A SunCam online continuing education course

What Wetlands Boards Expect from Engineers

by

Peter Tavino PE

INTRODUCTION

Wetlands Boards or Commissions or Panels can consist of community volunteers, paid staff or a combination of both. Sometimes they are known as Conservation Committees. They may be combined with Planning and Zoning Boards too. Some states and their Departments of Environmental Conservation (or Protection, etc.) handle Wetlands issues for both large and for small scale Wetlands impacts, depending on acreage and features. Some parts of our country may have no local Wetlands and Watercourses regulations at all. Large water bodies including navigable waters are under the jurisdiction of the Army Corps of Engineers, which just claimed more territory in the author's town the month of this writing. Rural and farmland regulations differ greatly, under the US Department of Agriculture, and are not covered specifically in this course. Neither are certain Coastal regulations.

To facilitate reading of this course, a Board or Commission or Panel is hereby referred to as the "Board", and Inland Wetlands and Watercourses are "Wetlands".

Since Board activity will vary from state to state and even town to town, the frequent use of the words "may" and "might" invite the reader to check the specific nature of your own local situation before proceeding. But note the similarities in how Wetlands are protected throughout America.

Like almost all engineering today, procedures must follow existing codes, bylaws or regulations passed by statute or law from the legislating body. Commonly, each state delegates local permitting and enforcement to the county, city, or town. Agencies, Panels or Commissions that have been in existence for dozens of years, serving the local community and their interaction and expectations from engineers appearing before them is the topic of this SUNCAM course.

WETLANDS REGULATIONS

Municipalities adopt their own Inland Wetland and Watercourse Regulations conforming to state laws allowing such, by having their governing bodies vote these regulations and

amendments in place as in Virginia, shown here: https://vacode.org/28.2-1302/ *(Web site references beyond this SUNCAM course are not part of the test questions.)*

Almost all of these regulations are now available for review online. Following them is the first thing an engineer should attempt, when seeking to receive permission to begin the construction project. Assuming that regulations in Elmville will apply to Oakdale is a big mistake.

Under the "Definitions" section are three important wordings shown below, but superseded of course by whatever the regulations say for the geographic community in which the work will occur.

Wetlands *means land, including submerged land as defined in this section, not regulated pursuant to sections … inclusive, of the (state) General Statutes, which consists of any of the soil types designated as poorly drained, very poorly drained, alluvial and floodplain by the National Cooperative Soils Survey, as it may be amended from time to time, of the Natural Resources Conservation Service of the U.S. Department of Agriculture (USDA). Such areas may include filled, graded, or excavated sites which possess an aquic (saturated) soil moisture regime as defined by the USDA Cooperative Soil Survey.*

Watercourses *means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs, and all other bodies of water, natural or artificial, vernal or intermittent, public or private, which are contained within, flow through or border upon the Town or any portion thereof not regulated pursuant to sections …, inclusive, of the (state) General Statutes. Intermittent watercourses shall be delineated by a defined permanent channel and bank and the occurrence of two or more of the following characteristics:*

(a) evidence of scour or deposits of recent alluvium or detritus,

(b) the presence of standing or flowing water for a duration longer than a particular storm incident, and

(c) the presence of hydrophytic vegetation.

Regulated activity *means any operation or use of a wetland or watercourse involving removal or deposition of material, or any obstruction, construction, alteration or pollution, of such wetlands or watercourses, and any earth-moving, filling, construction or clear-cutting of trees within 75 feet of wetlands or 75 feet of watercourses, but shall not include activities specified in Section 4 of these regulations.*

The above referenced 75 foot "Upland Review Area" or "Buffer" zone rationale is explained here http://www.eli.org/sites/default/files/eli-pubs/d18_01.pdf

If the property does not have Wetlands or adjacent areas that can be impacted, then building and zoning permits are expedited for approval without a wetlands permit. Usually just a signoff from the Board's representative may be required.

For jobs that could impact a Wetland, some Boards delegate minor activities such as a house back yard deck 75 feet from a wetland, to its Wetland enforcement officer, who can issue the permit for no fee, or a modest fee. For larger scale earth grading activity, or an impervious surface or change in storm water runoff condition, etc. the full Board usually reviews your plan and presentation.

This body conducts their meetings fairly by Robert's Rules of Order, using Parliamentary Procedure. Final votes on Motions required for permit approval must be by a majority with a chairperson presiding. Boards follow Freedom of Information policies and nighttime meeting volunteers might be mostly without scientific or engineering backgrounds. They avoid conflict of interest by recusing themselves from any project application with which they have personal connection. Examples include being related to the applicant owner, or team member, having a business interest directly with the application, etc. If a fellow Professional Engineer is also a volunteer Board member at night, expect that engineer to so declare these qualifications at the beginning of the meeting so that their vote is not prejudiced. Boards hold extraordinary power, backed up by state law, to issue cease work orders, etc.

These three and the other dozens or so of definitions within the regulations that they administer, have evolved over the years since their beginnings, in the middle of the last century. The 1948 Federal Water Pollution Control Act began the process. A famous documentary narrated by actress Katherine Hepburn in 1965 entitled "The Long Tidal River" helped lead to 1972 passage of the Clean Water Act, and subsequent local regulations.

RATIONALE FOR WETLANDS REGULATIONS

The unregulated polluting, filling and building at or near wetlands had unintended consequences on the *"indispensable and irreplaceable but fragile natural resource with which the citizens of the state have been endowed"* as described in the "Purpose and Authority" sections at the beginning of official regulations documents. Of course each state differs in regulations and specific geographies must be addressed. What is prohibited there might be permissible here, but certain Best Management Practices can be used by engineers to protect Wetlands wherever they may be.

In a philosophical conversation with our State's then Commissioner of the Department of Environmental Protection, (whose wife is now the author's district federal congresswoman) the author asked if the purpose of Wetlands regulations that has limited growth forty plus years ago, is the same today. Is the use of wetlands and upland review area to treat minor pollutants a bad thing? Wetlands can be helpful in removing limited pollutants, yet septic systems must be distant by law, unless exempted, usually for repair only. Today the Internet shows developers problems that they can encounter, by building on poorly drained soils, such as the not funny image below.

Saving trees in upland seems similar to saving trees in Wetlands soils, if stumping operations and haul road do not impact. Is habitat for Wetland wildlife more important than habitat for Upland wildlife? Note though, that application time is not the time to challenge whether saving wetlands trees is important, while awaiting vote on your pending project application.

These issues are addressed and updated as regulations change from time to time. Model wording from statutes to localities may or may not be implemented. Changes or amendments added at the end of a document should be checked for relevance to your application.

DETERMINING WETLANDS MAPPING BORDERS

Sometimes Wetlands soils follow delineation of the United States Department of Agriculture (USDA) soils maps that are available at http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm.

Poorly drained, alluvial or floodplain soils might be the locale's Wetlands by definition.

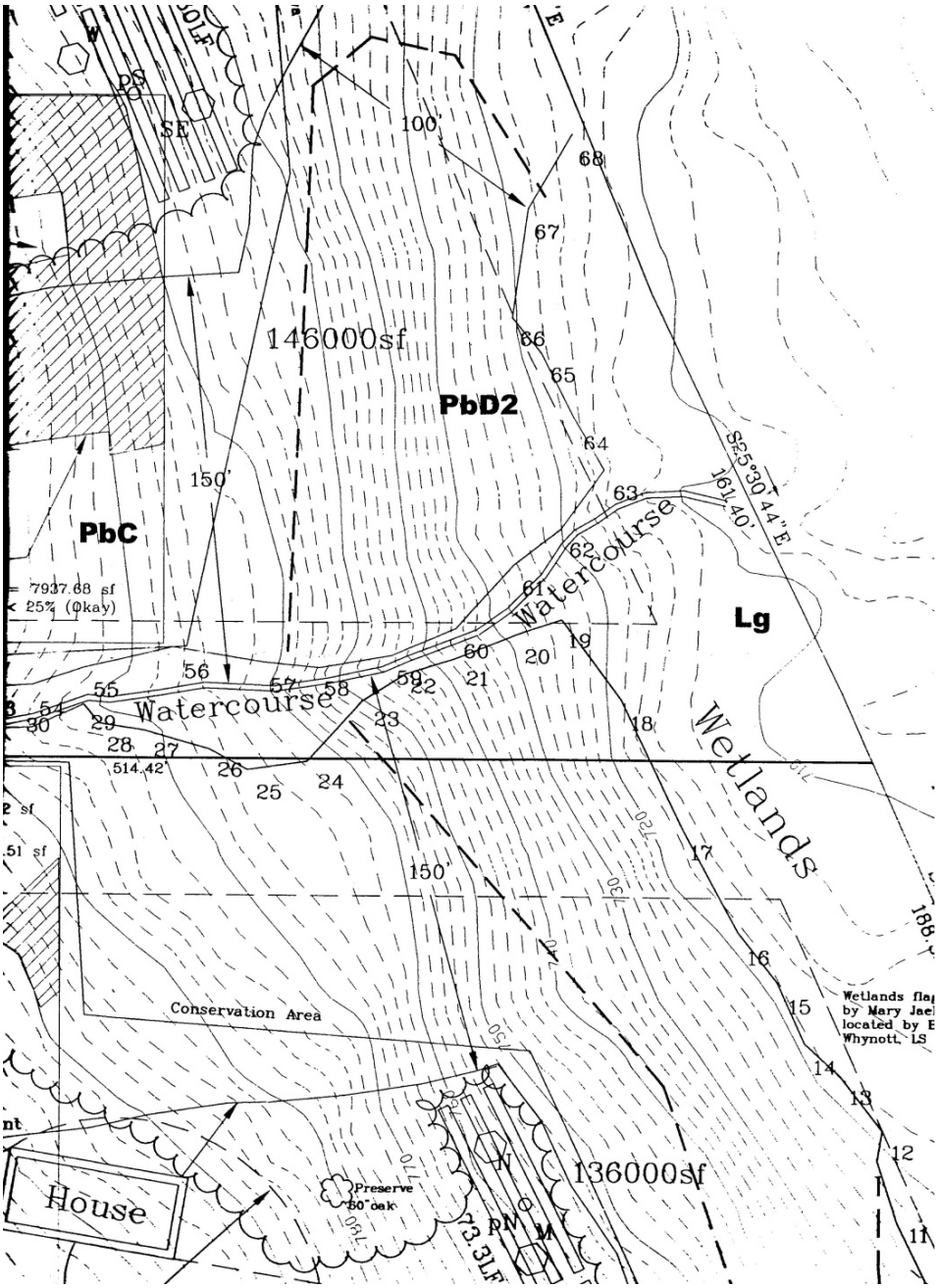
City Wetlands per Soil Map

In other cases, a qualified soil scientist, possibly certified by the Soil Science Society of America, will flag out Wetlands boundaries, by probing a soil auger into the earth. If 8 inch depth to mottling is the guideline criteria, the soil scientist will place colored flags along the line where the soil goes from more than 8 inches to less than 8 inches to mottling. These flags are commonly pink for wetlands or blue for water courses, to distinguish them from orange colors used often by Land Surveyors at monuments, property corner rebar pins, or controls spikes.

Where the exact boundary more specific than the web soil survey shows is required the soil scientist flagging will supersede the web soil survey.

The soil scientist also numbers the flags with permanent marker in the order placed Wire flags can be used if branch canopy is unavailable. The surveyor then field locates each flag

with instrument, and plots the Wetlands and Watercourse boundaries on a map for the engineer to use in design. With map in hand, and standing at a Wetlands flag as numbered, one will know exactly where they are located on the subject property. In the example below, Wetlands flags are numbered, and soil types from the web soil survey are labeled. Lg is Leicester-Ridgebury-Whitman very stony complex, poorly to somewhat poorly drained, and a regulated Wetland.



Pb = Paxton Soils are not Wetlands Soils. The Watercourse shown above was not numbered because it is close to the Wetland boundary. Note that Wetlands acreages (disturbed and not) can be computed by area command on Autocad to report to an Inquisitive Board that will ask on their application Form.

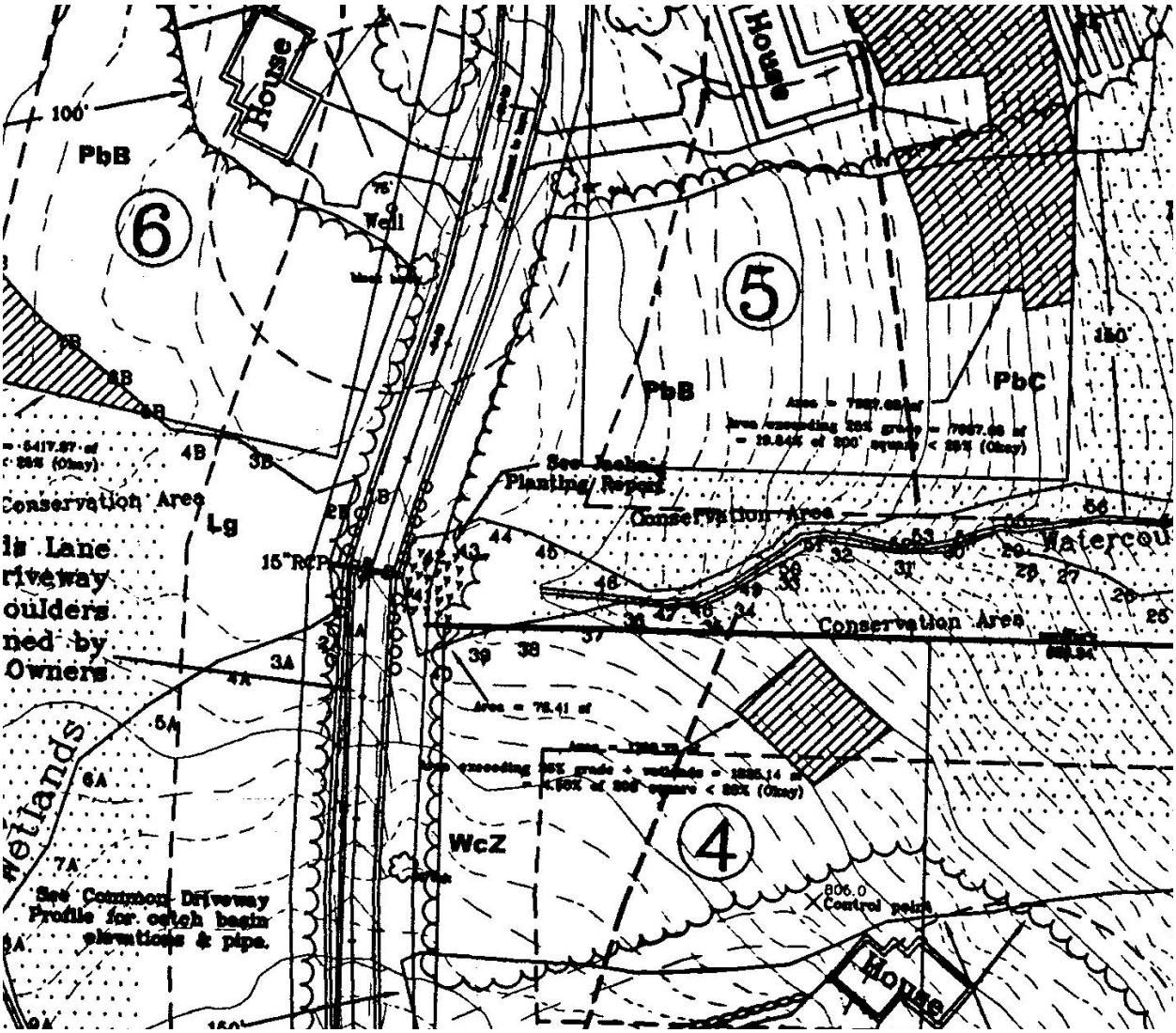
LOCATING NEW FEATURES ON A SITE PLAN

The easiest design is to keep disturbance as far away from these flags as possible. If the definition of upland review area extends one hundred feet from a Wetland, and soil disturbance can be kept there, perhaps no permit is required. If disturbance must be one hundred and fifty feet from a watercourse and that can be achieved, the permit might similarly not be required. Note in the proposed subdivision drawing above, that new lot homes and septic systems are shown at least one hundred feet from the soil scientist wetlands borders and one hundred and fifty feet away from the soil scientist mapped intermittent watercourse.

If the proposed facilities cannot be located distant for the landowners preference to develop, then the engineer applicant must convince the Board why there is no prudent and feasible alternative, if the regulations so require. Note that construction on existing building lots that were approved prior to Wetlands regulations or under previous permits, will have more flexibility then subdividing land and requiring great impact on Wetlands to do so. Building an addition within thirty feet might be approved, whereas subdividing new lots which will have houses thirty feet from Wetlands is likely to be denied, if there is already good existing use for the parcel.

Experienced engineers attempt to help their clients, while minimizing impact from features, like temporary construction earth disturbance, or permanent features such as fertilized lawns. Fertilizer can leach out phosphorus and nitrogen or other growth accelerators into a wetland. If surface or sub surface drainage patterns must be altered, the Board will want to know why. Even allowing heated rain water runoff from an asphalt parking area to drain immediately into a wetland can have impact. If a house was proposed on a building lot and required filling in hundreds of square feet of wetlands it would be denied, if that house could be built elsewhere on the lot within the zoning setback lines in upland areas that would not affect the Wetlands. But that same few hundred square feet of fill might be allowed, if by doing so a shared driveway could be built over that wetland to access much more acreage on the other side

that would otherwise be land locked. In the figure below, subdivision lots 5 and 6 were thus allowed, plus access to an existing house beyond.



Of course an existing driveway filled over wetlands would take preference for expansion over a new driveway that would require vast land tree clearing and filling in previously undisturbed areas. And shared driveways like this are Board preferred to individual driveways, even though homeowners might prefer their own private driveway to use and maintain.

Detention and retention basins normally are constructed closer to wetlands where more watershed can be captured, treated and retained to pre-existing runoff discharge levels.

Engineers must site these at or near upland review areas, as the Board must so agree. More discussion on engineered features will follow.

Winter Scene of a Detention Basin

APPLICATION PROCEDURE

An application form and application fee, depending on the intensity of activity is usually the first step of the process. Meeting with the Board's staff or other representative can be helpful, and all that is said off the record is not indicative of how a Board will later vote. Some boards require a mandatory pre-hearing meeting, to clarify what will be needed. In addition, if a project is located near (sometimes five hundred feet from) another municipality, that town, county or city might also have to be informed by the applicant of the proposed activity.

Often, the Application Form requires the owner and applicant's signatures, a site plan, a soil scientist report, surveyor stamp on flag location mapping, and a professional engineer's stamp or seal on drainage calculations and site plan. It is not uncommon for the Form to request that nine copies be submitted of all materials. One will be for the official public records file, and one for each of eight Wetlands Board members. These submissions are often due weeks before a meeting, so that Board members can review paperwork before official meetings. Usually the paid staff Wetlands Enforcement Officer will receive your package with drawing and report copies, and mail them individually to the volunteer board members' homes or places of business. Digital .pdf drawings may or may not be utilized.

A permit on a complicated application will not usually come up for a vote until the following meeting, so that Board members can absorb the information, and not make a hasty decision. For regularly scheduled monthly meetings, this could involve a minimum 30 day process, so schedule accordingly.

If a meeting is held as properly noticed by posted agenda, the applicant is given the opportunity to present the project to the Board. The days of flipchart 24 by 36 inch prints on tripod easels are giving way to PowerPoint presentations with AutoCAD PDF files shown on screen for all to see. A color coding showing Wetlands Areas and Buffer Area Limits is not unusual. Blue can be for Watercourse, green for Wetland, and yellow for the limit of the Upland review Buffer area. At the meeting, the Chairperson presides. There are commonly past Meeting Minutes and business items for their attention, as well as a list of projects before them. Some courteous Boards have been kind to audience and owners (paying professionals by the hour) by handling housekeeping items at the end of the agenda, giving audience members the option to listen to business not pertaining to their specific application, or to leave. When it is your turn, it is probably best not to address Madame Chairwoman (too formally) nor by their first name, (too informally), unless you must, or are a routine, familiar applicant.

If the Board consists of experienced volunteers, they will be familiar with your typical issues. They anticipate a brief summary and description of the site plan and report, which you previously submitted to them. Expect interruption questions as you go from any Board member, and give them the courtesy to answer immediately when asked.

At this time you may wish to indicate alternatives that were found to be infeasible by your Alternatives Analysis. Conclude by summarizing why your application package before them meets all of their regulations, and should be approved. This is their real goal, not to stop or promote various projects. If upon presentation, the Board finds that it meets their standard definition as a complicated, significant activity, -enough to go before a future public hearing, they will decide so without your opinion. Do not urge them to skip a Public Hearing. Public Hearings will be similar to Zoning Board of Appeals Variance requests, or Planning and Zoning or School Board public hearings, with which you may be familiar. Hearings must be properly advertised by registered mail to abutting landowners, by email, by newspaper notice declaration, etc. This is usually done after the initial Wetlands meeting and prior to the public hearing meeting date set 30 or 60 days later. The earliest a public hearing can begin is at a future scheduled meeting, after this adequate notice time is given. More meeting time could be required for the Board to study public comments, and your replies; so four to six months of time until the vote to approve is not unusual.

FIELD VISITS

Between the time of the submission and meeting or after the meeting and before the vote the Commission may decide to make a field visit to your site.

Field trip visits have evolved through the years. Sometimes only the Wetlands Enforcement Officer will tour the property, with or without the owner's representatives. At other times the entire Board decides to visit "on Saturday morning at 11 a.m. after the tour of the Smith Wetlands application property" to see conditions for themselves. If unauthorized work has proceeded without permit, "after the fact" processes are held to a higher standard, so expect a visit from the full contingent of Board members, and note that application fees for after the fact activities can be several hundred dollars more. Usually the engaged professional engineer makes apologies for ignorant owners, who tried to proceed under the radar.

Field visits in our time of open Freedom of Information follow certain fairness protocols. Now gone are the days where a few Board members may gather in private at a junk spare tire in a skunk cabbage patch, and decide amongst themselves that the project should not be approved.

The Chairperson if there, usually leads discussion that may be limited to observing only where they are on site and no other talking. The Field Visit can be documented in writing or recording minutes or notes to be added to the project Record for vote consideration at a future meeting. The owner and/or owner's engineering applicant representative may listen to spoken concerns by Board members, and may be invited to answer questions, mostly to orient the Board as to their location on the property. All numbered wetlands flags should be visible and replaced if torn off by deer or wind, so that those with site plan in hand know exactly where they are on the property. Having stakes and ribboning at proposed building locations can also help the Board understand what the final development will be like.

Proposed house location

PUBLIC HEARINGS

After any field visit and before a formal meeting to vote on approval or not, a public hearing may be held. Usually the public is not allowed on field visits, but may be, depending on many factors, including necessity, owner permission or denial. The public may listen at regularly scheduled meetings but usually are not allowed to provide testimony.

Board members may have seen a property to be knowledgeable for the public, who will be commenting before them at the later, evening public hearing meeting. Public hearing procedures are legally defined. The hearing usually starts with the engineer repeating the presentation given at a previous meeting but in more depth, for the public to see and hear. Public comments maybe responded to, as the Chairperson so desires. If the applicant is asked to wait until all public comments are delivered, the wise engineer takes notes on relevant issues and attempts to respond accordingly, so the public and Board can hear. Do not waste note time on irrelevant issues such as traffic or school impact. If issues are important or unexpected, and the public hearing is held open by the Chairperson and Board until a future meeting, the engineer can submit written testimony in the interim, showing why public comments of concern have been or will be addressed.

Presentation to the public

Engineers must keep cool during public hearings. Real stories are explained now to better prepare you for anything that could happen. A professional engineer in another state described how a citizen stood up at his project's Wetlands Public Hearing, holding a flower on the endangered species list, to be destroyed by the proposed construction. After the shock and awe, a mistake in classification was confirmed in time for the next meeting, where the permit was then issued.

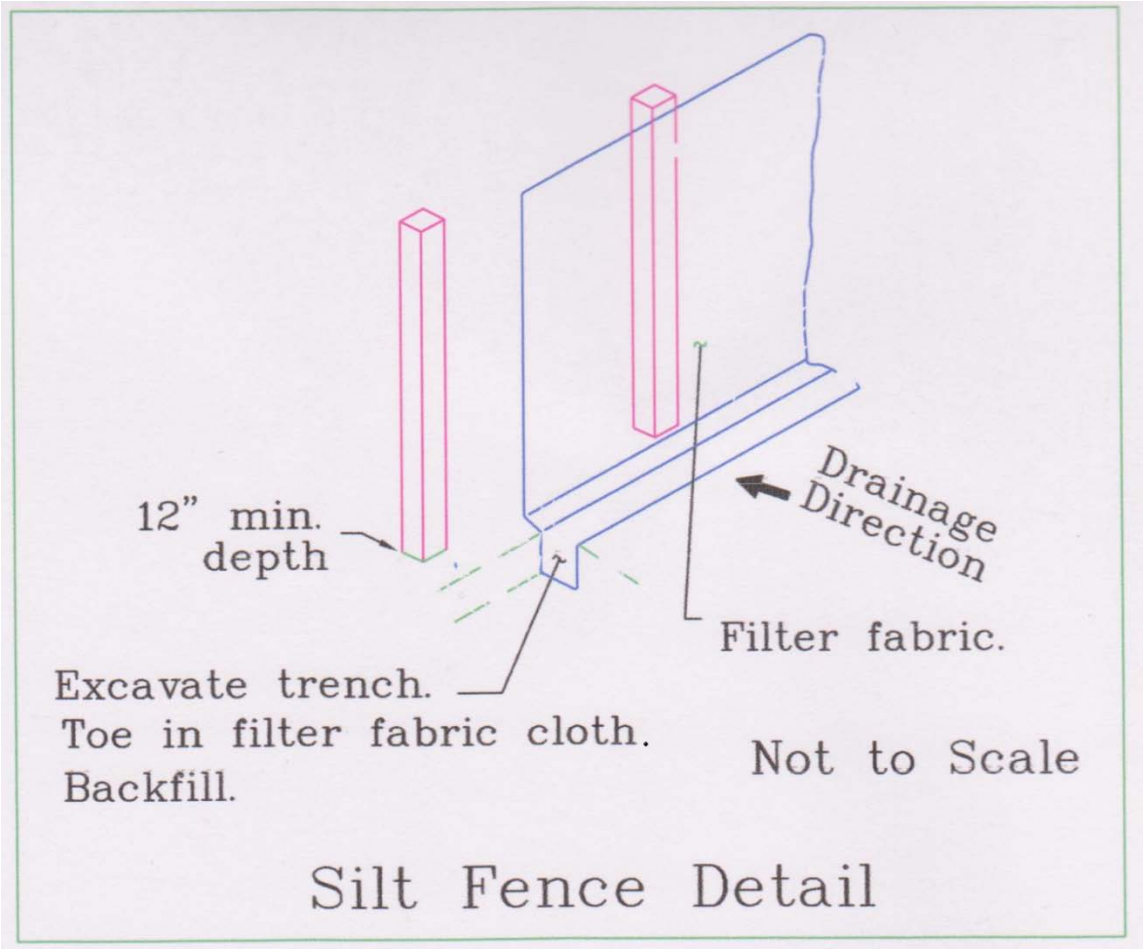
Another Wetlands Public Hearing had a neighbor on a Lake show frustration for submerged geothermal pond loops proposed at only six foot depth as a swimming hazard. The reply was that the neighbor was mistaken, because the loops were to be submerged fifteen feet deep as the owner reported such depth to be. How embarrassing it was, when the owner admitted for all to hear that the fifteen foot depth was actually out further in the lake than was reported, and confirmed by the drawings presented to him earlier. This embarrassment forced a withdrawal of being the formal applicant, and motivated the engineer next time to insist that a licensed land surveyor provide soundings of pond bottom topography.

Public hearings must be managed by the Engineer, Owner, Soil Scientist and Attorney to stick to regulation type issues. It is a good opportunity to strengthen the Record, should the motion ever be appealed at the judicial level. With Wetlands Boards reportedly winning ninety five percent of the cases before a judge, avoidance of going to court by the applicant at almost all cost is prudent. Often, a rejected application that cannot be modified according to negative comments received may simply be resubmitted in a new application with alternatives used instead. And acceptance of a Motion to Approve with a list of Board "Conditions" is common.

TECHNICAL ISSUES

The Board will expect professional engineers to be expert in the typical issues that appear before them, and especially the most common control on all soil disturbance projects, the Soil **Erosion and Sedimentation Controls.**

Erosion and sedimentation control silt fencing becomes the de facto Limit of Disturbance.



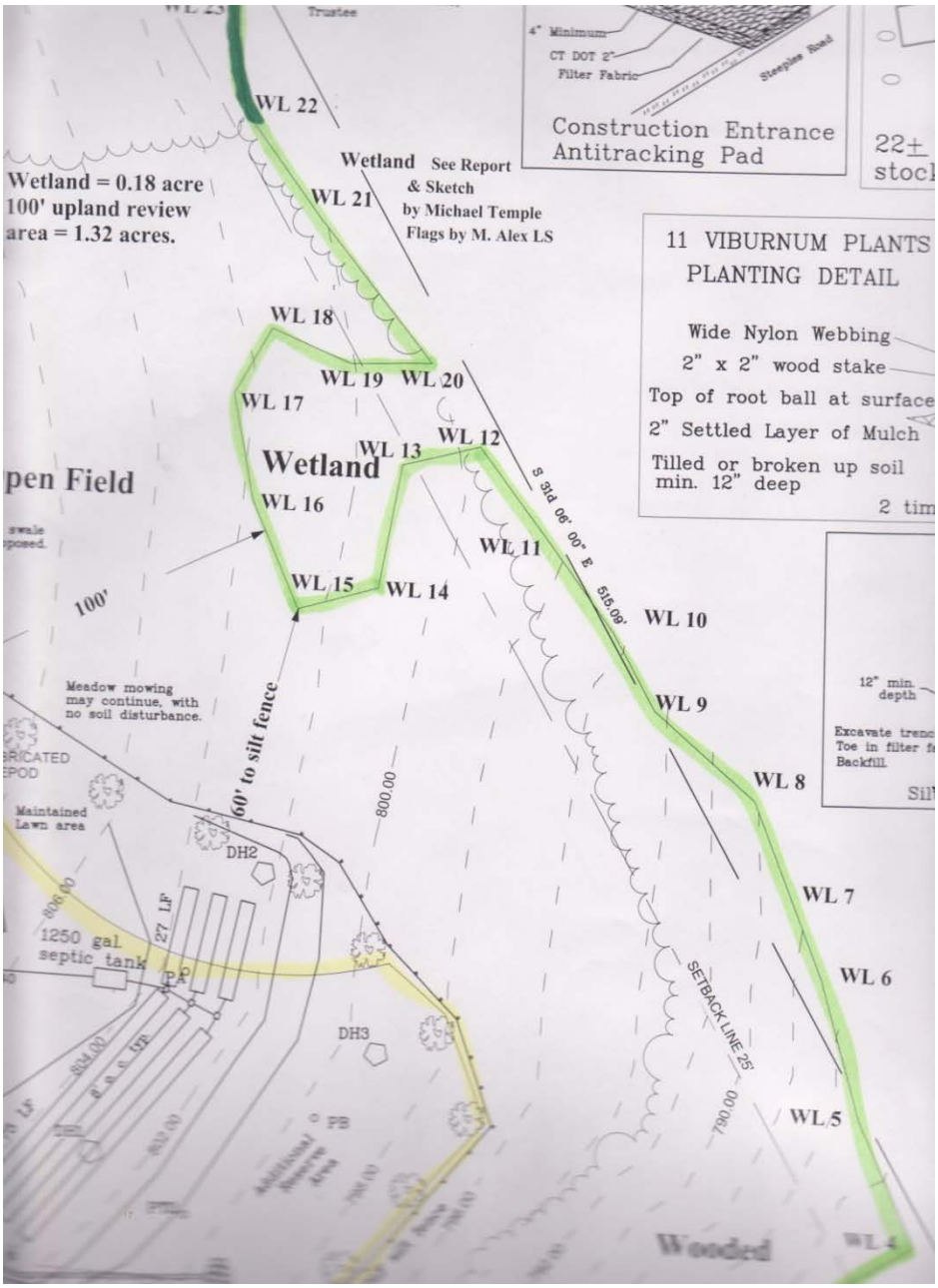
Typical Silt Fence or Filter Fabric Fence Detail. Posts are always located on the downhill side.

If soil disturbance constitutes a regulated activity and the upland review area definition extends one hundred feet from each pink wetlands flag, the Board will expect to see a silt fence line one hundred and one feet (or further) away from those flags on your site plan.

This allows track hoe movement and digging beyond their jurisdiction, and prevents soil from washing into the one hundred foot buffer area, and possibly into a Wetland itself.

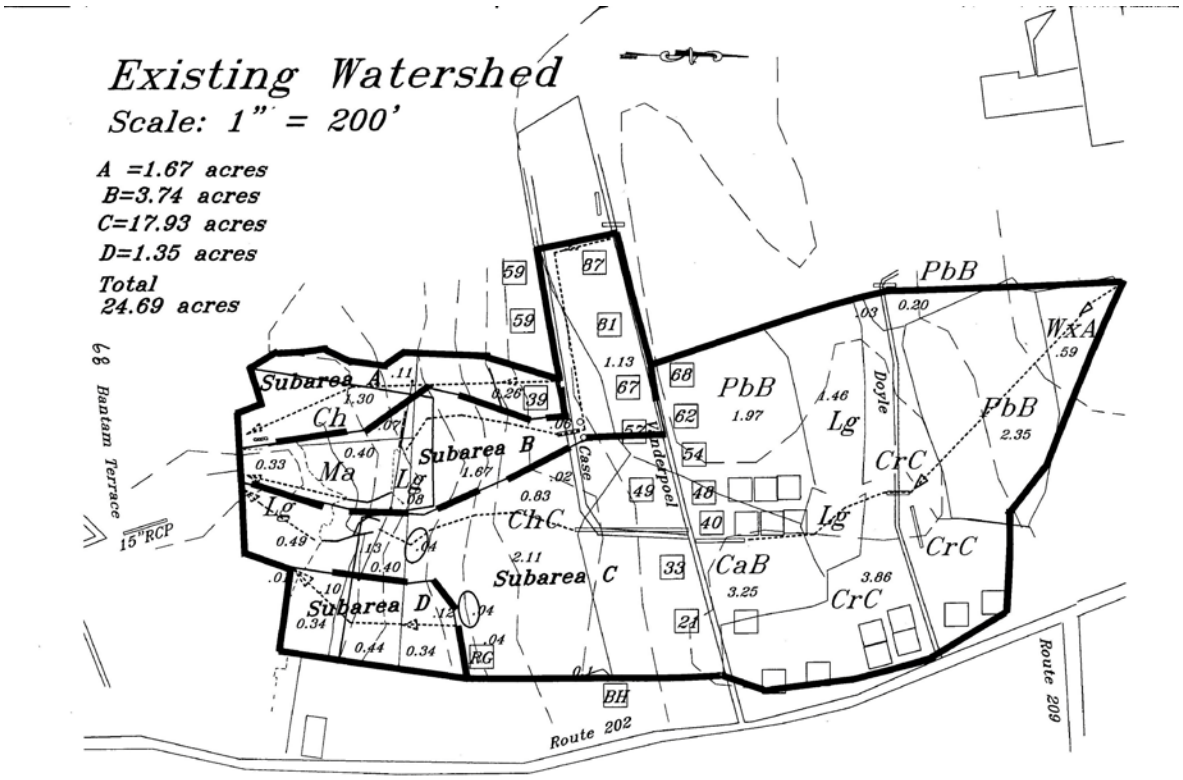
If proposed work activity requires more area and you set the silt fence sixty feet from pink flags, Board members may ask why it cannot be seventy five feet away. They know that distance allows runoff filtering, especially downhill. Perhaps in order to meet septic system construction guidelines (that might require minimum leaching system spread to engage a wide

swath of absorption soil) leaching trenches must be constructed to within 80 feet of an adjacent side wetlands, with twenty feet of room for select sand fill and track hoe movement. The silt fence barrier must be sixty feet away for a feasible construction, and would usually be so approved, as it was here. The attached sketch shows this. Note green wetlands flags and yellow one hundred foot buffer, from this 24" x 36" print submitted to the Board.



The days where Boards would ask why not build a three bedroom house alternative, instead of a four bedroom house, appear over, since the 2008 building construction economical decline. Single family residential proposals are now less frequent, and seem to be better received.

Also activity sixty feet from the side of a wetland running down a hill is voted more permissible than sixty feet directly uphill, which will tend to drain contaminants straight into a Wetland directly down gradient. While engineers understand that surface runoff proceeds perpendicular to level contour line topography, novice Board members may not easily realize this, and can be shown the watershed diagram, draining to the Wetland if necessary. Boards will expect design engineers to delineate watersheds and shed border sub drainage basins with ridge lines, shown below as heavy solid and dashed lines to assist them in judging potential impact from soil disturbance to Wetlands they protect.



Most experienced Board members can also envision sheet flow pattern impact perpendicular to the two foot contours shown on site and grading plans, where the watershed is significant or very steep. They will expect proper slope stabilization techniques (as shown below) to be specified.

Straw mat, stapled into the steep hillside

The typical detail of a silt fence located at the toe of a steep hill, or containing a large watershed acreage above, might require beefing up, with either a second parallel silt fence or an additional staked hay bale barrier. State Erosion and Sedimentation Control Manual Guidelines provide ready-made drawing details. They have Notes and Specifications, which towns and counties and Boards accept, along with their own publications.

SEQUENCING

Sequences of Operation for the Wetlands enforcement officer to follow during construction are usually not boilerplate, and must be specifically written by the Engineer/ Designer. Here is one example sequence:

HOUSE CONSTRUCTION SEQUENCE:

1. Layout house corner & field locations.
2. Install silt fences & anti-tracking pad.
3. Notify XXXTown to inspect E & S
   Control measures at least 48 hrs.
   (2 business days) in advance of next steps.
4. Excavate and install sewage fields.
5. Excavate and fine grade driveway.
6. Mulch all embankments.
7. Excavate and build foundation.
8. Set house with crane.
9. Drill well and geothermal boreholes.
10. Maintain erosion control measures.
11. Backfill, place topsoil and seed.
12. Plant buffer plants as shown.
13. Mulch as required until stable.
14. Once stable, remove fence & mulch.

The typical Wetland submission plan will have the lot lines, contours, wetlands flags as numbered, existing and proposed structures and facilities, plus Notes, Details, Specifications and Sequence of Operations. Be sure the contractor does not use a separate grading or sewage disposal design plan or other plan, instead of the approved Wetlands site plan. If unavoidable, always place a note on that plan referring to the existence of a separate Wetland submission plan for adherence. Whether a blueprint paper or PDF accessed by the site superintendent's handheld mobile device, the Wetlands plan approved should always be available in the field. Sometimes some Boards will require that their Wetlands Enforcement Officer be notified 24 or 48 hours

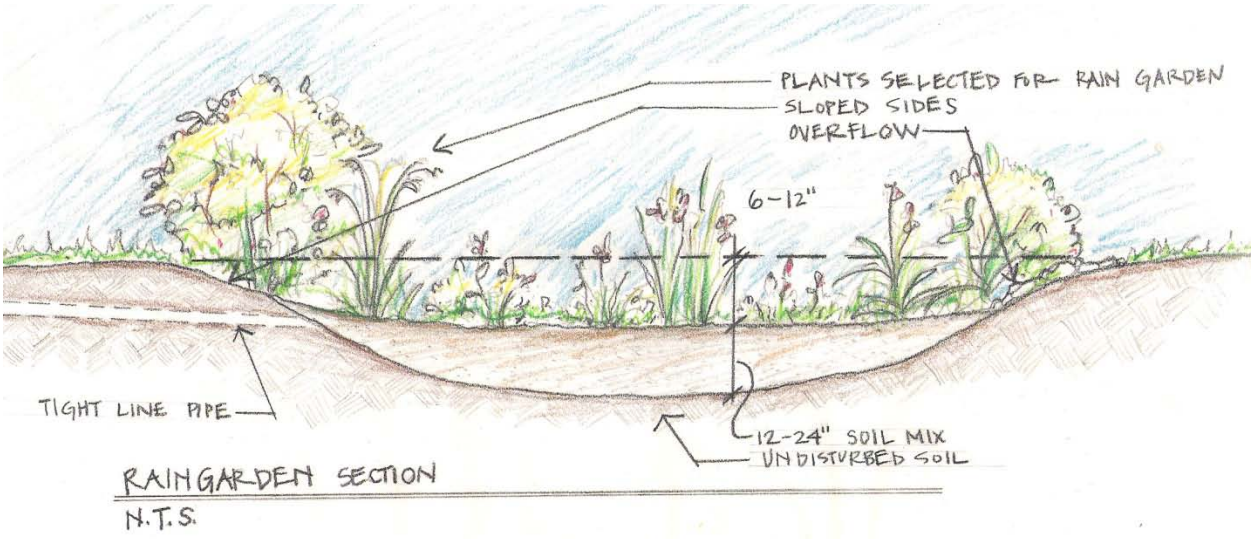
prior to initiation of any construction activity, so that E&S controls can be inspected for proper toe in.

COMMON WETLANDS FEATURES

Other common Wetlands features to be designed by engineers are:

Rain Gardens.

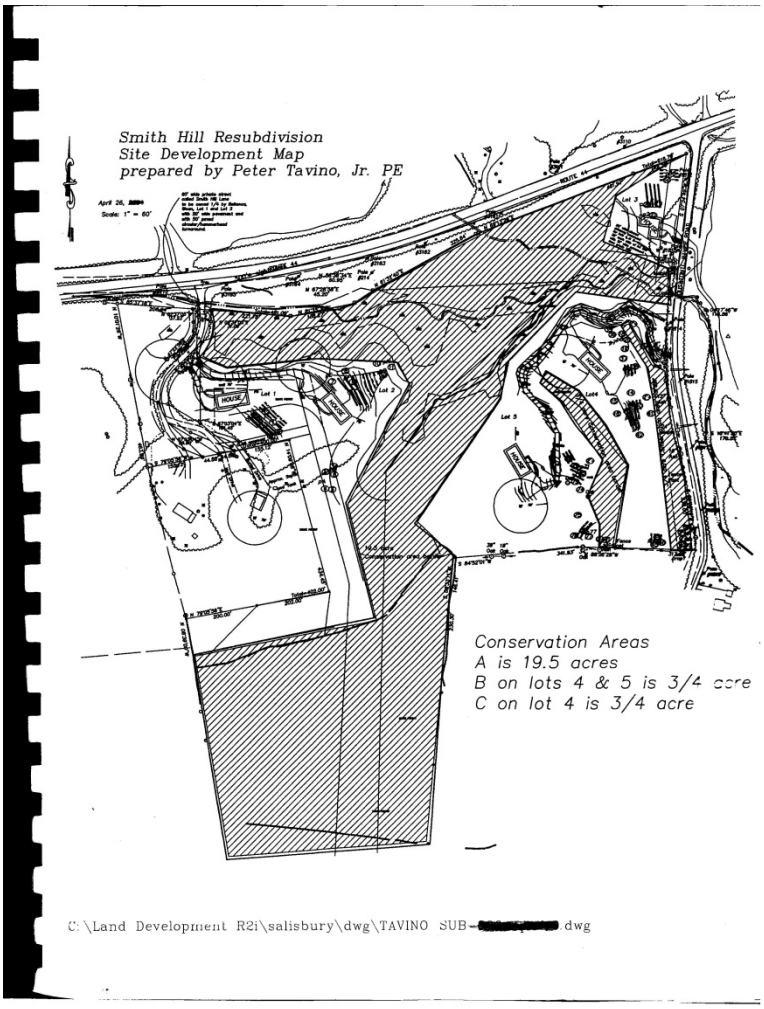
Modern state health codes now allow rain gardens immediately down gradient of septic systems, (as the only allowed intrusion into those soils) showing how widely promoted their use is becoming.



Operational Rain Garden

Conservation Easements

If Wetlands must be filled, with no suitable alternative, remediation or trade off should be proposed. Constructing new Wetland elsewhere is addressed below. Another popular tradeoff is to preserve conservation lands in perpetuity by deed restriction or easement in favor of a local land trust, or other entity. Wooded land that would not otherwise be needed for construction or ornamental landscaping can be mapped out, left in its natural state, and placed in permanent conservation, per conditions filed on the municipal land records, as part of the Wetlands application process.



INVASIVE PLANTS

Another popular remediation is the promised removal (to root surface at least) of invasive plants on the uplands site. These tend to radically change Wetlands health, and should be properly identified in the field by an expert, mapped, and shown to be mechanically removed by hand or excavator brush hog for example, and not sprayed by Round Up or other herbicide.

Conservation District Expert inspects invasive herbaceous perennials on site

Alternately, where invasive plants are undesirable, endangered species are highly desirable. Consult state maps with certain confidential settings of secretive natural resources mapping, to see if a vernal pool habitat for salamanders or such exists on your site, meriting special attention.

OTHER BEST MANAGEMENT PRACTICES

The engineer applicant should be familiar with all available Best Management Practices, (BMPs) beyond these sampled, such as Energy Dissipater riprap channels at culvert outfalls, bioremediation, permeable paver blocks, phosphorous removal techniques, fertilizer management programs, arch bridge span advantages over pipe culverts in fill, and wall construction replacing side slopes to reduce Wetland fill area.

Major Facility Best Management Practices such as Retention and Detention Basins and Ponds can be designed following advice in these listed SUNCAM courses by author David E. Fantina, PE:

169-Design of Drywells

171-Design of Sand Filters & Bioretention Systems

172-Design of Constructed Stormwater Wetlands

174-Design of Infiltration & Extended Detention Basins

189-A Guide to Low Impact Development

212-A Comparison of Runoff Estimation Techniques

The engineer's use of a full "tool box" of design options will lead to a smoother process avoiding costly redesign.

WETLANDS BOARD TRAINING

States usually have training programs and continuing education available, especially for their new Board members. Much of this is now by video online, such as this one.

http://www.ct.gov/deep/cwp/view.asp?a=2720&Q=434010&deepNAV_GID=1907

This training is presented by State Engineers, Attorneys, successful veteran Chair People and Wetlands Enforcement Officers.

In the past, perspectives from the Home Builders Association used to be presented. One year the author's Home Builders Association - Developers Council was asked to present information during the new Board member Training. The author showed them a sand filter design beneath a detention pond, situated just above an important city reservoir. This was during the early days of the Maryland Center for Watershed Protection, which featured success in Austin, Texas with pollutant removal from sand filters. During the demonstration, showing how clean the water sample was from the outlet pipe, yours truly drank a portion of it in front of the audience to show its purity. But the next day he became sick and learned the hard way, the difference in bacteria count, between deep groundwater well sourced potable water, and filtered water at grade!

These meetings also familiarize Board members with legal do's and don'ts, and perhaps a relevant court case review. When they begin their duties, Board members are given a large manual to read with typical wetlands images, plans, details and text to which they may refer. This manual will be used in the course of their oversight work, and it would behoove the design engineer to know of its content as well. But mostly the Board knows its own regulations cold, and will instantly recognized instances where they are not being met. These regulations booklets are almost always present at the regularly scheduled meetings. In addition to initial training, state associations of Wetlands Boards provide continuing education conferences with topics ranging from the latest court case findings, to technology use, to presentations of successful mitigation procedures, etc. If meeting attendance is open, the practicing applicant engineer is welcomed to participate.

IMPLEMENTATION IN THE FIELD

Successful soil stabilization and completion of the permitted work is guaranteed if the engineer oversees the approved design. After notifying the Wetlands enforcement officer that the erosion control silt fence and hay bales are in place and may be inspected (because

excavation work is about to start in about 2 days) the engineer should be prepared to show the enforcement officer how the approved site plan as designed will be installed and implemented. Any changes to the approved plan that are major might have to go back before the entire Board at their next meeting. Minor adjustments can usually be approved by the Wetlands enforcement officer. At the conclusion of the project, when all disturbed soil areas have been mulched and seeded or plantings have been complete, an optional As Built drawing for the owner may or may not be required.

Be sure that contract work prior to design that includes field inspection work is determined in writing before proceeding. If the Board does not take a monetary performance bond to ensure that the project is built as designed, the owner might opt to not install expensive plantings and such as promised for a rain garden for instance. And work anticipated by the engineer or Soil Scientist will not be performed. Once the first project is designed, constructed and inspected, your future projects will flow smoothly.

Thank you for taking this SUNCAM course. May the knowledge gained lead to better projects near Wetlands that are under your influence. Good Luck!

