Height of the Geocellular Tank in Groundwater	115	mm

$$1 \text{ N} = 1 \text{ kg} \frac{\text{m}}{\text{s}^2}$$

Archimedes Principle

Upthrust Buoyancy Force	$\propto$	Volume of Fluid Displaced
>>> Buoyancy Force	$=$	Mass of Fluid Displaced x Acceleration due to Gravity (G)
or >>> Buoyancy Force	$=$	Density of Fluid x Volume of Fluid Displaced x 'G'

Density of normal Water	1000	kg / m ³
Volume of Water Displaced	0.115	m ³
Acceleration due to Gravity (G)	9.81	m / s ²

<u>Calculated Buoyancy Force</u>	<u>1128</u>	kg m / s ² = N
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Downward Force is Basically the Mass of the Soil Cover which is assumed to be clean silty clay

The Mass of the Geocellular Tank itself is considered to be minimal and is not included

For the purposes of calculations the worst case is when the tank is empty -- ie no rainwater being stored

Approximate Weight of clean dry soil	1.50	tons / m ³
Conversion Factor of Tons Force to Newtons	9806.65	
>>> Approximate Mass of clean dry soil	14.71	kN / m ³

<u>Approximate Downward Force of the Soil Cover</u>	<u>5884</u>	(N / m ³) * m ³ = N
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There is No Buoyancy Effect with this Groundwater Level and this Depth of Cover