

Wingate Residences Haverhill
Recharge Calculation
 Revised June 2016

Required Recharge

Area Summary	
	Area (SF)*
Existing Impervious	89,381
Proposed Impervious	194,704
Required Recharge Area (Proposed - Existing)	105,323

* Areas calculated in HydroCAD

Note: Site consists of both HSG B and C soils; therefore, HSG B will be used to calculate the required recharge volume, providing a more conservative value.

Hydrologic Soil Group Summary		
Group	Target Depth Factor (in)	Area (SF)
A	0.6	0
B	0.35	105,323
C	0.25	0
D	0.1	0

Required Recharge (Rv) Calculation:
$Rv = \text{Target Depth Factor} \times \Delta \text{ Imp Area}$
$Rv = 0.35 \times (1/12) \times 105,323$
$Rv = 3,072 \text{ CF}$

Proposed Recharge Locations (detailed storage calcs included on following page)	
Location	Impervious Area Inflow (SF)*
Stormwater Basin 1 (5P)	53,464
Stormwater Basin 2 (6P)	16,182
Total	69,646

Impervious Area Ratio
Req'd Recharge Area = 105,323 SF
Impervious Area into Basins = 69,646 SF
Ratio = 1.51

* Areas calculated in HydroCAD

Adjusted Required Recharge (Rv) Calculation:
$Rv_{adj} = Rv \times \text{Impervious Area Ratio}$
$Rv_{adj} = 3,072 \times 1.51$
$Rv_{adj} = 4,646 \text{ CF}$

Proposed Recharge Volume Summary	
Location	Volume (CF)
Stormwater Basin 1 (Pond 5P)	18,497
Stormwater Basin 2 (Pond 6P)	15,749
Total	34,246

$Rv_{adj} = 4,646 \text{ CF}$
 Provided recharge = 34,246 CF

Recharge Requirement is met.

Proposed Recharge

Stormwater Basin 1 (Pond 5P)

Bottom of Basin elevation	103.00	FT
Weir elevation	105.65	FT
Storage Height	2.65	FT
Area @ Bottom of Basin	5,534	SF
Area @ Weir	8,426	SF
Storage Area = $(5,534 \text{ SF} + 8,426 \text{ SF}) / 2 =$	6,980	SF
Storage Volume = Storage height x Storage Area =	18,497	CF

Stormwater Basin 2 (Pond 6P)

Bottom of Basin elevation	103.10	FT
Weir elevation	105.80	FT
Storage Height	2.70	FT
Area @ Bottom of Basin	4,240	SF
Area @ Weir	7,426	SF
Storage Area = $(4,240 \text{ SF} + 7,426 \text{ SF}) / 2 =$	5,833	SF
Storage Volume = Storage height x Storage Area =	15,749	CF

Wingate at Haverhill
Drawdown Calculation
Revised June 2016

-- Maximum drawdown time is 72 hours --

Time to drawdown calculation

$$\text{Time} = \frac{Rv}{k * \text{bottom area}}$$

where,

Rv = storage volume

k = saturated hydraulic conductivity rate

bottom area = average surface storage area of recharge structure

Proposed Storage Drawdown Calculations

Stormwater Basin (5P)		
Net storage volume	18,497	CF
Bottom area	5,534	SF
k	1.02	in/hr *
Time =	39.32	hours
<i>Proposed drawdown time is acceptable.</i>		

* Rawl's Rate for sandy loam

Stormwater Basin (6P)		
Net storage volume	15,749	CF
Bottom area	4,240	SF
k	1.02	in/hr *
Time =	43.70	hours
<i>Proposed drawdown time is acceptable.</i>		

* Rawl's Rate for sandy loam