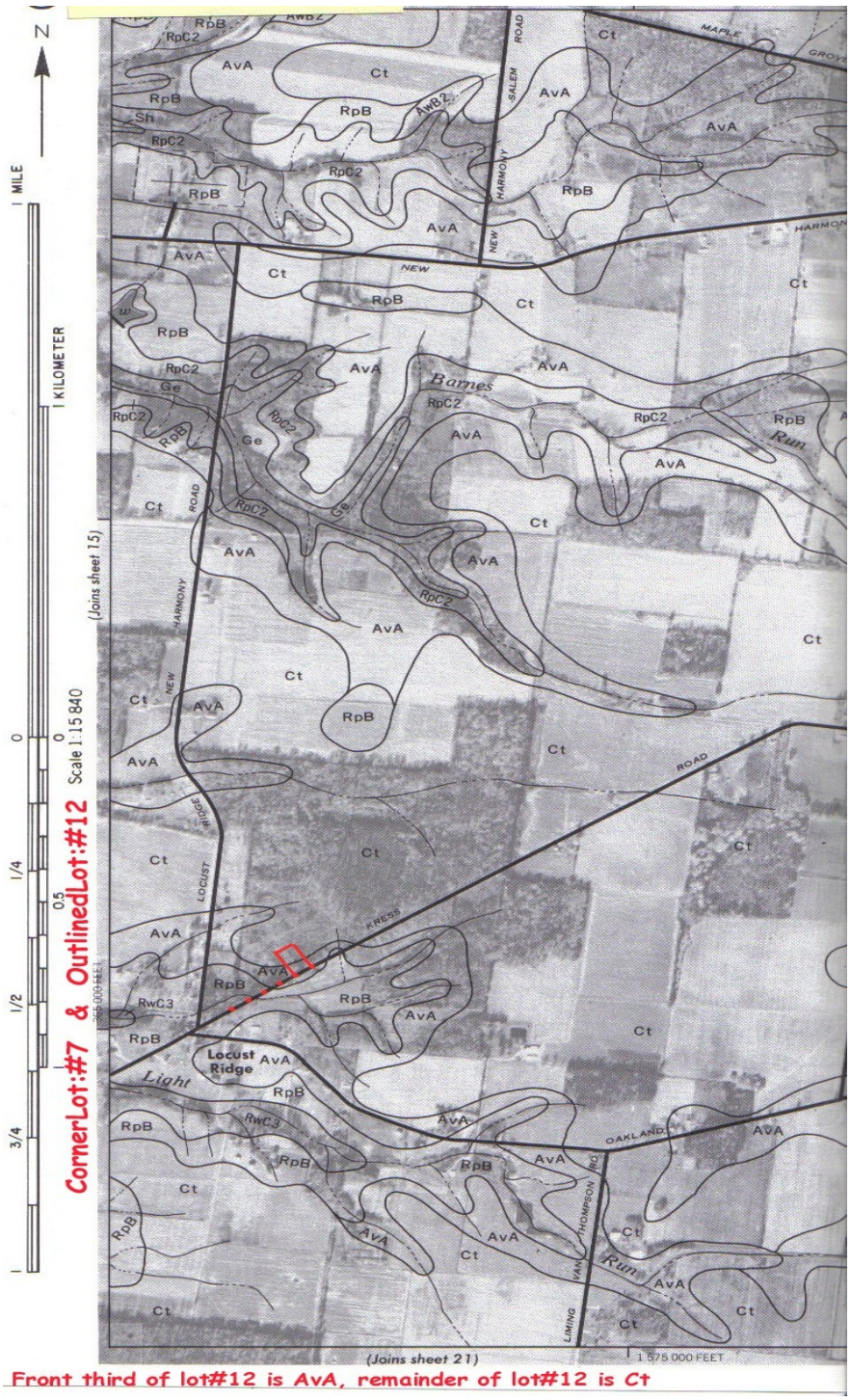

Map above was scanned from the **Soil and Water Conservation Maps** of Brown County, and annotated with information from the **surveyor's data** on the realtor's documentation, which drawings and elevations were in turn taken from the **BrownCounty Recorder**'s data for **Indian Woods**.

Note that our lot#12 (as well as lot#11) is in the **heavily woodsy** area and is **quite level** once you are beyond the road right-of-way granted to SCP and likely BCRWA. Also, as noted on the map, there are basically soils of the **Clermont Clay** type and **Avonburg** type, which we have used in customizing this experimental design.

The next table is an annotated version of the **Physical and Chemical Properties of the Soils** pages for the Avonburg and Clermont soils in the Soil and Water Conservation book.

For the distribution area we chose the Avonburg area of the lot, on the edge of the front woodsy area bordering the more private side of the front house clearing. **Since the depths of the observation pond and the stonecreek cells for returning the water to the ground are relatively shallow, we have highlighted the Avonburg data for the 0-8in and 8-29in levels.**

Permeability there is relatively moderate in those levels and **pH** is slightly acid for most of the depths.

Brown County, Ohio 1.85 g/cc ≈ 117 pcf

TABLE 17.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
Ag	0-5	15-27	1.20-1.45	0.6-2.0	0.16-0.20	6.1-7.3	Low	0.37	5	6	2-
Algiers	5-49	20-35	1.25-1.65	0.6-2.0	0.16-0.20	6.1-7.8	Low	0.37			
	49-60	0-5	1.60-1.70	2.0-6.0	0.02-0.04	6.1-8.4	Low	0.10			
AtC2	0-6	30-40	1.40-1.60	0.06-0.2	0.21-0.23	4.5-7.3	High	0.43	3	7	.5-
Atlas	6-58	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High	0.32			
	58-80	20-30	1.55-1.80	0.06-0.2	0.12-0.15	6.1-7.8	Moderate	0.32			
AvA	0-8	10-18	1.30-1.45	0.6-2.0	0.20-0.24	4.5-7.3	Low	0.43	4	5	.5-
Avonburg	8-29	22-30	1.35-1.50	0.6-2.0	0.18-0.20	4.5-5.5	Moderate	0.43			
[Distribution Area]	29-45	22-30	1.60-1.85	<0.06	0.06-0.08	4.5-5.5	Moderate	0.43			
	45-80	14-30	1.50-1.70	<0.06	0.06-0.10	4.5-8.4	Moderate	0.43			
AwB2*:											
Avonburg	0-6	10-18	1.30-1.45	0.6-2.0	0.20-0.24	4.5-7.3	Low	0.43	4	5	.5-
	6-31	22-30	1.35-1.50	0.6-2.0	0.18-0.20	4.5-5.5	Moderate	0.43			
	31-80	14-30	1.50-1.70	<0.06	0.06-0.10	4.5-8.4	Moderate	0.43			
Atlas	0-6	30-40	1.40-1.60	0.06-0.2	~~4.5-7.3~~	4.5-7.3	High	0.43	3	7	.5-
	6-58	35-45	1.50-1.70	<0.06	0.09-0.13	4.5-7.3	High	0.32			
	58-80	20-30	1.55-1.80	0.06-0.2	0.12-0.15	6.1-7.8	Moderate	0.32			
Bc	0-8	15-30	1.30-1.55	0.6-2.0	0.19-0.24	4.5-6.5	Low	0.37	4	6	1-
Blanchester	8-40	25-35	1.45-1.65	0.06-0.2	0.14-0.22	4.5-6.0	Moderate	0.37			
	40-80	30-45	1.45-1.70	<0.2	0.13-0.20	4.5-7.3	High	0.37			
	80-90	32-48	1.50-1.80	<0.2	0.07-0.18	6.6-8.4	High	0.37			
BoD2	0-6	15-25	1.30-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	5	1-
Bonnell	6-30	40-60	1.50-1.70	0.06-0.2	0.09-0.13	4.5-6.0	High	0.32			
	30-60	25-40	1.45-1.60	0.2-0.6	0.08-0.15	6.1-8.4	Moderate	0.32			
BoE, BoF	0-8	15-25	1.30-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	3	5	1-
Bonnell	8-30	40-60	1.50-1.70	0.06-0.2	0.09-0.13	4.5-6.0	High	0.32			
	30-60	25-40	1.45-1.60	0.2-0.6	0.08-0.15	6.1-8.4	Moderate	0.32			
BrD3	0-5	27-32	1.30-1.50	0.2-0.6	0.21-0.23	4.5-7.3	Moderate	0.43	3	7	.5-
Bonnell	5-27	40-60	1.50-1.70	0.06-0.2	0.09-0.13	4.5-6.0	High	0.32			
	27-60	25-40	1.45-1.60	0.2-0.6	0.08-0.15	6.1-8.4	Moderate	0.32			
ChF	0-6	5-18	1.30-1.50	0.6-2.0	0.14-0.18	4.5-7.3	Low	0.32	4	5	1-
Chili	6-39	18-27	1.30-1.55	2.0-6.0	0.09-0.16	4.5-6.5	Low	0.32			
	39-46	5-18	1.30-1.55	2.0-6.0	0.06-0.12	5.1-6.5	Low	0.17			
	46-65	1-10	1.25-1.50	6.0-20	0.02-0.08	5.1-7.8	Low	0.10			
CnC2	0-8	18-27	1.30-1.50	0.6-2.0	0.22-0.24	4.5-7.3	Low	0.43	4	6	1-
Cincinnati	8-27	22-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-5.5	Low	0.37			
	27-36	25-35	1.60-1.85	0.06-0.6	0.08-0.12	4.5-6.5	Moderate	0.37			
	36-72	25-40	1.55-1.75	0.06-0.6	0.08-0.12	4.5-6.5	Moderate	0.37			
	72-80	25-40	1.55-1.75	0.06-0.6	0.08-0.12	6.1-8.4	Moderate	0.37			
Ct	0-7	15-25	1.30-1.50	0.2-0.6	0.22-0.24	4.5-5.5	Low	0.43	5	6	1-
Clermont	7-15	15-25	1.35-1.55	0.06-0.2	0.20-0.22	3.6-5.5	Low	0.43			
[Constructed Wetlands area]	15-31	24-35	1.45-1.65	<0.06	0.18-0.22	3.6-5.5	Moderate	0.43			
	31-56	32-40	1.50-1.70	<0.06	0.15-0.20	4.5-7.3	Moderate	0.37			
	56-80	35-45	1.50-1.70	<0.06	0.10-0.18	4.5-7.3	Moderate	0.37			

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See footnote at end of table.

The **Constructed Wetlands** was selected to be in the **Clermont Clay** area because of the advantages of reduction of infiltration of the wetlands with groundwater, eliminating the need for a liner. Clearly the highlighted **permeability at the depths of the wetlands affected by groundwater is exceedingly low**, **namely under 0.06 inches per hour**, making the wetlands basically isolated and reducing the complications of construction. Appropriately also, the **Clermont soil tends to be rather acid, balancing the usual alkalinity of the greywater** to be sent through the wetlands for remediation.

The other concern on placement is the existence of typical **Brown County limiting condition**s. For this purpose, we have the Soil and Water Features pages of the Brown County Soil and Water Conservation book, here.

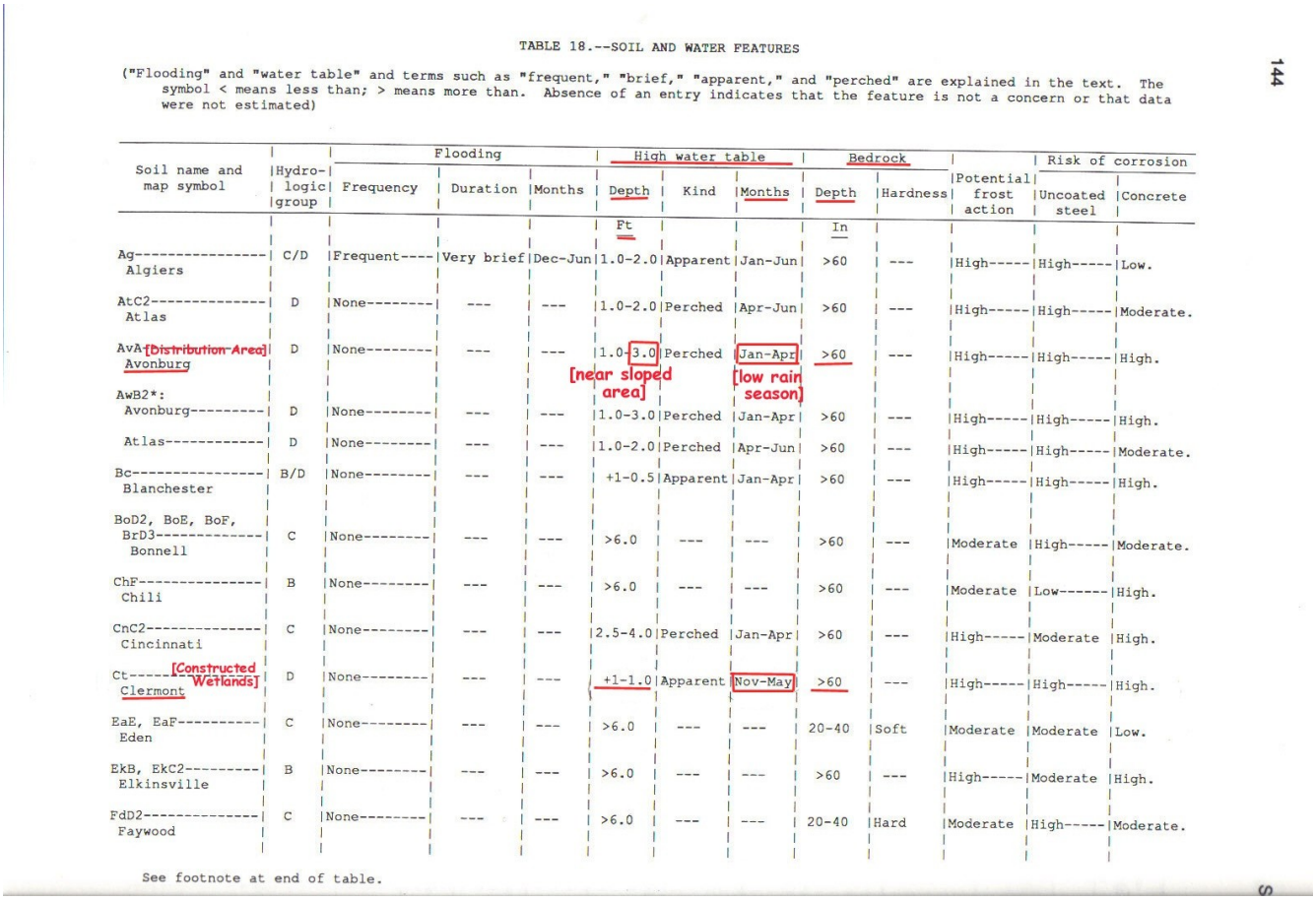

TABLE 18.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

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Soil name and map symbol	Hydrologic group	Flooding: Frequency	Flooding: Duration	Flooding: Months	High water table: Depth	High water table: Kind	High water table: Months	Bedrock: Depth	Bedrock: Hardness	Potential frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
					Ft			In				
Ag---- Algiers	C/D	Frequent----	Very brief	Dec-Jun	1.0-2.0	Apparent	Jan-Jun	>60	---	High-----	High-----	Low.
AtC2---- Atlas	D	None--------	---	---	1.0-2.0	Perched	Apr-Jun	>60	---	High-----	High-----	Moderate.
AvA [Distribution Area] Avonburg	D	None--------	---	---	1.0-3.0 [near sloped area]	Perched	Jan-Apr [low rain season]	>60	---	High-----	High-----	High.
AwB2*: Avonburg----	D	None--------	---	---	1.0-3.0	Perched	Jan-Apr	>60	---	High-----	High-----	High.
Atlas----	D	None--------	---	---	1.0-2.0	Perched	Apr-Jun	>60	---	High-----	High-----	Moderate.
Bc---- Blanchester	B/D	None--------	---	---	+1-0.5	Apparent	Jan-Apr	>60	---	High-----	High-----	High.
BoD2, BoE, BoF, BrD3---- Bonnell	C	None--------	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
ChF---- Chili	B	None--------	---	---	>6.0	---	---	>60	---	Moderate	Low------	High.
CnC2---- Cincinnati	C	None--------	---	---	2.5-4.0	Perched	Jan-Apr	>60	---	High-----	Moderate	High.
Ct---- [Constructed Wetlands] Clermont	D	None--------	---	---	+1-1.0	Apparent	Nov-May	>60	---	High-----	High-----	High.
EaE, EaF---- Eden	C	None--------	---	---	>6.0	---	---	20-40	Soft	Moderate	Moderate	Low.
EkB, EkC2---- Elkinsville	B	None--------	---	---	>6.0	---	---	>60	---	High-----	Moderate	High.
FdD2---- Faywood	C	None--------	---	---	>6.0	---	---	20-40	Hard	Moderate	High-----	Moderate.

See footnote at end of table.

For both locations, the bedrock is more than 60 inches deep and no concern for limits.

The **Avonburg** groundwater data is favorable to dispersion of clean water into the soil with much greater ease than most Brown county soils in our area. We hypothesized that the depth of winter groundwater was in the deeper range because of the sloping area beyond the strip of woods at the edge of this location. Hence the **3.0ft depth is quite good for sanitation and conservation purposes.**

And furthermore, **the timetable for high groundwater is shorter AND comes during the months of the year when rain is less frequent and less heavy, making the ground more receptive than would be the case in the early spring.**

All signs look favorable to **this area for dispersing clean water, treated water to either TS4 or TS5,**

which are basically body-contact safe and permitted for easy dispersing to ground and surface water.

Although the **constructed wetlands** are in the **Clermont Clay,** which has a **high groundwater table from November to May, this is not inappropriate for a wetlands, natural or constructed**, as long as the pumping from the collection area for TS4 or TS5 water coming from remediation in the wetlands, is not excessive which would mean a lot of (non-greywater) groundwater would be flooding the processing and upsetting the microbes. Because the permeability is so low, **the influx of groundwater, being limited by both a stormwater-stonecreek for the upper levels and by the permeability itself in general**, was hoped to be minimized. Two years of observation have shown that this hope is not vain. The pump generally runs about twice a day, just like in the summer when there is no drought. Drought reduces the pumping to once a day, meaning the designed-for greywater is being processed as planned for appropriate flows from the house.

So with our perfect score as an installer at OTCO in hand and with our other reams of data and calculations, we began the EXPERIMENT. Since we were both the owner and the installer, we did not require the County's documentation fee for paperwork as an 'installer' at least. Since we were inventing this version, of necessity, we proceeded. Being both designer and installer. No manufacturing required, yet.