2.3 Soil Data

The biggest factors in determining which LID SWMF will work best at your site are the soil characteristics. More specifically your soil's permeability rate (K), hydraulic soil group (HSG) and the depth of the seasonal high groundwater (SHGW). Permeability is the soil's ability to allow water to move through it. Infiltration is the movement of water through the soil and is the component of rainwater that recharges groundwater. Infiltration rates are highly dependent on the soil structure and slope of the land. By following the steps presented in the next few sections, the information that is gathered should provide sufficient soil data for projects associated with small single-family residential stormwater requirements in Walton County.

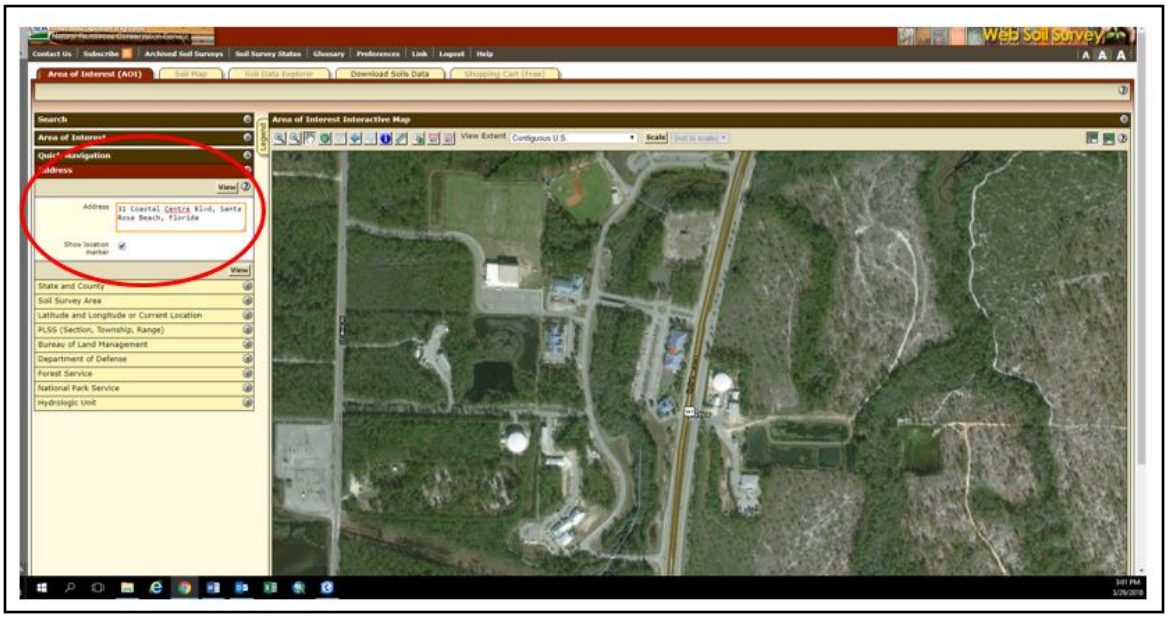
2.3.1 Hydraulic Soil Groups, Infiltration Rate, and SHGW

Stormwater systems should be designed to mimic the natural hydrologic functioning of a site. The hydrologic soil groups, as classified by the Natural Resource Conservation Service (NRCS) are as follows: Types A (well drained), A/D (well drained when dry, not well drained when wet), B/D (moderately well drained when dry, not well drained when wet), B (moderately well drained), C (somewhat poorly drained), and D (poorly drained). Most soils in South Walton County are A/D (60%) and A (25%). These are both well-draining, mostly sandy soils. Soil type A/D is generally located in areas with high to very high water tables, limiting the type of SWMF you can implement. Performance of infiltration-dependent LID applications will be constrained under wet conditions in areas with this soil type.

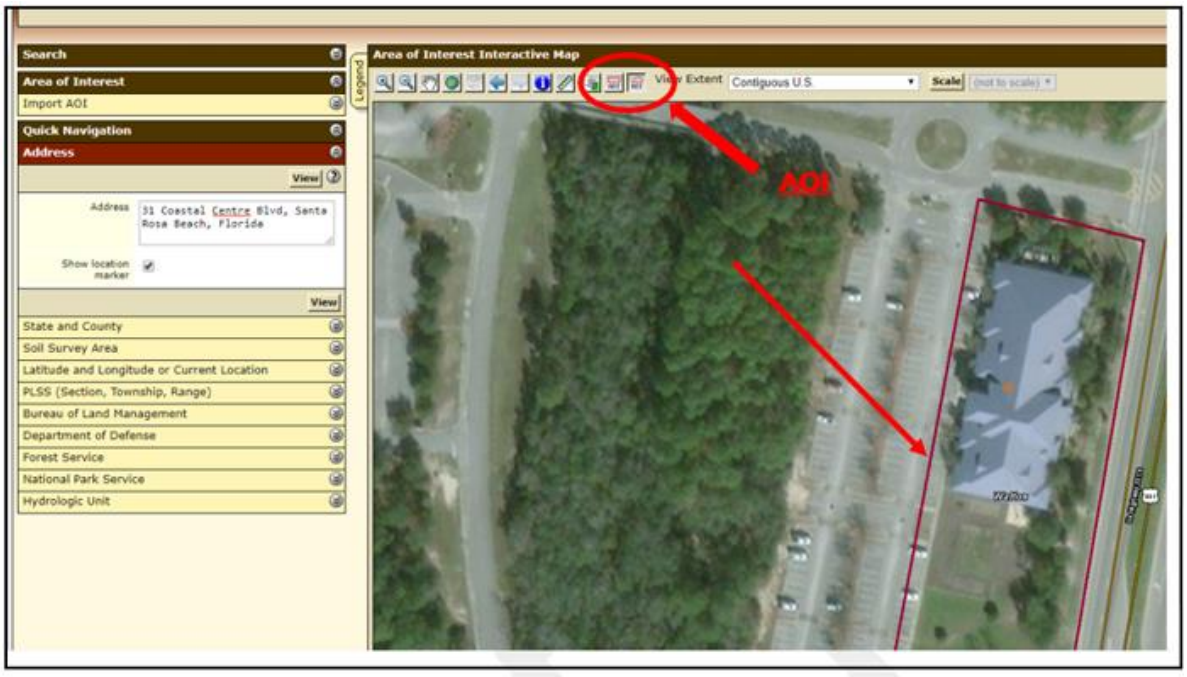
To gather site-specific information for your permit application start by going to the following Web Soil Survey page: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Look up your address on the following webpage and find the soil information needed to complete the drainage design.

1. Go to the Web Soil Survey page, under the left side "Quick Navigation" click on "Address" and enter your site address, click "View". If you don't have an address pan and zoom to the location of your parcel or use one of the other search options available.

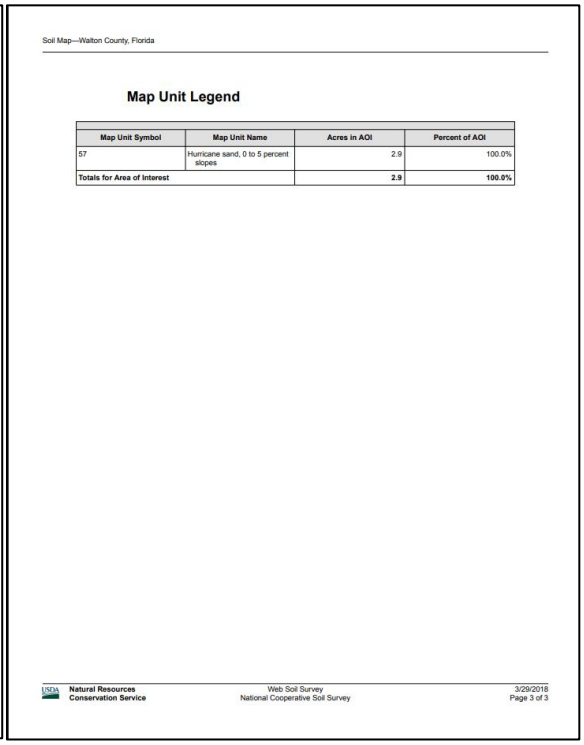


2. Use the top menu bar to zoom to your site, and then use the “AOI” (Area of Interest) buttons to delineate your site. Double click to close the polyline and execute the command.

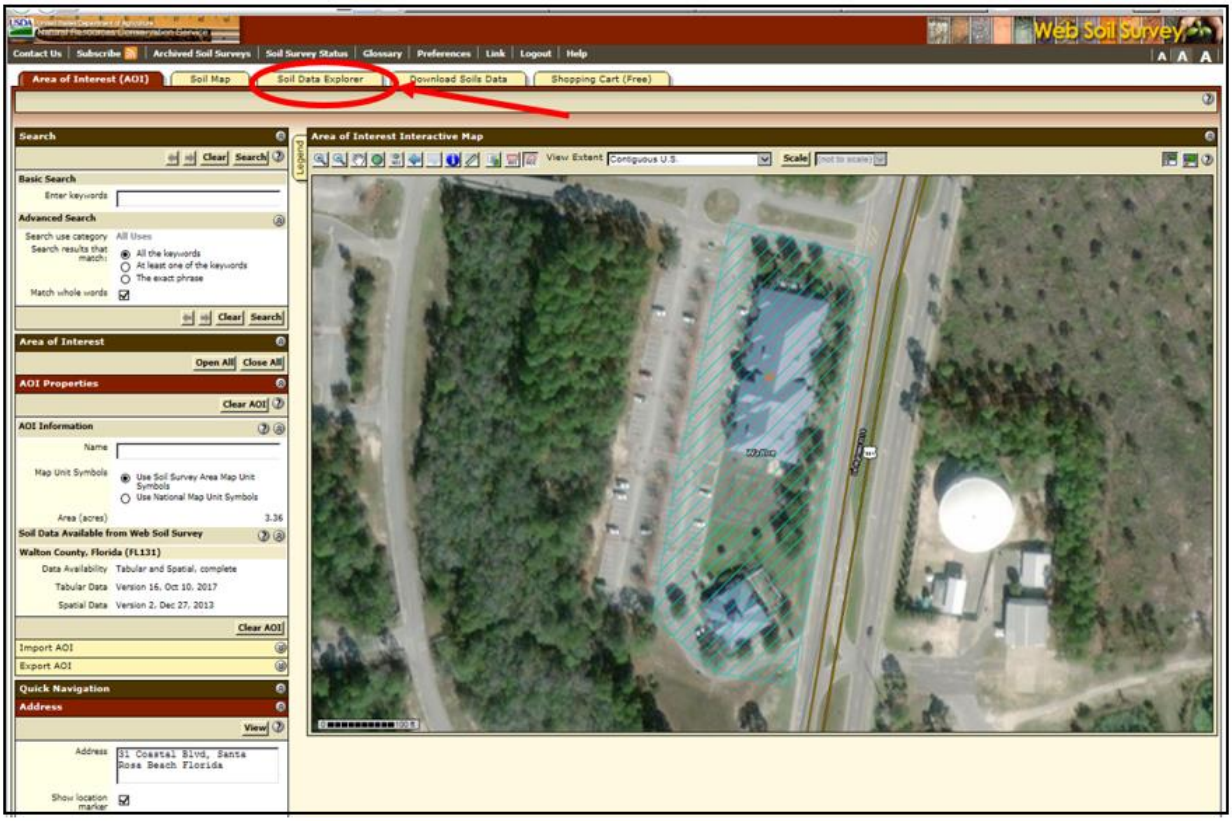


3. Go to the “Soil Map” tab and print the report for your record.

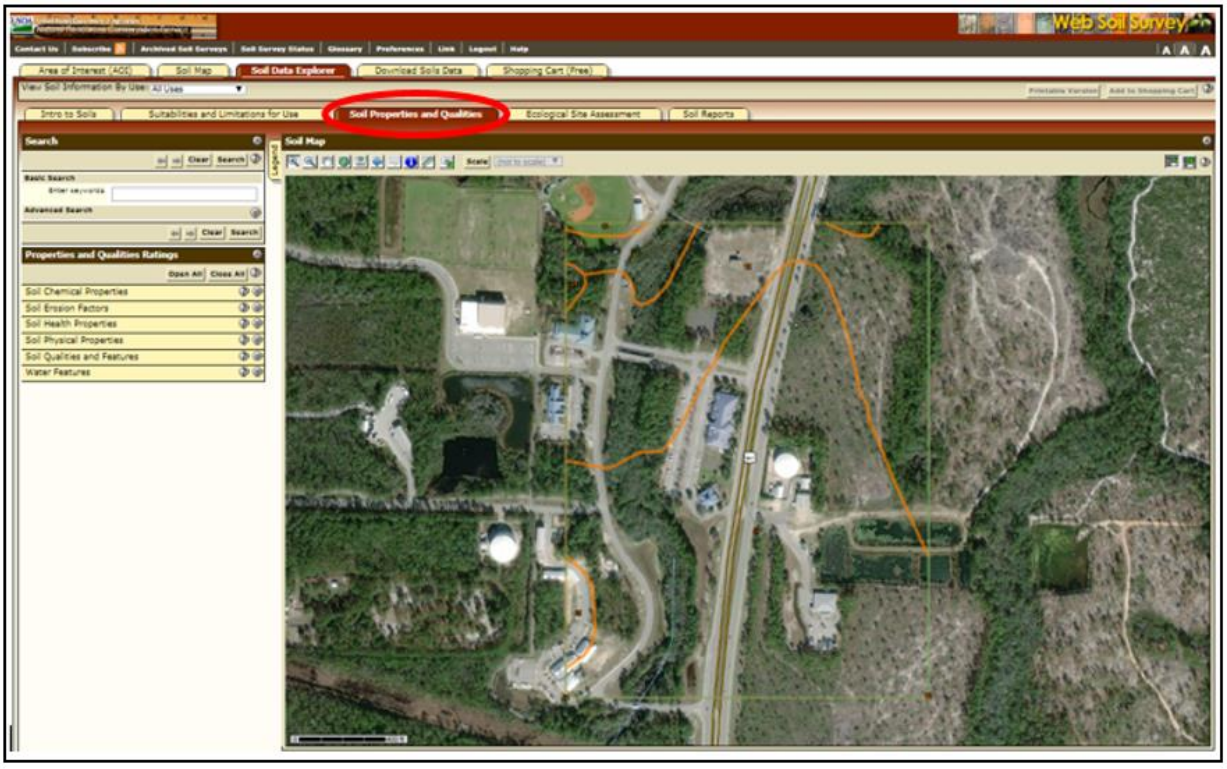
reminder Please print this report, as you will need to provide this with your application. The information on this report is key to your upcoming calculations/design.



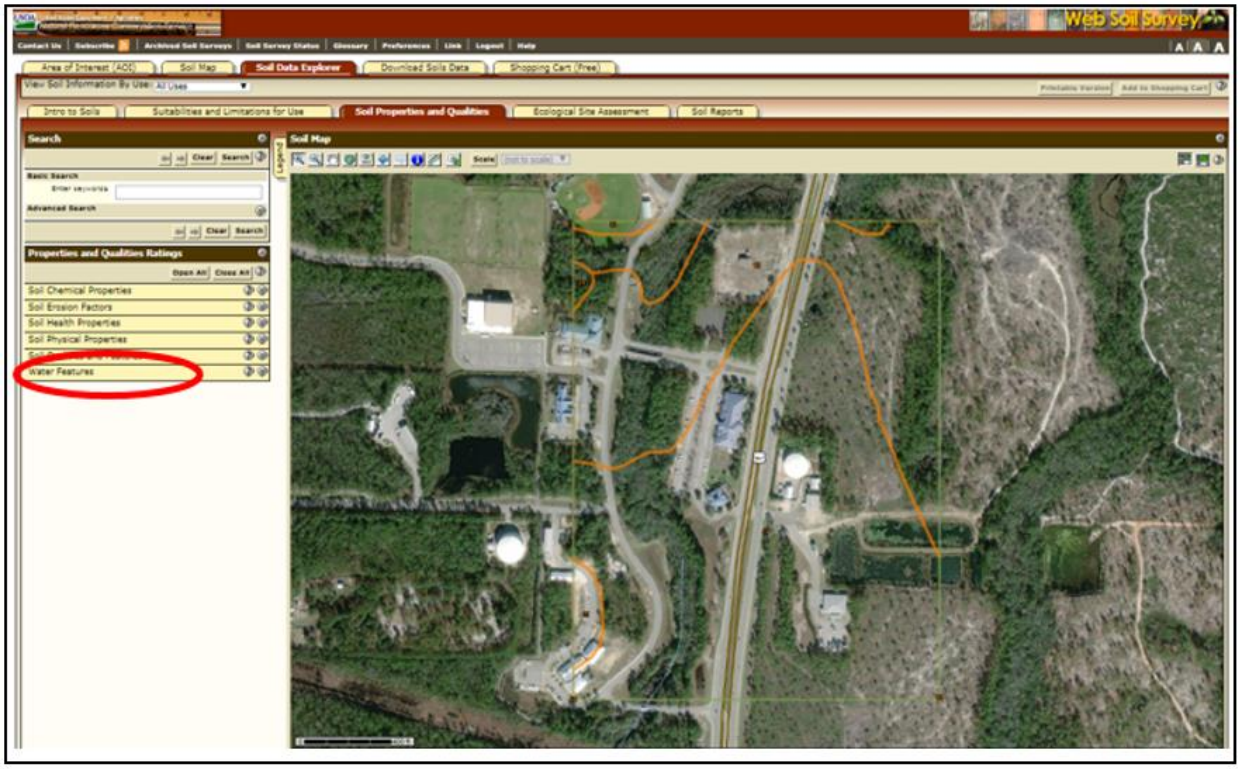
4. Next Click on “Soil Data Explorer” located on the top of the screen.



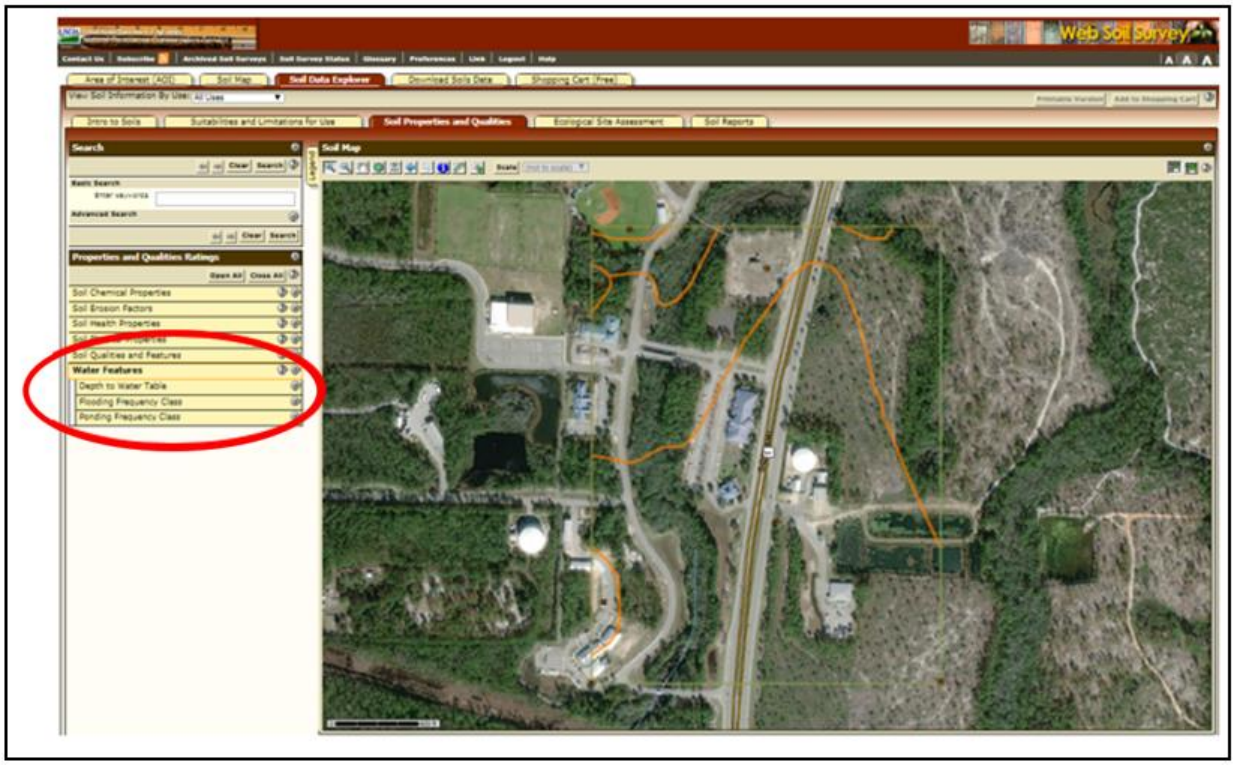
5. The subsurface drainage characteristics for your property can be accessed in the web soil survey under the “Soils Properties and Qualities” tab.



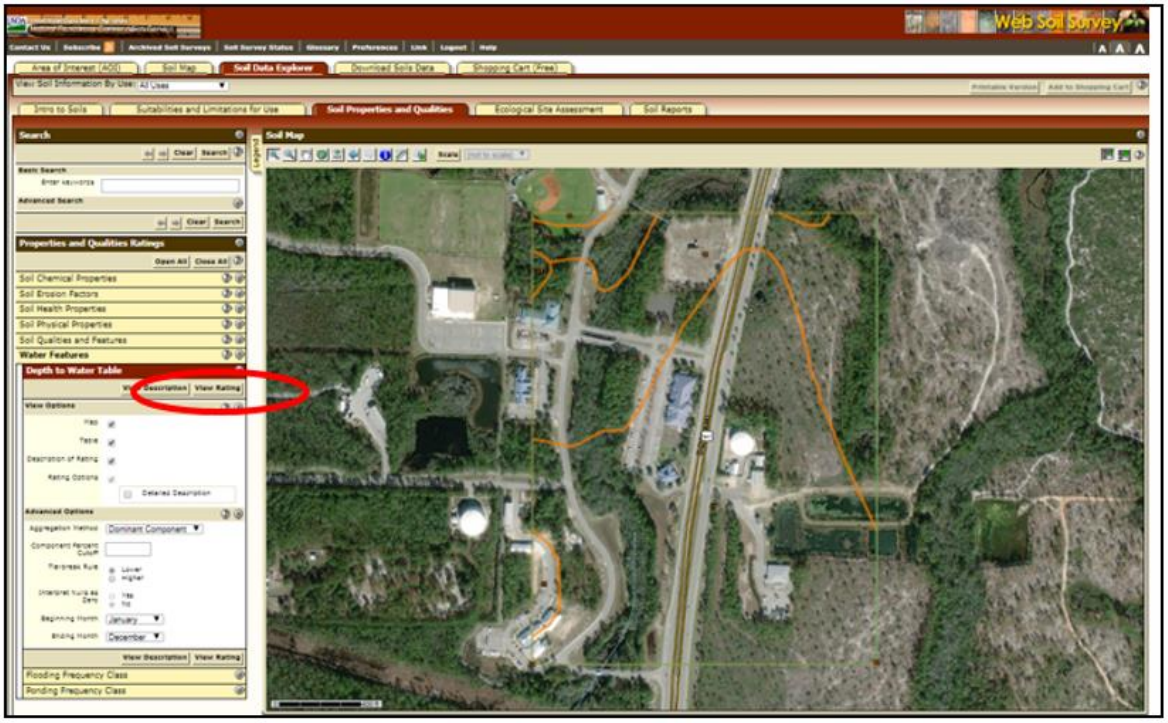
6. Expand the “Water Features” drop down menu located on the left hand side of the screen.



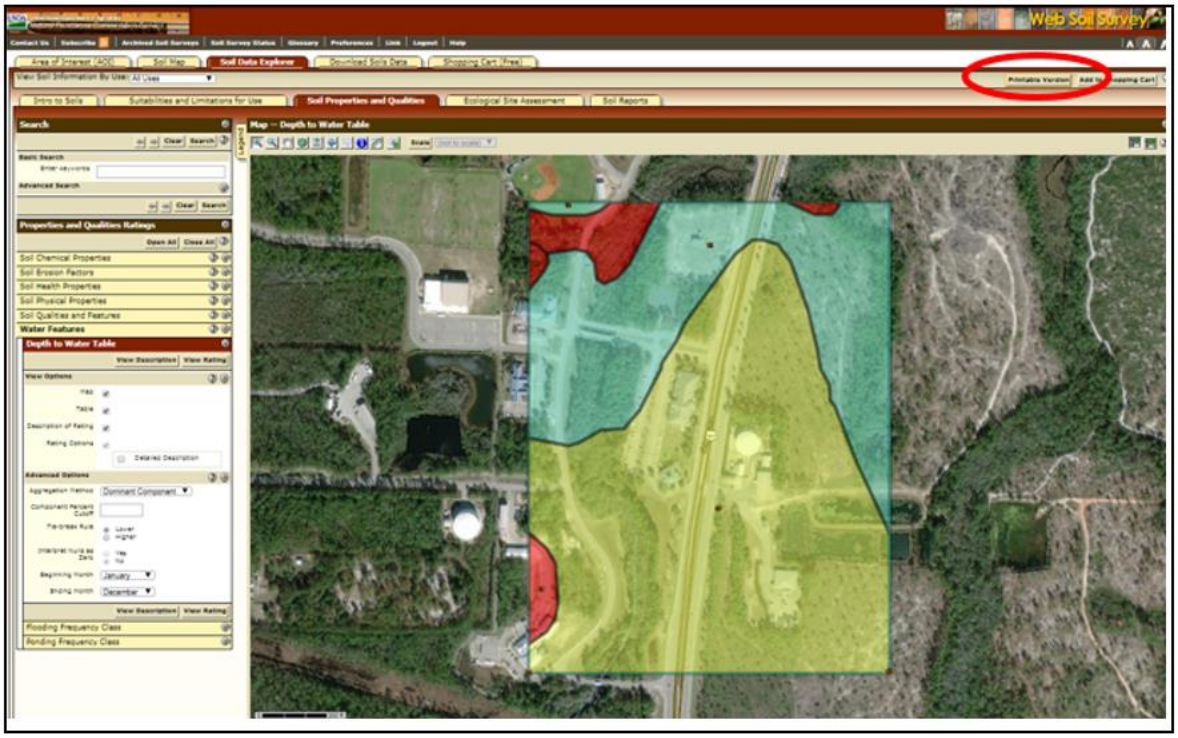
7. Expand the “Depth to Water Table” tab.



8. Click on “View Rating”



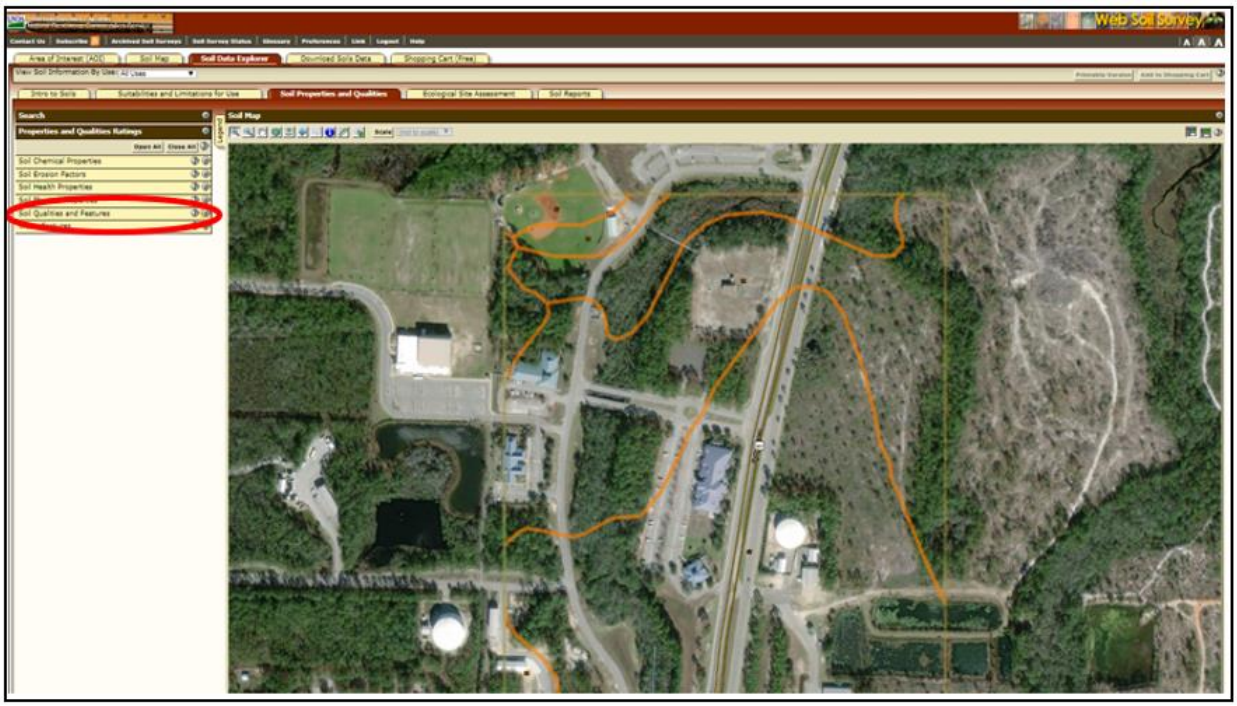
9. Print out the map to include in the application packet by clicking on the “Printable Version” on the top right corner.



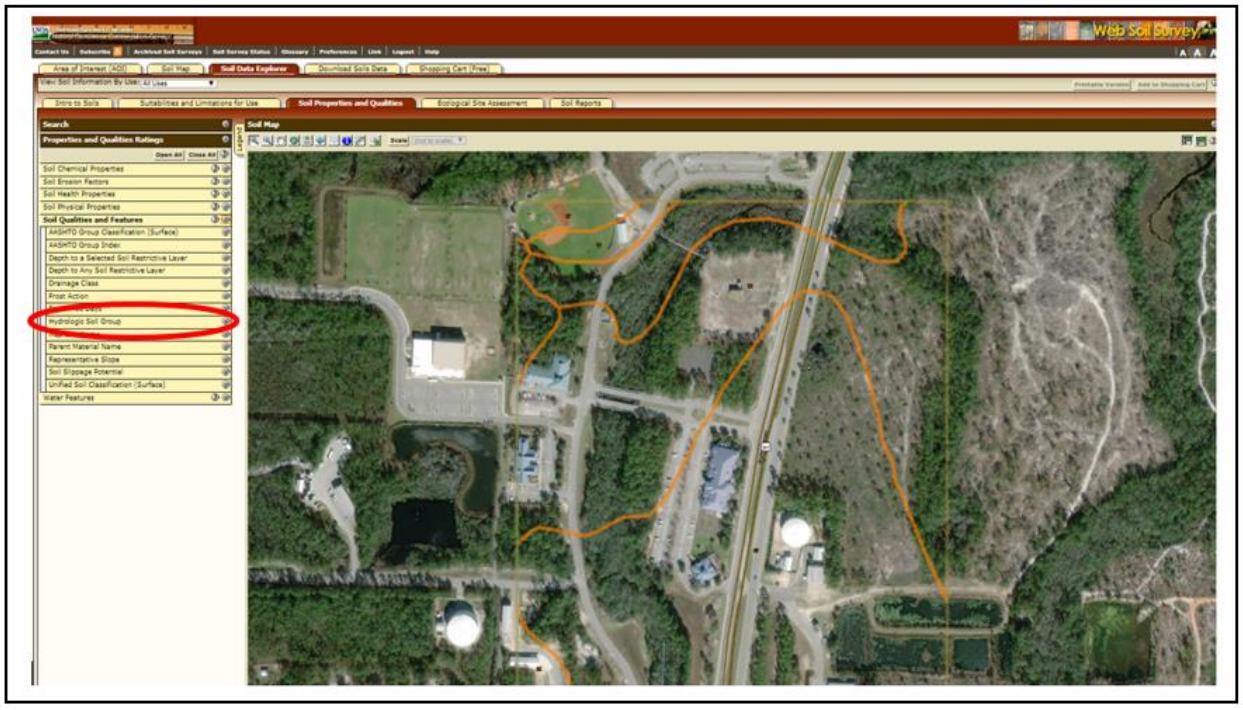
reminder Please print this report, as you will need to provide this with your application.

Next, you will determine the HSG that is associated with your property. The HSG will provide information associated with how fast water will drain (permeability / infiltration) from the LID SWMF that you choose to implement.

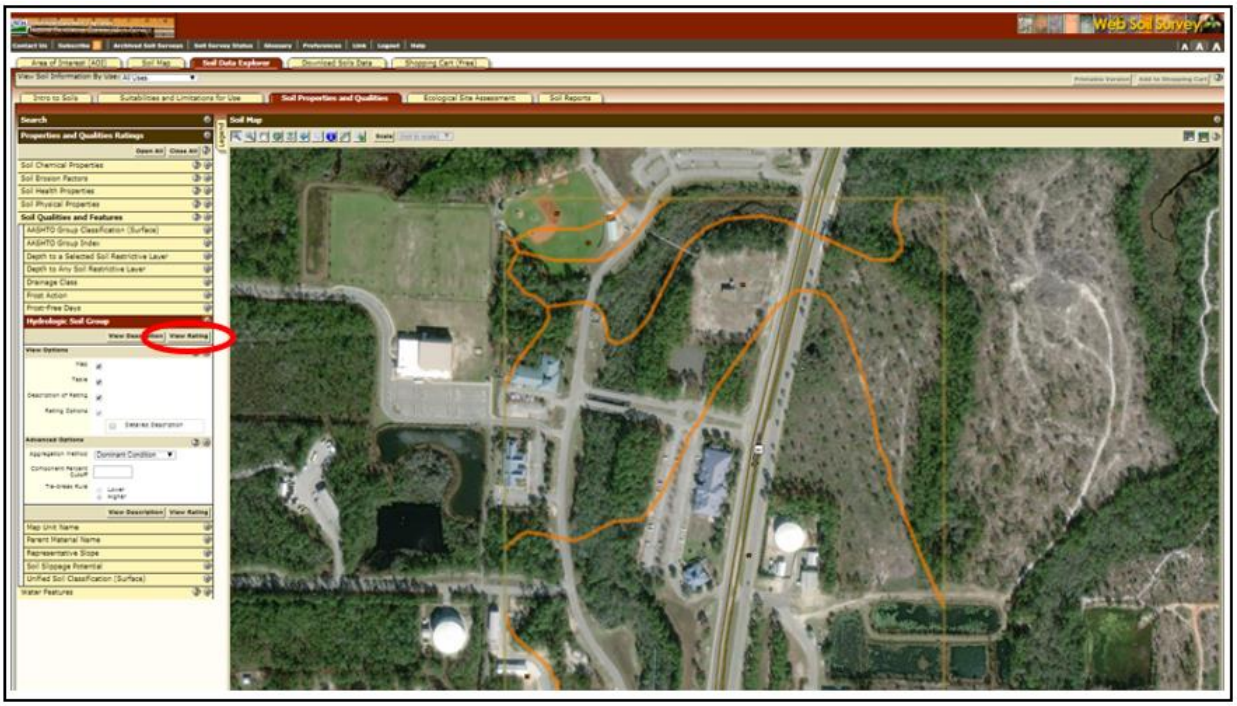
10. Click on “Soil Qualities and Features” located on the left side of the screen to expand the drop down menu.



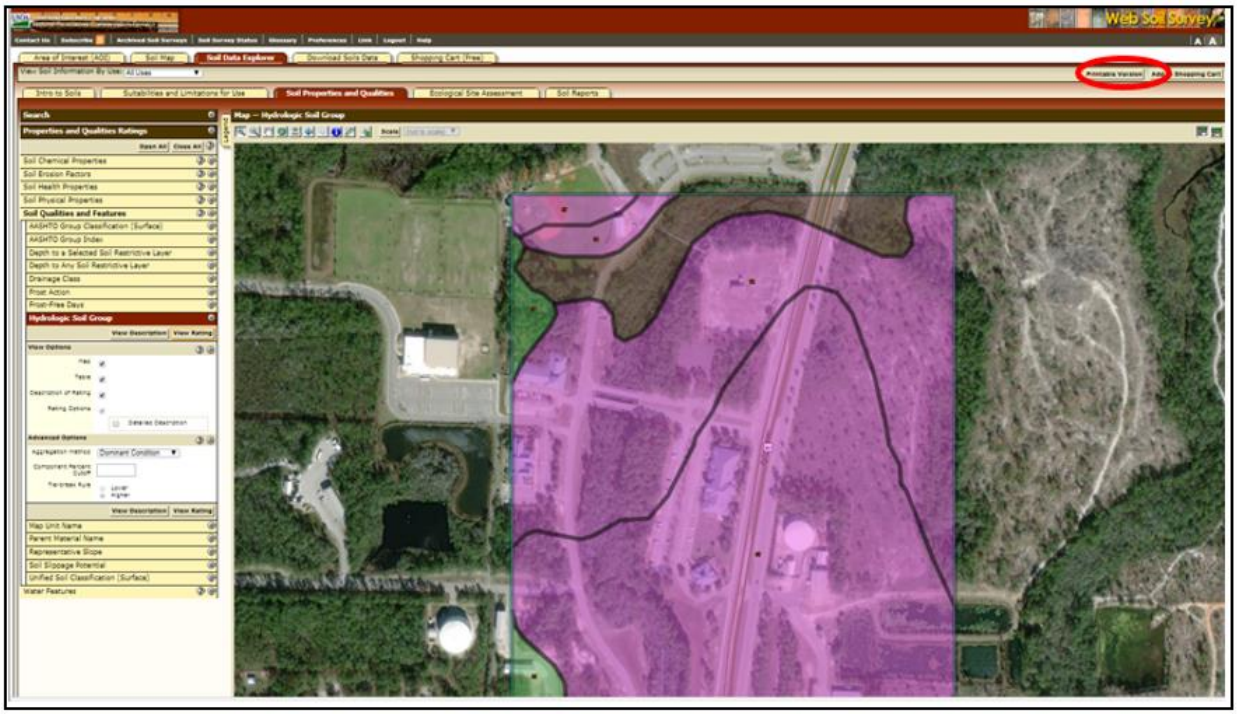
11. Click on “Hydrologic Soil Group” located on the left side of the screen.



12. Once this expands, click on “View Rating”.



The map should depict the hydrologic soils group. Next click on printable version and include it in the application. You will use this information in Section 2.4.3 to help you determine how fast your LID SWMF will drain (recovery rate).



reminder Please print this report, as you will need to provide this with your application.

Find the Soil Map Unit Number(s) on your report to determine the soil types at the location of the SWMF. Once you have identified the permeability of your soil you can determine how long it will take the chosen LID SWMF to drain; this is known as the recovery rate or recovery time. **Table 3** provides permeability rates associated with the different soil types identified in Walton County.

All LID SWMFs will not function the same way and most are highly dependent on the type of soil and the depth to groundwater. The permeability of soil determines how fast water will be absorbed into the ground. Soil permeability rates may dictate which LID approach will work the best for your project. If you have any questions regarding the applicability of one LID SWMF over another, please contact the Walton County Planning Department for assistance.

Table 3. NRCS Soil Data

Map Unit Symbol	Map Unit Name	HSG	SHGW Elevation (SHGW)	High Water Season	Permeability Rate (Ksat)
5	Chipley sand, 5 to 8 % slopes	A	-2 feet	Dec - Apr	6 in/hr
8	Dorovan-Pamlico association, frequently flooded	B/D	0 (at surface)	Jan – Dec	0.6 in/hr
12	Foxworth sand, 0 to 5 percent slopes	A	-3.5 feet	Jun – Oct	20 in/hr
16	Kureb sand, 0 to 8 percent slopes	A	-5 feet	----	6 in/hr
17	Lakeland sand, 0 to 5 percent slopes	A	-5 feet	----	6 in/hr
18	Lakeland sand, 5 to 12 percent slopes	A	-5 feet	----	6 in/hr
19	Lakeland sand, 12 to 30 percent slopes	A	-5 feet	----	6 in/hr
21	Leon sand, 0 to 2 percent slopes	A/D	0 (at surface)	Jun – Feb	0.6 in/hr
27	Rutlege fine sand, 0 to 2 percent slopes	A/D	0 (at surface)	Dec – May	6 in/hr
30	Tifton fine sandy loam, 5 to 8 percent slopes	B	-3.5 feet	Jan – Feb	0.6 in/hr
36	Pits	-	On-site test	On-site test	On-site test
45	Direго muck, frequently flooded	A/D	0 (at surface)	Jan – Dec	6 in/hr
49	Eglin sand, 0 to 5 percent slopes	A	-5 feet	----	6 in/hr
50	Mandarin sand, 0 to 2 percent slopes	A	-1.5 feet	Jun – Dec	0.6 in/hr
51	Bigbee loamy sand, 0 to 5 percent slopes, occasionally flooded	A	-3.5 feet	Jan – Mar	6 in/hr
53	Arents, 2 to 8 percent slopes	A	-5 feet	----	20 in/hr
54	Newhan-Corolla sands, rolling	A	-5 feet	----	20 in/hr
55	Beaches	-	0 (at surface)	----	0 in/hr
56	Kureb sand, hilly	A	-5 feet	----	6 in/hr
57	Hurricane sand, 0 to 5 percent slopes	A/D	-2 feet	Nov – Apr	6 in/hr
58	Duckston muck, frequently flooded	A/D	0 (at surface)	Jan – Dec	6 in/hr
62	Resota sand, 0 to 5 percent slopes	A	-3.5 feet	Dec – Apr	20 in/hr
63	Pickney sand, depressional	A/D	0 (at surface)	Nov – Apr	6 in/hr
64	Pamlico muck	A/D	0 (at surface)	Dec – May	0.6 in/hr
69	Florala loamy fine sand, 2 to 5 percent slopes	C	-1.5 feet	Dec – Mar	0.06 in/hr
99	Water	-	-	-	-
100	Waters of Gulf of Mexico	-	-	-	-

2.3.2 SHGW Elevation Verification (optional)

Since the elevation of the water table is such a crucial element of a good working SWMF, it is a good idea to double-check it with this simple process.

After a larger storm event dig a hole deep enough to observe groundwater, but no more than 5-feet. **Please secure the area, especially from small children and pets**. Observe, measure, and document the water level a few times a day for 3-days. Please discard any measurement that are significantly different from the majority of the measurements. Depending on the time of the year, the average of these remaining measurements will give you either the seasonal low, average, or high water table. **Table 3. *NRCS Soil Data*** provided in this section includes the months through which your measurements would be consider the seasonal high. If you are outside of the noted timeframe, simply add 1-foot to your measurement to convert it to the seasonal high.

If the SHGW elevation listed in **Table 3. *NRCS Soil Data*** and your calculated SHGW are significantly different, please contact our department for help, otherwise use the shallower depth.

2.3.3 Recovery Time Calculation

The entire storage volume of the chosen LID SWMF must recover in less than 72 hours. The calculation to determine the recovery time is as follows:

$$\textit{Recovery Time (hr)} = \frac{\textit{Depth of LID SWMF (in)}}{\textit{0.5*Permeability Rate (in/hr)}}$$

For example, if your site has soil identified as Foxworth (HSG A) than according to the information provided in **Table 3** the permeability rate will be 20 in/hr. The LDC requires a safety factor of 2 to be applied to permeability rates; therefore, you will divide the values found in **Table 3** by 2. For this example, the permeability rate used to determine the recovery time for your chosen LID would be as follows:

$$\frac{\textit{Permeability Rate Taken From Table}}{\textit{Safety Factor}} = \textit{Design Permeability Rate (in/hr)}$$

$$\frac{20\ in/hr}{2} = 10\ in/hr$$

If the proposed LID SWMF is 2 feet deep then the anticipated recovery time would be as follows:

Depth of SWMF / Design Permeability Rate (in/hr)	x	Conversion From ft to in	=	Recovery Time
$\frac{2\ ft}{10\ in/hr}$	x	$\frac{12\ in}{1\ ft}$	=	2.4 hr

If you have soil that drain slowly or have low permeability such as Dorovan Muck, which is frequently flooded, the permeability rate is 0.6 in/hr. If the same LID SWMF is placed in an area with this soil, the recovery rate would be:

Depth of SWMF / Factor of Safety * Permeability Rate (in/hr)	x	Conversion From ft to in	=	Recovery Time
$\frac{2\ ft}{0.5*0.6\ in/hr}$	X	$\frac{12\ in}{1\ ft}$	=	80 hr

As you can see, soil properties make a huge difference in the time that it will take for the stormwater to infiltrate into the native soils. We will use this equation again in **Section 5** and will refer to **Table 3** to apply the applicable infiltration rates for the soils on your property.

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