Carlisle Board of Health Land Irrigation Policy

Background

The Carlisle Board of Health (BOH) has established as its policy an allowed usage of 15% of the estimated average recharge (water replenishment for the property). This is designed to insure that an adequate supply of clean, drinkable water will remain available, allowing for residential use, evaporation, transpiration, and runoff.

***This policy applies to all new or modified irrigation systems in the town of Carlisle*.** Sufficient data must be presented to the BOH to demonstrate that the proposed system uses no more than the allowable water usage as calculated per the following methodology.

- Land irrigation systems for multi-unit dwellings and businesses will be metered. Actual water usage will be reported to the Board of Health annually.
- For single residence new or modified installations, installer must provide a flow estimate (gallons/minute) for a watering zone.

Purpose

The Town of Carlisle relies on private wells for its drinking water. Because of the interconnectedness of the underground water supply, overuse or pollution of water in one location may adversely impact residents in a completely different location. This Irrigation Policy is one of multiple controls implemented by the BOH to insure that all residents will have a sustainable supply of drinking water of adequate quality and volume.

Basis values (assumptions) for irrigation design and use

Annual water recharge per acre

An acre of land (43,560 ft^2) has an estimated average recharge of 9" of water per year[1], therefore:

Annual Recharge	$\frac{\text{9 inches of water}}{\text{year}}$	X	$\frac{\text{1 foot}}{\text{12 inches}}$	X	$\frac{43{,}560 ft^2}{\text{acre}}$	=	**$\frac{32{,}670 ft^3}{\text{acre}}$**
Each acre receives as recharge	$\frac{32{,}670 ft^3}{\text{acre}}$	X	$\frac{\text{7.481 gallons}}{ft^3}$	=	**$\frac{\text{244,404 gallons}}{\text{year}}$**		
or	$\frac{\text{244,404 gallons}}{\text{year}}$	X	$\frac{\text{1 year}}{\text{365 days}}$	=	**$\frac{\text{670 gallons}}{\text{day}}$**		

[1]This estimate comes from the Horsley Witten Group memo to the Carlisle Board of Health, dated March 14, 2016 (from Scott Horsley, *re: Board of Health Regulations – Septic Systems and Protection of Drinking Water*

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Example 1 - Estimated Irrigation Performance

Water usage rate for each irrigation head varies between:
Low: 0.64 gallons per minute (GPM) @ 30 psi
High: 3.4 GPM @ 50 psi
Estimated average water usage rate per irrigation head – 2 GPM
Estimated number of irrigation heads per watering zone – 5 heads
Estimated number of irrigation watering zones – 5 zones
Estimated run time per zone – 0.5 hours

Water usage rate per zone (if zone has 5 heads):	2 gallons / minute (per head)	X	5 heads / zone	=	**10 gallons / minute (per zone)**		
Water usage per zone for 0.5 hour runtime per day:	10 gallons / minute (per zone)	X	0.5 hour / zone	X	60 min / hour	=	**300 gallons / zone**
Water usage per day of irrigation use	5 irrigation zones	X	300 gal / zone	=	**1500 gallons / day**		

Example 2 – Allowable Annual Irrigation Use for a 2 Acre Lot Using the System Shown in Example 1

If the homeowner has an average irrigation system with 5 zones of 5 heads each, and irrigation heads that distribute 2 gallons per minute, with the system on for 0.5 hours per zone:

Allowable annual water use (2 acres)	244,404 gallons / year	X	2 acres	X	0.15	=	**73,322 gallons / year**
Maximum number of annual irrigation days:	73,322 gallons / year	X	day / 1500 gallons	=	**49 days / year**		