COMMONWEALTH OF MASSACHUSETTS
DIVISION OF ADMINISTRATIVE LAW APPEALS

	May 14, 2007
In the Matter of:	Docket No. DEP-05-124
	DEP File No. 156-10
Hoosac Wind Project (enXco, Inc.)	Florida

RECOMMENDED FINAL DECISION

Appeal by petitioner, a citizen group, from a wetlands permit issued by the Department of Environmental Protection allowing applicant enXco, Inc. to alter wetlands to access a site where the applicant plans to build a wind turbine project. After a full hearing, the preponderance of the evidence demonstrates that (1) the applicant did not accurately delineate the top of the inland banks at eleven streams at the site; (2) the project would impair the physical stability of the inland banks on the ten streams that would be bridged with open-bottom box culverts; and (3) although the project would alter more than fifty feet of inland bank, the applicant has not conducted a wildlife habitat evaluation pursuant to 310 CMR 10.54(4)(a)5 and 310 CMR 10.60. As a result, the work does not comply with the Wetlands Protection Act, M.G.L. c. 131, § 40, and the Wetlands Regulations, 310 CMR 10.00. Consequently, the applicant's wetlands permit must be vacated.

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Gregor I. McGregor, Esq. and Nathaniel Stevens, Esq. (McGregor & Associates, P.C., Boston) and James H. Wickersham, Esq. (Noble & Wickersham LLP, Cambridge) for the applicant, enXco, Inc.

James B. Art, Esq. (Grinnell, Dubendorf & Smith LLP, Williamstown) for the Conservation Commission of the Town of Florida.

Elizabeth B. Kimball, Esq., (Office of General Counsel, Boston) for the Department of Environmental Protection.

Natalie S. Monroe, Administrative Magistrate.

The petitioner and intervenor (collectively, the "petitioners") in this appeal challenge a wetlands permit that the Department of Environmental Protection issued to enXco, Inc. in connection with a wind turbine project to be built in the town of Florida. Although enXco's proposed project is a wind farm, this case is not about windmills or wind energy. This appeal is

limited to whether certain aspects of the project comply with the Wetlands Protection Act, M.G.L. c. 131, § 40, and the Wetlands Regulations, 310 CMR 10.00. In that regard, the parties presented over three hundred and fifty pages of pre-filed testimony, proffered more than one hundred and seventy exhibits, produced thousands of photographs of the project site, and questioned eleven witnesses during ten days of hearing with respect to seven disputed issues involving three bordering vegetated wetlands and twelve intermittent streams.

After considering the evidence and the applicable law, I recommend that the Acting Commissioner vacate the wetlands permit that the Department of Environmental Protection issued to enXco. I do so because I conclude that the proposed work does not comply with the Wetlands Protection Act and the Wetlands Regulations for the following reasons:

1. EnXco did not accurately delineate the upper boundaries of the inland banks on eleven of the intermittent streams at issue in this project. As a result, enXco cannot demonstrate that the proposed work meets the performance standards for inland banks under the Wetlands Regulations or that work within one hundred feet of the inland banks complies with the Wetlands Protection Act. See 310 CMR 10.54(4); 310 CMR 10.03(1)(a)3.[1]

2. The proposed work would violate 310 CMR 10.54(4)(a)1 because it would impair the physical stability of the inland banks on the ten streams that would be bridged with open-bottom box culverts.

3. The proposed work would alter more than fifty feet of inland bank at the site and enXco failed to perform a wildlife habitat evaluation pursuant to 310 CMR 10.60. As a result, the work does not comply with 310 CMR 10.60 or 310 CMR 10.54(4)(a)5.

[1] All citations to the Wetlands Regulations, 310 CMR 10.00, refer to the regulations that were in effect on November 13, 2003, when enXco filed its notice of intent with the Conservation Commission of the Town of Florida (the "Florida Conservation Commission").

Statutory Framework

Under the Wetlands Protection Act, M.G.L. c. 131, § 40 (the "Wetlands Protection Act" or the "Act"), any person who intends to "remove, fill, dredge or alter" a wetland resource area must request a permit from the local conservation commission. See M.G.L. c. 131, § 40; 310 CMR 10.05(4). A project that is located in a wetland resource area may be permitted if (1) the resource area is not significant to the protection of any of the "interests" identified in the Wetlands Protection Act, or (2) the work can be conditioned to comply with performance standards established for the resource area in which it would be built. See 310 CMR 10.03(1)(a)1-2.[2]

The Wetlands Regulations also regulate work within one hundred feet of a wetland resource area. A project in this one hundred foot "buffer zone" may be permitted as long as the proposed work would contribute to the protection of the interests identified in the Act. See 310 CMR 10.03(1)(a)3.

EnXco's proposed project would require work on, or within one hundred feet of, two types of wetland resource areas that are protected by the Wetlands Protection Act: inland banks and bordering vegetated wetlands. This appeal examines whether the project meets the requirements for work in, or within one hundred feet of, these two resource areas.

[2] The "interests" in the Wetlands Protection Act are as follows: protection of public and private water supply, protection of ground water supply, flood control, storm damage prevention, prevention of pollution, protection of land containing shellfish, protection of fisheries, and protection of wildlife habitat. M.G.L. c. 131, § 40.

Procedural History

On November 22, 2004, the petitioner, a group of twelve citizens (the "Citizens' Group"), initiated this appeal by filing a notice of claim for an adjudicatory hearing with the Department of Environmental Protection (the "DEP"). On January 21, 2005, a group of more than ten persons (the "Ten-Person Environmental Group") moved to intervene pursuant to M.G.L. c. 30A, § 10A. Both enXco and the DEP opposed the motion.

On February 3, 2005, a presiding officer at the DEP denied the Ten-Person Environmental Group's motion to intervene on the grounds that it did not comply with new rules for adjudicatory proceedings that the DEP had promulgated in December 2004.[3] At the same time, the presiding officer also issued a Statement of Disputed Issues, which identified eight issues to be adjudicated in this appeal. See Statement of Disputed Issues, dated February 3, 2005.

The DEP transferred this appeal to the Division of Administrative Law Appeals on February 17, 2005, and, on March 3, 2005, this tribunal ordered the parties to attend a pre-hearing conference on March 28, 2005. The Citizens' Group, enXco and the DEP all filed pre-hearing conference memoranda; rather than identifying issues for adjudication, each party adopted the issues in the DEP presiding officer's Statement of Disputed Issues.

On March 14, 2005, the Ten-Person Environmental Group renewed its motion to intervene. EnXco opposed the motion on March 21, 2005.

I held a pre-hearing conference on March 28, 2005, during which I set a schedule for submitting pre-filed testimony, motions for directed decision and motions to strike. At the conference, moreover, the petitioners reported that they had served on enXco a request for

[3] The ruling was incorrect because this appeal was filed on November 22, 2004 and the DEP's new adjudicatory rules only apply to appeals initiated on or after January 1, 2005. See 310 CMR 1.01(15)(d).

documents and for a site visit, but that the company had refused to produce any documents or to allow a site visit. See 301 CMR 1.00(12)(a) (requiring the parties to engage in cooperative discovery, including producing relevant documents and allowing site access). As a result, the schedule also included time for the parties to file and oppose motions to compel, as well to complete discovery (if warranted). Finally, during the conference, I allowed the Ten-Person Environmental Group's renewed motion to intervene. See Pre-Hearing Conference Report and Order, dated April 1, 2005, at pp. 1-2.

Following the conference, I issued a Pre-Hearing Conference Report and Order, which set the final hearing for August 16, 17 and 18, 2005, based on the parties' estimates that the final hearing would take two to three days. The Order also identified the issues for adjudication, which were based on the DEP presiding officer's Statement of Disputed Issues. A list of the issues for adjudication is attached to this decision at Appendix A. After the pre-hearing conference, moreover, enXco and the petitioners reached an agreement on a site visit, which occurred on May 10, 11 and 12, 2005.[4]

The parties submitted their pre-filed testimony between May 31, 2005 and July 13, 2005. The petitioners filed testimony from four witnesses: Eleanor Tillinghast, who attended the May 2005 site visit and made a photographic record of it; James Scalise, a registered professional engineer; Ed Stockman, a professional wetland scientist; and Pamela Weatherbee, a botanist. EnXco presented five witnesses: Jason Krzanowski, a civil engineer and the senior manager for enXco's wind turbine project; Darrin Harris, a registered professional engineer and Mr. Krzanowski's supervisor; Mary Johnson, an environmental consultant; Jeffrey Simmons, a professional wetland scientist; and Gary Sanford, Ph.D., also a professional wetland scientist. Two witnesses testified for the DEP: David Foulis, the environmental analyst in the DEP's

[4] The DEP did not participate in the site visit.

western regional office with principal responsibility for reviewing enXco's project; and Robert McCollum, the Program Chief of Wetlands and Waterways in the DEP's western regional office. While the Florida Conservation Commission is a party to this appeal, it did not proffer any witnesses.

After the parties had submitted their pre-filed testimony, enXco and the DEP filed a joint motion to strike much of the petitioners' pre-filed testimony and a joint motion for a partial directed decision, which sought to dismiss many (although not all) of the petitioners' claims. At the same time, enXco also filed a motion for this tribunal to accept revised project plans. The revised plans (1) delineated two new wetland areas that the petitioners had identified during their site visit ten weeks earlier; and (2) revised portions of the project in order to avoid impacting the newly-identified areas.

The petitioners opposed all three motions on August 8, 2005, a week before the first day of hearing. On August 11, 2005, the DEP filed a "reply brief" in which it accepted enXco's new boundary delineations and supported the company's motion to change the project plans. The Florida Conservation Commission also assented to enXco's proposed project changes.

On August 12, 2005, I granted in part and denied in part the joint motion to strike. Because the DEP and enXco's motion for a partial directed decision did not seek a full disposition of this appeal, and because it was filed shortly before the hearing was scheduled to begin, I took that motion under advisement and proceeded to conduct the hearing. At the start of the hearing, however, I informed the parties that I would dismiss Issue Nos. 3, 6(c), 6(d), 6(e) and 6(g) because the petitioners did not contest their dismissal.[5]

[5] "Issue __" refers to the issues for adjudication identified in the Pre-Hearing Conference Report and Order, dated April 1, 2005. See Appendix A.

Furthermore, before the hearing began, the parties asked for oral argument on enXco's motion to accept the new plan changes. I therefore heard argument on August 17, 2005. On August 18, 2005, I granted enXco's motion to revise its project plans, but expressly reserved ruling on whether the delineations were accurate or whether the revisions complied with the Wetlands Protection Act. As a matter of fairness, moreover, both the petitioners and the DEP had to be allowed an opportunity to review the plan changes at the site, as well as to submit testimony about those changes. I therefore worked with the parties to set a schedule for a site visit and for all of the parties to submit pre-filed testimony concerning the plan changes.

The petitioners' second site visit occurred on September 21 and 22, 2005.[6] The parties submitted their supplemental pre-filed testimony between October 18, 2005 and December 5, 2005. On December 8, 2005, the DEP and enXco moved to strike large portions of the petitioners' supplemental testimony. The petitioners opposed the motion on December 12, 2005. On the same day, I granted the motion in part and denied it in part.

The live portion of the hearing resumed on December 13, 2005.[7] The hearing continued over an additional six days: December 14-15, 2005; January 24-25, 2006; February 9, 2006; and February 13, 2006. The parties submitted post-hearing briefs on April 14, 2006, and reply briefs on May 12, 2006.

On March 7, 2007, I issued a written ruling on the DEP and enXco's joint motion for a partial directed decision. That ruling granted directed decision to the DEP and enXco on (a) Issue No. 1 with respect to the two bordering vegetated wetlands that the petitioners claimed were

[6] The DEP did not participate in the site visit.

[7] At the end of the third day of hearing in August 2005, the parties had only finished questioning five of the eleven witnesses. Additional hearing days therefore would have been required even if enXco had not changed the project plans. However, enXco apparently revised the plans shortly after the May 2005 site visit, see Applicant's Motion to Accept Plan Changes at Exh. A, so it is unclear why the company waited to file its motion until after all of the parties' testimony had been submitted. Had enXco filed its motion sooner, the parties could have addressed the plan changes in their initial pre-filed testimony and it would not have been necessary to postpone the hearing.

located near Stream No. 5 and Stream No. 15; (b) Issue No. 2 to the extent that it asked whether there were additional inland banks on the site that had not been identified on the plan of record; and (c) Issue Nos. 3, 4(b), 6(a), 6(b), 6(c), 6(d), 6(e), 6(g) and 7(c) in their entirety. The motion was denied in all other respects.

In light of my ruling on the DEP and enXco's motion, the following issues remain in this appeal:

(a) Issue No. 1 as it applies to "Proposed Wetlands 1 and 2."

(b) Issue No. 2 to the extent it asks whether enXco has accurately delineated the upper boundaries of the inland banks on the twelve intermittent streams that are at issue in this appeal.

(c) Issue Nos. 4(a) and 4(c).

(d) Issue No. 5.

(e) Issue No. 6(f).

(f) Issue Nos. 7(a), 7(b), 7(d), 7(e) and 7(f).

This decision addresses those issues.

Findings of Fact[8]

I. The Proposed Project.

EnXco seeks to build a wind turbine farm in the Hoosac Mountain Range in northwestern Massachusetts. The project would consist of twenty wind turbines, approximately four miles of roads, a stormwater management system, a maintenance building and a temporary construction yard. Eleven turbines (numbers 1-11) would be built on the top of Bakke Mountain, which is located entirely within the town of Florida. Nine turbines (numbers 12-20) would sit on Crum Hill, which is located to the east of Bakke Mountain and which straddles the Monroe-Florida

[8] Additional findings of fact are included in the discussion section of this decision.

town line. A public way named Tilda Hill Road runs between Bakke Mountain and Crum Hill. See, e.g., Krzanowski Dir. Test. at ¶¶ 13-17.[9]

The project area is largely undeveloped and heavily forested. Building the wind turbine farm would require vegetation clearing, constructing four new roads, installing culverts to bridge twelve streams and other wetlands, installing drainage features, constructing an operations and maintenance building and a staging area, installing electrical connections and utility poles, and erecting the wind turbines. The project is expected to take approximately a year to build. Krzanowski, Vol. 2 at pp. 156-57.[10]

A. The Proposed Roads.

EnXco has labeled two of the proposed roads "access roads" and refers to the other two as "ridge roads." One access road would start from Tilda Hill Road and would run east through Crum Hill up to its ridge; the other access road also would start from Tilda Hill Road but would travel through Bakke Mountain up to its ridge. The two access roads would be sixteen feet wide, widening to twenty-two feet at some curves. See Krzanowski Dir. Test. at ¶ 16; Krzanowski, Vol. 2 at p. 149.

The two ridge roads would provide access to the individual wind turbines; one would start at the top of the Crum Hill access road and run the length of the ridge of Crum Hill, while the second would connect to the Bakke Mountain access road and run along the ridge of Bakke Mountain. Because of the size of the turbines and the trucks needed to transport them, the two ridge roads initially would be thirty-five feet wide. After the project is fully built, portions of

[9] The witnesses' pre-filed direct testimony and pre-filed rebuttal testimony are cited as "Dir. Test." and "Reb.", respectively. "Supp. Test." and "Supp. Reb." refer to the witnesses' pre-filed supplemental direct testimony and pre-filed supplemental rebuttal testimony; this is the testimony that was filed in the fall of the 2005 to address enXco's revised project plans.

[10] Citations to testimony given during the ten days of hearing will be as follows: name of witness, followed by the transcript volume number ("Vol. __"), followed by the relevant pages in the transcript. There are ten volumes of transcripts; each volume corresponds to each of the ten days of hearing.

these roads would be covered with loam and vegetated in order to narrow them to a width of sixteen feet. See Krzanowski Dir. Test. at ¶ 16; Krzanowski, Vol. 2 at pp. 149-50.

All four roads would be gravel and would be constructed to receive HS-20 highway loads, meaning that they would be able to carry trucks that have individual axle loads of up to twenty tons. Krzanowski, Vol. 2 at pp. 157-59.

B. Resource Areas.

The proposed roads would be built across one bordering vegetated wetland (called BVW No. 13) and twelve intermittent streams (referred to as Stream Nos. 1, 2, 3, 5, 7, 8, 9, 10, 12, 13, 15 and 39). In addition to these resource areas, the roadways and turbines also would be built within one hundred feet of thirteen other bordering vegetated wetlands and three other streams.[11]

1. Crossing BVW No. 13.

The Crum Hill access road would be built through BVW No. 13. EnXco therefore proposes to fill 1,506 square feet of this wetland and then replicate 3,731 square feet of bordering vegetated wetland in a nearby location. Simmons Dir. Test. at ¶ 53(1)(i).[12]

2. The Intermittent Stream Crossings.

The proposed roads would cross the intermittent streams in three ways. First, enXco would install aluminum open-bottom box culverts ("open-bottom culverts") over ten of the streams (Stream Nos. 1, 2, 3, 5, 7, 8, 9, 10, 13 and 39), then build the roads on top of the culverts. An open-bottom culvert resembles an upside-down "U" and is akin to an arched

[11] See Plan of Record at pages SRV-755-L102, -L103, -L104, -L108, -L109, -L110, -L111, -L115, -L116, -L117, -L119 and -L120. The "Plan of Record" refers to the final set of project plans that enXco has submitted for this project, including the revised plan pages that I approved on August 18, 2005.

[12] In its post-hearing brief, enXco states that the roads also would be built across a second wetland. See Post-Hearing Brief of Applicant EnXco, Inc. ("enXco's Post-Hearing Br.") at p. 1. It appears that enXco is referring to a wetland that it variously has called "Wetland No. 16" and "former BVW No. 16." See Plan of Record at page SRV-755-111 (Rev. D). I do not review any aspect of this wetland, however, including whether the road would be built over it, because, in their post-hearing briefs, the petitioners abandoned all arguments concerning this alleged resource area.

bridge. It is meant to span a stream without touching the stream or its banks. In this project, the length of the open-bottom culverts would vary from twenty-three to sixty feet. Their spans would range between ten and twenty-nine feet, while their rises would be between two-and-a-half feet and nine feet above the stream bed. See Plan of Record at page SRV-755-L133 (Rev. E).[13]

Second, enXco would use a traditional pipe culvert to cross Stream No. 15. This would involve installing two pipes in the active stream channel, filling the stream with backfill and other material, then building the road on top of the stream and its banks. See Krzanowski Dir. Test. at ¶ 23 and n. 1; Plan of Record at page SRV-755-L133 (Rev. E). The culvert at Stream No. 15 would be thirty feet long. Id.

Finally, enXco would use an eighteen-foot pipe culvert and at least eighty feet of steel plates to cross Stream No. 12. Krzanowski Dir. Test. at ¶ 23 and n. 1; Krzanowski, Vol. 3 at pp. 117-18. Stream No. 12 is a former drainage ditch that flows parallel to Tilda Hill Road at the proposed entrance to the Crum Hill access road. In order to accommodate tractor trailers turning off of Tilda Hill Road, the entrance to the Crum Hill access road would be between eighty and

[13] The "length" of a culvert refers to the dimension that runs parallel to the stream. For example, a culvert with a length of thirty feet would run along thirty feet of the stream. "Span" refers to the distance necessary for the culvert to cross over the stream. See id. The "rise" measures the distance from the highest point on the culvert to the bottom of the stream bed. The dimensions of the open-bottom culverts are as follows:

Stream No.	Culvert: Length	Span	Rise
1	37'	29' 3"	6' 5"
2	28'	15' 6"	7' 3"
3	26'	10' 2"	2' 8"
5	60'	24' 4"	8' 2"
7	27'	19' 10"	7' 8"
8	23'	22' 1"	9' 3"
9	27'	12' 7"	5' 2"
10	23'	21' 6"	7' 8"
13	27'	20' 7"	5' 3"
39	50'	12' 1"	6' 7"

Id.

ninety-eight feet wide. Krzanowski, Vol. 3 at pp. 115-17. As a result, the Crum Hill access road would be built over a ninety-eight foot section of Stream No. 12. Jason Krzanowski, the senior manager for this project, explained:

> This access road is going to flare out to accommodate fixed-rear-axle trailers. In the interest of minimizing impacts, [enXco would] … install permanent culverts of …18 feet long at one point to cross this. Since this is going to be a permanent road, we wanted a permanent culvert. The remainder of the stream that is there, we didn't feel it was necessary to pipe it….So what we elected to do was plate over….
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> ***
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> They are three-quarter-inch-thick steel plates…. There's going to be a long row of these set to span over the stream. The tractor part of the truck would turn in over the permanent pipes. The tail end of the trailer lagging behind would steer onto the inside and cross over these plates at an angle.

Krzanowski, Vol. 3 at pp. 115, 117. To install the steel plates, enXco would wrap the stream banks with geotextile fabric, place the plates over the stream and its banks, build the road over the plates, and cover the banks with loam or gravel. Krzanowski, Vol. 3 at pp. 114-16; Plan of Record at page SRV-755-L133 (Rev. D). When the entire project is fully built, the plates would be removed and the stream would be restored. Krzanowski, Vol. 3 at p. 117.

C. Construction and Installation of the Open-Bottom Culverts.

With the exception of the culvert at Stream No. 1, the open-bottom culverts would be built less than eight feet from the top of the inland banks at the stream crossings. At some streams, the culverts would be built within two or three feet of the inland banks. Krzanowski, Vol. 2 at pp. 173-82; id., Vol. 3 at pp. 38-39.[14] As a result, several of the issues in dispute

[14] Mr. Krzanowski, provided the following measurements:

Stream crossing	Closest distance between culvert and inland bank	Stream crossing	Closest distance between culvert and inland bank
No. 1	> 6 feet	No. 8	3 feet
No. 2	5 feet	No. 9	2 feet
No. 3	4 feet	No. 10	3 feet
No. 5	4 feet	No. 13	3 feet
No. 7	4 feet	No. 39	2 feet

involve the installation of the open-bottom culverts. I therefore briefly describe how enXco would install the open-bottom culverts.

First, enXco would remove the trees and shrubs in and around the area where the open-bottom culvert is to be installed. A trench then would be excavated on each side of the stream. Each trench would be approximately two feet deep and two feet wide. Krzanowski, Vol. 3 at pp. 109, 119-20; id., Vol. 5 at p. 165. The trench would run the entire length of the proposed culvert at each given location; for example, if a culvert is thirty feet long, a roughly thirty-two foot trench would be dug on each side of the stream. See Krzanowski, Vol. 3 at pp. 107-110; id., Vol. 5 at p. 165 (the trench would be one to two feet longer than the actual length of the culvert). Using an excavator or backhoe, enXco would clear the trench of roots, boulders and other obstructions; large boulders would be "cracked" with a jackhammer, hoe ram or similar equipment. Krzanowski Dir. Test. at ¶ 58; Krzanowski, Vol. 3 at pp. 110-11.

After all of the obstructions have been removed from the trench, it would be leveled and the soil would be compacted to a minimum of 4,000 pounds per square inch. Krzanowski Dir. Test. at ¶ 58; Krzanowski, Vol. 2 at pp. 187-88; Plan of Record at page SRV-755-L133 (Rev. E). Next, the trench would be filled with approximately six inches of gravel; instead of gravel, in some instances enXco may pour a concrete pad. See, e.g., Krzanowski, Vol. 2 at p. 188; id., Vol. 3 at pp. 111-12. After the gravel or concrete is in place, an aluminum "pad" would be placed in the trench. The pad, which is a solid piece of metal, would be approximately eighteen inches wide and would run the entire length of the trench. Krzanowski, Vol. 3 at pp. 107-09, 110.

See Krzanowski, Vol. 2 at pp. 173-82. The crossing at Stream No. 1 is estimated because Mr. Krzanowski was not asked to give a measurement for this culvert after it was redesigned as part of the August 2005 project changes. But see id. at 170 (original culvert design called for installation six feet, at its closest point, from the inland bank); Krzanowski Supp. Test. at ¶ 9 (the revised project moved the culvert further away from the inland bank). Furthermore, these are minimum distances; because streams and inland banks are not perfectly straight, at any one crossing, the distance from the culvert to the inland bank may vary by a few feet. See, e.g., Krzanowski, Vol. 3 at pp. 38-39.

The culvert then would be assembled and placed on top of the pad. Because each culvert is a continuous piece of aluminum (like an inverted "U"), the bottom edge of the culvert would sit on the entire length of the pad. The trench would be backfilled and graded. Fill, gravel and other material would then be placed on top of the culvert in order to build the road over the stream. See Krzanowski Dir. Test. at ¶ 58; Krzanowski Vol. 5 at pp. 163-68; Plan of Record at page SRV-755-L133 (Rev. E).

D. The Use of Fill to Build the Roads and Embankments.

As previously discussed, the roads would be between sixteen and thirty-five feet wide. These widths refer to the driving surfaces of the roads, however. In order to cross over the open-bottom culverts, the roads would be elevated and would have sloping embankments at and near the stream crossings. Krzanowski, Vol. 2 at pp. 150-51. The widths of the entire road structure – *i.e.*, the road and its embankments – would vary from stream crossing to stream crossing. Id. at 152-56. At Stream No. 2, for example, the width of the entire road structure would be approximately forty feet. Id. at 153-54.

EnXco would use fill to build the roads and to raise them up to the necessary elevations. In general, the deepest amounts of fill would be on the road on top of and adjacent to the open-bottom culverts. The roads would slope downward from the open-bottom culverts, meaning that the depth of the fill would decrease as the road traveled away from the culvert.

The total amount of fill used at each culvert crossing would be extensive. At the crossing for Stream No. 2, for example, the fill would be ten feet deep at the top of the culvert; it would be forty feet wide and would extend one hundred feet back from the culvert. Krzanowski, Vol. 2, pp. 171-72, 178.[15]

[15] As previously stated, because the grade would be sloping, the fill would not be ten feet deep the entire length, but would start at ten feet deep and taper off.

II. Permitting History.

On November 14, 2003, enXco filed a notice of intent with the town of Florida for the portion of the project located in that town.[16] According to the original project plans submitted with the notice of intent, the roadways would have crossed nine streams. The company proposed to use traditional pipe culverts to cross all of them, which enXco estimated would have altered 375 feet of stream bank. See Notice of Intent at WPA Form 3, p. 3; id. at Narrative, pp. 5-6. EnXco also proposed to fill three bordering vegetated wetlands, for a total loss of 3,900 square feet of this wetland resource. Id. at p. 6. To compensate for these alterations, enXco proposed to replicate 309 feet of stream bank and 5,160 square feet of bordering vegetated wetland. Id.

During the review before the Conservation Commission, enXco identified two additional streams – Stream Nos. 12 and 15 – that were located in the path of the proposed roadways. See Johnson Dir. Test. at ¶¶ 20-21; Petitioners' Hearing Exh. 14A at p. 61. EnXco also replaced the pipe culverts with open-bottom culverts at nine of the stream crossings, *i.e.*, the locations where the roads would cross over the streams.

Following a series of public meetings, on May 17, 2004, the Florida Conservation Commission issued enXco an order of conditions allowing the project. By letter dated June 2, 2004, ten or more residents of Florida requested that the DEP issue a superseding order of conditions denying the project. Petitioners' Hearing Exh. 8.

On July 6, 2004, the DEP's western regional office acknowledged the residents' request and scheduled an informal meeting at the site on July 23, 2004. Petitioners' Hearing Exh. 5; Foulis Dir. Test., pp. 3-4 at ¶ 1(e)-1(f). David Foulis, the environmental analyst in the DEP's western regional office responsible for reviewing enXco's project, led the meeting. Foulis Dir.

[16] EnXco also requested and obtained an order of conditions for the elements of the project to be built in Monroe. That order of conditions is not at issue in this appeal, however; this case involves only those portions of the project that are located in Florida.

Test., p. 4 at ¶ 1(g). The meeting included a field walk, which took approximately two hours and included visits to four of the proposed stream crossings (at Stream Nos. 8, 9, 10 and 12). Foulis Dir. Test., pp. 4-5 at ¶ 1(g); Foulis, Vol. 8 at pp. 116-27, 141-42.

At the time of the field walk, enXco had not marked the centerline of the proposed roadways, the proposed culvert crossings or the boundaries of the inland banks. Foulis, Vol. 8 at pp. 120-25. Mr. Foulis relied on Mr. Krzanowski to show him the centerline of the road and other pertinent features. Id. During the site walk, moreover, Mr. Foulis stated that he did not think two bordering vegetated wetlands, BVW Nos. 7 and 37, met the regulatory definition of a bordering vegetated wetland; he also suggested that BVW No. 13 might be smaller than enXco had delineated it on the project plans. Id. at 138-41; Johnson Dir. Test. at ¶¶ 16(a), 26, 35. This was the only time that anyone from the DEP visited the project site. Foulis, Vol. 8 at p. 127.

A week later, on July 30, 2004, Robert McCollum, the Program Chief of Wetlands and Waterways in the DEP's western regional office, wrote a letter asking enXco for information, including field data forms and photographs for each affected bordering vegetated wetland, a written bordering vegetated wetland replacement area plan and a description of the stormwater management plans. See Petitioners' Hearing Exh. 6; McCollum Dir. Test. at ¶ 14. Mr. McCollum also asked enXco for a complete description of each stream crossing, including a stream classification, a description of canopy closure, an analysis of the predicted surficial hydrology of each stream, a "full and complete floral inventory of vascular plants" on the inland banks at the stream crossings, and photographs documenting the delineation of the inland banks. Petitioners' Hearing Exh. 6.

EnXco responded to Mr. McCollum's request on September 23, 2004. The response package included data about wetland documentation, the wetland replacement plan, aggregate

wetland impacts, stormwater management plans, Natural Heritage and Endangered Species findings, a Massachusetts Technological Collaborative work scope, and enXco's decommissioning plan. Krzanowski Dir. Test. at ¶ 41. EnXco also submitted "Exhibit 1.1: Data from Woodlot Alternatives," which had been prepared by Jeffrey Simmons, a Senior Project Manager at an environmental consulting firm, Woodlot Alternatives, Inc. ("Woodlot Alternatives"). Exhibit 1.1 included a photograph of each stream in the vicinity of the proposed stream crossing, an inventory of the vascular plants that were located on the inland bank, a description of the canopy closure at each stream crossing, and an analysis of the predicted surficial hydrology of each stream. See Petitioners' Hearing Exh. 14A.[17]

The response package also included revised project plans to show changes to the roadway design, as well as Mr. Simmons' delineations of the inland banks at the stream crossings. The revised project plans also re-delineated several of the bordering vegetated wetlands that had been identified in the notice of intent. In particular, bordering vegetated wetlands that originally had been mapped under the roads were now shown on the project plans as streams, inland banks and/or uplands. Consequently, bordering vegetated wetlands were removed from the path of the proposed roadways (because they had become streams, inland banks or uplands), leaving one bordering vegetated wetland – BVW No. 13 – in the road's path.[18] Moreover, portions of BVW No. 13 were re-designated as upland, meaning that the Crum Hill access road now crossed a smaller portion of the resource area than it had in the previous project plans. As a cumulative result of these re-designations, the plans now show that the project would alter 1,506 square feet of bordering vegetated wetland, rather than the 3,900 square feet identified in the notice of intent.

[17] Petitioners' Hearing Exhibit 14A is the actual document that enXco submitted to the DEP. Foulis, Vol. 8 at pp. 167-68.

[18] These re-delineations resulted in a curious phenomenon where a bordering vegetated wetland begins on one side of the proposed road, turns into another feature (such as a stream) in the location of the proposed road, and then resumes being a bordering vegetated wetland on the other side of the proposed road. See, e.g., Plan of Record at pp. SRV-755-L115 (Rev. C) and -L116 (Rev. D).

See, e.g., Simmons Dir. Test. at ¶¶ 19, 25; Simmons, Vol. 8 at pp. 66-67; Weatherbee Dir. Test. at ¶¶ 10-11.

Finally, the revised project plans depicted a twelfth intermittent stream (called Stream No. 39) in the path of the proposed roadways. The project plans indicated that the roadway would cross Stream No. 39 with an open-bottom culvert.

In early November 2004, Mr. Foulis called Mr. Simmons to ask him about the inventories of vascular plants that Mr. Simmons had identified as growing on the inland banks at the stream crossings. Simmons, Vol. 7 at pp. 46-47. Mr. Foulis told Mr. Simmons that he did not believe that the plants listed in Exhibit 1.1 were growing on the inland banks. This belief was based on his review of Exhibit 1.1 and his examination of the four streams during the July site visit. Id.; Foulis, Vol. 8 at pp. 156-57. Mr. Foulis asked Mr. Simmons to look into the matter and to send a written clarification if he (Mr. Simmons) changed his position. Id. at pp. 48-49.

In response to Mr. Foulis' request, Mr. Simmons reviewed his notes and the photographs that he had taken of the streams. On November 4, 2004, he submitted a letter to enXco revising the information in Exhibit 1.1. In particular, Mr. Simmons stated that the vascular plants listed in Exhibit 1.1 were not actually on the inland banks at the stream crossings, but were located either just above the inland banks or on the inland banks "just outside the proposed stream crossing." Weatherbee Dir. Test., Exh. D at p. 1.

On November 8, 2004, the DEP issued a superseding order of conditions approving the project. This appeal followed.

Standard of Review

A party opposing the DEP's decision to issue a superseding order of conditions has the burden of going forward on appeal. 310 CMR 10.03(2). To meet this burden, the party must "produce at least some credible evidence from a competent source in support of the position taken." Id. The applicant, however, always has the ultimate burden of proof. See 310 CMR 10.03(1)(a). See also Matter of Karp, Docket No. 98-138, Remand Decision, 8 DEPR 47, 51 n.9 (Feb. 26, 2001). Thus, once a petitioner comes forward with credible evidence from a competent source in support of its position, the burden switches to the applicant to prove by a preponderance of the evidence that the project will comply with the Wetlands Protection Act and the Wetlands Regulations. Id. See also Matter of Jan Companies, Docket No. 97-069, Ruling on Petitioner's Motion Regarding Burdens of Going Forward, 5 DEPR 54 (March 26, 1998).

Because the DEP issued a superseding order of conditions allowing the project, the petitioners have the initial burden of going forward. If they satisfy that burden on an issue, the burden of proof then shifts to enXco.

Discussion

I. Issue No. 1: Are there bordering vegetated wetlands which (a) were not properly delineated or were incorrectly designated as "bank" on the approved plans, and (b) which will be impacted by the project to an extent inconsistent with the performance standards at 310 CMR 10.55(a)-(b)?

In my ruling on the DEP and enXco's motion for directed decision, I dismissed Issue No. 1 except as it applies to two bordering vegetated wetlands, which enXco has named Area A and BVW No. 18. See Ruling on Motion for Partial Directed Decision, dated March 7, 2007, at pp. 4-6.[19] EnXco's consultants delineated Area A and BVW No. 18 in June 2005. Those

[19] In my directed decision ruling, I referred to Area A and BVW No. 18 as Proposed Wetland 1 and Proposed Wetland 2, respectively. Id.

delineations are shown on enXco's most-recent project plans. See Plan of Record at page SRV-755-L102 (Rev. D) and -L111 (Rev. D).

Area A is a U-shaped bordering vegetated wetland that is associated with Stream No. 1 and that sits on the northern side of the proposed ridge road for Bakke Mountain. The road and open-bottom culvert for Stream No. 1 would be built within two or three feet of the "tips" this U-shaped wetland; in some locations, the limit-of-work line would be a foot or less from the resource area. Krzanowski, Vol. 5 at pp. 99-103, 118-20; Plan of Record at SRV-755-L102 (Rev. D); Petitioners' Hearing Exhs. 2, 4.

BVW No. 18 lies just to the north of the proposed Bakke Mountain access road, at roadway station 23+30 on page SRV-755-L111 (Rev. D) of the revised project plans. The wetland is irregularly shaped; at its closest point, the limit-of-work line would be three to three-and-a-half feet from the wetland. Krzanowski, Vol. 5 at pp. 135-36.

The petitioners make two arguments concerning these two resource areas. First, they contend that enXco has not accurately delineated the wetlands and that both actually extend into the proposed project area. They claim that, as a result, construction activities will take place in the wetlands. In the alternative, the petitioners assert that even if the bordering vegetated wetlands are not within the limit-of-work area, filling and construction activities will impair them.

A. The Boundaries of Area A and BVW No. 18.

The petitioners presented Ed Stockman to testify about the locations of Area A and BVW No. 18. Mr. Stockman holds both B.S. and M.S. degrees in biology and is certified as a Professional Wetland Scientist by the Society of Wetland Scientists Certification Program, Inc. He has worked in the field of wetland science in Massachusetts for over nineteen years and has

delineated bordering vegetated wetlands under the Wetlands Protection Act. Stockman Dir. Test. at ¶ 1; Stockman, Vol. 1 at p. 189; Stockman, Vol. 4 at pp. 155-56. Mr. Stockman was a credible witness and he was qualified to provide expert testimony concerning the delineation of the bordering vegetated wetlands on the site.

Mr. Stockman testified that he examined Area A during the September 2005 site visit. Stockman Supp. Test. at ¶ 2. He dug a soil pit within the area that enXco had delineated as Area A, and a second within the proposed work area for the project, approximately eight feet from the boundary of Area A. Stockman Supp. Test. at ¶ 7 and Exhs. B, E. Mr. Stockman determined that the soils in both test pits were hydric and that both had supporting hydrology. Id. at ¶¶ 10-11. He concluded that the presence of hydric soil, with supporting hydrology, in the second test pit was "evidence that [Area A] is larger than drawn on the plans." Id. at ¶ 10. He therefore concluded that Area A extends into the proposed limit-of-work area for the project. Id. at ¶¶ 9, 12.

Mr. Stockman further testified that when the petitioners conducted the September 2005 site visit, the groundcover in and around Area A was "significantly trampled." Stockman Supp. Test. at ¶ 10. As a result, Mr. Stockman did not analyze the vegetation in Area A or around the second test pit. Id.; Stockman Supp. Reb. at ¶¶ 12-13; Stockman, Vol. 5 at pp. 49-50.

The petitioners have not met their burden of presenting credible evidence that Area A extends into the proposed limit-of-work area. See 310 CMR 10.03(2). Under the Wetlands Regulations, the boundary of a bordering vegetated wetland is "the line within which 50% or more of the vegetational community consists of wetland indicator plants and saturated or inundated conditions exist." 310 CMR 10.55(2)(c). Furthermore, "areas containing a predominance of wetland indicator plants are presumed to indicate the presence of saturated or

inundated conditions." 310 CMR 10.55(2)(c)1. Thus, the boundary of a bordering vegetated wetland is determined in the first instance based on the existence of wetland indicator plants. Soil hydrology may be used, by itself, to delineate the boundary of a bordering vegetated wetland only if the area in dispute has been disturbed:

> [w]here an area has been disturbed (e.g., by cutting, filling, or cultivation), the boundary is the line within which there are indicators of saturated or inundated conditions sufficient to support a predominance of wetland indicator plants, a predominance of wetland indicator plants, or credible evidence from a competent source that the area supported or would support under undisturbed conditions a predominance of wetland indicator plants prior to the disturbance.

310 CMR 10.55(2)(c)3.

In this case, the petitioners have failed to present credible evidence that the vegetation in the area was so degraded as to trigger the delineation procedure in 310 CMR 10.55(2)(c)3. At most, Mr. Stockman demonstrated that one layer of vegetation – the groundcover layer – had been severely trampled. However, Mr. Stockman testified that the shrub, sapling and tree layers in Area A had not been disturbed. See Stockman, Vol. 5 at pp. 83-85. Moreover, one of the petitioners' other experts, Pamela Weatherbee, testified that while the groundcover had been trampled, she still was able to identify the plants in that layer. Weatherbee Supp. Test. at ¶ 8.

"[E]xpert testimony does not suffice to sustain the burden of going forward on an issue if the testimony is based on improper, or improperly applied, methodology…." Matter of Cheney, Docket No. 98-096, Final Decision, 6 DEPR 198, 200 (Oct. 26, 1999). Without evidence that the proposed limit-of-work area had been disturbed within the meaning of 310 CMR 10.55(2)(c)3, Mr. Stockman was not justified in considering only hydrology when he opined that Area A extended into the proposed work area. Stated differently, his opinion was based on "improper … methodology." Cheney, 6 DEPR at 200.

The petitioners also failed to sustain their burden of going forward with respect to BVW No. 18. While the petitioners argue that BVW No. 18 is in the path of the proposed road, they did not present any evidence to this effect. As with Area A, the petitioners' only testimony on the delineation of BVW No. 18 came from Mr. Stockman. He did not testify, however, that BVW No. 18 extends into the roadway. Rather, he testified only that he found hydric soil in two test pits located within the limit-of-work line for the proposed project, and that he believed the boundaries of BVW No. 18 should be drawn more precisely. Stockman Supp. Test. at ¶¶ 21-23 and Exhs. J, L. Absent expert testimony that the wetland is located within the proposed limit-of-work area (as well as facts supporting that opinion), the petitioners have not met their burden of going forward on this claim.

B. Construction Activities Near the Wetlands.

The petitioners contend that, even if enXco has properly delineated both Area A and BVW No. 18, the proposed construction would occur so close to both wetlands that both would be altered. Petitioners' and Intervenors' Post-Hearing Brief ("Petitioners' Post-Hearing Br.") at p. 25. The construction and filling activities at issue would take place in the buffer zone to these two wetlands. Moreover, both bordering vegetated wetlands are presumed to be significant to public or private water supply, ground water supply, flood control, storm damage prevention, the prevention of pollution, the protection of fisheries, and wildlife habitat. 310 CMR 10.55(3). Consequently, to meet their burden of going forward, the petitioners had to present credible evidence that the buffer zone work would alter the wetlands and that the alteration would adversely affect the wetlands' ability to contribute to the protection of one or more of the interests of the Act (for example, preventing pollution). See 310 CMR 10.02(2)(b). See also

Matter of Priors Crossing, Inc., Docket No. 92-156, Final Decision, 3 DEPR 95, 98 (May 16, 1996). The petitioners did not meet this burden.

The petitioners adduced evidence that the project would be built extremely close to both wetlands. In particular, the petitioners have demonstrated that enXco plans to build roads, culverts and retaining walls a few feet – sometimes just two or three feet – from both Area A and BVW No. 18. Stockman, Vol. 5 at pp. 11-12; Stockman Supp. Test. at Exhs. M, N; Krzanowski, Vol. 5 at pp. 99-103, 107-21; Krzanowski Supp. Test. at ¶¶ 13-15; Plan of Record at SRV-755-L102 (Rev. D). Consequently, the limit-of-work line in some locations would be roughly one foot from the edge of the wetlands. Because enXco would place erosion and sediment control barriers six inches from the wetlands, at some points this would leave only inches between the barriers and the proposed construction activity, see Krzanowski, Vol. 5 at pp. 107-10, calling into question how enXco could build the roadways, culverts and retaining walls without working in the wetlands. In fact, in at least one location, the space between the wetland boundary and the limit-of-work line is so tight that there would not be enough room to install traditional erosion and sediment control barriers. Id. at ¶¶ 118-19; Petitioners' Hearing Exh. 4.

However, while the petitioners have shown that the project would be built very close to Area A and BVW No. 18, they have not presented any evidence that this work would alter either wetland, or that such an alteration would hinder either wetland's ability to contribute to the protection of statutory wetlands interests. See Priors Crossing, 3 DEPR at 98. Instead, the petitioners' experts testified that the close construction activities are "likely" to alter or negatively impact the wetlands to an "extent inconsistent with" the Wetlands Regulations. Stockman Supp. Reb. at ¶ 14. See also Stockman Supp. Test. at ¶ 22; Stockman Supp. Reb. at p. 6 (last para.); Scalise Supp. Reb. at ¶ 4. This opinion is conclusory. It does not address how the

wetlands would be altered or how any such alterations would hinder the wetlands' ability to contribute to the protection of statutory wetlands interests. "Although expert testimony may be evidence from a competent source, it will not sustain the burden of going forward on an issue if it presents opinions or conclusions without supporting facts." Matter of Cohen, Docket No. 99-206, Recommended Final Decision, 8 DEPR 99, 101 (May 3, 2001), *adopted as Final Decision*, 8 DEPR 99 (2001).

Because the petitioners failed to meet their burden of going forward, the burden of proof does not shift to enXco and Issue No. 1 must be decided against the petitioners. In light of this conclusion, it is unnecessary to examine the other parties' evidence that the two resource areas were properly delineated and that the proposed project would not alter either wetland.

II. Issue No. 2: Are there inland banks which (a) were not properly delineated on the approved plans, and (b) which will be impacted by the project to an extent inconsistent with the performance standards at 310 CMR 10.54(4)(a)(1 and 5)?

The Wetlands Protection Act and the Wetlands Regulations contain provisions protecting inland banks. An inland bank is

> the portion of the land surface which normally abuts and confines a water body. It occurs between a water body and a vegetated bordering wetland and adjacent flood plain, or, in the absence of these, it occurs between a water body and upland.

310 CMR 10.54(2)(a). The Wetlands Regulations define the top – or "upper boundary" – of an inland bank as "the first observable break in the slope or the mean annual flood level, whichever is lower." 310 CMR 10.54(2)(c).[20]

[20] A stream's "bank" typically refers to the land that starts at the edge of the stream and slopes upward to the first sharp break in the grade. The Wetlands Regulations do not necessarily regulate the entire "stream bank" as a resource area, but instead utilize the definition listed above to identify the "top" of the bank for jurisdictional purposes. To prevent confusion, I use the terms "stream bank" and "bank" to refer to the entire landform that laypersons generally would consider to be the stream's "bank." I use the term "inland bank" to refer to the portion of the stream bank that falls within the Wetlands Regulations' jurisdiction as a resource area.

The "first observable break in the slope" is the point on a stream bank where it significantly changes in grade. Foulis, Vol. 8 at p. 135. A stream bank's "annual flood level" is the highest level that water reaches on the bank in a year. Id., Vol. 9 at p. 56. Thus, the "mean annual flood level" refers to the arithmetic average of a stream bank's annual flood levels over a period of years. Id. at 17. Because the mean annual flood level is an average of annual peak flood levels, a stream may not reach its mean annual flood level in some years, while in other years water may flow above the stream's mean annual flood level. Moreover, water in a stream may reach its annual peak flood level for only a brief moment, or it could remain at its annual peak level for an extended length of time. Id. at 16; id., Vol. 10 at pp. 14-15.

If annual flood levels were available for a stream bank, it would be possible to calculate the mean annual flood level for that bank. Foulis, Vol. 8 at pp. 132-34. When no such data is available, the mean annual flood level must be estimated. One way to estimate it is to examine the stream bank for "field indicators," such as debris lines and changes in plant community. See, e.g., id. at 133-34. Such work must be performed by a professional who understands how to evaluate the field indicators and how to relate them to the mean annual flood level. Id.

Finally, along one stream bank, the first observable break in the slope may be lower than the mean annual flood level at some locations, while in other places on the same bank the mean annual flood level may be the lower feature. Foulis, Vol. 8 at p. 129.

Issue No. 2 asks whether enXco accurately delineated the tops of the inland banks at the stream crossings (*i.e.,* the locations where the roads would cross the streams). In particular, the petitioners contend that while enXco properly identified the presence of inland banks at eleven stream crossings, the upper boundary of each inland bank is higher than is shown on the project

plans.[21] The accurate delineation of the inland banks is important because enXco proposes to build the roads and culverts very close to the inland banks. As they currently are delineated, the inland banks are a few feet from the proposed roads and culverts. See table at footnote 14.[22] In fact, the open-bottom culverts would be installed in such close proximity to the inland banks that there would not be enough space for enXco to use the erosion controls mandated in the superseding order of conditions. Krzanowski, Vol. 5 at pp. 130-32, 151-52. See also Superseding Order of Condition, dated November 8, 2004, at Special Condition No. 24 (requiring enXco to install hay bales and siltation fences between all resource areas and all construction work). Given the tight spatial constraints, if enXco's inland bank delineations are off by as little as one or two feet, it would mean that construction would take place directly on the inland banks.

Because the DEP and enXco's motion for a partial directed decision did not challenge the petitioners' direct case on this aspect of Issue No. 2, I have not previously examined whether the petitioners met their burden of going forward on this question. I do so now and conclude that

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[21] The eleven stream crossings are at Stream Nos. 1, 2, 3, 5, 7, 8, 9, 10, 13, 15 and 39. The parties agree that the upper boundaries of the inland banks at Stream No. 12 have been accurately flagged at the first observable break in the slope. See, e.g., Petitioners' Post-Hearing Br. at p. 37 n.18; enXco's Post-Hearing Br. at p. 16. Accordingly, it is unnecessary for me to review the delineation of the inland banks at Stream No. 12.

[22] In this decision, the distances from the culverts to the inland banks are based principally on testimony from Mr. Krzanowski. First, Mr. Krzanowski was asked to measure the distance from each culvert to the closest point on the inland bank. Those measurements are in the table in footnote 14. On re-direct, Mr. Krzanowski testified that the streams are "meandering to a certain extent" underneath the culverts. Krzanowski, Vol. 3 at pp. 38-39. He testified that, therefore,

> [t]o take a single dimension and call that representative of the proximity of the culvert to the stream would be erroneous. In some cases it is 5 feet and in some cases it is 7 feet. It varies. In some locations you are going to get a little closer.

Id. However, enXco never had Mr. Krzanowski provide additional measurements of the distances from the culverts to the inland banks to show, for example, that the minimum distances were misleading. I infer from Mr. Krzanowski's testimony (and enXco's decision not to put in alternate measurements) that while the culvert-to-bank distance under any given stream might vary, it only varies by two or so feet. For example, if the minimum culvert-to-bank distance at a stream is three feet, then the maximum distance at that stream would be approximately five or six feet. See, e.g., Krzanowski, Vol. 3 at pp. 38-39 (in testifying that the distances vary at any one stream, witness used a two-foot differential). See also Scalise, Vol. 4 at pp. 72-73 (testifying that the inland bank lines at the site "wandered" by "a couple of feet").

they have. Moreover, after considering all of the evidence, I find that enXco did not accurately delineate the upper boundaries of the inland banks at the eleven disputed stream crossings. In particular, I find that (1) enXco's consultant failed to independently evaluate whether the top of the inland bank at each stream was the first observable break in the slope or the mean annual flood level, but instead believed he was supposed to flag the mean annual flood level at each stream crossing; and (2) each of the lines he flagged for Stream Nos. 1, 2, 3, 5, 7, 8, 9, 10, 13, 15 and 39 was below both the first observable break in the slope and the mean annual flood level.

A. Background.

At the time of the DEP's July 2004 site visit, the upper boundaries of the inland banks on the site had not been delineated or flagged. Simmons Dir. Test. at ¶ 16. Mr. Foulis therefore told Michael Thompson, a wildlife biologist from Woodlot Alternatives – one of enXco's environmental consulting firms – that enXco had to delineate the inland banks. Foulis Dir. Test., p. 4 at ¶ 9(vii); Foulis, Vol. 9 at pp. 6-7. He also told Mr. Thompson that the "upper boundary" of each inland bank at each stream at the site was the mean annual flood level. Foulis Supp. Test. at ¶ 33; Simmons Dir. Test. at ¶ 15. This determination was based on Mr. Foulis' belief that the mean annual flood level was below the first observable break in the slope on each stream bank. Foulis, Vol. 8 at pp. 128-29. Mr. Foulis showed Mr. Thompson the field indicators that marked the mean annual flood level,

> including very specifically a change in the substrate of the actual channel of the stream versus what was above that, a break in relative erosive forces and a dramatic change in the plant community at a very sharp line.

Id., Vol. 9 at pp. 6-7.

A week later, the DEP followed up in writing. Specifically, in his July 30, 2004 letter, see supra at p. 16, Mr. McCollum told enXco to submit "photographic documentation …

depicting brightly-colored flagging delineating the Mean Annual Flood Level" on each side of each intermittent stream. Petitioners' Hearing Exh. 6.

Mr. Thompson asked Jeffrey Simmons, a professional wetland scientist with Woodlot Alternatives, to delineate the inland banks, as well as to perform other work that the DEP had requested. Simmons, Vol. 5 at pp. 185-87; Simmons Dir. Test. at ¶ 10. Mr. Simmons, a Senior Project Manager at Woodlot Alternatives in Maine, has a bachelor's degree in environmental biology and a master's degree in natural resources. Mr. Simmons is certified as a professional wetland scientist by both the State of New Hampshire and the Society of Wetland Scientists. Simmons Dir. Test. at ¶ 1. He has over eighteen years of experience in the field of wetland science, including twelve years' experience delineating wetlands and other resource areas in accordance with the federal Clean Water Act and various state regulatory programs. Id. at ¶¶ 1, 3, 5 and Exh. A.

After speaking with Mr. Thompson, Mr. Simmons believed that the DEP had already determined that the top of each inland bank was the mean annual flood level and that he was supposed to flag the mean annual flood level at each stream crossing. Simmons, Vol. 5 at pp. 225-26; id., Vol. 7 at p. 27; Simmons Dir. Test. at ¶ 15.

Mr. Simmons performed the inland bank delineations in August and September of 2004. Simmons Dir. Test. at ¶ 20. He testified that at each stream crossing, he flagged the line that he believed was the mean annual flood level. Id. at ¶ 15; Simmons, Vol. 7 at pp. 36-37.

After he completed the inland bank delineations and the other work that the DEP had requested, Mr. Simmons prepared a document entitled, "Exhibit 1.1: Data from Woodlot Alternatives," which was sent to the DEP. See Petitioners' Hearing Exh. 14A; Simmons, Vol. 7 at pp. 25-26. In the cover letter to Exhibit 1.1, Mr. Simmons summarized the work that Woodlot

Alternatives had performed. The letter stated (in part) that "bank resources were delineated by marking the mean annual flood level in the field…." Petitioners' Hearing Exh. 14A, Cover letter at p. 2.

B. The Petitioners' Burden of Going Forward.

Before working on enXco's project, Mr. Simmons had never delineated the mean annual flood level on an inland bank under the Wetlands Regulations. Simmons, Vol. 6 at pp. 144-45; id., Vol. 7 at p. 9. When Mr. Thompson asked Mr. Simmons to delineate the inland banks at the site, he told Mr. Simmons about the field indicators that Mr. Foulis had identified during the July 2004 site visit. Id., Vol. 6 at pp. 141-42. Prior to flagging the inland banks, Mr. Simmons also looked at the 2000 preface to the amendments to 310 CMR 10.58, which regulates activities in riverfront areas. Id. at 143-44; id., Vol. 7 at pp. 8-10.[23] Mr. Simmons did not look at any other material before performing the inland bank delineations. Id., Vol. 6 at pp. 143-44. He also may have spoken to Mr. Foulis beforehand; Mr. Foulis believed that the two had had a conversation, but Mr. Simmons did not. See Foulis, Vol. 9 at pp. 147-48; Simmons, Vol. 7 at p. 46.

When questioned about the work he performed and his understanding of the mean annual flood level, Mr. Simmons gave inaccurate, inconsistent and contradictory testimony, indicating (at best) a lack of understanding of the mean annual flood level under the Wetlands Regulations. For example, Mr. Simmons testified that he did not know how the Wetlands Regulations define "mean annual flood level." Simmons, Vol. 6 at p. 133. He believed – incorrectly – that the Wetlands Regulations provide "field indicators" to identify the mean annual flood level and that the DEP has a policy concerning which field indicators to use. Id. at 133-35; Simmons Dir. Test. at ¶ 15.

[23] The parties agree that 310 CMR 10.58 is not applicable to this case. See, e.g., enXco's Post-Hearing Br. at p. 8; Foulis, Vol. 9 at pp. 75-76.

Similarly, Mr. Simmons initially testified that he did not know how frequently the streams at issue reach the mean annual flood level, but he believed that a stream would not reach its mean annual flood level every year. Simmons, Vol. 6 at p. 134; id., Vol. 7 at p. 22. He subsequently testified that the streams reach their mean annual flood level not every year, but almost every year. Id., Vol. 7 at pp. 39-40. He then changed his testimony again and testified that, on average, streams reach their mean annual flood level once a year. Id., Vol. 8 at pp. 69.[24]

Furthermore, Mr. Simmons testified he did not actually mark the mean annual flood levels on the banks because the necessary data was not available. See, e.g., Simmons, Vol. 6 at p. 136; id., Vol. 7 at pp. 21, 66-67; id., Vol. 8 at pp. 57, 60. Instead, he marked each stream's "bankfull event," because he could see "bankfull" field indicators on the streams. See, e.g., id., Vol. 8 at p. 46.[25] He testified that this was appropriate because, during a bankfull event, water flows above the mean annual flood level. Id. at 59-60.

However, Mr. Simmons gave contradictory testimony concerning his understanding of the term bankfull. He first testified that the term referred to the condition that exists when a stream fills up to the top of the first observable break in the slope, *i.e.*, when its banks are completely full and overflowing. Simmons, Vol. 6 at pp. 136-37. The following day, Mr. Simmons testified that bankfull refers to the "active area of the [stream] channel," which may be "well below" the first observable break in the slope. Id., Vol. 7 at p. 13. See also id. at 18-21 (contradictory testimony discussing a bankfull event as one in which water flows over the top of the first observable break in the slope).

Finally, the petitioners adduced evidence that Mr. Simmons flagged the boundaries using a methodology not designed to measure a water body's annual peak flood levels. In particular, Mr.

[24] If this were true, it would mean that water peaked at the exact same location on the bank each and every year.
[25] According to Mr. Simmons, bankfull field indicators include point bars, stain lines, debris lines and changes in plant community. Id., Vol. 6 at p. 136.

Simmons testified that in delineating the inland banks, he relied on his experience identifying the "ordinary high water mark" under the federal Clean Water Act. Mr. Simmons testified that the mean annual flood level is "comparable" to – and "essentially the same thing as picking out" – the ordinary high water mark. Simmons, Vol. 6 at p. 144-45; id., Vol. 8 at p. 9.

According to established precedent, however, the ordinary high water mark does not measure floods or peak flows. Section 404 of the Clean Water Act, 33 U.S.C. § 1344, utilizes the ordinary high water mark to establish federal jurisdiction over navigable waters. The Clean Water Act regulations define the ordinary high water mark as

> the line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

33 CFR 328.3(e). The ordinary high water mark is "placed there, as the name implies, from the ordinary flow of the river and does not extend to the peak flow...." United States v. Claridge, 416 F.2d 933, 934 (9th Cir. 1969). See also United States v. Pend Oreille Public Utility Dist. No. 1, 926 F.2d 1502, 1506 (9th Cir. 1991) (the federal Clean Water Act "mandate[s] the exclusion of annual spring floods in calculating the ordinary high water line"); United States v. Harrell, 926 F.2d 1036, 1041 (3rd Cir. 1991) (the ordinary high water mark does not include the "extraordinary freshets of the winter or spring") (citation omitted).[26]

To meet their burden of going forward, the petitioners had to "produce at least some credible evidence from a competent source in support of the position taken." 310 CMR 10.03(2). The evidence set forth above more than satisfies that burden. First, the petitioners adduced evidence that Mr. Simmons was not competent to delineate the mean annual flood level under

[26] This point is not seriously debated. EnXco admits that Mr. Simmons marked the ordinary high water line on the banks and that the ordinary high water line does not measure, or include, a stream bank's peak flood levels. See enXco's Reply Br. at p. 9.

the Wetlands Regulations. This evidence includes (a) the fact that Mr. Simmons had never delineated the mean annual flood level under the regulations; (b) his lack of preparation before performing the delineations; (c) his lack of understanding of the meaning of the term under the regulations; and (d) his inconsistent and contradictory testimony concerning both the mean annual flood level and bankfull conditions. Further, Mr. Simmons' use of the federal ordinary high water mark indicates that he actually marked a line below the mean annual flood level.

Finally, I reject the DEP and the Florida Conservation Commission's argument that the petitioners were required to submit their own delineation of the inland banks. The petitioners' obligation was to produce at least some credible evidence from a competent source in support of their position. 310 CMR 10.03(2). They did this by adducing evidence that the person who marked the inland banks was not qualified to do so and that he flagged a line lower than the actual mean annual flood level. While perhaps it was risky for the petitioners not to submit their own delineations, they were not required to do so and it did not leave them without a sufficient direct case. The cases that the Florida Conservation Commission cited do not say otherwise. See Matter of Crowley, Docket No. 89-152, Final Decision, 2 DEPR 153 (July 19, 1995); Cohen, 8 DEPR at 104 (listing an alternative delineation as one example of the type evidence that the petitioner could have used to meet the burden of going forward).

Nor did the petitioners ever concede that enXco's inland bank delineations were correct. See Petitioners' Opposition to Department's and Applicant's Motion to Dismiss for Failure to Sustain Case at pp. 10-11.

C. EnXco's Burden of Proof.

Because the petitioners met their burden of going forward, the responsibility shifted to enXco to prove by a preponderance of the evidence that it accurately delineated the tops of the

inland banks. 310 CMR 10.03(1)(a); Jan Companies, 5 DEPR at 54. Two witnesses testified that the inland banks were properly delineated: Mr. Simmons and Mr. Foulis.

1. Jeffrey Simmons.

I do not give any weight to Mr. Simmons' testimony for two separate reasons. First, I find that he was not qualified to provide expert testimony on the delineation of the mean annual flood level under the Wetlands Regulations. A witness may be qualified as an expert as a result of his knowledge, skill, experience, training or education. Mr. Simmons has not shown he has expertise in delineating the mean annual flood level under the Wetlands Regulations, or that he employed his knowledge, skill, experience, training or education in performing the delineations at the site. To the contrary, Mr. Simmons had never delineated the mean annual flood level under 310 CMR 10.54, and did very little to prepare himself before flagging the inland banks. See, e.g., Simmons, Vol. 6 at pp. 141-45 (before going to the site, he spoke with Mr. Thompson about bankfull field indicators and reviewed a provision of the Wetlands Regulations that is not applicable to the streams in this case). Furthermore, Mr. Simmons gave inaccurate, inconsistent and contradictory testimony, revealing a lack of understanding of both the mean annual flood level and the term "bankfull" (upon which he allegedly relied to delineate the inland banks). Under these circumstances, I find that Mr. Simmons was not qualified to give expert testimony on the delineation of the upper boundaries of the inland banks at the site.

Second, because he is the person who flagged the inland banks, I could treat Mr. Simmons solely as a fact witness. I do not do so, however, because having observed him testify over a period of four days, I do not find him to be a credible witness. As one Pennsylvania court observed, the "opportunity to observe demeanor and appearance of witnesses in many instances becomes the very touchstone of credibility." Connor v. Connor, 77 A.2d 697, 699 (Pa. Super.

1951) (citations omitted). See also Salem v. Massachusetts Comn'n Against Discrim., 404 Mass. 170, 175-76, 543 N.E.2d 283, 286 (1989) (emphasizing the importance of observing a witness's demeanor while testifying in order to determine credibility); New England Canteen Serv., Inc. v. Ashley, 372 Mass. 671, 675, 363 N.E.2d 526, 529 (1977) (same).

In this case, Mr. Simmons' testimony often appeared rehearsed. He frequently equivocated, did not make eye contact with opposing counsel and looked to enXco's attorney while he was testifying on cross-examination. Furthermore, Mr. Simmons repeatedly contradicted himself, making it impossible to find his testimony believable. Over the course of two days, for example, Mr. Simmons consistently agreed that he had to estimate, or approximate, the mean annual flood level because no flow data was available for the stream banks at issue. See, e.g., Simmons, Vol. 6 at p. 146; id., Vol. 7 at pp. 5-6. On the last day of questioning, on re-direct from enXco's attorney, Mr. Simmons stated that his delineations of the mean annual flood level were "dead on." Id., Vol. 8 at p. 9. Minutes later, he testified that he had marked a line *higher* on the stream bank than the mean annual flood level. Id. at 47. All three seemingly inconsistent statements cannot be true: the line he marked cannot be both an "estimate" and "dead on" accurate. Similarly, his delineation cannot be both "higher" than the mean annual flood level and a "dead on" accurate flagging of the mean annual flood level. The previous discussion in Section II.B provides further examples of the witness's vacillating testimony.

2. David Foulis.

Mr. Foulis has a bachelor's degree in natural resource studies, with a concentration in wetland ecology. Foulis Dir. Test., p. 1 at ¶ 2. He has seventeen years' experience in environmental sciences and currently is an environmental analyst in the DEP's western regional office. Id. at ¶ 1. In his position as an environmental analyst, Mr. Foulis is responsible for

reviewing requests for superseding orders of conditions under the Wetlands Protection Act. Id. He has observed many mountain streams in the Berkshires and has been involved in ten to fifteen projects involving intermittent streams similar to those at issue here. Foulis, Vol. 9 at pp. 77-78, 132-33. I find that he was qualified to provide expert testimony concerning the delineation of inland banks under the Wetlands Regulations.

First, Mr. Foulis testified that it was appropriate for Mr. Simmons to use the mean annual flood level – rather than the first observable break in the slope – as the upper boundary of the inland banks at the streams. He based his opinion on his review of the four streams he examined during the July 2004 site visit and his knowledge of intermittent mountain streams in the Berkshires. See, e.g., Foulis, Vol. 8 at pp. 128-29. He explained that he believed all eleven streams in dispute were "entrenched," meaning they had "deep, incised" channels that were eroding. Id., Vol. 9 at pp. 78-79. Because of this, water flowing in the streams would never reach more than a third or half way up the stream banks; flow in the streams would rarely (if ever) flow "over the top" of the stream banks. Id. at 17-18, 41-42. He therefore concluded that the mean annual flood level always would be lower than the first observable break in the slope at all of the streams. Id. See also Foulis Supp. Test. at ¶ 33.

Second, Mr. Foulis testified that Mr. Simmons' use of bankfull field indicators to identify the mean annual flood level was appropriate. He explained that a bankfull event is one in which water flows to the top of the stream bank, but it was his opinion that the eleven streams rarely reach "bankfull." Foulis, Vol. 9 at pp. 40-41. He testified, however, that the bankfull field indicators are evidence of the prolonged presence of water on the stream bank. See, e.g., id., Vol. 10 at pp. 13-14. In his opinion, at each stream crossing, water peaks at the same point on the bank every year and the water remains at that peak level for extended periods of time. Id.,

Vol. 9 at pp. 17, 20. Because bankfull field indicators show where "water [has been] sitting for prolonged periods," Mr. Foulis believed that Mr. Simmons was correct to use the bankfull field indicators to identify the mean annual flood level. Id., Vol. 10 at pp. 13-14.

Finally, Mr. Foulis concluded that Mr. Simmons had accurately delineated the mean annual flood levels on the banks. He based his opinion on (1) his belief that the top of the inland banks at the eleven streams always is the mean annual flood level; (2) his conclusion that it was appropriate for Mr. Simmons to use bankfull field indicators; (3) his visit to four streams on the site; (4) his examination of the project plans; and (5) his review of Exhibit 1.1, which contained the comprehensive stream data the DEP had requested after the July 2004 site visit. See, e.g., Foulis, Vol. 9 at pp. 129-31.

Mr. Foulis has extensive experience reviewing wetland boundaries and is familiar with intermittent mountain streams in the Berkshires. He also visited the site and was the individual at the DEP primarily responsible for evaluating this particular project. However, Mr. Foulis based his opinions on assumptions that are not supported by the extrinsic evidence, including Exhibit 1.1, which Mr. Foulis relied upon in reaching his conclusions. Mr. Foulis testified, for example, that it was appropriate to use the bankfull field indicators because flow in each of the streams reached the same peak flood level multiple times during one growing season, and that it remained at peak flood levels for prolong periods of time. See, e.g., Foulis, Vol. 9 at pp. 17-20. According to Exhibit 1.1, however, neither condition exists at these streams. First, Exhibit 1.1 states that the streams do not reach their highest flow multiple times during the growing season; rather, in most years they reach their highest peak flows only during the early spring. See Petitioners' Hearing Exhibit 14A at ¶¶ 1.1.5, 2.1.5, 3.1.5, 4.1.5, 5.1.5, 6.1.5, 7.1.5, 8.1.5, 9.1.5, 10.1.5, 11.1.5, 12.1.5. The one exception was Stream No. 1, which was predicted also to

experience "higher water levels" in the late fall. Id. at ¶ 1.1.5. Additionally, according to Exhibit 1.1, most of the streams had either very low or no flow during the summer months (*i.e.*, during a large part of the growing season). Id.[27]

Second, according to Exhibit 1.1, flood levels dissipate quickly at each stream; stated differently, the streams do not remain at flood stages for prolonged periods of time. Petitioners' Hearing Exh.14A at ¶¶ 1.1.5, 2.1.5, 3.1.5, 4.1.5, 5.1.5, 6.1.5, 7.1.5, 8.1.5, 9.1.5, 10.1.5, 11.1.5, 12.1.5. The following is representative of the conclusion reached with respect to each stream:

> Because of the presence of compact glacial till soils in its watershed, the generally persistent steep slope, and because of the small size of the watershed, water levels likely increase dramatically during precipitation events. However, peak flows are also expected to drop quickly following the cessation of a rain event.

Id. at ¶ 1.1.5. This is consistent with testimony from the petitioners' wetlands expert, Mr. Stockman. He testified that the streams are "flashy," which he defined as "respond[ing] rapidly to rainstorms and/or snowmelt…." Stockman Dir. Test. at ¶ 23.

Mr. Foulis also based his opinions on his conclusion that all of the streams have deep, incised channels. Again, Exhibit 1.1 indicates that the streams are not as uniform as Mr. Foulis believed. Stream No. 3 is described as having a "shallow channel," which changes in width from one to four feet at the proposed roadway crossing. Petitioners' Hearing Exh. 14A at ¶¶ 3.1.1, 3.1.5. The document states that Stream No. 9 has a "braided channel;" Stream No. 15 flows underground at some places within the proposed road crossing, while the flow in Stream No. 39 is "dispersed" across a wide area and flows underground in some locations. Id. at ¶¶ 7.1.5, 11.1.5, 12.1.5.

[27] Only four were predicted to have some flow most of the year (though not the entire summer); these were the four streams that Mr. Foulis visited. Id. at ¶¶ 5.1.5, 6.1.5, 7.1.5, 8.1.5.

Because Mr. Foulis based his testimony on assumptions that are not supported by the record, it must be discounted. I also discount Mr. Foulis' testimony because he visited only segments of four streams at the site. At the time, the inland banks had not been flagged. The proposed roads – including where they would cross the streams – were not marked; nor was there any flagging to show the locations or sizes of the open-bottom culverts. He relied on Mr. Krzanowski to point out the necessary features, but he never said what he had Mr. Krzanowski show him. See, e.g., Robinson v. Contributory Retirement Appeal Bd., 20 Mass. App. Ct. 634, 639, 482 N.E.2d 514, 518 (1985) (the "probative value of the expert testimony is for the fact-finding tribunal to decide"); New Boston Garden Corp. v. Board of Assessors, 383 Mass. 456, 468, 420 N.E.2d 298, 302 (1981) (expert testimony may be rejected when it lacks probative force, such as when it is based on incorrect assumptions, fails to consider pertinent facts, or is not supported by the evidence).

Most significantly, however, I cannot credit Mr. Foulis' conclusion that Mr. Simmons accurately delineated the inland banks because he did not see the banks after Mr. Simmons had flagged them. See Foulis, Vol. 8 at p. 127; id., Vol. 9 at p. 8. Thus, he has no basis for testifying that he knows Mr. Simmons placed the flags in the correct locations.

I considered the fact that Mr. Foulis reviewed a color photograph taken of each stream crossing after Mr. Simmons had flagged the inland banks. See Foulis, Vol. 9 at pp. 129-30. Each photograph is small – less than four inches long and three inches wide. See Petitioners' Hearing Exh. 14A at Figure 1-1 through Figure 12-1; see also Foulis, Vol. 8 at pp. 187-88 (Mr. Foulis reviewed the actual photographs in Exhibit 1.1, not enlargements). Each photograph provides a long-distance view of a stream, with land running parallel to the stream on either side of the photograph. Petitioners' Hearing Exh. 14A at Figure 1-1 through Figure 12-1. Mr.

Simmons, who took the photographs, testified that they were meant to depict a "representative portion" of each stream crossing, but that they do not show the entire stream crossing at each stream. See Simmons, Vol. 7 at pp. 66-68. Moreover, because of the size, quality and perspective of the photographs, as well as the plant cover they show, including trees, leaf litter and roots, the locations of the blue flags used to mark the tops of the inland banks are partially or entirely obscured. See Petitioners' Hearing Exh. 14A at Figure 1-1 through Figure 12-1.[28]

Therefore, it is not apparent how the photographs could be used to confirm that Mr. Simmons accurately flagged the inland banks. Nor did Mr. Foulis explain what features (such as blue flags or scour lines) he could identify in the small photographs or how those features (including their locations in relation to the stream and in relation to one another) allowed him to confirm the accuracy of the delineations. See, e.g., Foulis, Vol. 8 at pp. 169-86 (in reviewing enlarged versions of photographs from Exhibit 1.1, he was unable to identify basic features such as blue pin flags, centerline or ends of culverts, even though he testified he "extrapolated" from the photographs to determine that the flagging was accurate). As a result, Mr. Foulis' testimony that he used the photographs to confirm the delineations is a conclusion without supporting facts. See Matter of Fafard Real Estate Dev. Corp., Docket No. 95-103, Final Decision, 4 DEPR 78, 79 (June 2, 1997) (giving no weight to conclusory expert testimony).

I also weighed the fact that Mr. Foulis has expertise interpreting aerial photographs. See Foulis Dir. Test., p. 2 at ¶ 7. His experience relates, however, to interpreting aerial photographs taken from at least two hundred feet in the air. Foulis, Vol. 10 at pp. 9-10. Mr. Foulis did not

[28] Mr. Simmons testified that he delineated the inland banks by inserting a blue flag at regular intervals along the upper boundary of the inland bank. The upper boundary is the point where the stem (or "pin") of the flag enters the ground. Simmons, Vol. 7 at pp. 191-92.

testify that he utilized this expertise in reviewing the stream photographs; nor did he explain how such expertise is applicable to photographs not taken from a plane.[29]

D. Conclusion.

Having reviewed all of the evidence, I conclude that enXco has not shown, by a preponderance of the evidence, that it accurately delineated the upper boundaries of the inland banks at the stream crossings for Stream Nos. 1, 2, 3, 5, 7, 8, 9, 10, 13, 15 and 39.

First, the overwhelming evidence demonstrates that Mr. Simmons did not independently evaluate whether the top of the inland banks at each stream crossing was the first observable break in the slope or the mean annual flood level. Instead, he believed he was supposed to flag the mean annual flood level on every bank. The evidence further shows that Mr. Simmons believed the mean annual flood level was located below the first observable break in the slope at all of the stream crossings. See supra at pp. 28-30. See also Foulis Supp. Test. at ¶ 33 ("the Department required that the Applicant use the 'mean annual flood level'" at each stream crossing).

Along one stream bank, the first observable break in the slope may be lower than the mean annual flood level at some locations, while in other places on the same bank the mean annual flood level may be the lower feature. Foulis, Vol. 8 at p. 129. It was Mr. Simmons' responsibility to evaluate each stream bank to determine which feature (first break, mean flood level, or both) should be used as the inland bank's upper boundary. Instead, Mr. Simmons looked only for the mean annual flood level and he only looked for it below the first observable break in the slope. As a result, it is impossible to know whether the tops of the inland banks at

[29] Nor would it be appropriate to re-open the hearing so Mr. Foulis could further explain the basis for his conclusion that Mr. Simmons had accurately delineated the inland banks. If the hearing were re-opened, as a matter of fairness I would have to allow each party to supplement the record with respect to every issue on which that party's evidence fell short. For instance, I would have to allow the petitioners to provide additional evidence concerning Issue No. 1.

the eleven disputed streams should be the mean annual flood level, the first observable break in the slope, or a combination of the two.[30]

Second, the preponderance of the evidence demonstrates that, at the stream crossings for Stream Nos. 1, 2, 3, 5, 7, 8, 9, 10, 13, 15 and 39, Mr. Simmons flagged a line lower than the first observable break in the slope. This is undisputed.

Third, the preponderance of the evidence demonstrates that, at the stream crossings for Stream Nos. 1, 2, 3, 5, 7, 8, 9, 10, 13, 15 and 39, Mr. Simmons flagged a line lower than the mean annual flood level. The evidence shows, and enXco admits, that Mr. Simmons flagged the ordinary high water mark under the Clean Water Act. See enXco's Post-Hearing Reply Br. at pp. 8-9. As enXco also correctly admits, the ordinary high water mark "does not include those areas covered by peak flow or flood state…. It does not include the 'extraordinary freshets of the winter or spring.'" Id. at 9 (citation omitted). The mean annual flood level, however, is an average of a stream's annual peak flood levels – the very flow events that the ordinary high water mark does not measure. While Mr. Foulis testified that the ordinary high water mark and the mean annual flood level are "similar," he provided no factual or scientific basis for concluding that the two features are equivalent. His testimony on this point therefore is conclusory and I give it no weight. This is especially so given the established federal law to the contrary. Similarly, I do not credit Mr. Foulis' testimony that Mr. Simmons' delineations were accurate because he did not review the banks – either in person or through photographs that depicted the delineations – after Mr. Simmons had flagged them.

[30] Because it could be evidence that Mr. Simmons performed an independent evaluation, I did consider his testimony that he flagged the first observable break in the slope at Stream No. 12. I did not find the testimony compelling. Although the parties agree on the delineation of Stream No. 12, Mr. Simmons' claim that he flagged the first observable break in the slope does not match the rest of the evidence in this case. Compare Simmons Dir. Test. at ¶ 38 and Petitioners' Hearing Exh. 14A at Cover letter (stating that Mr. Simmons had flagged the mean annual flood level at every stream crossing, including Stream No. 12); Plan of Record at page SRV-755-L133 (Rev. E) (showing the top of the bank at Stream No. 12 as the "mean annual high water line").

Because enXco did not correctly delineate the top of the inland banks at the site, it cannot demonstrate that the project will comply with the Wetlands Protection Act or the Wetlands Regulations. Specifically, enXco cannot show that the project will not be built on the inland banks, or that the project will meet the performance standards for work on an inland bank. Nor can enXco show that work in the buffer zones to the inland banks will not adversely affect the inland banks' ability to contribute to the protection of statutory wetlands interests, as 310 CMR 10.54 requires.

My ruling on Issue No. 2 means that enXco cannot obtain a final order of conditions allowing the wetlands permit. Because this was a highly-contested appeal with a lengthy and complicated factual record, however, I address the remaining issues. Additionally, because much of the hearing focused on whether the open-bottom culverts would impact the inland banks and because it may be helpful to the Acting Commissioner, I discuss Issue No. 4 in some detail. I address the balance of the issues (Issue Nos. 5, 6 and 7) more briefly.

Furthermore, in the event that the Acting Commissioner does not accept my ruling on Issue No. 2, I analyze the remaining issues using enXco's delineations of the inland banks. In so doing, I note that the land above Mr. Simmons' flagging has more vegetation and is located closer to the proposed project than the areas that Mr. Simmons marked as inland bank. Thus, any impacts to the portions of the inland banks that Mr. Simmons flagged also would occur within those portions that are closer to the work site.

III. Issue No. 4: Will the use of open-bottom culverts to traverse streams:

a. impair the physical stability of the inland banks; and/or…

c. impair the capacity of the inland banks to provide wildlife habitat functions by altering the inland banks beyond the threshold provided at 310 CMR 10.54(4)(a)5?[31]

The DEP found that each of the inland banks at each of the twelve streams is significant to public water supply, private water supply, groundwater supply, flood control, storm damage prevention, the prevention of pollution, and the protection of fisheries and wildlife habitat. See Superseding Order of Conditions at p. 2 of 8; see also id., Cover letter at p. 1. As a result, any work on the inland banks must meet the performance standards set forth in 310 CMR 10.54(4). Those standards provide, among other things, that work on an inland bank cannot impair (a) the physical stability of the inland bank; or (b) the "capacity of the [inland] bank to provide important wildlife habitat functions." Id. Additionally, work in the buffer zones to the inland banks cannot impair the inland banks' physical stability or their capacity to provide important wildlife habitat functions.[32]

Issue Nos. 4(a) and 4(c) examine whether the use of open-bottom culverts to span ten of the streams would comply with these requirements. I already have determined that the petitioners met their burden of going forward on both issues. See Ruling on Motion for Partial Directed Decision at pp. 8-13, 15-18. I therefore have reviewed all of the evidence to determine whether enXco has met it burden of proof. I conclude that it has not.

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[31] I previously granted a directed decision to the DEP and enXco on Issue No. 4(b). See Ruling on Motion for Partial Directed Decision at pp. 14-15.

[32] The Wetlands Regulations do not contain performance standards for work in a buffer zone. Matter of Bachand, Docket Nos. 99-027 & 99-031, Recommended Final Decision, 8 DEPR 19, 21 (Feb. 2, 2001), *adopted as Final Decision*, 8 DEPR 19 (2001). However, buffer zone work cannot impair the wetland's ability to contribute to the protection of the interests of the Act. See 310 CMR 10.02(2)(b); Cohen, 8 DEPR at 102-03. If an activity in a buffer zone would impair one of the wetland's regulatory functions – such as bank stability, in the case of inland banks – then the activity would impair the wetland's ability to contribute to the protection of the interests of the Act. Id.; Bachand, 8 DEPR at 21.

With respect to Issue No. 4(a), I find that two aspects of the proposed construction would impair the physical stability of the inland banks: (1) the clearing of trees, shrubs and roots to install the open-bottom culverts; and (2) the excavation of boulders, rocks and bedrock from the culvert trenches. In addition, once the open-bottom culverts are installed, shade from the culverts would destroy the plants growing underneath them, thereby further impairing the physical stability of the inland banks. Turning to Issue No. 4(c), I find that the project would alter more than fifty feet of inland bank, triggering enXco's obligation to perform a wildlife habitat evaluation in accordance with 310 CMR 10.60.

A. Do Plants Grow on the Inland Banks?

A threshold question relevant to both Issue Nos. 4(a) and 4(c) is whether the inland banks are vegetated. I conclude that they are. More specifically, I conclude that non-vascular plants and the "stems" or "trunks" of vascular plants are growing below the line that Mr. Simmons flagged as the top of the inland bank.

First, enXco admits that the inland banks at the crossings for Stream Nos. 9, 12 and 15 are vegetated. See, e.g., enXco's Post-Hearing Br. at p. 25 & n.13. Second, the preponderance of the evidence demonstrates that the inland banks at the remaining nine stream crossings (Nos. 1, 2, 3, 5, 7, 8, 10, 13 and 39) are vegetated with vascular, as well as non-vascular, plants. The petitioners' witnesses testified that they examined the banks at the stream crossings and that vegetation is growing below the line that Mr. Simmons flagged as the top of the inland bank.

One of the petitioners' witnesses was Pamela Weatherbee, an "independent consulting botanist" and the author of Flora of Berkshire County, Massachusetts. Weatherbee Dir. Test. at ¶ 1. She has a master's degree in botany and has worked as a botanist for various public and private organizations, including the Massachusetts Audubon Society and the Massachusetts

Division of Fisheries and Wildlife. Id. at ¶¶ 1-2. Ms. Weatherbee visited the site during the petitioners' May 2005 and September 2005 site visits. During the site visits she examined the banks where the open-bottom culverts are to be installed to evaluate whether there was vegetation in the areas that enXco had delineated as inland bank. Weatherbee Dir. Test. at ¶¶ 16-19; Weatherbee Reb. at ¶¶ 11, 12, 24.

Ms. Weatherbee testified that each and every inland bank at each stream crossing is vegetated. See Weatherbee Dir. Test. at ¶¶ 17-19; Weatherbee Reb. at ¶¶ 11, 12, 22, 24; Weatherbee Supp. Test. at ¶ 9. She gave examples of the vegetation that she identified, such as Canada mayflower and yellow birch; she also took photographs of specific plants growing on the inland banks at the stream crossings, including trout lily and false hellebore. See, e.g., Weatherbee Dir. Test. at ¶ 19; Weatherbee Reb. at ¶ 22; Weatherbee Supp. Test. at ¶ 9; Weatherbee, Vol. 4 at pp. 142-46.[33]

Furthermore, the petitioners produced photographs of the stream crossings, which show mosses and vascular plants growing below the line that Mr. Simmons marked as the top of the inland banks. These photographs support the petitioners' testimony concerning the presence of plants on the inland banks. See, e.g., Stockman Reb. at Exh. E-9, E-11; Weatherbee Supp. Test. at Exhs. 6, 7, 8; Stockman Supp. Test. at Exhs. H-1, I-2, R-1; Petitioners' Post-Hearing Br., App. D at pp. 1, 3, 4. Some photographs show trees sitting on the inland banks, overhanging the streams and actually forming parts of the inland banks. See, e.g., Tillinghast Dir. Test., Exh. A

[33] To refute the petitioners' testimony, the DEP and enXco's witnesses repeatedly testified that Mr. Weatherbee and the petitioners' other witnesses must have been looking at parts of the stream bank above line that Mr. Simmons flagged as the top of the inland bank. This testimony is speculative at best and I do not credit it.

at photograph nos. 187, 227, 229, 9234, 9305; Weatherbee Reb. at Exh. K; Stockman Reb. at Exh. E-9.[34]

In addition, when Mr. Simmons delineated the inland banks for enXco, he prepared an inventory of the vascular plants growing on each inland bank at each stream crossing. See Petitioners' Hearing Exh. 14A at Table 1-2 through Table 12-2. These inventories document trees, shrubs and other vegetation on each inland bank at each stream crossing. Id. At Stream No. 1, for instance, Mr. Simmons identified the following plants on the inland banks within the location of the proposed culvert crossing: New York fern, mountain wood-sorrel, red spruce, raspberry, hobblebush, red maple, turtlehead, fragile fern, false Solomon's seal, yellow birch, whorled aster, American beech, Canada mayflower, sedge, striped maple, sugar maple and Indian pipe. Petitioners' Hearing Exh. 14A at Table 1-2.[35]

Finally, while enXco's expert witnesses gave conflicting testimony concerning the amount of vegetation growing on the inland banks, they did not seriously dispute that plants are growing on them. For example, Mary Johnson, enXco's plant and soil scientist, testified that "herbaceous plants and/or the moss species … currently inhabit portions of the bank impact areas in streams 1, 2, 5, 9, 10…." Johnson Dir. Test. at ¶ 47. Likewise, Gary Sanford, enXco's botanist, testified that the inland banks at the proposed crossings for Stream Nos. 3, 7, 8, 13 and 39 do not have "significant growths of vegetation." Sanford Dir. Test. at ¶ 34.[36] It is reasonable to infer from

[34] In viewing photographs of the inland banks, I considered those segments of the streams that had been marked with blue pin flags because Mr. Simmons did not delineate the full length of every stream, but instead testified that he flagged the inland banks in the location of the stream crossings. Simmons Vol. 7 at pp. 133-35. Furthermore, I only considered plants and features *at or below* the points where blue pin flags had been inserted into the soil. See supra at footnote 28.

[35] I do not find credible Mr. Simmons' subsequent claim that the inland banks were essentially devoid of vegetation and the plants listed in Exhibit 1.1 were "just above" the inland banks, overhanging the inland banks, or on the inland banks but "just outside the proposed stream crossing[s]." See Simmons Dir. Test. at ¶ 24. After watching Mr. Simmons testify, observing his demeanor and considering the other evidence in this case, I do not find his testimony credible. See, e.g., Petitioners' Hearing Exh. 14A (Mr. Simmons states two dozen times that the inventories in Exhibit 1.1 list the "plant species identified within the bank resource areas at the proposed crossing").

[36] Ms. Johnson and Mr. Sanford's background and qualifications are discussed infra at p. 51.

this statement that Mr. Sanford found plants on the inland banks at those stream crossings, but not enough to satisfy his definition of "significant" (a definition that he never provided). It also is reasonable to infer that the stream crossings Mr. Sanford did not mention (at Stream Nos. 1, 2, 5, 9, 10, 12 and 15) do have "significant" amounts of vegetation. Furthermore, Mr. Simmons testified that some vascular plants (as well as some mosses) grow on the inland banks. See, e.g., Simmons, Vol. 7 at pp. 102-05.

B. Issue No. 4(a): Will the use of open-bottom culverts to traverse streams impair the physical stability of the bridged banks?

The parties' dispute falls into three categories: (1) the removal of vegetation to install the culverts; (2) other construction activities; and (3) the loss of plants under the open-bottom culverts once they are installed.

1. The removal of vegetation to install the culverts.

As part of this project, enXco would have to clear all of the vegetation in the path of the open-bottom culverts. This includes trees and shrubs that are in the buffer zone and that have roots growing on the inland bank, as well as a small number of trees that sit on or overhang the inland banks. Trees located between the culverts and the streams would be cut level to the ground, although enXco would not remove their trunks or pull out the roots. Krzanowski, Vol. 5 at p. 144. Moreover, to install the footings for the culverts, enXco would have to excavate a trench on each side of each stream, often within one to three feet of the tops of the inland banks.[37] The trench would be roughly two feet wide and two feet deep; it would run the entire length of the proposed culvert at each given location. See supra at pp. 12-13. Because the trench must be clear of all obstructions in order to install the culvert footings, all roots in the trench –

[37] The distances between the culverts and the inland banks are set forth in footnote 14, supra. One must subtract one foot from those measurements to determine the distances of the trenches from the inland banks. See Krzanowski, Vol. 5 at p. 130.

including those that extend into the inland bank – would be severed and removed. See, e.g., Krzanowski Dir. Test. at ¶¶ 56, 58.

a. The petitioners' evidence.

The petitioners presented evidence that the removal of the trees, shrubs and roots would destabilize the inland banks. For example, Mr. Stockman testified as follows:

> Along forested mountain streams, root systems from Bank vegetation and adjacent (buffer zone) trees and shrubs play a major role in bank stabilization and in some sections of these streams is the force that binds the Banks. The removal of trees and shrubs along the Banks and within the buffer zone of the stream Banks during construction and placement of the open-bottomed aluminum culverts will destroy not only the trunks and canopies of these trees and shrubs but their root systems as well. These are the same roots that stabilize the Banks. Roots and rootlets that are actively growing and alive bind soil particles including rocks. Dead roots and rootlets do not have the same binding ability as living roots and consequently do not stabilize a Bank for any length of time. When rootlets growing toward a Bank reach the Bank they are air pruned when exposed to dry air conditions. The effect of this air pruning is to create a lush growth of rootlets in the Bank. These roots and rootlets hold the soil, sand, gravel and stones on the Bank.

Stockman Dir. Test. at ¶ 22 (capitals in original). See also Scalise Dir. Test. at ¶¶ 6, 8, 14; Weatherbee Dir. Test. at ¶¶ 16-18, 20; Weatherbee Reb. at ¶¶ 11, 12, 22-24; Ruling on Motion for Partial Directed Decision at pp. 10-11.

The petitioners also produced numerous photographs that show roots growing in and on the inland banks. Some depict an extensive matrix of roots and root systems mixed with soils, stones and cobbles, while in other photographs large roots actually make up part of the inland bank. See, e.g., Tillinghast Dir. Test., Exh. A at photograph nos. 9195-97, 9205-09, 9302, 9391 (Stream No. 1); id. at photograph nos. 9582-96, 9599, 9600 (Stream No. 3); id. at photograph nos. 273-74, 282-84, 294 (Stream No. 9); id. at photograph nos. 187-96, 205, 209 (Stream No. 39). Still other photographs show large rocks and boulders mixed with soils, small pebbles and

roots. See, e.g., Tillinghast Dir. Test, Exh. A at photograph nos. 9525, 9532, 9534, 9550, 9552, 9574-75 (Stream No. 2); id. at photograph nos. 9757, 906-06 (Stream No. 5); id. at photograph nos. 225, 248, 261 (Stream No. 10).[38]

b. EnXco's evidence.

EnXco does not seriously dispute that clearing the vegetation to install the open-bottom culverts would destroy roots on the inland banks. See, e.g., Krzanowski Dir. Test. at ¶¶ 55-56. Instead, enXco argues that the inland banks would remain stable because rocks and boulders are the principal stabilizing forces for the inland banks.[39] EnXco presented evidence from four witnesses: Jason Krzanowski, Gary Sanford, Mary Johnson and Jeffrey Simmons.

Jason Krzanowski, who holds both a bachelor's degree and a master's degree in civil engineering, is an engineer-in-training and has approximately ten years' experience in the field of civil engineering. He is employed by Hill Engineers, Architects, Planners, Inc. ("Hill Engineering"), where he is the project manager and site engineer for the company's work on enXco's project. See Krzanowski Dir. Test. at ¶¶ 1-8. He designed enXco's project and prepared the project plans. Krzanowski, Vol. 2 at pp. 145-46.

Mr. Krzanowski testified that "[t]he stability of the banks at each roadway crossing is primarily the result of boulders and cobbles in the Bank soils…." Krzanowski Dir. Test. at ¶ 54 (capital in original). According to Mr. Krzanowski, soils and roots "overlying" the cobbles and boulders do not provide "substantive Bank stability." Id. at ¶ 55 (capital in original). Instead, "gravity serves to keep [cobbles and boulders] in place and root systems merely fill in the gaps

[38] Eleanor Tillinghast attended and made photographic records of the May 2005 and September 2005 site visits. She explained the methodologies she used both to take the photographs and to make a record of them. See Tillinghast Dir. Test. at ¶¶ 2-8; Tillinghast Reb. at ¶¶ 1-5; Tillinghast Supp. Test. at ¶¶ 2-7. I find her photographs to be reliable.

[39] EnXco's witnesses discussed other reasons why the destruction of roots on the inland banks would not impair their stability. See, e.g., Johnson Dir. Test. at ¶ 46; Sanford Dir. Test. at ¶ 33. I do not address those theories, however, because enXco's post-hearing brief did not argue in favor of those theories or even mention them. EnXco therefore abandoned those theories.

between stones, along with soils." Id. at ¶ 56. See also Krzanowski Supp. Test. at ¶ 26; Krzanowski Reb. at ¶ 26.

Gary Sanford has both a B.A. and a Ph.D. in botany, as well as an M.A. in biological sciences. He is the president of Sanford Ecological Services, an environmental consulting firm, and has worked for more than twenty five years in the field of environmental science. Sanford Dir. Test. at ¶¶ 1-8. Mr. Sanford testified that "[a]lthough roots may contribute to bank stability, cobblestone substrate provides stability by itself." Sanford Dir. Test. at ¶ 33. He further testified that "[c]ontinual natural erosion is needed to maintain relative stability at any one location on the stream." Sanford Supp. Test. at ¶ 22. He therefore opined that

> cutting trees and saplings along the embankment in localized areas of the stream will not alter the basic dynamics of the stream or lead to excessive erosion because of the presence of stones and rocks within the embankments that maintain their relative stability. As a result I do not anticipate a significant increase in erosion that would impair bank stability or surface or ground water stability.

Id.

Mary Johnson, who holds a bachelor's degree in natural resource management and a master's degree in plant and soil science, has over eight years' experience as an environmental consultant. At the time of the hearing, she worked for the Massachusetts Department of Agricultural Resources. Before that, she operated her own consulting company, Watershed Resource Consultants, which performed the initial wetland delineations for this project. Johnson Dir. Test. at ¶¶ 1-4; id. at ¶¶ 5-24. Ms. Johnson testified that roots help stabilize the inland banks:

> The existing stream banks are comprised primarily of cobble and boulders. The rock and soils on the edges of the water are held together by a complex interwoven matrix of roots – primarily tree roots. The roots that make up this matrix are not only the roots from trees immediately adjacent to the stream, but also are from many trees far beyond any areas that

> would be immediately impacted by the installation of the road and culverts.

Johnson Dir. Test. at ¶ 46.

Finally, Mr. Simmons opined that

> [t]he physical stability of the bank will continue to be provided primarily by the cobbles and boulders that form the existing stream channel. These features will not be disturbed by the proposed culvert construction, and therefore no impairment will result.

Simmons Dir. Test. at ¶ 40. See also id. at ¶ 66 (similar testimony).

c. The DEP's evidence.

Mr. Foulis testified for the DEP concerning the stability of the inland banks. He agreed that "the roots of woody plants" help stabilize the inland banks. Foulis Dir. Test. at ¶ 50. He further testified that such a statement is "is intuitive, and even codified within the Preamble of Bank (Inland) at 310 CMR 10.54(1)." Id.[40]

Mr. Foulis opined, however, that the installation of the open-bottom culverts would not impair the physical stability of the inland banks. First, he testified that the petitioners had not shown that any of the inland banks are "dominated" by the roots of woody plants. Foulis Direct Test. at ¶ 52. He stated that, according to Exhibit 1.1, seven of the ten streams that would be covered by open-bottom culverts are classified as either "rubble" or "cobble-gravel." Id. This, in his view, is evidence that the inland banks are not dominated by the roots of "woody plants." Id. Second, Mr. Foulis opined that the footings and "arch plates" for the culverts would be built in "close proximity" to the inland banks and would "begin to serve the same stabilizing function, albeit more uniformly, than the roots of woody plants." Id. at ¶ 54.

[40] The Preamble to 310 CMR 10.54 reads, in pertinent part:

> Where Banks are partially or totally vegetated, the vegetation serves to maintain the Banks' stability, which in turn protects water quality by reducing erosion and siltation.

Id. (capitals in original).

d. Discussion.

After considering all of the evidence, I find that (1) roots growing on and in the inland banks help stabilize them; (2) removing trees and shrubs adjacent to the inland banks, as well as severing roots to excavate the trenches, would impair the inland banks' stability; and (3) removing the trees growing on the inland banks also would impair the physical stability of the inland banks.

First, while they disputed the degree of contribution, all of the witnesses except Mr. Krzanowski agreed that roots contribute to the inland banks' stability. As Mr. Foulis testified, the fact that roots stabilize inland banks is "intuitive" and codified in 310 CMR 10.54. Foulis Dir. Test. at ¶ 51. I do not find Mr. Krzanowski's alternative theory – that cobbles and rocks are held in place by gravity and that soils and roots merely "fill in the gaps" – to be credible. It is at odds with the other witnesses' testimony, with 310 CMR 10.54 and with generally-accepted scientific principles. See, e.g., Robinson, 20 Mass. App. Ct. at 639, 482 N.E.2d at 518 ("where there is conflicting expert testimony, the fact finder may completely discount the testimony of one expert and rely exclusively on the other").

Second, I have considered enXco's testimony that the death of roots would not impair the physical stability of the inland banks because they are composed primarily of cobbles and boulders. See, e.g., Sanford Supp. Test. at ¶ 22; Foulis Dir. Test. at ¶ 52 (the inland banks are not "dominated" by woody plant roots). The term "impair" means to "cause to diminish, as in strength, value or quality." The American Heritage Dictionary of the English Language (4th ed. 2004). See also Webster's Ninth New Collegiate Dictionary (1991) (impair is defined as "to damage or make worse by … diminishing in some material respect"). I am persuaded by the petitioners' testimony and other evidence in the case, including the petitioners' photographs and

testimony from enXco's witnesses, that the loss of roots on the inland banks would impair the physical stability of the inland banks within the meaning of the Wetlands Regulations. See, e.g., Scalise Dir. Test. at ¶¶ 6, 8, 14; Stockman Dir. Test. at ¶¶ 22, 24; Weatherbee Dir. Test. at ¶¶ 16-18, 20; Weatherbee Reb. at ¶¶ 11, 12, 22-24; See also Robinson, 20 Mass. App. Ct. at 639, 482 N.E.2d at 518.[41]

Third, I give no weight to Mr. Foulis' testimony that the open-bottom culverts would "serve the same stabilizing function" as the lost roots. See Foulis Dir. Test. at ¶ 54. Mr. Foulis did not explain how the soil, pebbles, rocks and cobbles that form the inland banks would adhere to metal footings or metal "arch plates" that are embedded in the ground behind the inland banks. As such, his opinions on this subject are factually-unsupported and conclusory. In addition, they find no support in the Preamble to 310 CMR 10.54. See footnote 40.

Similarly, the DEP's argument that the petitioners have not shown that erosion caused by the culverts would differ from ongoing erosion misapprehends the relative burdens in this case and is not well-founded. I note, however, that the petitioners' witnesses did testify that the culverts would cause a large increase in erosion and that the inland banks would be destabilized as a result.[42]

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[41] For example, the petitioners' photographs do not support the DEP and enXco's testimony that all of the inland banks are composed primarily of cobble and rocks, but instead support the petitioners' position. It appears that enXco and the DEP incorrectly included the entire stream bed as part of the inland bank. Mr. Simmons testified, for example:

> the jurisdictional Bank resource area encompasses the entire streambed. One small portion of this jurisdictional Bank resource area includes the usually narrow band of embankment on each side of the stream extending up to the MAFL [*i.e.*, the mean annual flood level]. This is the portion of the Bank resource area the Petitioners have focused their attention on in arguing that the Bank is vegetated, while ignoring the fact that the vast majority of the regulated area **is the streambed**.

Simmons Supp. Test. at ¶ 43 (emphasis and capitals in original). However, the "usually narrow band of embankment on each side of the stream" *is* the inland bank and it is stabilized by the roots of plants growing on and near it. See, e.g., 310 CMR 10.54 ("Where Banks are partially or totally vegetated, the vegetation serves to maintain the Banks' stability") (capitals in original).

[42] Also without merit are the DEP and enXco's arguments that open-bottom culverts are more expensive and more environmentally-friendly than pipe culverts. See, e.g., Department's Closing Br. at p. 1. Regardless of whether

Finally, the DEP argues that the superseding order of conditions contains two special conditions, numbers 41 and 42, which explicitly prohibit enXco from impairing the physical stability of the inland banks. Special Condition No. 41 prohibits any "activity," as defined in the Wetlands Regulations, from occurring on the inland banks, while Special Condition No. 42 "absolutely and specifically" prohibits enXco from disturbing the inland banks when it installs the open-bottom culverts. See Superseding Order of Conditions at Special Condition Nos. 41, 42. See also 310 CMR 10.04 (defining "activity"). While they are laudable provisions, Special Condition Nos. 41 and 42 cannot prevent the inevitable. The reality is that enXco must remove trees, shrubs and roots in order to install the culverts, and that doing so would kill the roots on the inland banks, which in turn would impair the physical stability of the inland banks. A superseding order of conditions cannot change that reality by declaring that "the inland banks cannot be impaired."

2. Other construction activities.

The petitioners challenge three additional aspects of the construction of the roads and open-bottom culverts. First, the petitioners contend that the extensive use of fill to build the roads near and over the streams would impair and alter the inland banks. They argue that this is especially likely because enXco does not intend to use erosion control measures to protect the inland banks during construction. Second, the petitioners claim that enXco would have to drive heavy equipment directly on the inland banks in order to install the culverts on the "opposite" side of the stream.[43] Finally, the petitioners contend that the use of aggressive construction

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these assertions are true, the project cannot be approved if it does not comply with the Wetlands Protection Act and the Wetlands Regulations. If the DEP believes that the project is in the public interest, it may be able to issue a variance. 310 CMR 10.05(1). This tribunal does not have that authority.

[43] EnXco would install the open-bottom culverts at the same time that it builds the roads. Krzanowski, Vol. 3 at pp. 104-06. Moreover, there is no alternative access to the site. Thus, when enXco reaches a stream, it would have to drive across, or reach over, the stream in order to perform any construction on the other side of it.

techniques to excavate, clear and level the culvert trenches would impair the physical stability of the inland banks.

The preponderance of the evidence demonstrates that, with one exception, the project could be conditioned to protect the inland banks from damage related to the construction of the roads and open-bottom culverts. For example, enXco presented evidence that erosion controls, such as fiber rolls, could be installed between the limit-of-work areas and the inland banks. See Krzanowski, Vol. 5 at p. 140. Similarly, Mr. Krzanowski presented unrefuted testimony that enXco would not have to drive on the inland banks in order to work on the opposite side of the streams. He testified that certain construction vehicles could hoist equipment over the streams, while others could reach across the streams to work on the other side. Krzanowski Dir. Test. at ¶¶ 25, 57, 58; Krzanowski Reb. at ¶ 2.

In addition, the DEP must pre-approve the design of any temporary bridge that enXco wanted to place over the streams or inland banks. See Superseding Order of Conditions at Special Condition No. 41. Finally, the superseding order of conditions could require enXco to use hand tools and manual labor for many aspects of the trench excavation. See Krzanowski, Vol. 3 at pp. 38-40; id., Vol. 5 at pp. 163-65. This evidence was essentially uncontested and is sufficient to demonstrate that the project could be conditioned to prevent the disputed construction activities from impairing the inland banks.

The one exception relates to the removal of bedrock, rocks and boulders from the culvert trenches. Mr. Krzanowski acknowledged that when enXco excavates the trenches, it is likely to encounter bedrock, rocks and boulders that support and/or are part of the inland banks. See, e.g., Krzanowski, Vol. 5 at pp. 163-65. He testified that enXco would remove these obstructions by "chipping" or "cracking" them with jack hammers or hoe rams. Krzanowski Dir. Test. at ¶

58(c); Krzanowski, Vol. 5 at pp. 165-66. The jackhammers would be similar to those "used in street construction," while a hoe ram is "a backhoe with an oversized jackhammer on it." Krzanowski, Vol. 5 at pp. 165-66. See also id., Vol. 3 at p. 110-11 (enXco might use a sixty-pound hammer attached to an air compressor to break rocks that are in the trench).

Mr. Krzanowski testified that these activities could take place without harming the inland banks. See, e.g., Krzanowski, Vol. 3 at pp. 38-40; id., Vol. 5 at pp. 143-45. He did not, however, explain the basis for this opinion. Given the trenches' close proximity to the inland banks, enXco needed to provide a cogent, fact-based explanation of how it could use a jackhammer or hoe ram within a foot or two of an inland bank without impairing the inland bank's physical stability. EnXco needed to provide similar evidence to demonstrate how it could use such equipment to "crack" or "chip" the very rocks and boulders that make up the inland bank without impairing the inland bank's stability. Since it did not do so, enXco failed to meet its burden of proving that the project would comply with the Wetlands Regulations. More specifically, it failed to demonstrate that the excavation of rocks, boulders and bedrock from the trenches would not impair the physical stability of the inland banks.

The DEP's argument – that a compliance monitor and a prohibition against activity on the inland banks are sufficient to protect the inland banks – is without merit.

3. Shade from the open-bottom culverts.

a. Would the open-bottom culverts "shade out" and kill the plants under them?

The preponderance of the evidence demonstrates that shade from the open-bottom culverts would destroy plants growing underneath them, except at the culverts' outside edges. This includes plants growing on the inland banks as well as in the narrow uplands between the inland banks and the culvert walls.

The open-bottom culverts would cover between twenty-three and sixty feet of inland bank on both sides of the stream at each stream crossing. See table above, at footnote 13. The tallest culvert, located at Stream No. 8, would sit roughly nine feet above the stream bed. Id. The remaining culverts would sit between three and eight feet above the stream bed. Id. Because they are arched, and because the inland banks are higher than the stream beds, there would be even less room between the roofs of the culverts and the tops of the inland banks. See, e.g., Petitioners' Hearing Exh. 14A (active portions of the stream channels are between approximately one and three feet deep). Moreover, there would be very little land between the culverts and the inland banks – from two to eight feet at most stream crossings.

The petitioners' wetland scientist and botanist both testified that the open-bottom culverts would be too dark to support plant life. See, e.g., Stockman, Vol. 2 at pp. 59-60; Stockman Dir. Test. at ¶ 24 (the "lack of light will kill the plant community covered by an open-bottomed culvert"); Weatherbee Dir. Test. at ¶ 15 (the culverts would "essentially block out all solar radiation, making it impossible for green plants to live and grow").

EnXco's witnesses generally agreed that shade from the culverts would prevent plants from growing under them. See, e.g., Simmons Dir. Test. at ¶ 46 ("[s]hading effects from open bottom culvert crossings will likely result in the mortality of vegetation" growing beneath the culverts); id. at ¶ 67 ("[s]hading will eliminate vegetation within the culvert"); Johnson Dir. Test. at ¶ 47 (it is "likely" to be "somewhat darker" in the centers of the culverts and, as a consequence, plants in the "dark interior portions of the longer culverts" are likely to be "shaded out"); Sanford, Vol. 8 at pp. 99-100 (plants will die in the interior sections of the longer culverts).

While enXco's witnesses did not dispute that shade from the culverts would destroy vegetation, enXco and the DEP attempt to qualify the types of plants that would perish and the circumstances in which they would die. First, enXco argues that because trees would be cut to install the culverts, the forest canopy would be opened up near the culverts, increasing the amount of light available and allowing plants to flourish at the outer edges of the culverts. See enXco's Post-Hearing Br. at p. 26. EnXco's testimony on this point was unrefuted. See Johnson Dir. Test. at ¶ 46; Simmons, Vol. 8 at pp. 46-47. I therefore find that because clearing trees and other vegetation would open the forest canopy at the mouths of the culverts, plants would grow at the very edges of the culverts. This finding does extend beyond the first few feet inside the culverts, however, because the witnesses did not provide specific distances; instead they testified in terms of the "edges" and the "mouths" of the culverts. See, e.g., Simmons, Vol. 5 at pp. 217-18; Johnson Dir. Test. at ¶ 47; Johnson, Vol. 5 at pp. 107-08. See also Simmons, Vol. 5 at p. 218 (witness testified that he did not know how far inside the culverts that plants could survive). In addition, the increased forest canopy has a downside; the plants that grow on the outer edges of the culverts would further darken the interior portions of the culverts. Id., Vol. 8 at pp. 45-46.

Next, both enXco and the DEP contend that some plants need shade and therefore would survive under the culverts. Mr. Simmons testified, for example, that certain shade-tolerant species, such as mosses and ferns, would "survive in general terms at the mouths at each end of the culverts." Simmons, Vol. 5 at pp. 217-18. See also id., Vol. 7 at pp. 184-85. Ms. Johnson similarly opined that, depending on the orientation of the culvert, light may penetrate enough to allow mosses and algae to grow underneath it. Johnson, Vol. 6 at p. 75. See also Foulis Dir. Test. at ¶ 57 (many plants are "adapted to and dependent on shade for portions of their life cycle").

This testimony goes to the types of plants that could survive, not to the ultimate fact that the culverts would prevent plants from growing beneath them. Neither the DEP nor enXco presented evidence that the wide variety of vascular plants currently growing on and adjacent to the inland banks are shade-tolerant and would continue to grow under the culverts. See, e.g., Petitioners' Hearing Exh. 14A at Table 1-1 to 12-1 (listing vascular plants growing on the inland banks). In fact, the evidence yields the opposite conclusion: while a few plants might survive, most would die.

Third, enXco and the DEP argue that because the stream crossings are well-shaded already, the culverts would not produce appreciably more shade. See, e.g., Department's Closing Br. at pp. 30, 31. See also Simmons Dir. Test. at ¶ 47; Foulis Dir. Test. at ¶ 57. This is not born out by the evidence; most significantly, it is not supported by enXco's own witnesses, who testified that the open-bottom culverts would kill the plants under them. Moreover, the evidence demonstrates that it would be appreciably darker under the culverts compared to the existing light conditions at the stream crossings. The culvert widths underscore that each of them would cover completely twenty-three to sixty feet of inland bank and vegetation at each stream crossing, a darkness that is not comparable to existing vegetative shading. Moreover, plants currently grow beneath the existing vegetative shading.

In August and September of 2004, for example, Mr. Simmons reviewed the canopy cover – *i.e.*, the light conditions under the forest canopy – at each stream crossing. Simmons, Vol. 7 at p. 166. He estimated that the canopy cover at the crossings ranged from eighty-seven to ninety-four percent, which he described as "well shaded." Simmons Dir. Test. at ¶ 47. Nevertheless, Mr. Simmons testified that direct sunlight shines through to the ground at the stream crossings; the light is sufficient to support (and in fact does support) vegetation. See Simmons, Vol. 7 at

pp. 168-69.[44] By contrast, Mr. Simmons opined that the "canopy cover" in the center of the culverts would be one hundred percent, *i.e.*, there would be no direct light. Id. at 169.

In addition, Mr. Stockman testified that the canopy cover is not dense throughout the year, unlike the relatively uniform conditions under a culvert. He explained that trees in the Berkshire Mountains generally are fully leafed between approximately late May and early September. Stockman, Vol. 2 at pp. 61-62. However, the forest canopy is fairly open in the spring, during the early growing season. Id. This testimony is supported by photographs of the site taken in late May 2005. See, e.g., Tillinghast Dir. Test., Exh. A at photograph nos. 9294, 63, 193 (depicting Stream Nos. 1, 7 and 39, respectively). See also Johnson, Vol. 6 at p. 107 (in the spring, it would be darker under the culverts than under the existing forest canopy).[45]

Finally, both enXco and the DEP assert that the amount of light under the culverts would depend on several factors, including the orientation of the culvert, its height and the topography of the stream crossing. See, e.g., Simmons Dir. Test. at ¶ 89. See also Foulis Dir. Test. at ¶ 56 (listing factors such as "differential stream gradient … [and] reflection off of smooth surfaces such as surface water, snow, ice, leaves, the trunks of trees[,]… etc."). They argue that these factors "refute" the petitioners' conclusion that the open-bottom culverts would cause plants to die. Id.

The DEP and enXco misunderstand the relative burdens in this case. The petitioners presented credible evidence that it would be too dark under the culverts for plants to grow. Indeed, enXco's witnesses did not dispute this basic fact. The burden therefore is on enXco to demonstrate that the culverts would not kill the plants growing beneath them. It therefore was

[44] Photographs of the canopy cover support this testimony. See, e.g., Petitioners' Hearing Exh. 22 (showing canopy cover at Stream No. 1).

[45] I also note that Mr. Foulis' testimony concerning shading effects was based on his assumption that these are "high-arch culverts." See Foulis Dir. Test. at ¶¶ 57, 140. He did not define what he meant by "high arch," but the evidence does not support his assumption. See supra at p. 58 and footnote 13.

the company's responsibility to present evidence that, because of factors such as culvert height and orientation, there would be sufficient light under each culvert to support the vegetation that currently grows on the inland banks and adjacent buffer zones. EnXco did not adduce any such evidence during the hearing; as a result, enXco failed to meet its burden of proof.[46]

I do note, however, that the open-bottom culverts would be low. It therefore is not at all apparent that the culverts would be set high enough to allow light to penetrate beneath them much beyond their edges.

b. Would the death of plants under the culverts impair the physical stability of the banks?

For the reasons set forth at Section III.B.1, I conclude that the death of vegetation underneath the culverts would impair the stability of the inland banks. I reject the DEP and enXco's claims that the vegetation on the inland banks is too sparse to contribute to bank stability. While some inland banks have far less vegetation than others, if enXco believed that certain reaches were so meagerly vegetated that the death of these plants would not impact the inland banks, it needed to proffer concrete evidence to support this claim, including expert testimony and evidence specific to particular inland banks. It did not. More importantly, however, enXco admits that there is abundant vegetation growing in the buffer zone immediately above and adjacent to the inland banks. Roots from these plants help stabilize the inland banks; there is no doubt that the death of these plants would impair the stability of the inland banks. See

[46] In its post-hearing brief, enXco does argue that there would be enough light under the culvert at Stream No. 9 because the culvert would be oriented east to west and its crest (*i.e.*, its highest point) would be three feet above the stream bed. See enXco's Post-Hearing Br. at p. 25. This assertion required expert testimony, which enXco did not supply. I did consider Ms. Johnson's testimony about light under culverts, but it does not support enXco's claim concerning Stream No. 9. First, she testified that there would be enough light under some culverts to support mosses and algae; she did not testify that vascular plants (either in general or those growing at Stream No. 9) could survive. Johnson, Vol. 6 at p. 75. Nor were her personal observation of a sixty-foot culvert probative because, as Ms. Johnson stated, it was a different type of culvert than the ones at issue here. Id. at pp. 74-75. Indeed, Ms. Johnson was able to walk under the culvert. Id. It would not be possible for an adult to walk under many, if not all, of enXco's open-bottom culverts. See p. 58 and footnote 13 (discussing height measurements under the culverts).

Section III.B.1, supra. See also Petitioners' Post-Hearing Br., App. D at pp. 3, 5 (photographs showing abundant roots and rootlets on the inland banks); Stockman Reb. at Exhs. E-9, E-11 (same); Weatherbee Reb. at ¶ 22 and Exh. F (same).

C. Issue No. 4(c): Will the use of open-bottom culverts impair the capacity of the bridged banks to provide wildlife habitat functions by altering the inland banks beyond the threshold provided at 310 CMR 10.54(4)(a)5?

If an inland bank is significant to wildlife habitat functions, a project cannot impair the bank's capacity to provide those functions. 310 CMR 10.54(4)(a)5. A project that would alter less than fifty feet of inland bank is deemed not to impair this capacity. Id.[47] Inland bank alterations of fifty feet or more may be permitted if they would "have no adverse effects on wildlife habitat." Id.

Consequently, if a project would alter at least fifty feet of inland bank, the project proponent must perform a wildlife habitat evaluation pursuant to 310 CMR 10.60. See 310 CMR 10.54(4)(a)5. The evaluation must ascertain whether the project would alter the wildlife habitat characteristics on the inland banks such that the

> alteration [would], following two growing seasons of project completion and thereafter (or if a project would eliminate trees, upon the maturity of replanted saplings) substantially reduce [the inland banks'] capacity to provide the important wildlife habitat functions listed in 310 CMR 10.60(2).

310 CMR 10.60(1)(a). Those wildlife habitat functions are as follows:

> 1. Food, shelter and migratory and breeding areas for wildlife; and
> 2. Overwintering areas for mammals and reptiles.

310 CMR 10.60(2)(a).

[47] More accurately, the regulations provide a safe haven for projects that would alter less than ten percent or fifty feet of bank, whichever is less. Id. The parties agree that the operative figure here is fifty feet. The DEP and other parties similarly agree that this appeal involves a single project on a single lot within the meaning of 310 CMR 10.54(4)(a)5.

In this case, the DEP found that all of the inland banks within the limit-of-work lines on the site are significant to wildlife habitat functions. See Superseding Order of Conditions, Findings at p. 1. It concluded, however, that enXco did not need to perform a wildlife habitat evaluation under 310 CMR 10.60. Specifically, the DEP permitted enXco to alter a total of forty-eight feet of inland bank at Streams Nos. 12 and 15, but determined that the use of open-bottom culverts would not alter any length of inland bank at any of the ten stream crossings. Id. Based on this reasoning, the project would alter less than fifty feet of bank and no wildlife habitat evaluation was required. Id.

Issue No. 4(c) asks whether the open-bottom culverts would alter inland banks beyond the fifty-foot threshold, thus triggering the need for enXco to perform a wildlife habitat evaluation. See Ruling on Motion for Partial Directed Decision at pp. 15-18.[48] I previously determined that the petitioners met their burden of going forward on this issue. Id. I now consider all of the evidence and conclude that the project would alter more than fifty feet of inland bank.

To begin, the DEP and enXco miscalculated the amount of inland bank that would be altered at Stream Nos. 12 and 15.[49] Since there is inland bank on both sides of each stream, the eighteen-foot culvert at Stream No. 12 would alter thirty-six feet of inland bank and the thirty-foot culvert at Stream No. 15 would alter sixty feet (a total of ninety-six feet, not fifty). See, e.g., Matter of Pacheco, Docket No. 98-072, Final Decision, 6 DEPR 218, 219 n.1 (Nov. 9, 1999) (because a pipe culvert would cover the bank on both sides of the intermittent stream, a twenty-four foot pipe culvert would alter forty-eight feet of inland bank). See also Ruling on Motion for Partial Directed Decision at pp. 17-18.

[48] If the answer to Issue 4(c) is "yes," then Issue No. 5 looks at compliance with 310 CMR 10.60.
[49] The parties do not dispute that the pipe culverts at Stream Nos. 12 and 15 would alter the inland banks on those streams.

To build the Bakke Mountain access road, moreover, enXco would install at least eighty feet of steel plating over Stream No. 12, and then build the road on top of the steel plates. Krzanowski, Vol. 3 at pp. 115-17. The plates would be in place approximately a year, until the project is completed. Id. at 117-18. EnXco admits that the inland banks on Stream No. 12 are well vegetated. At a minimum, therefore, the steel plates would kill the vegetation growing on the inland banks under the plates. As a result, the use of the steel plates at Stream No. 12 would alter at least one hundred and sixty feet of inland bank. See 310 CMR 10.04 (defining alter to include the destruction of vegetation).[50]

The fact that the plates would be removed after a year does not change the fact that the inland banks would be altered. Even assuming that the inland banks could be restored immediately after project completion, a "temporary" alteration lasting a year nonetheless is an alteration under the Wetlands Regulations. Id. See also Foulis, Vol. 9 at pp. 61-62 (the definition of "alter" in 310 CMR 10.04 does not distinguish between temporary and permanent alterations); Department's Closing Brief at p. 23 (because the term "alter" is used to trigger further DEP review, it has a low threshold).

Finally, I find that the use of open-bottom culverts at the remaining stream crossings would alter the inland banks under the culverts by changing existing conditions in two different ways: destroying plants on the inland banks and impairing the physical stability of the inland banks. See supra at Section III.B. See also 310 CMR 10.04 (to "alter" means to "change the condition of" a resource area, including destroying vegetation). The open-bottom culverts would cover a total of 328 feet of streams at the ten stream crossings. See SRV-755-L133 (Rev. E). This translates into the alteration of 656 feet of inland bank.

[50] The plan of record indicates that further inland bank alterations are likely. According to the plan, enXco would wrap the inland bank with a geotextile fabric and then place loam or gravel on top of it. See Plan of Record at SRV-755-L133 (Rev. E). See also Krzanowski, Vol. 3 at pp. 115-18 (explaining installation of the steel plates).

EnXco contends that the vegetation on the inland banks is so sparse that the death of these plants would be "too inconsequential to be deemed an alteration" under the Wetlands Protection Act. See enXco's Post-Hearing Br. at p. 28 (quoting Matter of Central Vermont Rwy., Docket Nos. 83-208 & 83-035, Tentative Final Decision, 1986 WL 181483 (July 18, 1986)). In prior adjudicatory decisions, the DEP Commissioner has identified activities that might be too *de minimis* to constitute an alteration, such as stepping on plants, picking wildflowers, dropping a discarded match or damaging vegetation in an attempt to untangle a fishing line. See Central Vermont Rwy., 1986 WL 181483 at *6; Matter of Van Meter, Docket No. 87-082, Final Decision, 1989 WL 384992 (Aug. 15, 1989). The activities in this case are entirely different in kind and scope: enXco is proposing to build ten open-bottom culverts that would permanently cover 656 feet of inland banks; this not only would kill the plants currently growing on the inland banks, but it would prevent vascular plants from growing under the culverts in the future. See, e.g., Van Meter, 1989 WL 384992 at *5 (contrasting "casual" or "isolated" activities that may result in *de minimis* alterations with "organized" or "systematic" activities, which would not be *de minimis*; annual mowing of up to an acre of bordering vegetated wetland was not a *de minimis* alteration).

I also reject enXco's argument that killing plants beneath the culverts is not an alteration because the plants are not "ecologically" and "biologically" significant, or because there are no "plant communities" on the inland banks. In defining "alter," the Wetlands Regulations do not distinguish between "significant" and "insignificant" plants; nor does the regulation limit the definition of "alter" to the destruction of a "plant community." See 310 CMR 10.04. That phrase simply is not in the definition of "alter." Id. See also Bachand, 8 DEPR at 24 (lowering

the water level in a bordering vegetated wetland "is no less an alteration because its impact may be negligible or not adverse").

As the DEP explained in its post-hearing brief:

> Alter is intended to be tripped easily, so that activities which alter a resource area – and therefore might potentially impair a resource area – are brought into the regulatory control of the [Wetlands Protection Act] permitting scheme so that the activity can be conditioned as necessary to avoid impairment.

Department's Closing Br. at p. 23. That is precisely the case here. The fact that the project would alter fifty or more feet of inland bank does not mean the project should have been denied. It simply triggered further review under the Wetlands Regulations; in particular, it prompted enXco's obligation to perform a wildlife habitat evaluation under 310 CMR 10.60. See 310 CMR 10.54(4)(a)5. I turn to that issue next.

IV. Issue No. 5: If the project will alter inland banks beyond the threshold provided at 310 CMR 10.54(4)(a)5 [see Issue No. 4(c) above]:

a. Will such alteration have any adverse effects on wildlife habitat as set forth in 310 CMR 10.60(1)(a)?

b. Does the wildlife assessment that the applicant submitted meet the standards of 310 CMR 10.60(1)(b)?

Issue Nos. 5(a) and 5(b) are listed out of order. The first question is whether enXco performed a wildlife habitat evaluation that complies with 310 CMR 10.60; this is Issue No. 5(b). If enXco did so, then the inquiry becomes whether, despite the evaluation, the project would have an adverse effect on wildlife habitat; this is Issue No. 5(a). If, however, enXco has not performed a proper wildlife habitat evaluation, the inquiry ends there. That is, if enXco has not complied with the threshold requirement of performing an evaluation, a final order of conditions for the project cannot be issued. See, e.g., Matter of Symes, Docket No. 91-130, Final

Decision, 3 DEPR 104 (June 3, 1996) (when a project triggers 310 CMR 10.60, completion of a wildlife habitat evaluation is a prerequisite to project approval).

I previously determined that the petitioners had met their burden of going forward on Issue No. 5(b). See Ruling on Motion for Partial Directed Decision at pp. 18-22. After reviewing all of the evidence, I find that enXco did not perform a wildlife habitat evaluation pursuant to 310 CMR 10.60. The evidence is as follows.

First, there is no dispute that the DEP did not require enXco to perform, and enXco did not perform, a formal wildlife habitat evaluation for the current version of the project. This is because the DEP found that the project would alter less than fifty feet of inland bank. See supra at p. 64.[51] When the DEP issued the superseding order of conditions, however, it found that two documents – Exhibit 1.1 and a letter to enXco – constitute a wildlife habitat evaluation under 310 CMR 10.60. The Superseding Order of Conditions states:

> Though not required of the applicant per 310 CMR 10.54(4)(a)5 for this project, and not submitted by the applicant for this purpose, the Department has determined that the … data presented within "Exhibit 1.1, Data from Woodlot Alternatives" (dated September 20, 2004 and supplemented on November 4, 2004), constitutes a "wildlife habitat evaluation" per 310 CMR 10.60(1) and 2(a), in that it correctly characterizes the "…topography, soil structure, and plant community composition and structure …" of Bank (Inland) within the limit-of-work line as they relate to the provision of "...important wildlife habitat functions…" [per the requirement at 310 CMR 10.60(2)(a)]….

Superseding Order of Conditions, Findings at pp. 1-2 (capitals in original).

As previously discussed, Mr. Simmons prepared Exhibit 1.1 in September 2004 in response to instructions from the DEP to submit, among other things, (a) an inventory of all vascular plants on the inland banks at each stream crossing; (b) a description of the canopy cover

[51] EnXco did submit a wildlife habitat evaluation for an earlier version of the project. See Petitioners' Hearing Exh. 7; Johnson, Vol. 6 at pp. 30-41. Because the project has changed considerably since then, that evaluation is no longer applicable. See, e.g., Johnson Dir. Test. at ¶ 30; Johnson, Vol. 6 at p. 70.

at each stream crossing; and (c) an analysis of the predicted surficial hydrology of each stream crossing. See Petitioners' Hearing Exh. 14A; Simmons Dir. Test. at ¶¶ 10-11, 23.

Mr. Simmons was not asked to conduct a wildlife habitat evaluation for enXco and he did not prepare a wildlife habitat evaluation for this project. Simmons, Vol. 7 at pp. 80-81. He did not prepare Exhibit 1.1, or any part of it, as a wildlife habitat evaluation. Id. at 79-81. Furthermore, Exhibit 1.1 does not identify wildlife in the area; nor does it discuss wildlife habitat or analyze the project's expected impact on wildlife habitat. See Petitioners' Hearing Exh. 14A. See also Sanford, Vol. 8 at pp. 88-90 (a list of the wildlife likely to be found in the area at issue is "integral" to a wildlife habitat evaluation).

The second document listed in the superseding order of conditions is the November 4, 2004 letter that Mr. Simmons sent to enXco to clarify certain information in Exhibit 1.1. In particular, the letter stated that the "inventory of vascular plants" in Exhibit 1.1 did not reflect the plants growing on the inland banks at the stream crossings. Rather,

> [m]any of the species … were noted to be growing in the buffer area just above the mean annual flood level on the stream bank and/or overhanging the bank resource area. In some cases, the species … were also noted growing just below the mean annual flood level, but outside of the proposed road crossing footprint.
>
> ***
>
> The regulated bank resource areas within the project footprint at all stream crossings, with the exception of three (Streams 9, 12, and 15), are devoid of vascular plant species. In most cases the only vegetation observed below the mean annual flood level were a variety of moss species.

Weatherbee Dir. Test. at Exh. D. As with Exhibit 1.1, Mr. Simmons did not write the November 2004 letter for the purposes of performing a wildlife habitat evaluation. The letter does not purport to be an evaluation, does not identify wildlife in the area, does not discuss wildlife habitat and does not analyze the project's expected impact on wildlife habitat. Id.

The two documents simply are not a wildlife habitat evaluation. As the petitioners correctly point out, Exhibit 1.1 and the November 2004 letter

> were not intended to be a wildlife habitat evaluation, they do not by their own terms purport to be a wildlife habitat evaluation, they do not mention the words 'wildlife habitat' or even 'wildlife,' and they say nothing whatsoever about the effects the project … will have on wildlife habitat.

Petitioners' Post-Hearing Br. at p. 53. I find especially persuasive the fact that the two documents do not analyze whether the project will have an adverse effect on wildlife habitat. That is, the two documents say nothing about whether the project, including the placement of culverts over the streams and inland banks on the site,

> will, following two growing seasons of project completion and thereafter (or if a project would eliminate trees, upon the maturity of replanted saplings) substantially reduce [the inland bank's] capacity to provide the important wildlife habitat functions listed in 310 CMR 10.60(2).

310 CMR 10.60(1)(a). Nor do the documents mention, let alone evaluate, the important wildlife habitat functions that are applicable to inland banks: food, shelter, migratory and breeding areas for wildlife, and overwintering areas for mammals and reptiles. See 310 CMR 10.60(2)(a). The very purpose of 310 CMR 10.60 is to ensure that projects do not adversely affect wildlife habitat functions. See 310 CMR 10.60(1); 310 CMR 10.54(4)(a)5. The failure to analyze the habitat functions that the inland banks provide, or to evaluate whether the project would substantially reduce the inland banks' capacities to provide those functions, makes it impossible to conclude that the two documents constitute a wildlife habitat evaluation.[52]

Finally, I have considered Mr. Foulis' testimony explaining why he was satisfied with Exhibit 1.1 and the November 2004 letter. See, e.g., Foulis Dir. Test. at pp. 9-10, ¶ 4; Foulis,

[52] The petitioners also proffered copies of the DEP's Wildlife Habitat Evaluation Form, which applicants complete when 310 CMR 10.60 is triggered. See Weatherbee Dir. Test. at Exh. E. Exhibit 1.1 and the November 2004 letter do not contain significant categories of information called for in that form, such as the presence, types and amounts of (a) wildlife food; (b) shrub and/or herbaceous vegetation suitable for nesting; (c) cover, perches, basking and denning habitat; and (d) breeding areas on or adjacent to the bank. See Weatherbee Dir. Test. at Exhs. C, D, E.

Vol. 9 at pp. 70-73, 120-23. The explanations appear to be post-hoc rationalizations and are not credible. Nor do they change the basic facts: the author of the documents – Mr. Simmons – did not conduct a wildlife habitat evaluation and did not prepare the two documents as an evaluation. See, e.g., Simmons, Vol. 7 at pp. 80-81. In fact, no one from Woodlot Alternatives performed a wildlife habitat evaluation for enXco. Id., Vol. 5 at pp. 199-200. Similarly, I have considered the DEP's argument that evidence adduced at this hearing – including testimony from Mr. Foulis – can constitute a wildlife habitat evaluation. It cannot. See, e.g., Symes, 3 DEPR at 104.

If a project would alter at least fifty feet of an inland bank that is significant to wildlife habitat functions, the project proponent must perform a wildlife habitat evaluation *and* must demonstrate – via the evaluation – that the project will not substantially reduce the inland bank's capacity to provide important wildlife habitat functions. See 310 CMR 10.60(1)(a); 310 CMR 10.54(4)(a)5. Because enXco did not perform a wildlife habitat evaluation, a final order of conditions approving the project cannot be issued. Id. See also Symes, 3 DEPR at 104. In addition, the testimony was based on inaccurate assumptions, such as the assumptions that the inland banks are essentially devoid of vegetation and that the project would not impair the stability of the inland banks.

V. Issue No. 6: Does the BVW replication plan for the designated replacement area meet the performance standards at 310 CMR 10.55(4)(b)? In particular …

f. Can at least 75% of the surface of the replacement area be reestablished with indigenous wetland plant species within two growing seasons, and prior to said vegetative reestablishment, will any exposed soil in the replacement area be stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods? See 310 CMR 10.55(4)(b)6.[53]

EnXco proposes to fill 1,506 square feet of a bordering vegetated wetland known as BVW No. 13 and to create a 3,731 square-foot replacement wetland adjacent to the remaining portion of BVW No. 13. See Superseding Order of Conditions at p. 2 of 8. Issue No. 6(f) examines whether enXco's proposed replication plan complies with 310 CMR 10.55(4)(b)6, which provides that

> at least 75% of the surface of the replacement area shall be reestablished with indigenous wetland plant species within two growing seasons, and prior to said vegetative reestablishment, any exposed soil in the replacement area shall be stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods….

Id. Because Issue No. 6(f) was not part of the DEP and enXco's motion for a partial directed decision, I have not previously evaluated whether the petitioners met their burden of going forward on this issue. I do so now and conclude that they have not.

In their post-hearing brief, the petitioners rely on the testimony of one witness, Mr. Stockman, who opined that the "proposed replication will not meet the performance standards because the hydrology is inadequate." Stockman Dir. Test. at ¶ 32. Mr. Stockman explained that

> [w]etland replication areas without adequate hydrology will not develop and maintain a viable wetland community that meets the performance standard (310 CMR 10.55 (4)(b)6.) requiring a 75 % reestablishment of indigenous wetland plant species within two growing seasons

[53] Issue Nos. 6(a)-(e) and (g) are not listed here because I previously dismissed them. See Ruling on Motion for Partial Directed Decision at pp. 3, 23-25.

Id. at ¶ 31. Mr. Stockman also testified that enXco proposes to "supplement the groundwater hydrology of the replication area with treated stormwater drainage from the roadway." Id. at ¶ 33. He testified that it was

> doubtful that this source of water will supply sufficient hydrology, especially during dry conditions to develop and maintain a 3,731 square foot replication area.

Id.

This testimony does not satisfy the petitioners' burden of going forward. Although expert testimony may be used to satisfy the burden of going forward, "expert testimony does not suffice … if the testimony is based on improper, or improperly applied, methodology…." Cheney, 6 DEPR at 200-01. In this case, Mr. Stockman based his opinions on his examination of two test pits that enXco dug in or around the proposed replication area. Stockman Dir. Test. at ¶ 32. When he examined the pits in May 2005, they were dry. Id. Based on these observations, he concluded that the "seasonal groundwater at this location" is unreliable. Id. Mr. Stockman did not explain the methodology he employed, and it is not apparent that one observation of two test pits is a scientifically-accepted method for determining whether the groundwater hydrology in a proposed replication area is inadequate.

To satisfy their burden of going forward, the petitioners had to present credible evidence from a competent source that (a) enXco would not be able to establish at least seventy-five percent of the replacement area within two growing seasons; or (b) prior to establishing the replacement area, exposed soil in the area would not be "stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods…." 310 CMR 10.55(4)(b)6. Having failed to present any such evidence, the petitioners cannot prevail on this issue.

VII. Issue No. 7: Will the stormwater management activities (including point source discharges) that will take place either (a) in a resource area or (b) in a buffer zone to a resource area (a) impair or destroy any portion of the resource area or (b) alter the resource area, respectively?

Stormwater discharges within a resource area or buffer zone are presumed to comply with the Wetlands Protection Act and the Wetlands Regulations if the discharges meet applicable standards in the DEP's Stormwater Management Policy. Five standards are at issue in this appeal: Standards 1, 2, 4, 8 and 9.[54] I find that the project would comply with all five.

A. Issue No. 7(a): Will the project's stormwater management system discharge untreated stormwater directly to, or cause erosion in, wetlands or waters of the Commonwealth? See Stormwater Management Standard 1.

If a project complies with all other stormwater standards, then it is deemed to comply with Standard 1. See DEP Stormwater Management Policy (November 18, 1996) at p. 5 (stormwater that meets the requirements of all other stormwater standards is considered to be "treated stormwater"). Because I find that the project would meet the remaining standards in dispute, I conclude that it also would meet Standard 1.

B. Issue No. 7(b): Is the project's stormwater management system designed so that post-development peak discharge rates to a resource area do not exceed pre-development peak discharge rates? See Stormwater Management Standard 2.

I conclude that the project would comply with Standard 2. The preponderance of the evidence demonstrates that the proposed stormwater management system would not increase peak discharge rates to a resource area. See, e.g., McCollum Dir. Test. at ¶¶ 25-29; Krzanowski Dir. Test. at ¶¶ 73-78, Krzanowski, Vol. 2 at pp. 216-31; id., Vol. 3 at pp. 70-75. I accept the DEP's testimony that enXco correctly used the "TR-55" methodology to calculate runoff quantities. See McCollum Dir. Test. at ¶ 28. Furthermore, enXco presented evidence that it has developed controls for the 2-year storm, as well as for the 10-year 24-hour storm. See, e.g.,

[54] I previously granted a directed decision to the DEP and enXco with respect to Standard 3, which was Issue No. 7(c) in this appeal. See Ruling on Motion for Partial Directed Decision at p. 26.

Krzanowski, Vol. 2 at pp. 218-19; McCollum Dir. Test. at ¶¶ 27, 63. See also Stormwater Management Policy at p. 5. The evidence also shows that the project would not increase the off-site flooding impacts resulting from a 100-year 24-hour storm event. Id. Finally, the petitioners' claim that enXco calculated discharge rates using a 720 acre drainage area is not accurate. EnXco used twenty-one smaller watersheds. McCollum Dir. Test. ¶¶ 28, 63.

C. Issue No. 7(d): Is Stormwater Management Standard 4 applicable to this project and if so, is the project's stormwater management system designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS)? See Stormwater Management Standard 4.

In order to comply with Standard 4, a stormwater management system must be designed to remove at least 80% of the average annual load of total suspended solids ("TSS"). Stormwater Management Policy at p. 4. The standard is presumptively met when (a) "suitable nonstructural practices for source control and pollution prevention are implemented; (b) stormwater management best management practices ("BMPs") are sized to capture the prescribed runoff volume; and (c) stormwater management BMPs are maintained as designed." Id.

The preponderance of the evidence demonstrates that the project would comply with Standard 4. The project utilizes suitable non-structural measures, such as narrowing the roads once the project is complete, vegetating the slopes, and ringing each turbine with a crushed stone pad in order to facilitate infiltration. Further, the stormwater management system is designed to capture runoff volume using appropriate BMPs, including sand filter/forebays, water quality swales and stone-lined ditches. Finally, enXco has an operations and maintenance plan that provides for the stormwater management BMPs to be maintained as designed. See, e.g., Krzanowski Dir. Test. at ¶ 89; Krzanowski, Vol. 3 at pp. 19-26, 30, 47-55; McCollum Dir. Test. at ¶¶ 38-42.

The petitioners assert that the project runs afoul of Standard 4 because the proposed gravel roads should be treated as impervious. They contend that by treating the roads as pervious, enXco used "flawed variables within their equations and analysis" to demonstrate compliance with Standard 4. Petitioners' Post-Hearing Br. at pp. 63-64. The argument is not persuasive. EnXco has demonstrated that the roads are properly considered "pervious" for the purposes of Standard 4. See, e.g., McCollum Dir. Test. at ¶ 39; Krzanowski, Vol. 2 at pp. 231-37.

D. Issue No. 7(e): Does the project include erosion and sediment controls to prevent wetlands impacts during construction or land disturbance activities? See Stormwater Management Standard 8.

The preponderance of the evidence demonstrates that the project complies with Standard 8 because it includes erosion and sediment controls that are adequate to prevent impacts to resource areas during construction and land disturbance activities. See, e.g., McCollum at ¶¶ 45-48; Krzanowski Dir. Test. at ¶¶ 90-97. See also Stormwater Management Policy at p. 5. The petitioners challenge only three aspects of enXco's erosion and sediment control plan. First, the petitioners assert that enXco has not proposed any erosion controls between the inland banks and the limit-of-work lines. For the reasons discussed supra at Section III.B.2, I do not find this to be a convincing argument. Second, the petitioners contend that there is insufficient room to install erosion controls at two locations near Stream No. 1 and BVW No. 18. This is not accurate. Mr. Krzanowski testified that while there was not enough space to install standard hay bales and siltation fences, enXco could utilize more narrow hay bales or other alternate measures. See Krzanowski, Vol. 5 at pp. 140, 146-49. It is troubling that enXco proposed alternative erosion controls only after the petitioners pointed out that the measures enXco originally planned to use would not work. Nevertheless, enXco has demonstrated that it could use erosion and sediment controls at the two disputed locations near Stream No. 1 and BVW No. 18.

Finally, the petitioners complain that the plan of record does not show the specific locations where erosion and sediment controls would be located, but instead depicts only an illustration of the "typical" controls to be used on the site. There is nothing in Standard 8 that requires such a high level of plan detail.

E. Issue No. 7(f): Does the stormwater management system have an operations and maintenance plan which ensures that systems function as designed? See Stormwater Management Standard 9.

The petitioners have dropped their challenge to Standard 9. See Petitioners' Post-Hearing Br. at pp. 54-66. I therefore find in favor of enXco with respect to this standard.

Ruling and Disposition

The project does not comply with the Wetlands Protection Act and the Wetlands Regulations for the following reasons:

1. EnXco did not accurately delineate the upper boundaries of the inland banks along eleven of the intermittent streams at issue in this project. As a result, enXco has failed to demonstrate that the proposed work meets the performance standards for inland banks under the Wetlands Regulations, or that work in the buffer zones to the inland banks would contribute to the protection of the interests identified in the Wetlands Protection Act. See 310 CMR 10.54(4); 310 CMR 10.03(1)(a)3.
2. The proposed would violate 310 CMR 10.54(4)(a)1 because it would impair the physical stability of the inland banks on the ten streams that would be bridged with open-bottom box culverts.
3. The proposed work would alter more than fifty feet of inland bank at the site and enXco failed to perform a wildlife habitat evaluation pursuant to 310 CMR 10.60. As a result, the project does not comply with 310 CMR 10.60 or 310 CMR 10.54(4)(a)5.

EnXco therefore is not entitled to a wetlands permit for this project. The superseding order of conditions that the Department of Environmental Protection issued to enXco is vacated.

Notice

This decision is a recommended final decision of the Administrative Magistrate. It has been transmitted to the Acting Commissioner of the Department of Environmental Protection for a final decision in this matter. This decision therefore is not a final decision subject to reconsideration under 310 CMR 1.01(14)(d), and may not be appealed to the Superior Court pursuant to M.G.L. c. 30A. The Acting Commissioner's final decision is subject to reconsideration and court appeal and will contain a notice to that effect. Because this matter has now been transmitted to the Acting Commissioner, no party shall file a motion to renew or reargue this recommended final decision or any portion of it, and no party shall communicate with the Acting Commissioner's office regarding this decision unless the Acting Commissioner, in her sole discretion, directs otherwise.

May 14, 2007

_____
Natalie S. Monroe
Administrative Magistrate

Appendix A

Statement of Issues to be Adjudicated,
from the Pre-Hearing Conference Report and Order, dated April 1, 2005

1. Are there Bordering Vegetated Wetlands which (a) were not properly delineated or were incorrectly designated as Bank (Inland) on the approved plans, and (b) will be impacted by the project to an extent inconsistent with the performance standards at 310 CMR 10.55(a)-(b)?

2. Are there inland Banks which (a) were not properly delineated on the approved plans, and (b) will be impacted by the project to an extent inconsistent with the performance standards at 310 CMR 10.54(4)(a)(1 and 5)?

3. Is there Land Under Water Bodies and Waterways which (a) was not properly delineated on the approved plans, and (b) will be impacted by the project to an extent inconsistent with the performance standards at 310 CMR 10.56(4)(a)(4)?

4. Will the use of open-bottom culverts to traverse streams:

   a. impair the physical stability of the bridged Banks [see 310 CMR 10.54(4)(a)(1)];

   b. impair the surface water quality as a result of increased Bank erosion [see 310 CMR 10.54(4)(a)(3)]; and/or

   c. impair the capacity of the bridged Banks to provide wildlife habitat functions by altering the inland Banks beyond the threshold provided at 310 CMR 10.54(4)(a)(5)?

5. If the project will alter inland Banks beyond the threshold provided at 310 CMR 10.54(4)(a)(5) [see 4(c) above]:

   a. Will such alteration have any adverse effects on wildlife habitat as set forth in 310 CMR 10.60(1)(a)?

   b. Does the wildlife assessment that the applicant submitted meet the standards of 310 CMR 10.60(1)(b)?

6. Does the BVW replication plan for the designated replacement area meet the performance standards at 310 CMR 10.55(4)(b)? In particular:

   a. Will the surface of the replacement area to be created be equal to that of the area to be lost? See 310 CMR 10.55(4)(b)(1).

   b. Is the ground water and surface elevation of the replacement area approximately equal to that of the lost area? See 310 CMR 10.55(4)(b)(2).

   c. Is the overall horizontal configuration and location of the replacement area with respect to the bank similar to that of the lost area? See 310 CMR 10.55(4)(b)(3).

d. Will the replacement area have an unrestricted hydraulic connection to the same water body or waterway associated with the lost area? See 310 CMR 10.55(4)(b)(4).

e. Is the replacement area located within the same general area of the water body or reach of the waterway as the lost area? See 310 CMR 10.55(4)(b)(5).

f. Can at least 75% of the surface of the replacement area be reestablished with indigenous wetland plant species within two growing seasons, and prior to said vegetative reestablishment, will any exposed soil in the replacement area be stabilized to prevent erosion in accordance with standard U.S. Soil Conservation Service methods? See 310 CMR 10.55(4)(b)(6).

g. Will the replacement area be provided in a manner that is consistent with all other General Performance standards for each resource area in Part III of 310 CMR 10.00? See 310 CMR 10.55(4)(b)(7).

7. Will the stormwater management activities (including point source discharges) that will take place either (a) in a resource area or (b) in a buffer zone to a resource area (a) impair or destroy any portion of the resource area or (b) alter the resource area, respectively? Specifically:

a. Will the project's stormwater management system discharge untreated stormwater directly to, or cause erosion in, wetlands or waters of the Commonwealth? See DEP Stormwater Management Policy (November 18, 1996), Stormwater Management Standard 1.

b. Is the project's stormwater management system designed so that post-development peak discharge rates to a resource area do not exceed pre-development peak discharge rates? See Stormwater Management Standard 2.

c. Will the project's stormwater management system increase annual recharge to groundwater to a resource area and, if so, will this violate Stormwater Management Standard 3 (which requires that loss of annual recharge to groundwater be minimized through infiltration measures to the maximum extent practicable, and that the annual recharge from the post-development site should approximate the annual recharge from pre-development or existing site conditions, based on soil types)?

d. Is Stormwater Management Standard 4 applicable to this project and if so, is the project's stormwater management system designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS)? See Stormwater Management Standard 4.

e. Does the project include erosion and sediment controls to prevent wetlands impacts during construction or land disturbance activities? See Stormwater Management Standard 8.

f. Does the stormwater management system have an operations and maintenance plan which ensures that systems function as designed? See Stormwater Management Standard 9.