

This letter adds to the points made by abutters and neighbors of the subject property at the June 20, 2007 meeting of the Conservation Commission.

## **A. Points of Law regarding the Standing of this Application:**

### ***Proposal Does Not Qualify as a Limited Project***

The Commonwealth of Massachusetts Wetland Protection Regulations, as promulgated by the Commissioner of Department of Environmental Protection, and as specifically cited by the applicant in Section 310 10.53(e), address only two forms of allowable non-compliance with the Act or the Regulations: a limited project, and waivers granted for public benefit.

The 1999 decision by this Commission regarding the previous application concluded that "The project does not meet the thresholds for a Limited Project." Below, we demonstrate that the current proposal also fails to do so.

Regarding **limited projects**, the following language is germane:

The preamble indicates how the Commission is to evaluate such limited projects:

**"...the issuing authority *may* issue an Order of Conditions and impose such conditions as will contribute to the interests identified in M.G.L. c. 131, § 40 permitting the following limited projects..."**

In the exercise of this discretion, the issuing authority shall consider ... the significance of the project site to the interests identified in M.G.L. c. 131, § 40..."

Paragraph (e) states:

**"(e) The construction and maintenance of a new roadway or driveway of minimum legal and practical width acceptable to the planning board, ...**

**...The applicant shall design the roadway or driveway according to the minimum length and width acceptable to the Planning Board, and shall present reasonable alternative means of access to the Board."**

You will note that **there is no provision for other structures to be approved within the buffer zones in a limited project.**

**However, the applicant acknowledges that at least one house already violates the required no-build buffer zone (AS&E Letter, 6/26, Pg 2, "State Of Lots", Para 2, in which they state "...However, their [the sewage disposal systems] locations are such that one of the homes will be required to be placed in conflict with the Acton Wetlands Bylaw.").**

In fact, **the fill required to build the embankment and create the elevation of 6 feet required for the house and septic systems and the groins planned for retention at the base of the embankment are structures that are located within the 75 foot no-build buffer zone.**

MassDEP Wetlands Policy 88-2, Access Roadways, states

**"2) Even if the general requirements of the regulation are met as described in paragraph 1 above, the issuing authority may deny limited project status for certain work. ... For example, the issuing authority may permit an access proposal requiring a relatively small wetlands loss, all of which would be replicated, to gain access to a relatively large area of uplands all of which would otherwise be inaccessible.**

If, however, it is particularly important to avoid alteration of this wetland in order to protect the interests of the Act, for example when the wetland: lies adjacent to or above ... **an area that is the primary cone of influence to a well; ... or has some other special environmental attribute**, the issuing authority may appropriately deny the same proposal."

### ***Proposal Does Not Qualify for a Waiver***

Regarding waivers, 310 CMR 10.05(10), Variance, reads:

**"(a) The Commissioner may waive the application of any regulation(s) in 310 CMR 10.21 through 10.60 when he finds that:**

1. [other conditions]... and
2. **that the variance is necessary to accommodate an overriding community, regional, state or national public interest; or that it is necessary to avoid an Order that so restricts the use of property as to constitute an unconstitutional taking without compensation."**

Note that the applicant **did not claim** that such a denial represented a taking without compensation in 1999, and that **the Commission's 1999 decision also concluded that the denial did not do so.**

This is primarily because **the applicant cannot demonstrate a loss of value when no such buildable-lot value had ever been ascribed to the subject property**, and is supported by the legal precedent that was referenced in the previous decision. This means that the applicant's claim in his letter of June 20 that denial might represent a loss of \$500,000 is purely speculative and in contradiction to the evidence and the prior decision, and is not realizable value.

The paragraph (10) Variance also continues, with regard to how such a waiver shall be applied for:

**"(b) Procedure. A request for a variance shall be made in writing and shall include, at a minimum, the following information:**

1. [other conditions]... and
2. **evidence that an overriding public interest is associated with the project which justifies waiver of 310 CMR 10.21 through 10.60, or evidence that the Superseding Order so restricts the use of the land that it constitutes an unconstitutional taking without compensation.**

The request for a variance shall be sent to the Department by certified mail or hand delivered and a copy thereof shall at the same time be sent by certified mail or hand delivered to the conservation commission and any other parties.”

Section 1.5 WAIVERS FROM RULES AND REGULATIONS, reads:

“Strict compliance with these Rules and Regulations *may* be waived when, in the judgment of the Commission, *such action is in the public interest, and is consistent with the intent and purpose of the Bylaw.* Any request for a Waiver must be submitted to the Commission in writing.

**The Waiver(s) shall be presented at the time of filing.**

**(The Commission shall require the Applicant to submit a written justification stating why a Waiver is desired or needed, is in the public benefit, and is consistent with the intent and purpose of the Bylaw.)”**

Of course, the applicant has not demonstrated how the proposal serves the public interest, nor has he demonstrated how the proposal supports the intent and purpose of the Bylaw. And of course, he has not submitted the waiver request at the time of filing.

## **B. Environmental Review**

No environmental study was completed for the subject property in 1999, despite what the applicant indicates. Only one of the abutters, upstream of the subject property, undertook a review of their own property, at their own expense. The applicant declined to do so.

The applicant has been directed by the Concomm to conduct this review, but has failed to do so, or even initiate it.

This environmental review must address four aspects of the environment:

1. Rare Species Identification
2. Suspected Vernal pools
3. Wildlife Habitat
4. Hydrology

### **1. Rare Species Identification**

The applicant has reported that the two species of special concern reported on an abutter's property in 1999 have been delisted. The applicant has not addressed the possibility that other rare species remain on the site, and in the proposed wetland crossing area. The biologist who conducted the 1999 review was a specialist in obligate amphibians, and identified two types of rare species. There is no evidence that all other rare species now on the 2007 list were missing from the site, since the review was not intended to be comprehensive; it was only intended to be conclusive regarding the presence

of any such species. Discovery of two such cases was sufficient to prove that the site contained rare species.

The applicant has just provided a letter dated July 16 from Caron Environmental Consulting that explains how the wetland delineation was done. This letter lists the most abundant species on the site. The letter completely fails to address the presence or absence of rare species, which is the matter at hand, and so fails to address any of the outstanding environmental questions.

## **2. Suspected Vernal pools**

These have not been evaluated by proper criteria:

### **Acton Wetlands Bylaw: Section F3.14**

**"The term "vernal pool" as used by this Bylaw shall include, in addition to that already defined under the Massachusetts Wetlands Protection Act and regulations (310 CMR 10.00), any confined basin or depression not occurring in existing lawns, gardens, landscaped areas, or driveways that meets the certification criteria established in the Guidelines for Certification of Vernal Pool Habitat published by the Massachusetts Division of Fisheries and Wildlife, regardless of whether the site has been certified by the Massachusetts Division of Fisheries and Wildlife. "**

In the June 6 meeting, in response to a question about the presence of vernal pools, the applicant merely answered that none could possibly be located on the site, because none were shown on any environmental agency maps.

In responding to the question of whether the property contains any vernal pools, Caron makes the same error made twice already by the applicant: he reports that there are no Certified Vernal Pools on the site.

**This is not the question.** These responses by Caron and AS&E rest on the assumption that all pools on the subject property have been reviewed by a competent biologist, and that if any existed, they must therefore be represented on an agency map. **This is a false assumption. No such review has ever been performed, and it is the applicant who has been directed to undertake it.**

The MA NHESP has published a Vernal Pool Fact Sheet (August, 2000) that states, on page 2 under the section titled "Vernal Pool Protection":

**"Vernal pools that are not certified may also be protected by a local conservation commission or the DEP if credible scientific evidence is presented up until the end of the appeals period for a Superseding Order of Conditions issued by the DEP.**

**A conservation commission, or the DEP on appeal, can incorporate protective conditions into an Order of Conditions that would prevent the alteration of the wildlife habitat value of the pool and it's 100 foot "vernal pool habitat" if they occur within a regulated wetland even though it is not certified."**

In addition, **three** suspected vernal pools, not one as described by the applicant in their June 26 letter to the ConComm, were reported to the ConComm in the meeting of June 20. **One is within 75 feet of the location of the proposed wetland crossing.**

It is the applicant's responsibility to answer the question of whether vernal pools are present when three candidates have been reported. They can only do this by engaging a professional biologist to locate and evaluate such pools as part of a professionally-conducted environmental review, as directed by the Commission. The applicant's inability to locate the other two suspected pools reported at the June 20 meeting only further demonstrates the need for a professional review.

### **3. Wildlife Habitat**

The March 2006 revision to the Wetland Protection Act provides for the enforcement of **Wildlife Habitat Review Guidelines** by Conservation Commissions. Two of the criteria which determine that a detailed habitat review is required are a) the suspected presence of beavers, and b) the suspected nesting of turtles. This is independent of any rare species protection that the Commission is charged with.

In the June 6 meeting, the applicant reported that the BWV had expanded on the western edge since the 1999 flagging, and suggested that this may be due to **beaver activity**. The applicant also alluded to the possible presence of beavers in the June 20 meeting.

In addition, spotted turtles were identified in the 1999 review on an abutter's property, and the biologist reported that it was highly likely they were also present on the subject property in 1999. In the absence of the wildlife habitat review prescribed by the Wildlife Habitat Guidelines, there is no reason to believe they have left either site.

### **4. Hydrology**

The project's site plan does not show #8 Spring Hill Rd, or any of the abutters, such as the Sislers on Dustin Lane, who will be affected by the proposed changes to the property. It fails to show the complete wetland system, and how changes to the subject property, including a proposed 4-6 foot high retaining wall along the boundary with the Sisler property, will affect the flows of stormwater.

The effects of altering the topography of the uplands to elevate it by 6 feet, and of removing trees in the driveway, upland and wetland replacement areas have not been analyzed using the methods advocated by the USDA Natural Resources Conservation Service, such as Technical Resource 55.

#### **Impact of Tree Clearing on Hydrology**

The normal action of transpiration from the leaves of trees draws surface water during wet periods, and from the water table during drier periods. When trees are removed, the reduction in this root absorption and transpiration results in a larger amount of rainwater's reaching the water table. In predominantly wet areas, such as wetlands, the water table may not be able to absorb the extra amount in the same timeframes as before. This change can result in higher water table levels after rainfalls than were previously experienced, and may cause seasonal flooding where none existed previously.

In an article in the Journal of Environmental Quality, Australian researchers published a study that concluded that:

“Results suggest that tree clearing may increase deep drainage by up to 10 times, and that in watersheds where shallow unconfined aquifers are present and where %TSS > 0.25%, recharge areas should not be cleared.”

Although this recommendation was directed at potential salination problem areas, the effects of tree clearing on the water table that they discovered are independent of any salination factors.

Another study by the Bureau of Land Management and University of Idaho concluded that:

“...canopy removal substantially affects both average height and duration of seasonal PWTs [perched water tables].”

“Considerable research has demonstrated that removal of forest canopy affects the hydrologic balance of watersheds... Studies have also shown that ground water table levels rise in response to forest canopy removal (Heikuranen, 1966; Peck and Williamson, 1987).”

**So, there is insufficient analysis to establish that the replacement wetland will be able to perform all the functions of the lost wetland area, including handling the additional storm runoff load resulting from the clearing and the increased elevation of the upland, without causing flooding.**

#### **Intermittent vs Perennial Streams**

In offering definitions of perennial streams in their letter of June 26, the applicant cited 310 CMR 10.58(2)(a) through (c), but failed to include the following citation from 310 CMR 10.58(2)(d)

**“d. Notwithstanding 310 CMR 10.58(2)(a)1.a. through c., the issuing authority shall find that any stream is intermittent based upon a documented field observation that the stream is not flowing. A documented field observation shall be made by a competent source and shall be based upon an observation made at least once per day, over four days in any consecutive 12 month period, during a non-drought period on a stream ... Field observations made after December 20, 2002 shall be documented by field notes and by dated photographs or video.”**

The applicant reported observing 10 days of dry streambed in late June and early July, but failed to supply the required documentary evidence of each observation. Only one photograph was supplied.

In addition, the citation sustains the definition offered by Mr. Appelmans at the hearing on June 20 that in order to be perennial, a stream must be dry for a total of not more than four days over a consecutive 12 month period. This definition supersedes all others offered by the applicant.

**It should be noted that a perennial stream requires a 200 ft setback, as specified by the Acton Wetland Regulations, 1.3.8., so this is a material concern about the subject property.**

### C. Quality of the Site Plan

1. The site plan has not been formally submitted for review to either the town Board of Health or the Building Department.
2. In addition, the separations from the Abutter's Septics and Wells are not mapped, and have not been demonstrated to be adequate. The Sisler property, in particular, has a septic system located very close to the mutual property boundary.
3. The use of a sizeable (6 foot) retaining wall at the property boundary with the Sisler's lot may not be in compliance with zoning regulations, and may require a variance and/or abutter's approval.

All of these factors contribute to the likelihood that the plan before us is very likely, in fact, to need further revisions, and that any detailed review of the current version by the Conservation Commission would be wasted.

The project site plan has a number of persistent flaws, including the following:

1. In the 1999 plans, the **streams, the firepond, and the lot for #8 Spring Hill Rd** were included in the first version of the site plan, and in all subsequent versions. In the 2007 application, however, **both were omitted**. Only the streams and firepond were added to the current revision, after the Commission directed the applicant to do so. The applicant has not complied with the public's requests to show adjacent lots in order to provide a more comprehensive perspective of the impact of the proposal on all affected parties.
2. The tight fit of the existing two houses, wells and septic systems leaves **no room for replacement leaching fields** outside the wetland buffer zones. In 30 years, the septic systems will have to be replaced, and there will be no suitable location for them without requiring further filling of the wetlands.
3. **Portions of the structures already encroach on the no-build buffer** and others lie exactly on the boundary. Any revisions required by the Board of Health or by the Building Department will therefore very likely necessitate a re-review by the Conservation Commission. The applicant's strategy of pursuing ConComm approval first is therefore timewasting for the Commission and the public.
4. The assumedly-perfect accuracy of the survey (in some cases, structures directly on the no-build buffer zone boundary) suggests that **any error either during surveying or during construction will cause unplanned impact to the wetlands**. There is no provision in the site plan or the construction details for avoiding these kinds of error, other than simplistic assurances that every effort will be made to avoid it. In other words, there is no margin for error.
5. The appropriateness of locating a new driveway immediately adjacent to an existing driveway on the same lot has not been reviewed against building codes. It is possible that compliance with the wetland protection interests of the WPA and with the zoning regulations would necessitate construction of a common driveway for both the two new houses and the existing house on #8 Spring Hill Rd. This would substantially alter the proposal.

6. There are no specified locations for fill, debris, construction materials or equipment on the site.

7. Mr. Donohoe of AS&E reported at the June 20 meeting that he didn't know where the percolation tests (conducted illegally as part of the 1999 proposal) took place. In fact, between the seven revisions to the two proposals, the septic systems have been sited at different locations. If it's the case that AS&E doesn't know where the percolation tests were conducted, then it has not been established that the proposed septic systems will be located on land that will percolate properly.

#### **D. Approach of the Applicant Regarding Application Submission and Review**

This project is essentially the same proposal that was submitted and denied in 1999. The prior ConComm decision noted **multiple reasons for denial, only one of which may need reconfirmation** pending environmental review. **The rest of the factors that led to the decision are not materially different.**

Four separate versions of the site plan were submitted during 10 meetings in 1999, and we are looking at the third in plan in three meetings in 2007.

The current approach essentially represents a process of shoehorning the planned houses into unsatisfactory space by trial and error, at the cost of the Commission's and public's time, and taxpayer expense for affected town staff. The applicant should have submitted all appropriate documentation, in a form that is already compliant, or included requests for waivers, variances and exemptions, at the first application, as required by law.

It is not in the interests of the Conservation Commission or the public for the applicant to be permitted to repeatedly alter the application, upon each discovery of a defect that should have already been known to the applicant through competent professional review. The Commission's task is oversight, as is the public's. It is not empowered nor equipped to direct the work of applicants to make their proposals compliant in any substantive way, as this application has demonstrated that it requires.

On the contrary, the Commission is empowered to deny applications that do not include the necessary and properly-submitted materials, and do not comply with existing, published laws and regulations. It is our view that the Commission should deny this application to save further wasted effort on the part of the applicant to patch it up, and on the part of the Commission and public to point out more of its obvious flaws, when it shows no merit in the first place.

In support of our recommendation to the Commission, we reference 310 CMR 05 (4), Notices of Intent:

"(f) If the issuing authority rejects a Notice of Intent because of a failure to obtain or apply for all permits, variances and approvals required by local by-law, it shall specify in writing the permit, variance or approval that has not been applied for."

## E. Citations

### 1. Limited Projects / Access to Uplands

310 CMR 10.53 (Preamble):

"Notwithstanding the provisions of 310 CMR 10.54 through 10.58 and 10.60, the issuing authority **may issue an Order of Conditions and impose such conditions as will contribute to the interests identified in M.G.L. c. 131, § 40 permitting the following limited projects** (although no such project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.59).

In the exercise of this discretion, the issuing authority shall consider the magnitude of the alteration and the significance of the project site to the interests identified in M.G.L. c. 131, § 40, the availability of reasonable alternatives to the proposed activity, the extent to which adverse impacts are minimized, and the extent to which mitigation measures, including replication or restoration, are provided to contribute to the protection of the interests identified in M.G.L. c. 131, § 40."

...

"(e) The **construction and maintenance of a new roadway or driveway** of minimum legal and practical width acceptable to the planning board, where reasonable alternative means of access from a public way to an upland area of the same owner is unavailable. Such roadway or driveway shall be constructed in a manner which does not restrict the flow of water. Reasonable alternative means of access may include any previously or currently available alternatives such as realignment or reconfiguration of the project to conform to 310 CMR 10.54 to 310 CMR 10.58 or to otherwise minimize adverse impacts on resource areas.

The issuing authority may require the applicant to utilize access over an adjacent parcel of land currently or formerly owned by the applicant, or in which the applicant has, or can obtain, an ownership interest. The applicant shall design the roadway or driveway according to the minimum length and width acceptable to the Planning Board, and shall present reasonable alternative means of access to the Board."

### MassDEP Wetlands Policy 88-2, Access Roadways

"2) **Even if the general requirements of the regulation are met as described in paragraph 1 above, the issuing authority may deny limited project status for certain work.** The issuing authority should evaluate the magnitude of the wetlands impacts proposed and the significance of that particular wetland to the interests of the Act. **For example, the issuing authority may permit an access proposal requiring a relatively small wetlands loss, all of which would be replicated, to gain access to a relatively large area of uplands all of which would otherwise be inaccessible.**

If, however, it is particularly important to avoid alteration of this wetland in order to protect the interests of the Act, for example when the wetland: lies adjacent to or above a public water supply, **particularly in an area that is the primary cone of influence to a well**; is in an Area of Critical Environmental Concern; contains rare species habitat; is a Class A designated water body by the Division of Water Pollution Control; is an anadromous fish run; **or has some other special environmental attribute**, the issuing authority may appropriately deny the same proposal.”

## 2. *Waivers and Variances*

310 CMR 10.05(10), Variance, reads:

“(a) The Commissioner may waive the application of any regulation(s) in 310 CMR 10.21 through 10.60 when he finds that:

3. there are no reasonable conditions or alternatives that would allow the project to proceed in compliance with 310 CMR 10.21 through 10.60;
4. that mitigating measures are proposed that will allow the project to be conditioned so as to contribute to the protection of the interests identified in M.G.L. c. 131, § 40; and
5. **that the variance is necessary to accommodate an overriding community, regional, state or national public interest; or that it is necessary to avoid an Order that so restricts the use of property as to constitute an unconstitutional taking without compensation.**”

“(b) Procedure. A request for a variance shall be made in writing and shall include, at a minimum, the following information:

1. a description of alternatives explored that would allow the project to proceed in compliance with 310 CMR 10.21 through 10.60 and an explanation of why each is unreasonable;
2. a description of the mitigating measures to be used to contribute to the protection of the interests identified in M.G.L. c. 131, § 40; and
3. **evidence that an overriding public interest is associated with the project which justifies waiver of 310 CMR 10.21 through 10.60, or evidence that the Superseding Order so restricts the use of the land that it constitutes an unconstitutional taking without compensation.**

The request for a variance shall be sent to the Department by certified mail or hand delivered and a copy thereof shall at the same time be sent by certified mail or hand delivered to the conservation commission and any other parties.”

Section 1.5 WAIVERS FROM RULES AND REGULATIONS of the **Acton Wetland Regulations**, reads:

“Strict compliance with these Rules and Regulations *may* be waived when, in the judgment of the Commission, ***such action is in the public interest, and is consistent with the intent and***

***purpose of the Bylaw. Any request for a Waiver must be submitted to the Commission in writing.***

**The Waiver(s) shall be presented at the time of filing.**

**(The Commission shall require the Applicant to submit a written justification stating why a Waiver is desired or needed, is in the public benefit, and is consistent with the intent and purpose of the Bylaw.)"**

### ***3. Vernal Pools, Certification and Protection of***

#### **MA Natural Heritage and Endangered Species Program**

"The Massachusetts Natural Heritage and Endangered Species Program has issued guidelines for vernal pool certification. The following are five sets of conditions which would indicate that a water body or depression is a vernal pool. Methods A and B identify a vernal pool by the "obligate species", those which require the fish-free yet temporary waters of a vernal pool for their life cycle. Methods C, D, and E identify a vernal pool by demonstrating that it has no fish yet does have "facultative species", those organisms which require a few months of water for their life cycle."

" 'Confined basin depression'. A confined basin depression is low area which collects water. It must not have a ***permanent*** above ground outlet."

See [http://www.vernalpool.org/macert\\_2.htm](http://www.vernalpool.org/macert_2.htm) and

<http://vernalpool.org/pdf/vpcert.pdf>

Note that a confined basin depression **may have a temporary, above ground outlet**, and therefore a temporary hydraulic connection to the downstream firepond **is not conclusive evidence** that the pool in question is not vernal.

### ***4. Intermittent Streams***

310 CMR 10.58(2)(d) states:

"d. Notwithstanding 310 CMR 10.58(2)(a)1.a. through c., the issuing authority shall find that any stream is intermittent **based upon a documented field observation that the stream is not flowing. A documented field observation shall be made by a competent source and shall be based upon an observation made at least once per day, over four days in any consecutive 12 month period, during a non-drought period on a stream not significantly affected by drawdown from withdrawals of water supply wells, direct withdrawals, impoundments, or other man-made flow reductions or diversions. Field observations made after December 20, 2002 shall be documented by field notes and by dated photographs or video.**"

### ***5. Buffer Zones and Setbacks***

The Acton Wetland Protection Regulations address the enforcement of buffer zones as follows:

**“These setbacks are the minimum and may be extended further if deemed necessary for the protection of the interests of the Bylaw by the Commission.**

The setbacks shall be as follows:

- (1) 0-foot setback for wetland-dependent structures (drain outfalls, weirs, etc.), fences, and **structures necessary for upland access where reasonable alternative access is unavailable.**
- (2) **50-foot setback of undisturbed natural vegetation.**
- (3) **75-foot no-build setback to the edge of driveways, roadways, and structures.**
- (4) 50-foot chemical free area, within which no fertilizers, herbicides, pesticides or other chemical maintenance substances shall be used.
- (5) 100-foot setback for underground storage of gasoline, oil, or other fuels and hazardous materials.
- (6) **100-foot setback of undisturbed natural vegetation to the mean high water line for vernal pools.**

## ***6. Effects of Tree Clearing on Water Table***

“Use of soil survey information to assess regional salinization risk using geographical information systems”, by Bui, E.N. [CSIRO, Queensland (Australia)] ; Smettem, K.R.J. [Univ. of Western Australia, Nedlands (Australia)] ; Moran, C.J. ; Williams, J. [CSIRO, Canberra (Australia)], Journal of Environmental Quality, VOL. 25, ISSUE 3, May-Jun 1996:

“Results suggest that tree clearing may increase deep drainage by up to 10 times and that in watersheds where shallow unconfined aquifers are present and where %TSS > 0.25%, recharge areas should not be cleared.”

“Perched Water Table Responses to Forest Clearing in Northern Idaho”, S. L. Rockefeller, P. A. McDaniel\*, and A. L. Falen, USDI-Bureau of Land Management and Soil and Land Resources Division, University of Idaho, Soil Science Society of America Journal, 68:168-174 (2004)

“Results indicate that **canopy removal substantially affects both average height and duration of seasonal PWTs** [*perched water tables*]. Average PWT levels were 6 to 107% higher under cleared treatments, with greatest increases observed when seasonal precipitation was close to long-term averages. Seasonal PWTs developed 2 to 8 wk sooner under cleared treatments compared with forested treatments. Additionally, it took as much as four months before PWTs in the forested treatments reached an equivalent height as those in the cleared treatments.”

“Considerable research has demonstrated that **removal of forest canopy affects the hydrologic balance of watersheds**. Clearing of forests results in increased catchment water yields (Hibbert, 1967; Williamson et al., 1987; Swank et al., 1988) and soil-water content (Hibbert, 1967; Sharma et al., 1987). Increases in soil-water content result from two major changes associated with

replacement of trees by grasses: reduced transpiration losses resulting from less annual water uptake by the replacement species (Lassoie et al., 1983; Eastham et al., 1994); and decreased evaporation losses resulting from less aboveground interception of annual precipitation (USDA, 1940; Calder, 1979). **Studies have also shown that ground water table levels rise in response to forest canopy removal (Heikuranen, 1966; Peck and Williamson, 1987).** These studies also demonstrate that increases in soil water are more pronounced in higher rainfall areas.”

See: <http://soil.scijournals.org/cgi/content/full/68/1/168>

## **7. Wetland Replication**

### **MA DEP Wetland Replication Guidelines**

#### **2.4.4 Cross-Sections**

“Cross-sections of the proposed wetland subsurface, showing soil types, depths, and locations, and if applicable, the 100-year floodplain elevation should be depicted using both horizontal and vertical scales. Also include predicted high and low ground water elevations, perched ground water conditions, and other indicators of surface or ground water hydrology including direct observations and soil characteristics. Locations of cross-sections should be indicated on the plan view.

#### **3.0 Considerations During Construction**

##### **3.1 Scheduling and Sequencing**

“...The wetland replication plan should include a **schedule showing** the sequence of major construction steps and **compliance monitoring.**” [p.20]

“When possible, **the replication area should be excavated and graded to the specifications in the plan before work in the existing wetland begins.**” [p.20]

“**The replication project should be substantially complete before existing wetlands are impacted** (however, if use of soils or vegetation from the impacted wetland is proposed, the disturbance necessary to remove the wetland soils or vegetation may precede completion of the replication site). In any case, the proposed replication area should be excavated prior to filling the wetlands to be altered.” [p. 21]

#### **310 CMR 05 (4) Notices of Intent**

“(f) If the issuing authority rejects a Notice of Intent because of a failure to obtain or apply for all permits, variances and approvals required by local by-law, it shall specify in writing the permit, variance or approval that has not been applied for.”