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EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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THE OFFICE OF APPEALS AND DISPUTE RESOLUTION

May 7, 2013

In the Matter of

M.G. Hall Company

Docket Nos. WET-2012-023
File No. 245-1365

North Reading

RECOMMENDED FINAL DECISION

In this appeal, M.G. Hall Company (the "Petitioner") challenged the denial of its proposed project in a Superseding Order of Conditions ("SOC") issued by the Department's Northeast Regional Office under the Massachusetts Wetlands Protection Act, G.L. c. 131, § 40 and the Wetlands Regulations, 310 CMR 10.00. The Petitioner proposed to construct a paved parking area with compensatory flood storage and stormwater management on land adjacent to its commercial facility, Ryer's Store, at 162 Park St. in North Reading. The North Reading Conservation Commission (the "Commission") had approved the project. The Department denied the project on the grounds that the proposed work did not meet the performance standards for bordering land subject to flooding ("BLSF") and for stormwater management. The Petitioner claimed that the Department's assertion of jurisdiction over the project was untimely and that the proposed work meets the performance standards.

The Department was entitled to, but did not receive, a copy of the Commission's Order of Conditions ("OC"). In past Department practice, the time period for Department action may be

tolled when a person entitled to notice does not receive notice of the issuance of the relevant document. See Matter of Antonio and Helen Chasse, Docket No. 89-159, Final Decision (September 3, 1992). Accordingly, although its involvement in this matter was initiated long after the issuance of the Commission's OC, I conclude that the Department properly asserted jurisdiction over this matter. As to the proposed work, the Petitioner advanced a project design intended to meet the performance standards by (1) excluding the porosity of the stone bedding around pipes for purposes of calculating compensatory storage for work in BLSF and (2) relying on sequential and/or concurrent use of the same area to provide compensatory storage for work in BLSF and to control peak stormwater discharges and provide other stormwater management. The Department argued that the project's design falls short on both counts, and also failed to meet other regulatory requirements. After considering all the evidence, I conclude that the Petitioner's project as proposed does not conform to the Department's performance standards. I recommend to the Department's Commissioner that the SOC denying the project as proposed be sustained. Although the Applicant referred to an alternative project design involving a stormwater tank storage system, the alternative was not offered as a plan change and was not sufficiently developed to determine whether it could meet the performance standards.[1] Ogren PFT, Exh. 2.

PROPOSED PROJECT

The site is currently an undeveloped, wooded basin approximately one quarter acre in size, with Ryer's Store and its associated parking lot immediately adjacent and surrounded by

[1] The Petitioner's testimony included proposals to overcome some of the objections to the design of the project raised by the Department at the time it issued the SOC, including plans with a revision date of November 24, 2012. In addition to not having been offered as the plan of record, these plans were withdrawn during the hearing in part due to an issue with filter fabric. McQuilken Cross. During the hearing, however, the Department raised additional issues, including whether the BLSF boundary was properly determined and whether there was bordering vegetated wetlands at the site. These issues should be evaluated in any new Notice of Intent filed for the site.

other commercial development. The basin has steep sides and differences in relief of approximately five feet, from approximately elevation 65 to 70 feet NGVD.[2] Stormwater Management Report, p. 5, Expanded Parking Plan Grading and Drainage, Flood Storage Detail, June 30, 2010, revised April 13, 2012. Almost the entire site is within the mapped 100-year floodplain of the Ipswich River, and therefore any work must meet the requirements for work in BLSF. The BLSF at the site is connected to floodplain more immediately bordering the Ipswich River by a 15 inch diameter, 64.7 foot long culvert located in the southwest corner of the lot.[3] See Notice of Intent and Stormwater Management Report, Appendix A. Flows from the Ipswich River reach the site when flood flows rise to the elevation of the culvert outside the basin somewhere between the two and ten-year storm events. Flows leave the site as floodwaters recede or as runoff ponds in the basin and reaches the elevation of the culvert within the basin. McQuilken Cross. The elevation of the 100-year floodplain at the site according to the Federal Emergency Management Agency ("FEMA") maps is at elevation 67.8 ft or 67.6 based on the Flood Profiles and Floodway Data. The elevation of the 10-year floodplain is at elevation 65.6. The elevation of the bottom of the 15 inch diameter pipe that serves as the inlet to and outlet of the basin is at elevation 64.06 within the basin and 63.11 at the outlet outside the basin. Ogren PFT, Ex. 3; McQuilken Reb. p. 1; See Expanded Parking Plan (June 30, 2010).

The paved parking lot is proposed to be constructed over the basin, with flood storage and stormwater management underneath. The area of BLSF on the site is 10,993 sq. ft. and the proposed impervious surface is 11,349 sq. ft, so that the pavement will essentially cover the

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[2] NGVD means National Geodetic Vertical Datum, an established reference point. All elevations in this Recommended Final Decision are NGVD.

[3] The culvert size is identified as 12 inch diameter on the plans and Notice of Intent, but the error was discovered upon field inspection. The presence of this culvert that serves as both an inlet and an outlet for the basin is critical to an understanding of the hydrology of the site.

BLSF. The proposed flood storage system is a combination of 36-inch corrugated metal pipes and crushed stone. The volume of the basin is proposed to be expanded by excavation, but essentially the entire area will contain pipe and stone. McQuilken Cross. Two retaining walls will provide barriers between the flood storage system and a pedestrian ramp and an existing elevated platform. Project Narrative, filed with Notice of Intent. The elevation of the bottom of the stones is 65.1. Cross Sections Plan, Sheet 3 of 3, (April 13, 2012); Expanded Parking Plan Grading and Drainage, Flood Storage Detail, June 30, 2010, revised April 13, 2012.[4] The 100-year flood elevation is reached at approximately one half to two thirds up from the bottom of the 36 inch corrugated metal pipes, which are 6 to 8 inches from the bottom of the stones. Expanded Parking Plan Grading and Drainage, Flood Storage Detail, June 30, 2010, revised April 13, 2012; McQuilken Cross. Above the corrugated metal pipes is another foot of stones, then 8 inches of sub-gravel base for the pavement. Expanded Parking Plan Grading and Drainage, Flood Storage Detail, June 30, 2010, revised April 13, 2012.[5]

The proposed stormwater management system includes concrete curbing around the parking area and the routing of runoff through a proprietary hydrodynamic separator with the treated runoff discharging to the proposed floodplain storage system. Stormwater Management Report, pp. 2-3. The Petitioner submitted drainage calculations for the existing and proposed runoff for the 2-year, 5-year, 10-year, 25-year, 50-year, and 100-year storms. According to the Petitioner's calculations, the peak runoff rate is less under developed than existing conditions for each of these storm events. Stormwater Management Report, pp. 5-6. The soils were classified

[4] The Petitioner filed another plan with revisions dated 11/24/12 which revised the basin outlet and lowered the bottom of the stone from Elevation 65.1 feet to 64.65. McQuilken PFT, Exhibit 15.

[5] There are variations in the elevations in the proposed design that do not appear to be material. The West Proposed Flood Plain Field is located on the East side of the basin and the East and Center Flood Plain Fields are located on the West side of the site. Expanded Parking Plan Grading and Drainage, June 30, 2010, revised April 13, 2012.

as Hydrologic Group C soils in the Notice of Intent. Stormwater Management Report, pp. 2-3. In sum, runoff from the existing parking lot currently enters the basin, together with rainfall directly to the basin, and either infiltrates or exits through the 15 inch culvert. The proposed conditions would replace the wooded basin with new pavement underlain by pipes and stone, and runoff would either infiltrate or exit through the culvert. In both existing and proposed conditions, flood flows from the Ipswich River will enter through the 15 inch culvert, preventing the exit of any stormwater that would otherwise flow through the culvert at that time.

REGULATORY FRAMEWORK

Under the Department's regulations, BLSF is an area which floods from a rise in a waterway or water body, providing temporary storage for flood water. 310 CMR 10.57(1)(a)1 and 2. During periods of peak runoff, flood waters are slowly released through surface discharge and by evaporation and percolation into the soil. 310 CMR 10.57(1)(a)2. The placement of fill in BLSF increases the extent and level of flooding by eliminating flood storage volume or by restricting flows, causing increased property damage. Id. The boundary of BLSF is "the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm," typically expressed as the 100-year storm elevation. 310 CMR 10.57(2)(a)3. The boundary often is determined by reference to the most recently available flood profile data prepared for the National Flood Insurance Program, currently administered by FEMA as shown on maps ("FEMA maps"). Id. The regulations contain provisions governing the determination of BLSF when this information is unavailable or disputed. Id. In addition to the interests of flood control and storm damage prevention promoted by BLSF, the ten-year floodplain is significant to the protection of wildlife habitat. 310 CMR 10.57(1)(a)3. The ten-year floodplain is the estimated maximum lateral extent of flood water

theoretically resulting from the statistical ten-year frequency storm, which may also be shown on FEMA maps or determined by calculations. 310 CMR 10.57(2)(a)4.

Unless specifically exempted, stormwater runoff from proposed projects in resource areas or the buffer zone must meet stormwater management standards identified in the regulations and further explained in the Massachusetts Stormwater Handbook. 310 CMR 10.05(6)(k). These provisions apply to both the quality and the quantity of stormwater runoff, to reduce the discharge of pollutants and to preserve the pre-development hydrology of a site. An applicant must design a stormwater management system so that post-development peak rate discharges do not exceed pre-development peak rates. Stormwater Standard 2, 310 CMR 10.05(6)(k)2. The annual recharge from the post-development site must approximate pre-development annual recharge based on soil type. Stormwater Standard 3, 310 CMR 10.05(6)(k)3. The design must provide the removal of 80% of the annual load of total suspended solids. Stormwater Standard 4, 310 CMR 10.05(6)(k)4. An applicant must prepare an operation and maintenance plan. Stormwater Standard 9, 310 CMR 10.05(6)(k)9. An applicant must comply with all other applicable regulatory provisions of 310 CMR 10.00, including the performance standards for work in the resource area, as well as the stormwater management standards. 310 CMR 10.05(6)(q).

ISSUES IDENTIFIED FOR ADJUDICATION AND BURDEN OF PROOF

The parties agreed to the following issue for adjudication:

1. Whether the Department's intervention leading to the issuance of its SOC was timely, or must be dismissed on jurisdictional grounds?

2. Whether the work meets the performance standards for bordering land subject to flooding at 310 CMR 10.57(4)(a)1.?

3. Whether the work meets the performance standards for bordering land subject to flooding at 310 CMR 10.57(4)(a)2.?

4. Whether the work meets the performance standards for bordering land subject to flooding at 310 CMR 10.57(4)(a)3.?

5. Whether the work meets the Stormwater Management Standards at 310 CMR 10.05(6)(k), and in particular, Stormwater Standards 2, 3, 4, 7 and 9? See 310 CMR 10.05(6)(k)2., 310 CMR 10.05(6)(k)3., (310 CMR 10.05(6)(k)4., 310 CMR 10.05(6)(k)7., and 310 CMR 10.05(6)(k)9.[6]

The jurisdictional issue as to timeliness of the Department's action was addressed by motion, and the remaining issues were the subject of an evidentiary hearing. The parties were directed to incorporate their positions on (1) the use of a porosity ratio generally, as well as the specific ratio proposed, in calculating compensatory storage for work in BLSF and (2) the relationship between stormwater management requirements and the performance standard for compensatory storage for work in BLSF. At least two additional issues arose from the Department's testimony: whether the site contained bordering vegetated wetlands ("BVW") and whether the BLSF elevation had been properly determined. The issue of the presence of BVW would have required additional testimony, which was not necessary as my recommendations on the issues identified for adjudication would be dispositive if adopted. I addressed in part the question of the boundary of BLSF.

The Petitioner must demonstrate that the proposed project meets all applicable performance standards and the failure to meet any one provides grounds for denial of the project. 310 CMR 10.03(1)(a)2. Under the wetlands regulations, the burden of going forward and the burden of proof are placed upon the party contesting the Department's position in an appeal. 310

[6] The Department requested the addition of the issue to address compliance of the project with stormwater management standards after the Pre-hearing Conference. The request was consistent with the discussion at the Conference, where the parties discussed both compensatory flood storage and management of stormwater volume. The Department added Thomas Maguire as a witness. The Petitioner added Peter Ogren as a witness. The parties did not address Standard 7, as they agreed the project did not involve redevelopment of the site.

CMR 10.03(2); 310 CMR 10.05(7)(j)3.b. The weight to be attached to any evidence in the record rests with the sound discretion of the Presiding Officer. 310 CMR 1.01(13)(h)1.

ISSUE 1: JURISDICTION AS TO TIMELINESS

A request for action on an OC issued by a conservation commission, including an intervention by the Department, must be filed within ten business days of issuance of the OC.[7] 310 CMR 10.05(7)(c). Under the regulations, a conservation commission is required to mail or hand deliver a copy of an OC to the Department at the same time as the OC is mailed by certified mail (return receipt requested) or hand delivered to the applicant. 310 CMR 10.05(6)(e).[8] The requirement originates in the Wetlands Protection Act itself, which requires that after an OC is signed, "a copy thereof shall be sent forthwith to the applicant and the department." G.L. c. 131, § 40. There is no dispute that the Department did not act within ten days of the issuance of the OC to the Petitioner by the Commission. The timeliness of a request for Department action, including an intervention by the Department, is jurisdictional so that failure to act during the ten day period typically warrants dismissal of the request or a lack of jurisdiction to intervene. See e.g., Matter of Treasure Island Condominium Association, Docket No. 93-009, Final Decision (May 13, 1993).

While the Department's intervention was not issued within the ten day jurisdictional time period specified in the wetlands regulations, the Department moved for tolling of the time period, arguing that tolling is warranted on the grounds that it did not timely receive a copy of the

[7] The relevant provision of the regulations is entitled "Requests for Actions by the Department (Appeals)." 310 CMR 10.05(7). Requests related to documents issued by conservation commission may be filed by various persons, including the Department. Where the Department has decided on its own initiative to act, the action often is referred to as an "intervention," or as a verb, the Department will "intervene." These terms do not appear in the regulations.

[8] Note that "the additional requirement that the commission deliver a copy of the order to the department does not alter the date of issuance, it merely establishes that the Department is entitled to receipt of notice of the issuance, which may in appropriate case bear on the time the department has to appeal." Matter of Geoffrey Banfield, Docket No. 97-029, Final Decision at n. 4 (December 8, 1997). In other words, the Commission's OC was "issued" on September 15, 2010, even if a copy was not sent to the Department, according to this prior case.

Commission's OC. In unusual circumstances, the Department has recognized that the ten day appeal period may be tolled where legally required notice was not given to a party entitled to receive it and where the failure to obtain notice caused that party's failure to timely file an appeal. See e.g., Matter of Donald Bianco, Docket No. 93-063, Decision on Department's Motion to Dismiss (Nov. 7, 1995); Matter of Bay Park Development Trust, Docket No. 88-291, Final Decision, (March 31, 1989); Matter of Geoffrey Lenk, Docket No. 95-077, Final Decision (Feb. 6, 1996); See also, Matter of Cross Point Limited Partnership, Docket No. 95-088, Final Decision (April 30, 1996); Matter of Joseph DeMaio, Docket No. 97-063, Final Decision (April 9, 1998).[9] Under the circumstances presented, I conclude that the time period for Department action was tolled, making the Department's intervention timely. I address this issue in considerable detail as a ruling favorable to the Petitioner would void the Department's denial of the project.

In this matter, the Commission issued its OC to the Petitioner on September 15, 2010. The Petitioner apparently did not and has not yet commenced work on the project. The Department issued its intervention on April 3, 2012, approximately 18 months later. The Petitioner asserted that the Department's intervention was untimely. The Department argued that it did not receive a copy of the OC issued by the Commission to the Petitioner until March 26, 2012, when the OC was sent as an attachment to an email by Kathy Morgan, the assistant to the Commission, to Pamela Merrill at the Department and later forwarded to Wayne Lozzi, also at the Department. Thus, the Department argued that the time period for any action began on

[9] Tolling has been applied in wetlands cases both as to the ten day period for filing requests for superseding orders and for filing notices of claim for adjudicatory hearings, but the regulatory notice provisions differ. It is critical to distinguish between circumstances where notice is required, as compared to circumstances such as Conroy and Viera, where a petitioner was not entitled to notice and/or reviewed the actual Order prior to the close of the ten day period. Matter of Conroy Development, DALA Docket No. DEP-06-865, Recommended Final Decision (April 27, 2007), adopted by Final Decision (August 23, 2007), Matter of Viera, Docket No. 2001-177, Final Decision (December 5, 2002).

March 26, 2012 and extended ten business days thereafter, until April 9, 2012. Thus, the Department asserted that its intervention dated April 3, 2012 was timely. The Department provided an affidavit of Rachel Freed, the Department's Section Chief of the Northeast Regional Office Wetlands Program. Ms. Freed described her normal practice of receiving mail from the Department's mail room and segregating OCs for entry by another staff person into the Department's database using the postmark date on the envelope. According to the database, the Notice of Intent for the project was filed on July 20, 2010 and the OC was "finally received" by the Department from the Commission on March 26, 2012. A further notation states "[a]ssociated with a possible enforcement case." Ms. Freed recalled that the staff person responsible for data entry, Pamela Merrill, had made more than one request to the Commission for a copy of the OC. Ms. Freed further stated that of the 14 Notices of Intent from North Reading entered in the database between May 7, 2010 and October 7, 2010, four did not show receipt of an OC from the Commission. The Department argued that this discrepancy may indicate a problem with North Reading's mail room procedures.

The Petitioner opposed the motion, stating that the Commission had mailed the copy of the OC as it customarily handles the issuance of its OCs. The Petitioner provided an affidavit from Kathy Morgan, the administrative assistant to the Commission. Ms. Morgan stated that she followed the normal practice of her office by delivering to the Town's mail room on September 15, 2010 the original OC to the Petitioner for mailing by certified mail, return receipt requested, with a copy to the Department's Northeast Regional Office by regular mail, and retaining a copy of the OC for the Commission's files. She stated that the Commission's files contain the signed receipt returned by the Petitioner and the copy she made for the Commission, but no record of any correspondence to the Department that had been returned as undeliverable.

The Petitioner conceded that the period to request Department action, or for the Department to intervene, may be tolled in unusual and infrequent circumstances. However, the Petitioner argued that there must be a notice-related failure causing the Department to miss the deadline. The Petitioner noted that there is evidence in the record that the Department was aware of the issuance of the OC prior to actually receiving the OC, and argued that the date of notice of issuance of the OC is the operative date. Specifically, the Petitioner cited to a reference by Wayne Lozzi, the Department's wetlands staff assigned to this matter, that the OC was "associated with a possible enforcement case." Thus, the Petitioner argued that the Department had knowledge of the OC prior to receiving it on March 26, 2012, and thus, even if tolling is warranted, the Department has not shown that its intervention was timely. The Petitioner noted, correctly, that tolling is an unusual occurrence.[10]

As to the facts related to procedures for mailing and receipt of OCs, both the Commission and the Department appeared to have followed their respective normal practices. Ms. Morgan properly delivered the Department's copy of the OC to be mailed by the Town's mail room and Ms. Freed did not receive the copy within the expected time frame from the Department's mail room. There is no evidence related to whatever may have occurred in either mail room, and therefore no proof as to whether or not the copy of the OC was sent by the Town's mail room or whether or not it was received by the Department's mail room.[11] The Petitioner has pointed to

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[10] Given the administrative burden on commissions and the Department in tracking voluminous documents filed under the Wetlands Protection Act, lapses from whatever cause are remarkably infrequent. Clearly the timely exchange of documents between Commissions and the Department is essential to their joint administration of the Act.

[11] Because a mail room was involved on both the sending and receiving end of this fact pattern, I need not address questions as to how the mailbox rule would apply. An example of a "mailbox rule" is found in the department's hearing rules, where "notice of actions and other communications from the Department hand-delivered or mailed to the person's last known address shall be presumed received upon the day of hand-delivery or, if mailed, three days after the date postmarked." 310 CMR 1.01(3)(b).

evidence, in the form of the notation in the Department's database indicating that the Department had notice of the existence of the OC prior to actually receiving it, and argued that the ten day period should begin when the Department had notice of the OC rather than the date it received a copy of the OC. However, there is also evidence that the Department took steps to obtain a copy of the OC when it had notice.[12]

In a case involving ineffective notice, where the Department issued a copy of a superseding determination of applicability by certified mail to a conservation commission and the commission simply did not receive it, the appeal period was tolled until the commission had knowledge of the issuance. Matter of Geoffrey Lenk, Docket No. 95-077, Final Decision (Feb. 6, 1996); See Matter of Bay Park Development Trust, Docket No. 88-291, Final Decision (March 31, 1989). In the circumstances presented in Lenk, however, the Commission's agent received a copy of the Department's detailed cover letter that fully described the rationale for its action; the actual Superseding Determination of Applicability contained only a checked box and a statutory citation. Thus, the Commission had all the necessary information to file a notice of claim within ten days of receiving the copy of the cover letter, even without a copy of the Superseding Determination of Applicability. This result is consistent with Matter of Chasse, where the time period was tolled until the Department received a copy of the Order, not necessarily when it

[12] Department cases have distinguished circumstances where tolling is related to notice or receipt, and in some circumstances has considered whether parties either diligently sought or evaded notice. See Matter of Joseph DeMaio, Docket No. 97-063, Final Decision (April 9, 1998), citing Michelin Tires (Canada) Ltd. v. First National Bank of Boston, 666 F.2d 673 (1st Cir. 1981)("a person has notice of a fact when, from all the information at his disposal, he has reason to know of it"); Conte v. School Committee of Methuen, 4 Mass. App. 600 (1976) ("the party to a transaction . . . cannot willfully shut his eyes to the means of acquiring knowledge which he knows are at hand and thus escape the consequences which would flow from the notice had it actually been received."); Matter of Jose Verissimo, Docket No. WET-2008-006, Recommended Final Decision (June 5, 2008), adopted by Final Decision (July 3, 2008), Final Decision on Reconsideration (October 23, 2008). Here there is evidence that the Department did not "willfully shut its eyes" to the means of learning whether an OC may have been issued, but instead it requested a copy of the OC from the Commission, clearly indicating that it did have reason to believe that there was an OC and that it was taking steps to obtain the copy to which it was entitled. Neither the means of communication nor the date of the request for the OC is in the record.

received a copy from the Commission. Matter of Antonio and Helen Chasse, Docket No. 89-159, Final Decision (September 3, 1992). Here there is no evidence that the Department received any copy of the OC or any correspondence describing the OC prior to March 26, 2012.

Past cases distinguish defective notice to the Department: "The regulations require conservation commissions to send orders of conditions to the department because the documents themselves are essential to the Department's ability to review orders of conditions issued by commissions throughout the Commonwealth. Only when the Department receives an order is it able to determine whether to request an SOC of itself, as the regulations permit it to do." Matter of Ivan Garshelis, Docket No. 98-157, Ruling on Motion (July 16, 1999). Here there is no evidence that the Department received a copy of the OC, to which it was entitled upon issuance under the statute and regulations, prior to March 26, 2012. Accordingly, the Department's decision to intervene on April 3, 2012 was timely, allowing it to assert jurisdiction over this matter.

WITNESSES, PRE-HEARING MOTIONS AND POST-HEARING MOTIONS

The Petitioner presented testimony of Peter Ogren and John F. McQuilken, Jr., both registered professional engineers and land surveyors, and Steven Eriksen, an environmental consultant. The Department presented testimony of Wayne Lozzi, a wetlands staffperson in the Northeast Regional Office, and Thomas Maguire, the Department's Wetlands Program Regional Coordinator with particular expertise in stormwater management. Each was qualified as an expert witness.

There were references to alternative plans in the testimony, related to a storage tank and other plan revisions dated November 2012. The plans of record in this proceeding are the plans filed for the record with the date of June 30, 2010 (Notice of Intent) and plan revisions including

a Cross Section plan dated April 13, 2012. The Department has a procedure, its Plan Change Policy, which allows an applicant to propose changes in plans under certain circumstances, a process that ensures that only one plan will be subject to review at a time. See Administrative Appeals Policy for the Review of Project Plan Changes (DWW Policy 91- 1), Issued February 8, 1991, Revised March 1, 1995. In this appeal, the Applicant did not choose to formally submit amended plans.

In its memorandum of law accompanying its direct case, the Department argued that the Petitioner had failed to sustain its direct case by failing to meet its burden of going forward. 310 CMR 1.01(11)(e); 310 CMR 10.03(2). The Petitioner filed an opposition to dismissal, arguing that the testimony of its witnesses showed that the project meets the applicable performance standards. The Department is correct that the Petitioner must demonstrate that the proposed project meets all applicable performance standards and the failure to meet any one provides grounds for denial of the project. 310 CMR 10.03(1)(a)2. The burden of going forward in a wetlands case, however, requires the production of "some credible evidence from a competent source in support of the position taken," a burden met by the Petitioner. 310 CMR 10.03(2). Thus, I declined to dismiss the Petitioner's claims prior to the hearing, which proceeded as scheduled.

The Petitioner moved to strike portions of Mr. Maguire's testimony related to BVW, buffer zone, and the 100-year flood elevation and the Department filed an opposition. I considered this testimony to the extent it was relevant to the issues for adjudication.[13] The

[13] If the Commissioner adopts this Recommended Final Decision and the Applicant files a new Notice of Intent, any BVW at the site should be shown on the plans and any work within the BVW or the buffer zone must comply with applicable regulations. According to the Department, in the plans related to an Order of Conditions issued for the site in 2006 and a certificate of Compliance issued in 2008, BVW was present on the site but BVW was not depicted on the plans filed with this Notice of Intent. Maguire PFT, paras. 30-36; McQuilken Cross; Department's Post-hearing Brief. The 100-year flood elevation should also be evaluated.

Department moved to strike rebuttal testimony of Petitioner's counsel, who provided a copy of a 1972 wetlands permit and related documents. While the Department is correct that Mr. Senior was not identified as a witness and the document is of limited utility without the plans, I allowed the testimony to the extent it showed that some work at the site was conducted with a permit.

An issue arose at the hearing as to an incorrect reference to software related to recharge calculations in the testimony of Mr. McQuilken. McQuilken Hearing Testimony, correction to PFT. The Department filed an analysis with its closing brief after its witness, Mr. Maguire, had reviewed the material. The Petitioner responded to this analysis, and the Department filed an objection. I was able to at least partially resolve the questions raised by the post-hearing filings as to groundwater mounding.

ISSUE 2: BLSF STANDARD FOR COMPENSATORY STORAGE

The performance standard for BLSF at 310 CMR 10.57(4)(a)1 states:

> Compensatory storage shall be provided for all flood storage volume that will be lost as the result of a proposed project within Bordering Land Subject to Flooding, when in the judgment of the issuing authority said loss will cause an increase or will contribute incrementally to an increase in the horizontal extent and level of flood waters during peak flows.
>
> Compensatory storage shall mean a volume not previously used for flood storage and shall be incrementally equal to the theoretical volume of flood water at each elevation, up to and including the 100-year flood elevation, which would be displaced by the proposed project. Such compensatory volume shall have an unrestricted hydraulic connection to the same waterway or water body. Further, with respect to waterways, such compensatory volume shall be provided within the same reach of the river, stream or creek.

BLSF is a protected resource area primarily to prevent flooding and related storm damage. The premise of this performance standard for proposed work in BLSF is that incremental filling within the floodplain increases the extent and level of flooding, with resulting property damage. 310 CMR 10.57(1)(a). An applicant proposing to place fill or otherwise diminish flood storage

capacity in BLSF must provide equivalent flood storage at the same elevation. Thus, the requirement for compensatory storage ensures that there will be *no* loss of flood storage from the project, up to and including the 100-year storm event, so that flood flows will not be affected by the project. Although an issuing authority may find that a loss of storage capacity from the project will not increase flooding during peak flows, an applicant must make a showing to that effect, as "the extra water will have to go somewhere." MACC, Environmental Handbook for Conservation Commissioners, p. 260. Such a finding would be more likely where the loss of storage is de minimis as compared to relatively large peak flows downstream.

The traditional way of calculating compensatory storage is to determine the volume of proposed fill at each elevation and expect an applicant to excavate and remove an equivalent volume for storage to compensate for the filled area. The excavated volume must be greater than the filled volume, at each elevation of the floodplain up to the 100-year floodplain elevation, to provide incremental flood storage. Hydrology Handbook for Conservation Commissioners (March 2006), p. 9-21 to 9-24. Although the analysis is typically summarized on a chart showing the elevations and incremental volumes of fill and excavation, the calculations can be verified though methods of estimating volumes between cross-sections or contours shown on plans. Id, p. 9-22 to 9.23. The requirement that compensatory storage must have an unrestricted hydraulic connection to, and be within the same reach of, the waterway ensures that flood flows will pass freely in an equivalent manner post-construction. The Petitioner's proposed work involves at least two issues related to compensatory storage, whether and how to take into account voids within fill placed within BLSF and whether and how stormwater runoff may be directed to BLSF.

The Petitioner provided the required table showing flood storage volume calculations, with the simple explanation that the existing wooded floodplain basin would be replaced by the proposed floodplain storage system of 36 inch corrugated metal pipes embedded in stone. McQuilken PFT, Ex. 5. The Petitioner's flood storage volume calculations show a total proposed "cut," or excavation, of 9,722 cubic feet ("cf") compared to a proposed total "fill" of 9,047 cf.[14] The incremental cut and incremental fill volumes are shown in one foot increments from elevation 65 ft. to elevation 67 ft. and from elevation 67.0 ft. to elevation 67.8 ft., the 100-year storage elevation. Id. The table shows that the proposed floodplain storage exceeds the volume of existing floodplain storage incrementally. Id. It is the Petitioner's treatment of voids in the stones, however, that is disputed by the Department. Voids are the interstitial spaces between the stones, space that may be occupied by air or water. Porosity is the volume of voids over the total volume expressed as a percent. Basically, the Petitioner's proposed design rests on the theory that voids constitute 40% of the volume where the stones are placed, and because the voids provide storage, compensation is required for only the 60% of the volume that represents the stone and pipe walls.[15]

The Department argued that the Applicant was not required to compensate for the area within the corrugated metal pipes, but was required to compensate for the area of stone fill, including the voids. In other words, the Department would not allow the 40% credit for voids within the stones. The Department further argued that the proposed compensatory storage would be located within the same footprint of the area to be filled, and therefore did not meet the

[14] Whether the compensatory storage had been provided in the proper increments was not initially in dispute in this appeal.

[15]The Department did not dispute the 40% figure for the initial installation. Support for the 40% porosity for the proposed stone was provided by the Petitioner in a letter to Mr. Lozzi dated April 17, 2012 and included in the record. The porosity was based on a compacted condition and protected from soils migration by a geotextile outside the system. The Department did dispute whether the 40% porosity would be maintained over time, if the voids became filled with sediments from floodwaters or stormwater.

regulatory requirement that compensatory storage must be a volume "not previously used for flood storage." 310 CMR 10.57(4)(a)1. The Petitioner's rationale is quite simple, that the voids do not constitute "lost" flood storage volume or a "loss" of storage that would increase flood flows, because these voids remain available for flood storage. 310 CMR 10.57(4)(a)1. Taken together with the additional proposed excavation, the Petitioner claims that sufficient compensatory storage has been provided.

The Petitioner's compensatory storage is shown on Exhibit 5 of Mr. McQuilken's direct testimony. See Appendix B-Expanded Flood Storage Volume Calculations, August 31, 2010, Revised April 13, 2012. Although the areas of new storage are not shown on the plans, Mr. McQuilken testified that the project included additional excavation within the basin. He clarified at the hearing that the areas outside the existing grade shown on the Cross Sections plan depict compensatory flood storage. McQuilken Cross. He testified that no compensation would be required for the area within the corrugated metal pipes and the voids between the stone around the pipes because those areas were not lost to, but instead would remain as, flood storage. Thus, the compensatory storage is not located within the same footprint as the area to be filled to the extent that the basin would first be expanded to account for loss of storage volume. From this perspective, the volume of the newly excavated area was not previously used for flood storage. The regulations require a compensatory volume but do not specify a location – and therefore do not preclude the provision of compensatory storage in the floodplain provided that the newly created storage is "a volume not previously used for flood storage." Matter of Neponset Associates, Docket No. 97-007 and 97-008, Final Decision (December 31, 1997). This logic, however, does not extend to the 40% voids within the stones.

Mr. Maguire testified that taking voids into account for purposes of compensatory storage calculations had never been proposed by an applicant or approved by the Department.[16] Mr. Maguire confirmed at the hearing that the natural extension of the Petitioner's theory as to voids in fill would require also taking into account the voids in the excavated material.[17] The logical consequence of a comparable analysis would require a much larger volume of excavate than was proposed by the Petitioner. Mr. Maguire also stated that when flooding occurs, the groundwater also rises and saturates the void spaces while the river is peaking. Thus, the voids in the stone may be occupied by groundwater and not available to accept surface water flows from the Ipswich River. Maguire Redirect.

Although the calculation of fill and compensatory storage typically assumes a filled volume and an empty volume of new storage excavated from the ground, the Department has allowed engineered storage where flow floods will be unimpeded. Matter of Burkhard Corp, Docket No. 98-086, Final Decision (June 16, 1999)(Allowed the construction of an 800 cf "flood storage vault" under the corner of a building, connected to the floodplain by three concrete pipes that would allow floodwaters to pass unimpeded in and out of the vault). Although the grounds for its approval are not stated in the testimony, the Department's SOC apparently allowed the space within the 36-inch corrugated metal pipes as either flood storage that was not "lost" or as compensatory storage where the pipes will be placed within newly excavated areas. As to the stones, Mr. McQuilken testified that floodwaters flowing through the stone will be less restricted than flood waters flowing through the existing basin. The testimony suggests that the stones

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[16] Voids may be taken into account for purposes of stormwater management. Lozzi Cross.

[17] I inquired about voids in excavate based on my understanding that various soils, sands, and glacial till have varying porosities. See Dunne, Thomas and Leopold, Luna B., Water In Environmental Planning, W.H. Freeman and Company (1978) (Values of porosity as decimal fraction, e.g., soils 0.30-0.50, silt 0.40-0.50, coarse sand 0.30-0.35, gravel 0.25-0.40, glacial till 0.25-0.45).

should be accepted as part of an engineered approach to flood storage. Mr. McQuilken used an equation for the velocity of flow through the basin, assuming heavy forest litter, and arrived at 0.25 feet per second. This equation, however, appears to be used for sheet flow or shallow concentrated flow of less than one-half foot, but the BLSF boundary within the basin is just under two feet measured vertically.[18] Presumably after the ground litter is covered with water, the velocity of additional flood waters would increase as the resistance of the litter on the floor of the basin is no longer a factor. In contrast, the flow of floodwaters through the stones would be affected throughout the 100-year flood elevation. Indeed, within the basin, assuming a porosity of 40%, the stone occupies 60% of the space outside the corrugated metal pipes. While it is not clear whether Mr. McQuilken's calculation of 0.35 feet per second as the velocity of flow through the stones was based on a methodology for calculating surface flow or groundwater flows, he did not compare this flow with flows through the basin after the litter was immersed.[19]

I am not persuaded by the Petitioner's argument that the voids within the stones provide comparable storage to the storage provided under existing conditions. Instead, I find that compensatory storage must be provided for the volume of the stones and any interstitial voids between the stones, for several reasons. The Department's guidance related to calculations for compensatory flood storage presents methodologies for determining the volumes of fill and excavated material. Hydrology Handbook for Conservation Commissioners (March 2002), p. 9-

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[18] Mr. McQuilken used an equation referenced in the National Engineering Handbook, Hydrology, 1985, called the upland formula, to calculate the velocity through the existing basin, "in which velocity V=Kv*S½. Kv=2.5 feet per second for forest with heavy litter and the slope S=1%." I was not able to locate this reference, but did locate a velocity equation for forest with heavy litter in a more recent publication of the National Engineering Handbook, Hydrology, 2010, p. 15-8. This equation is $V=2.516(s)^{0.5}$. Mr. McQuilken solved his equation and arrived at a figure of 0.25 feet per second. To arrive at that solution, the ½ in his equation must be 0.5 as an exponent, as shown in the equation I located. 0.5 as an exponent means to calculate the square root.

[19] Mr. McQuilken used a figure for the velocity through ASTM Crushed Stone #6 (3/3" to ¾") from a reference of Thomas N. Debo, 1990. Mr. Ogren testified that the 15 inch culvert under the maximum inlet flow condition is a maximum of 9.3 cfs, but I could not locate a velocity in the basin after the ground surface was inundated. Ogren PFT.

21 to 9-24. The calculations are based on volumes between cross-sections or contours, with no consideration of the characteristics of the fill or excavated material. As the Department confirmed, there are voids in most materials and to exclude these volumes from fill would reduce the amount of flood storage capacity provided. The Petitioner's reduction of compensatory storage based on the 40% voids in the stone bedding would not meet the objectives of the regulations to provide equivalent storage for flood flows. I note in addition that taking into account the voids in both the fill and the excavated material might provide the corresponding volumes, but it would be far more complex from the perspective of administrative efficiency to determine the porosity for the fill and excavated materials. Finally, the Petitioner has not shown that the movement of floodwaters through stone would be equivalent to the movement of floodwaters through the basin. The Department's approach of comparing the volume of fill and the volume of new storage without considering voids is consistent with the regulations, which also focus on volume without reference to voids, and is consistent with its long history of implementing this performance standard.[20]

The second dispute related to the Petitioner's project design is the proposed use of compensatory storage for stormwater management. The regulations permit alteration of BLSF for stormwater management purposes, including detention. 310 CMR 10.05(6)(k). The Department's guidance states that compensatory storage is "a separate volume from that required for peak rate attenuation under Standard No. 2 of the stormwater policy." Hydrology Handbook for Conservation Commissions (March 2002), p. 9-21.[21] Further, any use of BLSF for

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[20] While the contribution to flood flows from taking porosity of fill into account on an individual site may be small, the cumulative increase in flood volumes from the reduction in storage if generally allowed could be substantial.

[21] "Land Subject to Flooding requirements should not be confused with Stormwater Management Policy requirements. Although there is a functional relationship between stormwater and flooding, the regulatory requirements are distinctly different." Hydrology Handbook for Conservation Commissioners (March 2002), p. 9-1.

stormwater management that involves the loss of flood storage, either from the placement of a structure such as a berm for a detention basin or from the ponding of runoff such as a wet retention basin, requires compensatory storage to ensure that the 100-year flood will be accommodated. See Environmental Handbook for Conservation Commissioners, p. 299. The newly created storage must also be incrementally equivalent to storage lost to fill, and this is the nub of the problem with the design of the Petitioner's project.

The Petitioner argued and provided calculations to show that peak flows that must be controlled for purposes of stormwater management will leave the site prior to flood flows from the Ipswich River arriving at the site during the 100-year storm event. McQuilken PFT. Specifically, Mr. McQuilken prepared hydrographs for the watershed showing that by the time flood flows crest in the Ipswich River at hour 20.75 of the 24 hour storm, post-development runoff at the site will have already peaked at hour 12.20 (hour 12.14 pre-development) and stopped by hour 12.80 (hour 24.40 pre-development) with only 3 cf of runoff stored within the stone and pipe system. McQuilken PFT. The analysis, however, is based on a single 100-year storm event. The 100-year storm has a one percent chance of occurring in any year, but can occur at any time and may be followed by additional rainfall. It may well be true that the simultaneous occurrence of the 100-year storm event with additional rainfall that would fill stormwater management BMPs will be infrequent. Under the regulations, however, the volume provided for compensatory storage where fill is proposed in BLSF must be available to accept flood flows at any time. Compensatory storage cannot be allocated to other uses on the grounds that the 100-year storm has not yet peaked or has already subsided. In addition, the compensatory storage must be available at each increment. If stormwater occupies the lower

elevation, compensatory storage is not available at that level.[22] This aspect of the Petitioner's project design will be addressed further in the discussion of whether the project complies with the stormwater management standards.

The Department also argued, based on the testimony of Mr. Maguire, that the 100-year floodplain designated by FEMA was not accurate.[23] As Department guidance notes, where development has occurred in a watershed, over time the FEMA elevations may no longer reflect current conditions. Hydrology Handbook for Conservation Commissioners (March 2002), p. 9-8. The FEMA study for this reach of the Ipswich river was conducted in 1974, based on data from 1938 to 1972. Maguire PFT, para. 65. Mr. Maguire provided photographs of flooding at and near the site in recent storms. Maguire PFT, Ex. 3. Mr. Maguire testified that there had been three floods in the past 11 years that were greater than the 100 year storm. Maguire PFT, para. 56. Based on his calculations, the 100-year floodplain should be at elevation 69.2 ft., or elevation 68.1 ft. if based on observations, rather than 67.8 ft. as used by the Petitioner. If the floodplain were at a higher elevation, more compensatory storage would be required; other calculations would be affected as well. As the Department notes, the elevation of the 100-year floodplain at a site may be the subject of a challenge in an adjudicatory hearing. Reliance on the FEMA flood profile studies is a rebuttable presumption under the regulations, which may be

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[22] Mr. McQuilken testified that the volume for peak rate attenuation would be stored under the volume required for compensatory storage related to the BLSF. McQuilken PFT. He did not provide calculations, however, to show that the requisite compensatory storage would be provided at each increment when stormwater entered the system .

[23] The Department further noted the distinction between the 100-year flood elevation as shown on the FEMA maps as opposed to the Flood Insurance Study. Under the regulations, the data in the Flood Insurance Study, the Floodway Data and Flood profiles, must be used to determine the 100-year flood elevation. The maps allow a determination of whether a particular site is within BLSF. 310 CMR 10.57(2)(a)3.; Hydrology Handbook for Conservation Commissioners (March 2002), p. 99-1 to 9-3. Therefore, at this site, BLSF as determined by FEMA would be at elevation 67.6 feet rather than 67.8 as shown on the maps and used by the Petitioner in its Notice of Intent.

overcome by credible evidence from a professional competent in such matters. 310 CMR 10.57(2)(a)3; Hydrology Handbook for Conservation Commissions (March 2002), p. 9-2.

The Petitioner pointed out that the accuracy of the FEMA elevation had not been questioned by the Department at the time of issuance of the SOC and that the regulations contain a methodology for determining BLSF boundaries that was not used by Mr. Maguire.[24] However, the regulation specifies, and has been interpreted to require, credible evidence from a competent professional to overcome the presumption rather than requiring any particular methodology. 310 CMR 10.57(2)(a)3.; Matter of David Webber/Woodlot, LLC, Docket No. DEP-07-146, Recommended Final Decision (August 12, 2002) (Remand). As the Department's hearings are de novo, issues not raised at the time of the SOC may be raised in subsequent adjudication. Mr. Maguire's testimony calls into question the accuracy of the FEMA elevation. The Petitioner also noted that the Department does not typically challenge the FEMA boundary. Mr. Maguire

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[24] 310 CMR 10.57(2)(a)3. states:

> 3. The boundary of Bordering Land Subject to Flooding is the estimated maximum lateral extent of flood water which will theoretically result from the statistical 100-year frequency storm. Said boundary shall be that determined by reference to the most recently available flood profile data prepared for the community within which the work is proposed under the National Flood Insurance Program (NFIP, currently administered by the Federal Emergency Management Agency, successor to the U.S. Department of Housing and Urban Development). Said boundary, so determined, shall be presumed accurate. This presumption may be overcome only by credible evidence from a registered professional engineer or other professional competent in such matters. Where NFIP Profile data is unavailable, the boundary of Bordering Land Subject to Flooding shall be the maximum lateral extent of flood water which has been observed or recorded. In the event of a conflict, the issuing authority may require the applicant to determine the boundary of Bordering Land Subject to Flooding by engineering calculations which shall be:
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> a. based upon a design storm of seven inches of precipitation in 24 hours (*i.e.*, a Type III Rainfall, as defined by the U.S. Soil Conservation Service);
> b. based upon the standard methodologies set forth in U.S. Soil Conservation Service Technical Release No. 55, *Urban Hydrology for Small Watersheds* and Section 4 of the U.S. Soil Conservation Service, *National Engineering Hydrology Handbook*; and
> c. prepared by a registered professional engineer or other professional competent in such matters.

testified that FEMA was scheduled to update its flood elevations for the area beginning in two years. Maguire Redirect.

It appears that the Department is correct in its assessment that the flood elevations are underestimated in this area, but it is not clear how extensive the issue of accuracy of floodplain elevations for the Ipswich River may be or the effect of making a determination for this small site on other property within this reach of the Ipswich River. The Department indicated it would send its data to the Town of North Reading Board of Selectmen for purposes of requesting a Letter of Map Revision by FEMA, the official procedure for modifying a flood study. A Map Revision would seem a good approach because it provides a mechanism for applicants to know in advance the floodplain elevation.[25] The Department may, as part of any more general consideration of increased flooding, be developing other methods of updating hydrologic information that could be used by the Applicant in preparing a new project design for this site. Based on the evidence, I find that the presumption that the FEMA boundaries are accurate has been overcome and recommend a reassessment of the 100-year floodplain, but make no determination of the elevation due to the likelihood that FEMA in a Map Revision or the Department by policy will resolve this question.[26]

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[25] It was not clear whether the Department viewed this site as specifically underestimating the extent of flooding or questioned the elevations over a larger area. While I make no finding as the relationship between the accuracy of the flood elevations at this site, increased flooding, and climate change at this site, the situation here may reflect a recent trend toward more frequent and severe storm events in the Northeast. For example, a map showing the percentage increases in very heavy precipitation, defined as the heaviest 1% of all events, for each region of the U.S. from 1958 to 2007 is available at http://www.globalchange.gov/HighResImages/2-National-pg32_left.jpg. While the trend is for increase in heavy precipitation nationwide, the percentage change for the Northeast was the greatest, at 67%. More recent National Climate Assessment draft data suggest the figure is higher.

[26] Floodplain boundaries are most efficiently determined prospectively, rather than through an adjudicatory hearing, long after the project is planned and the application filed. An additional problem in resolving the question of the floodplain boundary in this appeal was that it was not identified as an issue for adjudication, but instead was raised in the Department's direct testimony. A better approach to determining flood elevations might be through the filing of an Abbreviated Notice of Resource Area Delineation, to provide the basis for a Notice of Intent for a project. As to this appeal, there is evidence to support a conclusion that the FEMA elevation is incorrect and evidence to support Mr. Maguire's determination of the 100 year floodplain elevation at 68.1 ft. on the basis of observation or 69.2 ft.

ISSUE 3: BLSF STANDARD FOR UNRESTRICTED FLOWS

The performance standard for BLSF at 310 CMR 10.57(4)(a)2 states:

> Work within Bordering Land Subject to Flooding, including that work required to provide the above-specified compensatory storage, shall not restrict flows so as to cause an increase in flood stage or velocity.

This performance standard stems from the same language in the preamble for BLSF as the requirement for compensatory storage: "Over time, incremental filling of [BLSF] causes increases in the extent and level of flooding by eliminating flood storage volume *or by restricting flows*, thereby causing increases in damage to public and private properties." 310 CMR 10.57(1)(a)2 (emphasis added). The performance standard is intended to ensure that the work will not result in greater velocities of flood flows or an increase in flood stage. Velocity refers to the speed and stage refers to "the elevation of the water surface in a storage structure (e.g., reservoir, detention basin) or a water body." Hydrology Handbook for Conservation Commissions (March 2006), p. A-9 (definition of "Stage"). A proposed project meets this performance standard if the applicant can demonstrate that the project design does not restrict flood flows in a manner that will lead to faster or higher flows.

The parties disputed two aspects of this performance standard as applied to the proposed project, whether portions of the subsurface storage system will be physically isolated and whether the stones themselves impermissibly restrict flows. The Petitioner pointed out that the existing 15 inch pipe through which any flows arrive or exit the site restricts flows, so that the existing pipe is responsible for any restriction of flows on the site and not the proposed fill or

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based on calculations, if the Commissioner prefers to set the 100-year floodplain boundary at the site in a Final Decision concluding this adjudication. Maguire PFT, paras. 44-57. Mr. Maguire followed the procedures used by FEMA in its 1989 Flood insurance Study and recent data from the So. Middleton USGS stream gage. Maguire PFT, paras. 52-57. While this methodology appears to differ from the methodology described in the wetlands regulations for sites where no FEMA data is available, Mr. Maguire is updating FEMA data where it is already available rather than evaluating a site that has never been studied. The Petitioner objected to the elevation of 68.1 ft. based on observations due to limitations in the accuracy of the underlying technology, LIDAR. The Petitioner argued that the methodology specified in the regulations for sites where FEMA data is unavailable should be used.

compensatory storage. McQuilken Cross. The Petitioner argued that compensatory storage always expands the previous extent of flood flows. The Petitioner further argued that the work will not have any effect on flood stage or velocity of the Ipswich River, and therefore any restriction in flows is irrelevant. Mr. Lozzi testified that the increase in flood stage is relevant in both the basin and the river. Lozzi Cross.

Because "stage" in this context, as interpreted in Department guidance, refers to both the elevation of storage structures such as detention basins and the water body, I conclude that both are relevant in a determination of whether a project complies with this performance standard. Some of the disputed testimony turns on whether portions of the site are cut off, particularly by the wall along the footprint of the existing elevated structure and another wall and ramp at the northwest corner of the site. In response to the Department's position that the storage area cannot be restricted in any way, the Petitioner relies on the testimony of Mr. McQuilken that the 36 inch corrugated metal pipe connects the area beneath the platform with the flood storage system, so there is no restriction in flow. McQuilken PFT. The Department insists that there can be no restriction in flows, either from isolation of storage areas or from the stone around the pipes. Mr. Lozzi testified that these areas were blocked or restricted from a hydraulic connection to the 36 inch pipes. Lozzi PFT. Mr. McQuilken testified that flow would occur through these areas through the stone bedding. McQuilken PFT. The Department countered that the stones themselves were a restriction because the discharge rate would be reduced when the flow reaches the stones. Maguire PFT, para. 66.

The prohibition on restriction of flows ensures that proposed work will not be located in such a way that would raise flood elevation or increase flow velocities, for example, by narrowing the width, decreasing the depth, or isolating portions of the BLSF. Mr. McQuilken

testified that the volume of runoff in the basin would be the same under existing and proposed conditions, but there may be an increase in the rate of runoff that would exit the site through the culvert. McQuilken Redirect. Mr. Maguire also testified that runoff would leave the site more quickly. Maguire Cross. However, Mr. Maguire testified that water either entering or exiting the site through the 15 inch culvert would be an impediment when it blocked flows that would otherwise occur in the opposite direction, thus restricting flows. Maguire Redirect. Mr. Maguire also testified that the movement of water through the stones would be slower than under existing conditions. Although runoff under existing conditions is affected by surficial vegetation in the basin, as the Petitioner noted, the movement of runoff is governed by the equation for the movement of surface waters. Mr. Maguire believed that the movement of water through the stones would be slower because the equation for discharge of groundwater takes into account the cross-sectional area of the basin and the small areas between the stones.[27] From this perspective, the movement of flows through the stone is restricted as compared to the movement of flows without any impediment. Although the Petitioner argued that water moves more easily through stones than over the rough terrain of the existing ground surface, once the basin begins to flood the ground ceases to restrict flows but the presence of stones would remain as a restriction.

Less clear, however, is whether the restriction will increase flood flows after the water has passed through the culvert and left the site. Any restriction in flow from the presence of the stone in the basin would not appear to cause of an increase in flood stage or velocity downstream. Instead, any increase in flood stage would occur within the basin, when water from the Ipswich River is entering the culvert and stormwater from the site is unable to exit the culvert. An increase in flood stage or velocity beyond the site, downstream in BLSF of the

[27] The distinction is between the equation for surface water, Q=Au where the Discharge equals the Area in sq. ft. times velocity and the equation for groundwater, Darcy's Law, Q=Au, where Discharge equals the cross-sectional area of flow times the mean flow velocity.

Ipswich River, would more likely occur due to the lack of full compensatory storage for the voids around the stones rather than any restriction of flows by the slower movement of water through the stones. I find that there is sufficient evidence to support a conclusion that restriction in flows from the proposed work may cause an increase in flood stage within the basin but not within the Ipswich River.

ISSUE 4: BLSF STANDARD FOR WILDLIFE HABITAT

The performance standard for BLSF at 310 CMR 10.57(4)(a)3 states:

> Work in those portions of bordering land subject to flooding found to be significant to the protection of wildlife habitat shall not impair its capacity to provide important wildlife habitat functions. Except for work which would adversely affect vernal pool habitat, a project or projects on a single lot, for which Notice(s) of Intent is filed on or after November 1, 1987, that (cumulatively) alter(s) up to 10% or 5,000 square feet (whichever is less) of land in this resource area found to be significant to the protection of wildlife habitat, shall not be deemed to impair its capacity to provide important wildlife habitat functions. Additional alterations beyond the above threshold, or altering vernal pool habitat, may be permitted if they will have no adverse effects on wildlife habitat, as determined by procedures contained in 310 CMR 10.60.

Under the regulations for BLSF, the ten-year floodplain is presumed significant to wildlife habitat. 310 CMR 10.57(1)(a). The lower floodplain generally is considered more important as wildlife habitat due to differences in the hydrologic regime and proximity to the waterway. Id. The regulation excludes extensively altered areas where wildlife habitat functions have been eliminated. Id.; see Matter of Burkhard Corp, Docket No. 98-086, Final Decision (June 16, 1999)(10-year floodplain "covered with asphalt and structures" not significant to wildlife habitat). Proposed work within the ten-year floodplain requires the submission of a wildlife habitat evaluation. 310 CMR 10.57(4)(a)3; 310 CMR 10.60. To justify its failure to file a wildlife habitat evaluation where one is required, the Petitioner must rebut the presumption of significance as to wildlife habitat. 310 CMR 10.03(5). "Significant" is a defined term, meaning to play a role: "A resource area is significant to an interest identified in M.G.L. c. 131, s. 40

when it plays a role in the provision or protection, as appropriate, of that interest." 310 CMR 10.04.

The Petitioner did not submit a wildlife habitat evaluation with its Notice of Intent. Steven Eriksen provided testimony related to wildlife habitat for the Petitioner. His direct testimony was limited to stating that there was no vernal pool at the site, the area was not within the ten-year flood zone, and the surrounding area adjacent to the site had been extensively altered. He stated that there was no migratory pathway to the upper floodplain, that it cannot provide water or sandy nesting areas for amphibians or wildlife, and there was no edge effect to provide wildlife habitat. Eriksen PFT, p. 3. Mr. Eriksen stated that he discussed wildlife habitat with the Commission's Conservation Administrator, Leah Brisbane, and they agreed that the physical characteristics of the site, its geographic location adjacent to developed sites, and its isolation made it "unlikely" to provide wildlife habitat characteristics.[28]

The Department's witness, Wayne Lozzi, testified that the site does include the ten year floodplain, at elevation 65.6 ft. Lozzi PFT, para. 25. Based upon this elevation, he concluded that the project would alter more than 5000 sq. ft., or 10% of the total ten-year floodplain at the site, and therefore would exceed the threshold for a wildlife habitat evaluation under the regulations. Lozzi PFT, para. 26. Alteration could be allowed, but only if the evaluation showed that there would be no adverse affect on wildlife habitat. Lozzi PFT, para. 27.

In testimony filed by Mr. Ogren and at the hearing, the Petitioner conceded that the site contains the ten-year floodplain. Ogren PFT, Ex. 3; McQuilken Cross. Nonetheless, the Petitioner argued that the site is not significant to wildlife habitat, pointing to the discussion with Ms. Brisbane and the developed condition of adjacent areas. The Petitioner's reliance on the

[28] It appears that, were the project to go forward and the parking lot to replace the wooded area, then the area of the ten-year floodplain would be so extensively altered that any wildlife habitat functions would be effectively eliminated, as is the case with the surrounding developed area.

discussion between Mr. Eriksen and Ms. Brisbane is misplaced for two reasons. First, the ten-year floodplain apparently had not been identified at the site, an omission that would change the applicability of the regulations. Second, even if the Commission had been aware of the ten-year floodplain at the site and still determined that the site did not provide wildlife habitat, the Department has independent authority to request information from applicants under the statute and regulations and would be entitled to require the submission of a wildlife habitat evaluation. 310 CMR 10.05(7)(g). See Wolbach v. Beckett, 20 Mass. App. Ct. 302 (1985) (Department does not hold a public hearing and may request additional information from an applicant that is not subject to local review).

As the Department argued, the relevant question is whether the resource area *at the site* plays a role in providing wildlife habitat, not whether the *adjacent* developed areas provide wildlife habitat. It is undisputed that the area proposed to be altered at the site is currently an undeveloped wooded area. The Petitioner misapprehends the purpose of a wildlife habitat evaluation, and overstates its complexity. The Simplified Appendix A Evaluation is one-page checklist serving as an aid to identify habitat features that may be present at a site. See Wildlife Habitat Guidance, p. 24. If any are present, their alteration may not have an adverse effect and a Detailed Appendix B Evaluation form may be required. Id. p. 29. The Petitioner argued that Mr. Eriksen's testimony constituted a wildlife habitat evaluation, but that assertion does not pass muster. Mr. Eriksen testified that he observed no signs of wildlife habitat. Eriksen Reb. But there is no testimony to support a conclusion that the wooded area to be developed actually was assessed for all of the specified habitat features or that Mr. Eriksen met the qualifications to conduct a wildlife habitat evaluation.[29] The Petitioner was required to submit an evaluation

[29] The regulations require that a wildlife habitat evaluation "be performed by an individual with at least a masters degree in wildlife biology or ecological science from an accredited college or university, or other competent

unless it could rebut the presumption of significance and show that the wooded area was devoid of habitat features; there is no testimony that the wooded area was sufficiently assessed to support this conclusion. An applicant cannot simply assert that a surrounding developed area is sufficient to rebut the presumption that would otherwise apply to an undeveloped area, although it may well be sufficient to show that a Simplified Appendix A evaluation, as opposed to a Detailed Appendix B evaluation, should be required. I conclude that the Petitioner did not comply with the performance standard related to the protection of wildlife habitat by failing to submit a wildlife habitat evaluation.

ISSUE 5: STORMWATER MANAGEMENT STANDARDS

The Stormwater Management Standards at 310 CMR 10.05(6)(k) identified as relevant to the resolution of this appeal state:

> 2. Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR 10.04.
>
> 3. Loss of annual recharge to ground water shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices and good operation and maintenance. At a minimum, the annual recharge from the postdevelopment site shall approximate the annual recharge from the pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.
>
> 4. Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:
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> a. Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan and thereafter are implemented and maintained;

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professional with at least two years experience in wildlife habitat evaluation." 310 CMR 10.60(1)(b). Mr. Eriksen has a degree in plant and Soil Science and extensive soils and wetlands experience, but he did not testify to expertise with wildlife habitat evaluations. Eriksen PFT, para. 1.

> b. Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with Massachusetts Stormwater Handbook; and
> c. Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.
>
> 9. A long-term operation and maintenance plan shall be developed and implemented to ensure that the stormwater management system functions as designed.

310 CMR 10.05(6)(k)2.), 310 CMR 10.05(6)(k)3., 310 CMR 10.05(6)(k)4., and 310 CMR 10.05(6)(k)9.

Stormwater Standard 2: Control of Peak Rates

Stormwater Standard 2 requires that post-development peak discharge rates do not exceed pre-development peak discharge rates. 310 CMR 10.05(6)(k)2. Peak discharge rate means the maximum flow, expressed as volume per unit time, for a given hydrologic event at a specified location. Hydrology Handbook for Conservation Commissioners, p. A-7 to A-8. The development of an undeveloped site typically involves the construction of impervious surfaces which increase both the volume of runoff by decreasing infiltration and increasing peak rates as the velocity of runoff over impervious surfaces increases. Id., p. 6-1. Control of peak rates from newly developed sites can reduce or prevent flooding impacts downstream. Id., p. 6-2. Much of the testimony focused on the control of the peak discharge rate, because the stormwater runoff will enter the basin that is also intended to accommodate floodplain storage.

The Petitioner provided testimony in support of the theory that the peak discharges would be reached and leave the site relatively quickly, and much more quickly than flows from the Ipswich River would enter the basin through the culvert and begin to fill the floodplain storage system. Although there is conflicting testimony of the calculations related to the time of concentration and other factors as to the timing of the entry of flood waters into the basin, the

proposed design is flawed because it relies on the capacity of BLSF to accept stormwater flows where that capacity must be reserved for flood flows from the Ipswich River. When the BLSF is at full capacity with flows from the Ipswich River during the 100 year storm event, even from a rainstorm that occurred two days before, another rain event may occur discharging flows to the storage system. Under those circumstances, the Petitioner's proposed design does not conform to the performance standard for control of peak discharges.

The question is whether peak flows will leave the site at all times, and the answer appears to be no, because runoff will not be able to leave the basin when flood waters from the Ipswich River are entering the basin. This occurs at the tailwater end of the culvert, where tailwater is the difference between the theoretical or actual elevation of the water surface at the outlet end of a pipe and the invert of the pipe. Tailwater must be accounted for when stormwater management is placed in BLSF. Environmental Handbook for Conservation Commissioners, p. 299. As Mr. Maguire testified, runoff will not discharge through the culvert when it is filled with the Ipswich River flood flows, and there will be no peak rate attenuation provided when the 36 inch pipes and stones are filled with flood flows from the Ipswich River. Similarly, flows will be blocked at the tailwater end of the culvert. Maguire PFT. Para. 89. The Petitioner responded that the peak flood flows in the Ipswich River and peak discharge from the site do not occur at the same time. Mr. McQuilken testified that when floods waters are cresting in the Ipswich, discharges from the project site will have already peaked and subsided, so that the storage volume is available for flood waters. He testified that he proposed lowering the culvert to allow more runoff and increase the volume available for storage, so that both flood storage and peak attenuation could be provided. McQuilken PFT. The volume for flood storage, however, must be adjusted to reflect the volume occupied by the stones, without the 40% reduction proposed for

the voids. The Petitioner has not demonstrated that the proposed project will meet the requirement for peak rate attenuation as required by Stormwater Management Standard 2.

Stormwater Standard 3: Recharge to Groundwater

An applicant must minimize or eliminate loss of annual recharge to ground water, so that the annual recharge from the post-development site approximates the annual recharge from pre-development conditions based on soil type. This Standard is typically met through infiltration of the required recharge volume. Stormwater Handbook, Vol. 1, Chapter 1, p. 1. The required recharge volume that must be infiltrated is determined by multiplying the recharge volume for the soil group times the total impervious area within the soils group. Stormwater Handbook, Vol. 1, Chapter 1, p. 6; Vol. 3, Chapter 1, pp. 15-16. Infiltration BMPs are designed and sized based on calculation methods. The "Rawls rate" is the infiltration rate in inches per hour for various texture classes of the Hydrologic Soil Groups, which range from 0,02 to 8.27 inches per hour. Stormwater Handbook, Vol. 3, Chapter 1, p. 22. An infiltration basin should be designed to exfiltrate within 72 hours; an equation to determine the time of drawdown of an infiltration basin is its storage volume divided by its bottom area times a hydraulic conductivity rate associated with the hydrologic soil group classification at the site. Stormwater Handbook, Vol. 3, Chapter 1, p. 25. Indeed, the determination of compliance with this Stormwater Standard requires proper classification of soils at the site.

The parties disagree on the classification of soils at the site. In the Stormwater Report submitted with the Notice of Intent, the Petitioner stated that the soils on the site are classified Uthordents, which do not have a specified Hydrologic Soil Group. Based on neighboring Group D soils and sandy on-site conditions, the Petitioner used Hydrologic Soil Group C soil as the basis of the Stormwater Report. Stormwater Report Narrative. Mr. McQuilken testified that he

used a textual classification as medium sand based on test pits he conducted as a certified soil evaluator. McQuilken Reb. 92. For purposes of initially determining the required recharge volume, the Petitioner used the target depth factor of 0.25 inch which is associated with Group C soils. Id., p. 7; Stormwater Handbook, Vol. 3, Chapter 1, p. 16. However, Mr. McQuilken used a Rawls rate of 8.27 inches per hour, the maximum rate possible, which is associated with sand, Hydrologic Soil Group A. Mr. Maguire disputed this rate as too high. Mr. Maguire explained that while it may be justified as the rate through the stone, for design purposes the rate is limited by the infiltration rate of the slowest material, the underlying parent material. Maguire PFT, para. 94. Mr. McQuilken countered that the initial classification was based on soil maps, which depicted Uthordents, but that Hydrologic Soil Group A soils were actually found at the site. McQuilken Reb., para. 105. Mr. Maguire testified that no soil textual analysis was provided, as required by the Handbook. Maguire PFT, para. 115.

The Stormwater Handbook contains extensive guidance on documenting compliance with the recharge requirements, which include soil evaluation by a competent soil professional. Stormwater Handbook, Vol. 3, Chapter 1, p. 9. Where a soil survey does not identify the Hydrologic Soil Group at the site, additional measures are prescribed. Id. A soils textual analysis is required based on test pits:

> The Soil Textual Analysis must be completed using standard USDA soil physical analyses (Black, et. al., 1965), i.e., particle size analyses. Classification of soil texture shall be consistent with the USDA Textual Triangle. The soil textural analysis for Stage 1B must be conducted in the surface soil horizons. NRCS Soil Survey evaluations typically cover the first 60-inch soil depth. The field investigation for Stage 2 must occur in the actual soil layer where recharge is proposed.

Stormwater Handbook, Vol. 3, Chapter 1, p. 10. As a Registered Professional Engineer, Mr. McQuilken was qualified to conduct this analysis, but he did not testify that he took all of these steps and there is no evidence in the record to support a conclusion that the analysis he did

undertake was as extensive as envisioned in the Stormwater Handbook. The task of soil evaluation for the project site is extensive because apparently the entire basin, i.e., virtually the entire project site, is intended to provide recharge through the stones. This evaluation must be conducted in full before the design of the stormwater management system. I find that the Petitioner has not adequately documented compliance with the soil evaluation requirements that are necessary to support compliance with Standard 3 related to stormwater recharge.

A second major point of contention between the parties involves the analysis as to "mounding" under the basin from excess infiltration. A mound develops as a natural consequence of the desired recharge. The analysis is a tool to ensure that the mound will not prevent full draining of the basin, which could cause additional runoff to bypass the basin, or emerge surficially. A mounding analysis is required when there is less than a four foot separation between the seasonal high groundwater and the bottom of an exfiltration system and the recharge system is designed to attenuate a peak discharge of a 10-year or higher, 24-hour storm. Stormwater Handbook, Vol. 3, Chapter 1, p. 28. Id. The methodology specifically identified to conduct the analysis is the "Hantush" method, which predicts the maximum height of the groundwater mound beneath a recharge area. Stormwater Handbook, Vol. 3, Chapter 1, p. 29. The mounding analysis must show that the recharge volume will exfiltrate within 72 hours and that the groundwater will not break out above the land surface or raise the water elevation in a resource area. Id. Thus, an evaluation of groundwater mounding is required to confirm that infiltration will occur as designed, resulting in compliance with Stormwater Standard 3.

The Department noted in its direct testimony that the Petitioner had failed to conduct a mounding analysis. Mr. McQuilken filed the required analysis with his rebuttal testimony, but identified an incorrect website for the software program he used. The error was corrected at the

hearing, with the identification of AQTESOLV as the appropriate software, and the parties agreed that Mr. Maguire would be allowed to rebut this aspect of Mr. McQuilken's testimony. Mr. Maguire verified the calculations that Mr. McQuilken performed as to a 24 hour time period for evaluation, but asserted that the time period for evaluation must be 72 hours. Maguire, Hantush Mounding Analysis. Based on the substitution of 72 hours for 24 hours in the calculation, Mr. Maguire concluded that the mound would elevate upwards into the recharge area, causing the design to fail in violation of the requirements. The Petitioner filed a rebuttal by Mr. McQuilken to this testimony, stating that Mr. Maguire's calculations were incorrect, in that if a 72 hour evaluation period were used, the volume of rain in feet per day must be divided by three to reflect the 72 hour, or three day, period. McQuilken Reb. of Hantush Mounding Analysis. The Department argued that this rebuttal testimony should be stricken as not allowed and untimely.

The guidance in the Department's Handbook on the conduct of a mounding analysis is limited. It is clear that a 72 hour evaluation period is required, as asserted by Mr. Maguire. To resolve this question, I consulted the AQTESOLV website used by both witnesses. Time is one of the variables that must be input to run the calculation. There is a warning to use consistent units for the input parameters. While I understand Mr. McQuilken's point that to spread the volume over three days the rate per day must be divided by three, there is nothing from the software itself to indicate that such a correction should be made. Instead, the input for time is an independent variable, and as long as the units are consistent, the answer should be correct.[30] This question is highly technical, and rather than make a finding as to whether the time input for the evaluation period is wholly independent from the time providing the basis for the recharge

[30] In other words, it seemed likely that the software would make the correction, if necessary, where an input for time as an independent variable differed from the time used to expressed the rate. The website also provided the Hantush equation upon which the software is based, but it did not provide me with any insight into this question.

rate, I find that Mr. McQuilken has not provided adequate support for his opinion, and therefore has not shown that mounding will not occur based on the 72 hour period of evaluation.

Stormwater Standard 4: 80% Removal of Total Suspended Solids

The Petitioner proposed the use of a proprietary hydrodynamic separator to provide water quality treatment of the runoff from the parking lot prior to discharge into the floodplain storage system. Stormwater Management Report, p. 8. A hydrodynamic separator is a type of structural best management practice ("BMP"), a flow-through structure with a settling unit for coarser sediment. Stormwater Handbook, Vol. 2, Chapter 2, p. 10. There are several categories of post-construction BMPs: pretreatment, treatment, conveyance, and infiltration. Stormwater Handbook, Vol. 2, Chap. 1, p. 22. Proprietary separators are within the class of pretreatment BMPs: "The first BMP in a treatment train, these measures typically remove the coarse sediments that can clog other BMPs." Stormwater Handbook, Vol. 2, Chap. 1, p. 23. A BMP treatment train is a series of BMPs in sequence to maximize pollutant removal. Stormwater Handbook, Vol. 2, Chap. 1, p. 32. Under Stormwater Management Standard 4, BMPs must be selected to achieve a total removal rate of 80% of total suspended solids ("TSS," which are the particles in runoff, as opposed to dissolved pollutants). Removal rates have been calculated for a variety of traditional BMPs. Stormwater Handbook, Vol. 1, Chap. 1, p. 11. Due to increased emphasis on stormwater management, new and innovative BMPs, such as proposed here, have been manufactured and marketed. The Department encourages consideration of proprietary BMPs where appropriate to the site. Stormwater Handbook, Vol. 2, Chap. 4, p. 2. Because the effectiveness of proprietary BMPs varies with size, flow design, and site conditions, they must be evaluated to determine the removal rate. Stormwater Handbook, Vol. 2, Chap. 4, p. 1. Performance of some proprietary BMPs has been evaluated through the Technology Assistance

Reciprocity Protocol ("TARP"). Because the hydrodynamic separator proposed here has not been evaluated by TARP, it must be reviewed case-by-case according to guidance provided in the Handbook. The evaluation typically determines the validity of the manufacturer's claims as to performance.

The Petitioner claimed that its proprietary hydrodynamic separator, model CDS 2015-4, would achieve a TSS removal rate of 93.1%, as a predicted net annual load removal efficiency. Stormwater Report, p. 11. The Petitioner claimed that this removal rate exceeds the required 80%, and no further treatment is required to meet Standard 4 because the site is not near a sensitive area and the project is not a land use with higher potential pollution loads. See Stormwater Standards 5 and 6. The Department claims that this efficiency rate has not been verified and further that a proprietary hydrodynamic separator may be used only for pretreatment. The Department is correct that the Stormwater Handbook specifies that for Standard 4, "TSS removal – Varies by unit. Must be used for pretreatment and placed first in the treatment train to receive TSS removal credit. Follow procedures in Chapter 4 to determine TSS credit." Stormwater Handbook, Vol. 2, Chap. 2, p. 10. As to applicability of proprietary separators, the Handbook advises: "Because they have limited pollutant removal and storage capacity, proprietary separators must be used for pretreatment only." Id., at 12.

Thus, it is clear that the Department anticipated that proprietary separators would not meet the 80% required removal and would need to be combined with additional BMPs. Hydrodynamic separators also remove larger particles and allow smaller particles to pass through with the runoff. It is not clear why a pretreatment BMP that actually did effectively remove 93.1% of TSS, exceeding the 80% requirement, would require further TSS removal. However, there is an indication that dissolved solids may be removed by settling or filtration BMPs as

opposed to separators where runoff flows through very quickly and only coarser sediments are removed. Stormwater Handbook, Vol. 2, Chap. 1, p. 33. Pretreatment with a proprietary separator to remove large particles followed by a settling or infiltration BMP would remove more pollutants overall. Although proprietary separators of the type proposed by the Petitioner are clearly intended to receive credit for TSS removal for pretreatment only, followed by another BMP, there is some ambiguity as to how to handle circumstances where the actual removal rate exceeds the regulatory standard.

The second part of the inquiry, however, is whether the claimed removal rate of 93.1 % should be accepted. The Department may review a technology and assign a removal rate, but has not done so for the proprietary separator selected by the Petitioner. Absent an assigned removal rate, the "Issuing Authority makes a case-by-case assessment of a specific proposed use of a proprietary technology at a particular site and assigns a TSS removal efficiency." Stormwater Handbook, Vol. 2, Chap. 4, p. 1. Mr. McQuilken calculated a water quality flow rate of the proposed project of 0.12 cfs, which could be provided adequate water quality treatment by the specific model of hydrodynamic separator, the CDS 2015, which has a treatment flow rate of 1.4 cfs. Stormwater Report (2010), p. 10. Mr. McQuilken testified that the hydrodynamic separator had been designed to treat the required water quality volume with a TSS removal rate of 93.1%, citing to the Stormwater Report filed with the Notice of Intent in 2012. McQuilken PFT, p. 9. The Stormwater Report contains the statement, "As calculations provided by the manufacturer of the hydrodynamic separator indicate, the CDS 2015-4 unit has a TSS Removal Rate of 93.1%." This statement was followed by a table which purported to show a predicted net annual load removal efficiency of 93.1% based on the rational runoff method and rainfall based on Boston data. McQuilken PFT, p. 11.

Mr. Maguire questioned the accuracy of the asserted 93.1% TSS removal rate, on the basis of a comparison with the 55% removal rate for an extended detention basin, another BMP, which is credited with a 55% TSS removal rate with a design detention time of at least 24 hours. Maguire PFT, para. 123. Mr. Maguire testified that the residence time of 1.6 minutes in the hydrodynamic separator, which is also the time of concentration used in the calculations for the water quality treatment volume, was inaccurate, closer to 2.3 or 4.6 seconds, and much too short a time for gravity separation to occur. Maguire PFT, paras. 122 and 123. In addition to these technical concerns, Mr. Maguire asserted that the Department had not evaluated the efficacy of the technology and the Petitioner had not submitted independent studies substantiating the TSS removal rate for a proprietary separator that could provide the basis for approval as required by the Stormwater Handbook. Maguire PFT, para. 123.

In rebuttal, Mr. McQuilken supplied a report entitled Independent Review of CDS 2015 Product Evaluation prepared by FB Environmental Associates, Inc. (2009). McQuilken Reb., para. 123 and Ex. 21. The conclusion of the study of influent flows of 0.12 to 1.8 cfs and influent TSS concentrations of 300 mg/l was that removal efficiency ranged from 30% to 100%, with a significant linear relationship between flow and removal efficiency. McQuilken Reb, para. 123 and Ex. 21, p. 10. The FB Associates study states that when the results of the testing were inserted into the weighted New Jersey Department of Environmental Protection ("NJDEP") efficiency calculation assuming a 100% treatment rate of 1.4 cfs yielding a weighted removal efficiency estimate of 70% (Table 3)." McQuilken Reb, para. 123 and Ex. 21, p. 7.[31] The Petitioner also filed the MASTEP Technology Review, which stated the FB Environmental Associates study had generally followed TARP laboratory test protocols, but there was "no

[31] New Jersey is an active participant in the TARP program.

evidence of a Quality Assurance Project Plan, little discussion of quality control, higher than recommended particle size distribution, limited range of influent sediment concentration, sediments analyzed by SSC method but not TSS." McQuilken Reb., Ex. 20 and para. 20.[32] The Petitioner has not adequately explained why the Department should accept a TSS removal rate of 93.1 % for the proposed hydrodynamic separator or shown that use of this proprietary device approved for pretreatment, in combination with another BMP, would meet the Department's requirement of 80% removal of TSS.[33]

Standard 9: Operation and Maintenance Plan

An applicant must submit a long-term operation and maintenance plan to ensure that the proposed stormwater management system will function as designed over time. The Petitioner included such a plan with its Notice of Intent. Stormwater Report, pp. 19-21. The Department challenged the adequacy of the Petitioner's plan as to two components. First, Mr. Maguire testified that the plan had not included a cost estimate as required. Maguire PFT, para. 128. I find that the Petitioner did include a cost estimate, which is called the estimated operation and maintenance budget, of $2,700.00 annually. McQuilken Reb., para. 29; Stormwater Report, p. 21. The second challenge is that the void space in the stones will be "difficult, if not impossible to clean," and that maintaining the void volume is critical to infiltration and storage capacity. Maguire PFT. para. 129. The Petitioner responded that there are two sources of sedimentation, from the parking area from which runoff will be treated by the hydrodynamic separator, and flood flows from the Ipswich River, which are an existing, infrequent condition. McQuilken

[32] The STEP program no longer approves stormwater technologies.

[33] The Department's guidance on the requirements of Standard 4 does not typically require an issuing authority to develop calculations related to TSS removal efficiencies. Instead, the removal efficiencies for various BMPs are provided in a chart. Handbook, Vol. 1, Chapter 1, p. 11. It is clear from the discussion of the review of proprietary devices that the evaluation is sufficiently complex that it is not best accomplished by a Presiding Officer in an adjudicatory hearing without further documentation and explanation.

Reb., para. 129. A maintenance plan was provided for the hydrodynamic separator. Stormwater Report, pp. 19-20.

Although Mr. McQuilken is correct that sedimentation from the Ipswich River flood flows occurs under existing conditions, the effect on the stormwater management system or compensatory flood storage will undoubtedly differ from the effect on a wooded basin. Mr. Maguire filed a photograph of the 15-inch culvert showing that approximately one-third of it horizontally was filled with sediments. Maguire PFT, para. 33, Ex. 8. The Petitioner did not propose any maintenance of the stones to avoid sedimentation, nor did the Department seek a maintenance program for the stones. The question of sediment reducing the voids in the stones over time may be more properly characterized as a dispute over the design of the project for floodplain storage as for the adequacy of the operation and maintenance plan. This question is properly addressed comprehensively, in any future filing for development of the site. If stones are part of the design, there must be some assurance that they will not become clogged with sediment over time, or some provision for maintenance must be required.

CONCLUSION

For the reasons stated, I recommend that the Department's Commissioner issue a Final Decision that would sustain the SOC denying approval for this project. The Petitioner has not demonstrated that its project design meets the performance standards for work in BLSF, because by excluding the porosity of the stone bedding around pipes for purposes of calculating compensatory storage, the flood storage volume is insufficient. The Petitioner failed to meet the requirements for stormwater management by relying on sequential and/or concurrent use of the same area to provide compensatory storage for work in BLSF and to control peak stormwater discharges. The Petitioner also failed to submit a wildlife habitat evaluation as required. While

the Petitioner proposed revisions to the project design, it did not file new plans for approval. Issues as to the presence of bordering vegetated wetlands and the determination of the 100 year floodplain elevation arose during the adjudication that should be considered in any future plans for the site.

Pamela D. Harvey
Pamela D. Harvey
Presiding Officer

NOTICE- RECOMMENDED FINAL DECISION

This decision is a Recommended Final Decision of the Presiding Officer. It has been transmitted to the Commissioner for his Final Decision in this matter. This decision is therefore not a Final Decision subject to reconsideration under 310 CMR 1.01(14)(d), and may not be appealed to Superior Court pursuant to M.G.L. c. 30A. The Commissioner's Final Decision is subject to rights of reconsideration and court appeal and will contain a notice to that effect.

Because this matter has now been transmitted to the Commissioner, no party shall file a motion to renew or reargue this Recommended Final Decision or any part of it, and no party shall communicate with the Commissioner's office regarding this decision unless the Commissioner, in his sole discretion, directs otherwise.

SERVICE LIST

In The Matter Of:	M. G. Hall Company
Docket No. WET-2012-023	File No. 245-1365 North Reading
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Date: May 7, 2013