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Cedar Pond Water Quality Management Plan

EEA #15474

Single Environmental Impact Report

April 13, 2017

Project Name

Cedar Pond Water Quality Management Plan
Cedar Pond
Orleans, Massachusetts

Cedar Pond outlet control structure

Project Proponent

Town of Orleans
c/o John Kelly
Town Administrator
19 School Road
Orleans, MA 02653

LEC Environmental Consultants, Inc.

12 Resnik Road, Suite 1
Plymouth, MA 02360
508-746-9491
508-746-9492 fax

www.lecenvironmental.com

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April 13, 2017

Federal Express

Matthew A. Beaton, Secretary of Energy and Environmental Affairs
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston MA 02114

Re: EEA #15474 [LEC File #TOO\15-311.01]
Single Environmental Impact Report
Cedar Pond Water Quality Management Plan
Orleans, Massachusetts

Dear Secretary Beaton:

On behalf of the Project Proponent, the Town of Orleans, LEC Environmental Consultants, Inc. (LEC) is filing this Single Environmental Impact Report (SEIR) for the *Cedar Pond Water Quality Management Plan* involving the reinstallation of weir boards within the existing outlet control structure at the northeastern portion of Cedar Pond in Orleans, Massachusetts. The purpose of the project is to improve water quality within Cedar Pond, restore diadromous fish habitat, and protect adjacent forested wetland habitat.

Following review of an Expanded Environmental Notification Form (EENF) and supplemental materials, an EENF Certificate was issued on March 25, 2016, granting the request to file a SEIR. As stated in the Certificate, *the Proponent should submit a Single EIR in accordance with the Scope included in this Certificate, which is limited to clarifying wetland issues.* The following Supplemental Information and Attachments, including the Adaptive Operations and Maintenance Plan, have been prepared in accordance with EENF Certificate Scope and 301 CMR 11.07.

Thank you for consideration of this SEIR. Should you have any questions or require additional information, please do not hesitate to contact me at 508-746-9491 or at bmadden@lecenvironmental.com.

Sincerely,

LEC Environmental Consultants, Inc.

Brian T. Madden
Wildlife Scientist

cc: Town of Orleans; CSP/SMAST; Distribution List

Single Environmental Impact Report

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1. Overview

The Town of Orleans is proposing to reinstall weir boards within the outlet control structure at the northeastern portion of the 15.1± acre Cedar Pond. The Town received an Order of Conditions (DEP #SE54-2286) from the Orleans Conservation Commission on June 6, 2015 to reinstall weir boards at the Cedar Pond outlet. A Request for Departmental Action was subsequently filed by Sheila Bonnell representing the Friends of Rock Harbor. The Department of Environmental Protection (MassDEP) conducted an on-site and issued a letter on September 1, 2015, indicating that the project proposal exceeds one or more wetland thresholds at 301 CMR 11.03(3), consequently requiring the filing of an Environmental Notification Form (ENF). Cedar Pond is also located within the Inner Cape Cod Bay Area of Critical Environmental Concern (ACEC), thus also triggering the ENF threshold at 301 CMR 11.03(11).

On January 29, 2016, LEC Environmental Consultants, Inc., (LEC) filed an Environmental Notification Form (ENF) pursuant to 301 CMR 11.05 of the MEPA Regulations. The ENF provided a comprehensive description of Cedar Pond, its history, and associated Wetland Resource Areas, in addition to detailing the proposed project and compliance with the performance standards enumerated within the *Massachusetts Wetland Protection Act* (WPA) Regulations at 310 CMR 10.00. Following an on-site conducted on March 1, 2016, MEPA concluded the project would trigger the mandatory Environmental Impact Report (EIR) threshold for alteration of greater than 10 acres of other wetlands under 301 CMR 11.03(3)(a)1.b. The public comment period was subsequently extended, a Single EIR (SEIR) was requested, and supplemental materials were submitted on March 8, 2016 for the Expanded ENF (EENF).

An EENF Certificate was issued on March 25, 2016, granting the request to file a SEIR. As stated in the EENF Certificate, *the EENF provided a sufficiently-detailed environmental baseline, provided a thorough discussion of the projects' programmatic and physical elements, included a sufficient alternatives analysis, and identified potential impacts and measures to avoid, minimize, and mitigate those impacts. The Preferred Alternative can be carried forward into the Single EIR. The Single EIR must present detailed information regarding the proposed Adaptive Operations and Maintenance Plan. This plan should clearly state goals in terms of ecological (e.g. fish passage) and water quality parameters…*

The following SEIR has been prepared in accordance with 301 CMR 11.07 as modified by the Scope outlined in the EENF Certificate (Appendix A). The Adaptive Operations and Maintenance Plan has been included herein, referred to as the "Fishway Operations and Maintenance Plan" prepared by the MA Division of Marine Fisheries (DMF) in concert with the

Town of Orleans, LEC, and Coastal Systems Program at the School of Marine Science and Technology, University of Massachusetts-Dartmouth (CSP/SMAST) (Appendix B).

2. Project Description and Permitting

2.1 Proposed Project

Reinstallation of the weir boards in Cedar Pond is proposed as an ecological restoration project to improve water quality within Cedar Pond, restore diadromous fish habitat, and protect adjacent forested wetland habitat. As reviewed in detail within the EENF, historical evidence suggests that Cedar Pond was initially a fresh waterbody and managed as part of an alewife fishery/herring run. Weir (flash or pen) boards had been in place within the outlet control structure for numerous decades since the construction of Route 6 in the late 1950's until 2004 when the boards were reportedly removed.

Tidal flow was substantively increased into the Pond following extensive debris and sediment removal within the downgradient Cedar Pond Creek north of Rock Harbor Road in January 2007. These changes in 2007, coupled with the prior removal of the weir boards, have increased salinity levels [from 6 parts per thousand (ppt) to over 21 ppt] within the brackish Cedar Pond, which has adversely affected overall water quality, anadromous fish spawning/nursery habitat, and wetland habitat conditions.

Based on CSP/SMAST's data collection and review of available information detailed within their July 2013 *Cedar Pond Water Quality Management Plan* and October 10, 2014 *Technical Memorandum*, restoration goals are best achieved by reducing salinity levels within the Pond. While water quality conditions were also degraded prior to 2007, conditions have worsened, including more frequent failure to meet MassDEP dissolved oxygen minimum, increased chlorophyll concentrations, and loss of nitrogen attenuation. Cedar Pond previously provided nitrogen attenuation of watershed loads (58% reduction based on 2002-2003 Massachusetts Estuaries Project measurements). Under present conditions, additional nitrogen is exported to the already nitrogen overloaded Rock Harbor. Continuous readings during the 2015 summer showed 84% of dissolved oxygen concentrations were below the MassDEP regulatory minimum compared to 25% in 2012 and chlorophyll concentrations averaged 100 µg/L compared to 24 µg/L in 2012.

Existing Pond salinity levels are not conducive to anadromous alewife or white perch spawning or nursery habitat. Furthermore, increased salinity levels threaten the adjacent freshwater vegetated wetland (Atlantic White Cedar Swamp) and associated wildlife habitat, including potential vernal pool habitat.

CSP/SMAST recommends a 1.45 m (NAVD88) initial board height based on their review of all available water level and tidal datasets. This height will allow freshwater outflow, but much lower tidal inflows to slowly reduce salinity levels with the ultimate target level of 1-4 ppt similar to pre-existing conditions (prior to 2007). It is anticipated that there will be a gradual freshening of the upper water column and slower freshening of the saltier deeper waters.

Actual proposed work is limited to re-inserting new weir boards into the existing slots within the concrete outlet control structure. The weir boards will be composed of pressure treated 2" x 6" boards. The rusted metal bracket (top) will be replaced above water levels. No dredging, water pumping, aeration, or alum application are currently proposed. Cormorant control is being pursued as a separate matter.

The EENF discussed the potential future installation of a fish ladder at the outlet control structure. Based on recent discussions with DMF, the fish ladder is not currently being proposed as the Adaptive Operations & Maintenance Plan addresses seasonal diadromous fish migration (see below).

2.2 Applicable Statutory and Regulatory Standards

Reinstallation of the weir boards will require a Superseding Order of Conditions (DEP #SE54-2286) and Ch. 91 Minor Project Modification pursuant to 310 CMR 9.22(3) from MassDEP. The following reviews applicable regulatory standards pursuant to the WPA Regulations (310 CMR 10.00) and Waterways Regulations (310 CMR 9.00).

2.2.1 Wetlands Protection Act Regulations

As detailed within the EENF, protectable Wetland Resource Areas associated with Cedar Pond include:

- Land Under Water Bodies and Waterways (310 CMR 10.56);
- Bank (310 CMR 10.54);
- Bordering Vegetated Wetlands (BVW, 310 CMR 10.55);
- Lands Under Pond that Underlie an Anadromous/Catadromous Fish Run (310 CMR 10.35); and
- Land Subject to Coastal Storm Flowage (LSCSF, 310 CMR 10.04).

The EENF provided a comprehensive description of each Wetland Resource Area. The *Wetland Resource Area Map*, prepared by LEC Environmental Consultants, Inc., dated October 30, 2015 (Appendix C) depicts the approximated boundaries of BVW, Bank, and LSCSF equivalent to El. 12 around the Pond (Flood Zone AE) according to the July 16, 2014 Federal Emergency

Management Agency Flood Insurance Rate Maps Barnstable County (*Community Panel Numbers 25001C0436J*).

Replacing the weir boards will result in 1± sf (approximately 2" wide x 6" deep x 72" long) of direct impact to Land Under Water (310 CMR 10.56) and Lands Under Pond that Underlie an Anadromous/Catadromous Fish Run (310 CMR 10.35).

The EENF comprehensively reviewed how the project complies with the applicable WPA Regulations' performance standards associated with Land Under Water (310 CMR 10.56), Bank, BVW, and Lands Under Pond that Underlie an Anadromous/Catadromous Fish Run.

Following issuance of a Final MEPA Certificate, the Town will continue to work with MassDEP for issuance of a Superseding Order of Conditions.

2.2.2 Waterways Regulations

In response to the EENF, MassDEP provided a comment letter on March 22, 2016, indicating that the culvert under Route 6 is not exempt from Chapter 91 Licensing for its location within the MassDOT Right-of-Way (ROW) as only bridge projects funded through the Transportation Bond Bill are exempted. However, MassDEP stated they *would not consider the removal or reinstallation of the weir boards in the outlet control structure as a substantial structural alteration*.

In the process of compiling the SEIR, LEC reached out to the Southeast Regional Waterways Program to review compliance with 310 CMR 9.05(3)(c) and 9.22(3). These regulations address provisions for which no Chapter 91 License or Permit is required and whether the project would require a Minor Project Modification, respectively. Based on their review, MassDEP ultimately concluded that a Minor Project Modification would be the more appropriate course of action. Following issuance of a Final MEPA Certificate, LEC and the Town will continue to work with the MassDEP Waterways Program for issuance of the Minor Project Modification.

3. Wetlands

As requested in the EENF Certificate, the following provides detailed information on the Adaptive Operations and Maintenance Plan and reviews ecological (e.g., fish passage) and water quality goals, how storm events have been incorporated into the design, data collection, and management scenarios, including contingency plans, if monitoring does not demonstrate progress toward water quality goals. The following also provides additional information on potential changes to the Wetland Resource Areas, Cedar Pond functioning as a nutrient sink, adjacent

septic system impacts, and supplemental improvements being pursued separately that will benefit Cedar Pond.

3.1 Adaptive Operations and Maintenance Plan

The Adaptive Operations and Maintenance Plan, referred to as the "Fishway Operations and Maintenance Plan" (Appendix B), was developed by DMF in coordination with the Town, LEC, and CSP/SMAST.

The weir boards set at 1.45 m (NAVD88) will be adjusted to allow for the seasonal migration of diadromous fish while meeting the water quality restoration goals as reviewed below. Specifically, from March 15th to June 30th, during the upstream river herring migration, the board height will be reduced to allow at least 6 inches of water depth to flow over the top board. During the juvenile herring emigration period of July 1st to November 15th, the board height will be adjusted to allow at least 2 inches of water depth to flow over the top board. These board adjustments will enable adult and juvenile herring passage during their respective migratory periods.

The Town (Department of Public Works Staff in coordination with DMF and the Orleans Planning and Conservation Offices) has agreed to maintain the weir boards. The outlet control structure will be inspected in early March and late June of each year, prior to board adjustment during the seasonal migration periods. Monitoring site inspections will be conducted a minimum of twice a month during the migratory periods. Board heights may be adjusted during these site inspections to ensure appropriate water depths flowing over the top board as detailed above.

A staff gauge will be affixed to the outlet control structure at an established benchmark elevation. Water levels will be recorded at each site inspection, in addition to documenting other general observations (e.g., tide stage, number of boards, and flow depth over the top board).

Downgradient portions of the migratory stream corridor will also be managed to ensure unimpeded fish passage. Cedar Pond Creek between Route 6 and Rock Harbor Road and the portion of Rock Harbor Creek north of Rock Harbor Road to the Salt Marsh will be inspected each year at the start of adult herring migration period and monthly through June 30th to remove debris from the stream channel.

Any maintenance or repairs to the outlet control structure or weir boards is proposed to occur outside the seasonal migration periods. The Town of Orleans is encouraged to maintain annual records that document events related to fish migration and the Fishway Operations and Maintenance Plan that may assist future efforts to manage fish passage at Cedar Pond.

Considering that the outlet control structure is located within the Route 6 ROW, MassDOT also retains the rights to adjust the elevation of the weir boards for flood control purposes.

3.2 Additional Ecological Goals

In addition to restoring diadromous fish habitat, supplemental ecological goals involve protecting the westerly abutting forested wetland habitat, including the 13± acre Atlantic White Cedar Swamp. As noted in the EENF, potential vernal pool habitat exists within the BVW (Atlantic White Cedar Swamp) immediately west of Cedar Pond and the abandoned Cedar Pond Road. The July 2013 *Cedar Pond Water Quality Management Plan* identified two culvert pipes extending under/through the low-lying abandoned road. During high water levels, areas abutting the northerly pipe maintain a direct surficial hydrologic connection between the BVW and Cedar Pond. Reducing salinity levels in Cedar Pond, especially shallow waters that may enter the abutting forested wetland system, will provide protection of the potential vernal pool habitat associated with the BVW west of the Pond.

Furthermore, approximately 15± dead or significantly stressed Atlantic white cedar trees are located immediately adjacent to the northwestern shoreline of Cedar Pond. Additional stressed red maple trees also overhang this portion of the Pond. Abutting and overhanging Bank vegetation will benefit from lower salinity levels as existing conditions appear to be threatening the freshwater vegetation that dominates the Pond perimeter. Bank stability will consequently be protected.

Reinstallation of the weir boards and reducing salinity levels in the Pond, especially in the upper portion of the waterbody, will serve to facilitate protection of the adjacent BVW and its associated interests, most notably erosion/sedimentation control, ground water supply, and wildlife habitat.

3.3 Water Quality Goals

Water quality goals as broadly stated in the July 2013 *Cedar Pond Water Quality Management Plan* are to establish the highest quality environment and restoration of Pond resources. These goals will be accomplished through returning Cedar Pond to a brackish salinity regime with target salinity range of between 1-4 ppt along with other separate measures (e.g., addressing the summer cormorant population and effectively reducing the sediment nutrient regeneration and oxygen demand). Achieving the target salinity range will restore the nitrogen attenuation capacity in Cedar Pond to protect Rock Harbor and relieve present bottom water anoxia.

As outlined within the CSP/SMAST January 14, 2016 *Technical Memorandum*, monitoring of Cedar Pond during the summer of 2015 (June to September), showed that 2015 water conditions are worse now than the prior lower salinity conditions; 84% of shallow Dissolved Oxygen (DO)

concentrations were below the MassDEP minimum concentration (310 CMR 4.05) as opposed to 25% in 2012 and only 2% in 2009. Average chlorophyll concentration had quadrupled (99.7 µg/L average in 2015 compared to 24.2 µg/L average in 2012). This data reinforces that while the Pond was impaired in past lower salinity conditions, it has degraded further recently with increasing salinity levels.

Furthermore, surface and bottom total nitrogen concentrations prior to 2007 had maximum concentrations ~1 mg/L and 2.1 mg/L, respectively, while after 2007, these concentrations had increased to 2.1 mg/L and 4.6 mg/L, respectively. As reviewed in the July 2013 *Cedar Pond Water Quality Management Plan*, lower salinity will improve oxygen levels and lower nitrogen concentrations and work in conjunction with other planned management efforts (e.g. cormorant management) to achieve the ecological goals established by the Town to produce a restored and more resilient ecosystem.

In summary, reduced salinity levels are anticipated to increase DO concentrations and lower chlorophyll concentrations within Cedar Pond closer to pre-existing conditions.

3.4 Storm Events

Impacts from storm events in Cedar Pond were reviewed by CSP/SMAST in the context of storm surges (storm related salt water inflow) and Pond water levels reported in the October 10, 2014 *Technical Memorandum* that details the recommended initial board height in the outlet structure. The *Technical Memorandum* summarizes a review of available water level data in both Cedar Pond and in the adjacent stream channel north of Route 6 (Cedar Pond Creek and Rock Harbor Creek). This review found that Cedar Pond, as it is currently configured without boards, showed water level fluctuations generally in a narrow range and that only the highest of storm surges in the creek impacted the water level in the Pond.

Available water levels in both the Pond and the downgradient creek showed that water levels in Cedar Pond only increased in 5.7% of the times that creek tidal elevations were above the water level elevation in Cedar Pond. While these are relatively infrequent events, they have brought high salinity water into the Pond over the past nearly 10 years and gradually increased salinity to the present levels.

Replacing the boards will likely result in water levels in the Pond fluctuating even less than at present. In addition, it is virtually certain that the salinity will become lower and more stable with the restoration of the inlet structure's function (by reducing the frequency of periodic high salinity inputs).

Based on the water level data review, an initial board height (1.45 m NAVD88) was recommended to minimize the impacts of the highest tidal storm surges and limit tidal exchange.

This board height was recommended as a "temporary starting point for management" and this height may be adjusted as follow-up monitoring of water levels and salinity are reviewed along with fish passage.

3.5 Monitoring / Data Collection / Contingency

The Town already has an adaptive monitoring program for Cedar Pond ready to be activated following the approvals for the reinstallation of the weir boards. This program was approved by the Town in 2013 and pre-board baseline data collection was initiated following the Orleans Conservation Commission approval of the board installation. However, monitoring was subsequently suspended with the appeal of the Order of Conditions. The partial monitoring results were summarized in a January 14, 2016 CSP/SMAST *Technical Memorandum* submitted as part of the EENF.

Once the weir boards are re-installed, the monitoring program will include the installation of two continuous monitoring devices (sondes) located at shallow and deep depths that will be programmed for high frequency recording (10-15 minute intervals) of water column temperature, salinity, water level, and chlorophyll, with dissolved oxygen also being measured at the shallow depth. Data is to be retrieved every three months and at that time, temperature and dissolved oxygen profiles, clarity reading, and water quality samples from Cedar Pond and flow and water quality samples from the downgradient creek system would also be collected.

Data would be reviewed semi-annually, including comparison to past monitoring records, and summarized in a technical memorandum. Each technical memorandum will provide a regular assessment of progress toward water quality goals and any recommended changes in monitoring or management. All results would be reported to and coordinated with the Town of Orleans Marine and Fresh Water Quality Task Force and Town of Orleans Director of Planning & Community Development.

The Town, Orleans Marine and Fresh Water Quality Task Force, and CSP/SMAST are proposing to evaluate water quality monitoring results over the first three years following weir board installation. Diadromous fish migration results will also be evaluated over this time period and DMF will be consulted on whether board height adjustments are prudent to maximize the potential success for fish passage, while balancing water quality goals.

The prescribed review and monitoring will allow the Town and other interested stakeholders to regularly assess progress toward meeting the Cedar Pond restoration goals. These regular reviews will allow the Town and project staff to adjust management strategies. It is anticipated that other future improvements (see below) around the Pond will contribute to enhancing water quality. Regular monitoring and review will help the Town to gauge the timing of addressing

these factors and measure the benefits of implementing additional management strategies to address their impacts.

3.6 Wetland Resource Area Potential Changes

The EENF provided a comprehensive description on how the restoration project complies with applicable WPA performance standards, most notably pertinent to Land Under Water, Bank, BVW, and Lands Under Pond that Underlie an Anadromous/Catadromous Fish Run. As reviewed, Wetland Resource Areas are not anticipated to be negatively impacted.

Specifically, salinity levels above the Pond's substrate (i.e., Land Under Water) and especially within deeper portions of the Pond will remain relatively the same for an extended period of time. Saline waters will continue to overtop weir boards during high water events (e.g., spring/extreme tides and/or storm events) and settle to the Pond bottom, thus maintaining deep salinity levels. Land Under Water associated with Cedar Pond will continue to provide general wildlife habitat functions during the process of restoring anadromous fish habitat. Restoring salinity levels will protect potential breeding habitat, escape cover and/or food for fisheries historically associated with Cedar Pond, most notably the diadromous white perch, alewife, and American eel. Furthermore, reduced salinity levels may also facilitate re-establishment of aquatic vegetation within shallow waters, including species previously identified in the Pond: pondweed (*Potamogeton spp*.), bladderwort (*Utricularia* spp.), and white water lily (*Nymphaea alba*) as described in the EENF.

While the proliferation of invasive common reed (*Phragmites australis*) stands are not anticipated considering the presence of the overhanging woody vegetation along the majority of the Pond's shoreline, the Town is proposing to monitor *Phragmites* vegetative cover. Prior to weir board installation, the existing patches will be documented for stand size and configuration (e.g., via GPS-survey, aerial interpretation, and/or photography, etc). The *Phragmites* stands will be monitored on a yearly basis to document potential changes to vegetative cover. Observations will be evaluated by the Town for future potential invasive species management and/or weir board adjustments, while balancing the above-referenced ecological and water quality goals.

In addition to protecting the adjacent BVW (Atlantic White Cedar Swamp containing potential vernal pool habitat), reduced salinity levels will protect the freshwater vegetation occurring around the perimeter of the Bank to Cedar Pond, therefore promoting Bank stability.

3.7 Cedar Pond as a Nutrient Sink

During the 2002-2004 monitoring that was conducted for the Massachusetts Estuaries Project (MEP) assessment of Rock Harbor, Cedar Pond was documented to remove 58% of the watershed nitrogen entering from groundwater, surface water, and atmospheric deposition, thus

lowering the nitrogen load to downgradient waters (i.e., Rock Harbor via Cedar Pond Creek / Rock Harbor Creek). At the time, Cedar Pond was considered to be brackish.

Nitrogen is removed primarily through denitrification and burial in pond sediments. These removal mechanisms are natural functions associated with brackish and freshwater ponds and had been measured in numerous settings during the course of the more than 60 MEP assessments. Salinity readings in Cedar Pond surface waters, at the time of the MEP measurements, averaged 8.6 ppt. Similar monitoring during 2012 showed that summer nitrogen attenuation was no longer occurring and Cedar Pond was exporting more nitrogen than watershed nitrogen inputs (more than 2X) due to the system changes caused by the increased salinity (average of 20.9 ppt).

In addition, subsequent monitoring conducted in summer 2015 generally showed that conditions within Cedar Pond had worsened since 2012 with findings that included: a) increased surface salinity having risen to an average of 21.3 ppt, b) significantly more shallow DO readings less than the MassDEP minimum concentration (25% of readings in 2012; 84% of the readings in 2015), and c) average chlorophyll concentration had quadrupled (99.7 µg/L average in 2015 compared to 24.2 µg/L average in 2012). All of these observations show a highly degraded system that is showing the highest levels of eutrophication and moving toward even higher degradation due to the higher salinities it is now experiencing. Reinstallation of the boards in the inlet control structure to lower salinity conditions should restore better water quality conditions, such as those that have been measured in the past. Improved oxygen conditions should increase nitrogen removal by denitrification and restore nitrogen attenuation in Cedar Pond, thus reducing nitrogen loading to Rock Harbor.

3.8 Adjacent Septic System Impacts

The July 2013 *Cedar Pond Water Quality Management Plan* identified that the *maximum projected increase in pond water levels would be 0.09 m or~3.5 inches* following re-establishment of the weir boards to mimic pre-existing water levels when the boards were in place. As noted in the EENF, Cedar Pond is primarily bounded by a well-defined, moderately steep Bank, ranging in heights from 6-24 inches on average. A maximum increase of 3.5± inches in water elevation should be fully contained within the existing Bank limits. No Bank erosion or scour is anticipated with the minimal increase in water levels. As stated above, reduced salinity levels will serve to better protect the freshwater vegetation stabilizing the Bank surrounding Cedar Pond.

The EENF Certificate states that *the Single EIR should address whether re-establishment of pond elevations will affect septic systems and analyze nutrient levels in the pond*. Developed residential properties abutting Cedar Pond were evaluated to review septic system locations in

relation to Cedar Pond water levels. Specifically, the following properties containing single-family dwellings surrounding Cedar Pond were reviewed as depicted on the *Residential Septic System Map*, prepared by LEC, dated February 20, 2017 (Appendix D):

- 26 Locust Road (Map 25, Parcel 34)
- 30 Locust Road (25/35)
- 34 Locust Road (25/36)
- 38 Locust Road (25/37)
- 42 Locust Road (25/38)
- 46 Locust Road (25/39)
- 48 Locust Road (25/40)
- 52 Locust Road (25/41)
- 56 Locust Road (18/1)
- 58 Locust Road (18/2)
- 62 Locust Road (18/3)
- 64 Locust Road (18/6)
- 7 Jones Road (18/9)
- 11 Jones Road (18/10)
- 7 Cedar Pond Road (25/33)

Available Board of Health (BOH) records were reviewed to ascertain system location, type, installation date, depth to groundwater, etc. Town of Orleans GIS 1-foot contour datum was analyzed to determine elevation changes surrounding Cedar Pond. Topography mildly to moderately ascends from Cedar Pond to the single-family homes off Jones Road, Locust Road, and Cedar Pond Rd.

Existing grades over the septic locations associated with the twelve (12) single-family homes off Locust Road are located 10-20± feet higher than Cedar Pond. Documented separations between known Soil Absorption Systems (SAS) to groundwater are at least 5-feet in depth or greater. In consideration of the elevation changes, a maximum 3.5" increase in Cedar Pond water levels will not affect the septic systems located off Locust Road.

Of the two residential properties off Jones Road, #7 Jones Road (18/9) recently had a septic upgrade in 2016 with 5.1 feet of separation documented between the SAS and high groundwater. A septic leach pit is listed as servicing the home at #11 Jones Road (18/9) with 5 feet of separation previously documented in BOH records.

Minimal septic information is available for #7 Cedar Pond Road (25/33). However, a 6-8± foot elevation change occurs between Cedar Pond and this property.

In summary, any minimal increase in water levels (max. 3.5 inches) post-board installation is not anticipated to have an impact on the surrounding septic systems in consideration of the elevation changes and available BOH records. The reinstallation of the boards will help restore pre-existing water levels in Cedar Pond. Furthermore, the July 2013 *Cedar Pond Water Quality Management Plan* and October 10, 2014 *Technical Memorandum* discussed the relatively small impact of tides on water levels in Cedar Pond. Both reports mentioned that water levels in Cedar Pond are influenced only slightly by day-to-day tidal changes; tidal elevations in Rock Harbor Creek explain less than half (47%) of the variability of water levels in Cedar Pond (Figure 5 in *Memorandum*) and day-to-day in Cedar Pond with the boards in were very limited (average of 0.05 m in 2008). These measurements suggest that fluctuations in Cedar Pond are more influenced by normal groundwater fluctuations in the surrounding aquifer than tidal changes.

It should be noted that if an extreme event were to occur where storm surge in Rock Harbor resulted in a large inflow to the entrance of Cedar Pond, the presence of the weir boards would lessen the inflow into Cedar Pond. Overall, the data on water elevation of Cedar Pond indicate little variation and suggest that storm or groundwater inflow effects on septic systems would not change from conditions over the past decades.

It should also be noted that the Town is continuing to work towards approval and implementation of a Comprehensive Wastewater Management Plan, which includes the installation of municipal sewer mains along Locust Road. Thus, existing homes will be able to abandon the septic systems and tie into the municipal line for treatment elsewhere in Town. Sewer tie-ins to the two Jones Road properties and 7 Cedar Pond Road may also be viable in the future.

3.9 Supplemental Pond Improvements

3.9.1 Cormorants

As noted in the EENF, nutrient loading from roosting double-crested cormorants (*Phalacrocorax auritus*) on the Eversource electrical lines over the northern portion of the Pond contributes significantly to the impairment of water quality in Cedar Pond. The Town is continuing to work towards eliminating the roosting cormorants separately from the weir board reinstallation. This may involve re-routing the electric lines away from open water.

3.9.2 Stormwater Improvements

The Massachusetts Department of Transportation (MassDOT) - Highway Division recently filed an ENF for proposed resurfacing of a 12.1 mile portion of Route 6 in Harwich, Brewster, and Orleans. A NOI Application also was submitted to the Orleans Conservation Commission for the proposed jurisdictional activities in Orleans, including improvements in the immediate watershed to Cedar Pond.

In conjunction with the resurfacing project, MassDOT is proposing to implement a series of Best Management Practices (BMP's) to improve water quality of stormwater discharge. The proposed stormwater improvements have been designed to support MassDOT's Impaired Waters Program.

Proposed stormwater retrofits, upgrades, and installation of BMP's are intended to improve infiltration, reduce runoff volumes and erosion, and improve water quality runoff being discharged into Wetland Resource Areas, including BVW connected to Cedar Pond.

An Order of Conditions (DEP File # 054-2371) was issued by the Orleans Conservation Commission in February 2017 and a final ENF Certificate (EEA #15638) was issued on March 10, 2016.

4. Fisheries Habitat

The Town, CSP/SMAST, and LEC met and coordinated with DMF to develop the "Fishway Operations and Maintenance Plan" (Appendix B) to ensure that the reinstalled weir boards will allow proper seasonal migration of diadromous fish (anadromous: alewife [river herring] and white perch and catadromous: American eel) while meeting the water quality restoration goals.

As detailed above, the board height will be adjusted to allow at least 6 inches of water flow during the adult upstream migration period from March 15th to June 30th. Board heights will be manipulated to allow at least 2 inches of water flow between July 1st to November 15th for juvenile migration. Regular site inspections will be conducted during these time periods to ensure sufficient water flow over the top boards for migration purposes.

Reinstallation of the weir boards will reduce salinity levels in Cedar Pond to more compatible conditions for alewife or white perch spawning and nursery habitat.

The Town and DMF are proposing to evaluate diadromous fish migration over a three-year period under the Fishway Operation & Maintenance Plan before determining whether additional board adjustments are necessary. Future adjustments will be monitored to determine effectiveness and weir boards will be managed accordingly. A fish ladder is not currently proposed and no modifications to the outlet control structure are currently contemplated.

5. Greenhouse Gas Emissions

The Project Proponent is respectfully requesting a formal exemption from the *Revised MEPA Greenhouse Gas Emissions Policy and Protocol (Effective Date: May 5, 2010*, aka "the GHG Policy"*)*. As stated in the GHG Policy,

Examples of projects that may qualify for this de minimis exemption (subject to approval by the Secretary) include (but are not limited to) the following:

- *Ecological restoration projects;*
- *Waterways dredging projects; and*
- *Dam repair or removal projects.*

The purpose of the project is to improve water quality within Cedar Pond, restore diadromous fish habitat, and protect adjacent forested wetland habitat. Consequently, the project is characterized as an ecological restoration project and therefore eligible for the de minimis exemption.

6. Proposed Section 61 Findings

As stated in the EENF and in accordance with 301 CMR 11.12(5)(d), *the Single EIR should include a separate chapter summarizing proposed mitigation measures. This chapter should also include draft Section 61 Findings for each State Agency that will issue permits for the project. The Single EIR should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.*

A Draft Section 61 Findings for the DEP Wetlands & Waterways Program is included within Appendix F.

7. Responses to Comments

7.1 Certificate of the Secretary of Energy and Environmental Affairs on the Expanded Environmental Notification Form

The following clarifications and responses to the EENF Certificate are provided below.

EEA #1 (Project Description): *This board elevation* (1.45 meters) *will increase water levels by approximately 3.5 inches and limit most incoming tides from entering the Pond* (pg. 2).

Clarification: Reestablishing the board height at 1.45 meters is proposed to *maximize "freshening" within the Pond, while also minimize concerns about rising water levels around the margins on the Pond (i.e., the maximum projected increase in pond water levels would be 0.09 m or~3.5 inches* (refer to October 10, 2014 *Technical Memorandum*, ENF Appendix H). Pond levels will increase no more than a total of 3.5 inches over the entire year. The estimated 3.5 inches represents a maximum increase during high groundwater conditions. Reinstallation of the weir boards will minimize tidal influences on Pond water levels.

EEA #2 (Environmental Impacts and Mitigation): *The project will permanently alter 15 acres of Land Under Water (LUW).*

Clarification: While more recent anthropogenic activities have increased salinity levels within the Pond as detailed in the EENF, re-installation of the weir boards will restore the system and result in salinity levels slowly decreasing over time with a gradual freshening of the upper water column and slower freshening of the saltier deeper waters. Salinity levels within deeper portions of the Pond (above LUW) will remain relatively the same for an extended period of time. Saline waters will continue to overtop weir boards during high water events (e.g., spring/extreme tides and/or storm events) and settle to the Pond bottom, thus maintaining deep salinity levels.

EEA #3: (Project Description and Permitting) *The Single EIR should include a detailed description of the proposed project and describe any changes since the filing of the EENF. If changes are proposed, the Single EIR should include updated site plans for existing and post-development conditions at a legible scale. It should provide a brief description and analysis of applicable statutory and regulatory standards and requirements, and describe how the project will meet those standards. It should include a list of required State Permits, Financial Assistance, or other State approvals and provide an update on the status of each of these pending actions.*

The EENF indicates that the project is exempt from c. 91 Licensing due to its location within the Route 6 right-of-way (ROW), which is under the jurisdiction of Massachusetts Department of Transportation (MassDOT). However, MassDEP comments indicate that this exemption only extends to bridge projects funded through the Transportation Bond Bill. The Town should determine if the project meets the criteria of 9.05(3)(c) and present its findings in the Single EIR.

Response: Refer to Section 2.

EEA #4: (Wetlands) *The Single EIR should present detailed information regarding the proposed Adaptive Operations and Maintenance Plan. This plan should clearly state goals of the Plan in terms of ecological (e.g. fish passage) and water quality parameters; describe how storm events have been incorporated and identify associated management scenarios; and identify type and frequency of data collection to support project goals including vegetation, water level, pore water salinity, and water column salinity parameters. The Single EIR should also identify potential changes to wetland resource areas. In addition, it should identify contingency plans if monitoring does not demonstrate progress toward water quality goals.*

I strongly encourage the Town to establish a technical advisory group to support the development and the implementation of the Adaptive Operations and Maintenance Plan.

The Single EIR should clarify the use of Cedar Pond as a nutrient sink within the context of the Cedar Pond Water Quality Management Plan as requested by MassDEP, CZM and DMF. Additionally, the proposal to install the weir boards will not address the salinity levels in the deepest portions of the pond and the Town has stated that it currently has no further plan for their remediation beyond pumping out this area. The Town also notes in the EENF that it is pursuing another proposal to address nutrient loading from avian sources, the details of which have not been finalized. The Adaptive Operations and Maintenance Plan must contain details necessary to condition any proposed changes to Cedar Pond's water quality regime and should propose conditions for consideration by permitting agencies.

The installation of boards is expected to result in a maximum projected increase in pond water levels of approximately 3.5 inches. This may affect the septic systems of the surrounding homes, and thereby increase nutrient inputs to the pond. The Single EIR should address whether re-establishment of pond elevations will affect septic systems and analyze nutrient levels in the pond.

Response: Refer to Section 3.

EEA #5: (Fisheries Habitat) *The Water Quality Management Plan includes a goal to establish favorable conditions for diadromous fish (alewife, white perch, American eel) migration, spawning, and nursery habitat. The Water Quality Management Plan indicates that when suitable conditions are restored, seasonal migratory fish passage will be enabled through the opening of the weir boards or the installation of a fish ladder. The structural design, operation and management of the outlet control structure will have a considerable impact on the effectiveness of supporting a healthy diadromous fish population in the pond. The Town should work with DMF to design the outlet control structure for fish passage and the Single EIR should present conceptual designs that could be incorporated into the outlet control structure.*

Response: Refer to Section 4.

EEA #6: (Greenhouse Gas Emissions) *The GHG Policy specifically includes a de minimis exemption for projects that are expected to produce minimal GHG emissions. This project appears to be consistent with the de minimis exemption; however, the Single EIR should formally request and document the project's applicability for this exemption.*

Response: Refer to Section 5.

EEA #7: (Mitigation/Draft Section 61 Findings) *The Single EIR should include a separate chapter summarizing proposed mitigation measures. This chapter should also include draft*

Section 61 Findings for each State Agency that will issue permits for the project. The Single EIR should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

Response: Refer to Section 6 and Appendix F.

EEA #8: (Responses to Comments) *The Single EIR should contain a copy of this Certificate and a copy of each comment letter received. In order to ensure that the issues raised by commenters are addressed, the Single EIR should include direct responses to comments to the extent that they are within MEPA jurisdiction. This directive is not intended to, and shall not be construed to enlarge the scope of the Single EIR beyond what has been expressly identified in this certificate.*

Response: The EENF Certificate and comment letters are included within Appendix A. Responses to Comments are detailed under this Section (7).

7.2 The Friends of Rock Harbor

The following provides responses to The Friends of Rock Harbor (FoRH) comment letter dated February 26, 2016.

FoRH #1: *When the Cedar Pond Water Quality Management Plan (CPWQMP) was developed originally for the Town of Orleans (2013), it did not include a comprehensive analysis of the two primary alternative futures for Cedar Pond: 1) continuation as a saline estuarine water body within the tidal reach of Cape Cod Bay, or 2) alteration into a brackish water body sealed off from the effects of Cape Cod Bay. Instead the CPWQMP made the case only for the brackish alternative.*

Response: Continuation of a saline waterbody was contemplated by CSP/SMAST and dismissed based on the findings outlined within the July 2013 *Cedar Pond Water Quality Management Plan* and follow-up Technical Memorandums (10/10/14 and 1/14/16). The *Cedar Pond Water Quality Management Plan* provided a detailed review of: a) current conditions, b) conditions that were measured prior to the 2007 changes, and c) conditions if the Pond were converted back to the pre-existing freshwater system. The Plan concluded that if the weir boards are not replaced, degraded water quality conditions are expected to worsen and negative impacts to the abutting forested wetland system (Atlantic White Cedar Swamp) and associated potential vernal pool habitat are anticipated to increase as the ecosystem will be harmed by further saltwater intrusion. In addition, the diadromous spawning and nursery habitat for alewife and white perch will consequently be lost forever. Furthermore, measurements collected by CSP-SMAST showed that Cedar Pond's ability to provide nitrogen attenuation of watershed loads had been eliminated by

the current conditions and additional nitrogen has and will continue to be exported to the already nitrogen impaired Rock Harbor (as indicated in the DEP-approved 2008 Massachusetts Estuaries Project report).

FoRH #2: *If the original CPWQMP had done a full alternatives analysis, then the LEC consultants would have been likely to consider the following facts:*

a. evidence that the water quality in Cedar Pond has in fact has not declined since removal of the pen boards in 2004 and cleaning of Rock Harbor Creek in 2007. The Report fails to even acknowledge the existence of a 2014 study by Amy Costa of the Center for Coastal Studies and sponsored by the Orleans Pond Coalition (Costa, 2014) the findings of which relate specifically to the saline alternative; that is, the health of the water body as a salt water pond. (See Appendix 1). The findings show that the total nitrogen in Cedar Pond has not increased as the pond has become more saline, except as a result of a single algae bloom in late summer, 2015. Additionally, water clarity is improving (Figure 2, Appendix 1) and increased mixing events are introducing oxygen into the deeper waters of the pond (Figure 3, Appendix 1) that were previously believed to be anoxic during most of the summer and fall. The findings directly contradict the repeated claim made in the ENF report that the pond has become increasingly impaired as its salinity has increased. The failure to consider them stems from the fact that the original CPWQMP did not fully consider the advantages along with any shortcomings of the saline alternative.

Response: As further outlined within the CSP-SMAST's January 14, 2016 Technical Memorandum, monitoring of Cedar Pond during the summer of 2015 (June to September), following development of the Plan, showed that 2015 water conditions are worse now than the prior lower salinity conditions; 84% of shallow Dissolved Oxygen (DO) concentrations were below the MassDEP minimum concentration (310 CMR 4.05) as opposed to 25% in 2012 and only 2% in 2009. This data reinforces that while the Pond was impaired in past lower salinity conditions, it was closer to being restored with lower salinity. Data submitted in the Friends of Rock Harbor's February 26, 2016 letter also reinforces the greater level of impairment under higher salinity conditions: surface and bottom total nitrogen concentrations prior to the 2007 Rock Harbor Creek alteration had maximum concentrations ~1 mg/L and 2.1 mg/L, respectively, while after 2007, these concentrations had increased to 2.1 mg/L and 4.6 mg/L, respectively. As indicated in the *Cedar Pond Water Quality Management Plan*, lower salinity will improve oxygen levels and lower nitrogen concentrations, in addition to achieving the ecosystem goals established by the Town (e.g., diadromous fish habitat restoration and forested wetland habitat protection) to produce a restored and more resilient ecosystem. The Cape Cod Commission (CCC) supports the project as stated in their March 1, 2016 comment letter.

FoRH #3: *b. The LEC report* (EENF) *fails to report the presence of anadromous and salt water species that have been documented in Cedar Pond as recently as 2014. These species include striped bass, blue fish, blue claw crabs, shrimp, and barnacles. This oversight is again a function of the bias toward the brackish alternative found in the original CPWQMP.*

Response: Species observations in Cedar Pond reported in the EENF were based on observations by LEC, retired NOAA Fisheries Scientist Paul Perra, DMF, Orleans Shellfish and Waterways Advisory Committee, and Orleans Marine and Fresh Water Quality Task Force (WQTF). LEC is unaware of other verified species observations; however, the presence of barnacles was noted in the ENF. Nevertheless, the species identified above are euryhaline organisms that can tolerate a wide range of salinities and would be expected to survive at reduced salinities.

FoRH #4: *c. Had the LEC been able to consider the salt water alternative, its authors might then have used existing data to properly test the hypothesis that such an alternative would lead to increased nitrogen levels in Rock Harbor. Although the LEC report transmits the faulty CPWQMP assertion of this claim, data collected by the Town of Orleans Water Quality Task Force between 2004 and 2014 show no such increase. See Appendix 2, which shows a steady decline in total nitrogen (TN) and no change in dissolved organic nitrogen between 2003-2014. The hypothesis that the increased salinity of Cedar Pond has led to a decline in water quality at Rock Harbor is not valid. Not considered by the report is the capacity of Rock Harbor marsh to absorb nitrogen as it leaves Cedar Pond and travels through the marsh to the harbor.*

Response: To reiterate, the "salt water alternative" was considered under the *Cedar Pond Water Quality Management Plan* as current conditions at the time of the Plan development included no boards present at the Pond outlet and high salinity conditions (>20 ppt) were present throughout the water column. Salt water conditions existed in both 2012, during the data collection for the preparation of the Plan, and during the 2015 summer when continuous monitoring was conducted. Both sets of data confirmed worsening conditions in Cedar Pond across a number of key parameters compared to pre-2007 data. Water quality conditions in Cedar Pond also worsened between 2012 and 2015. This progression of worsening conditions is related to increasing salinity levels in Cedar Pond as documented within the available data.

The *Cedar Pond Water Quality Management Plan* was prepared specifically for Cedar Pond, not Rock Harbor. Data collected by the MEP in Rock Harbor Creek, downstream of Cedar Pond, while the boards were in place had an average nitrogen load of 1.09 kg/d (complete hydrologic year: September 2002 and August 2003). Measured data collected for the *Cedar Pond Water Quality Management Plan* at the same location between June and September 2012 after the boards had been removed for a few years had monthly average nitrogen loads of 2.39 kg/d, 3.93 kg/d, 7.06 kg/d, and 4.19 kg/d, respectively. The "boards out" measured loads exported to Rock

Harbor Creek are clearly greater than the "boards in" measured loads. Putting these increased loads into proper context for the conditions in the Rock Harbor basin requires more than just looking at nitrogen concentrations. The MEP assessment included the collection and review of continuous dissolved oxygen and chlorophyll concentrations, benthic community details, sediment characteristics, and nitrogen contributions.

It should be noted that while the graphs provided in Appendix 2 of the FoRH letter do not show a strong increase in total nitrogen (TN), the FoRH conclusion does not consider the fact that dredging occurred in the Rock Harbor inlet in fall 2004/winter 2005. When a major hydrodynamic change occurs and when sediments are disturbed, nutrient dynamics are perturbed, which likely explains the very large variability in the Rock Harbor TN data during the dredge year and year after. Furthermore, it was during the January/February 2007 timeframe that Cedar Pond Creek north of Rock Harbor Road was cleaned out by machinery, thus increasing salt water flow to Cedar Pond. Taking all of these physical changes into account, the proper timeframe to examine TN changes in Rock Harbor is to look at the period 2007 through 2014 (dredging occurred again in fall 2014/winter 2015). During this period of non-hydrologic alteration and relatively stable conditions, the TN level in Rock Harbor appears to show a gradual increase of approximately 10%-15%, based on the graph provided by FoRH. This increase is consistent with a lowered nitrogen removal by Cedar Pond, hence a higher nitrogen load to Rock Harbor basin.

FoRH #5: *d. Full consideration of the salt water alternative would also have led to the question of whether fish kills had occurred during the past five years, during which the water has become increasingly saline. The fact is that no such fish kills have taken place, in contrast to the brackish condition, during which fish kills were a repeated occurrence with a major fish kill in 2001 prior to removal of flashboards and a less significant kill in 2008 when the pond was transitioning from brackish to the higher salinity; (Eichner, Howes, and Schlezinger, 2013).*

Response: Fish kills in surface waters typically occur when anoxic conditions exist throughout the water column leaving no refuge for fish to escape. Oxygen depletion can be due to a variety of factors, including sediment oxygen demand, high temperatures, algal blooms, reduced mixed layer volume, and combinations among these factors. Forensic evaluation of the previous Cedar Pond fish kills were not completed, so it is unclear which factors played the biggest roles. For this reason, absence of fish kills does not indicate improved conditions and neglects a host of other factors that could be playing a role in fish population dynamics, including the role of increased salinity likely altering the mix of fish and plant species, the fluctuations and timing of fish in the pond, the interrelationships of species in the Pond, and the size of the fish populations. What is clear, though, is that the increase in salinity stresses anadromous and diadromous fish and

brackish fish populations, like white perch and alewife. A fish kill during the salinity transition period (under increasing salinity) has been documented in other coastal ponds.

Available DO concentrations show conditions that are likely impairing sustainability of fish species in the Pond. The 2015 summer DO concentrations show a significant decrease in the frequency of acceptable DO concentrations compared to the 2012 summer. During 2015, DO sensors at 1.26 m depth only recorded 16% of the readings greater than the 5 mg/L DO minimum required by MassDEP surface water regulations (314 CMR 4.05). In contrast, during the 2012 summer, the DO sensor at approximately the same depth recorded more than 75% of the readings greater than the MassDEP minimum. Fish kills may not have been observed, but the trajectory for the system is clearly toward worse conditions with the persistence of salt water conditions.

FoRH #6: *e. While giving no consideration to the positive impacts of keeping Cedar a salt water pond, the LEC authors proceed to put forward the claims of negative impact related to the saline alternative originally proffered by the CPWQMP that are open to question. These include the following:*

1) that establishment of a herring run is feasible. Whether or not such a run existed in the past, we contend that a herring run is untenable under present circumstances, even in a brackish condition. Successful reestablishment of a herring run by inserting flashboards is highly unlikely, given the negligible elevation difference between Cedar Pond and Rock Harbor marsh and the documented overflow of salt water over the top of the flashboards during seasonal high tides in Cape Cod Bay (which will intensify as sea levels in the Bay rises due to climate change). Also note a 1989 letter from the Department of Marine Fisheries included in our Appeal stating that a herring run is not feasible: "...the present flow and the potential spring flow from Cedar Pond is much too small to adequately support an Anadromous fish run."

Response: As stated within DMF's March 15, 2016 ENF comment letter: *Cedar Pond, via Rock Harbor Creek, has been identified by MarineFisheries as diadromous fish habitat for alewife (Alosa pseudoharengus), white perch (Morone americanus) and American eel (Anguilla rostrata).*

White perch have been most recently documented within the Pond in November 2015 by retired NOAA Fisheries Scientist Paul Perra. Adult alewives were documented by members of the Shellfish and Waterways Advisory Committee in 2004. Current population sizes of both species are unknown. Reducing salinity levels within the Pond will serve to restore alewife or white perch spawning and nursery habitat as supported by DMF.

FoRH #7: *2) the salt water condition will damage a white cedar swamp northwest of the Pond. This swamp is better characterized by its predominant species as a red maple swamp. The few*

white cedar remaining and all other species can easily be protected by the Town of Orleans simply by building an earthen berm along what was once Cedar Pond road with several culverts containing flapper valves that will allow the fresh water from the swamp into Cedar Pond by keeping any saline water from the Pond from flowing west into the swamp.

Response: Building an earthen berm within the abandoned section of Cedar Pond Road will invariably require fill to be placed within the BVW directly abutting the potential vernal pool habitat. As stated under 310 CMR 10.55(4)(e) of the WPA Regulations, *any proposed work shall not destroy or otherwise impair any portion of a Bordering Vegetated Wetland that is within an Area of Critical Environmental Concern…* Consequently, building an earthen berm with several culverts containing flapper valves within a BVW and the Inner Cape Cod Bay ACEC could not be approved under the WPA Regulations.

FoRH #8: *3) that a possible vernal pool is threatened by salt water. Visual inspection indicates that a considerable amount of fresh water from the swamp to the west gathers along the remains of Cedar Pond road and currently is inhibited from flowing directly into Cedar Pond by blockage of the culverts that once passed under the old road. There is no verification that this is a vernal pool, although this possibility cannot be ruled out. As stated above, the simple and inexpensive solution for the Town is to build an earthen berm along the old road that includes several culverts containing flapper valves to permit fresh water flow into the Pond.*

Response: LEC has observed the 10-15± foot wide x 75± foot long elongated depression occurring immediately west of the abandoned Cedar Pond Road to hold 6-24± inches of standing water, consequently maintaining the physical characteristics of vernal pool habitat. The above Response details why an earthen berm is not viable.

FoRH #9: *We challenge several other claims made in the ENF prepared by LEC Environmental Consultants:*

a. that the insertion of the pen boards will not lead to erosion. Although there may be no discernible effects on the Pond shoreline, the effect on the banks of Rock Harbor creek where it exits the Pond and at the Rock Harbor Road culvert will be considerable. Even with the boards out we are seeing erosion of the banks on either side of the Rock Harbor Road culvert, and this impact will grow when water backs up because it cannot enter the Pond. In addition, an Orleans resident with land bordering the creek is experiencing flooding of his property during seasonal high tides that is likely to worsen if tidal waters cannot enter Cedar Pond.

Response: Based on CSP-SMAST's observations, incoming tidal waters at Rock Harbor Road currently rise faster than what the culvert can handle. This creates a backup north of the road and the pressure head creates rapid flow under the road. This rapid flow is directed toward the

western Bank just south of the road by the angle of the culvert pipe. CSP/SMAST's observations suggest that the rapidly swirling eddy created by incoming tides has the potential to create erosion of this Bank. Given that this issue is more a product of culvert size and is largely discounted by the current average tidal range in Cedar Pond of less than 2 inches, linking any erosion to the re-installation of the weir boards is a misunderstanding of the system's hydrology.

FoRH #10: *b. that specified fresh water plant species existed prior to 2007. This claim is not backed by anything except hearsay evidence.*

Response: Observations of freshwater aquatic vegetation, including pondweed (*Potamogeton spp*.), bladderwort (*Utricularia* spp.), and white water lily (*Nymphaea alba*), prior to 2007 were made by monitoring volunteers under the guidance of the WQTF. Furthermore, freshwater aquatic vegetation is evident on the Cedar Pond side of the weir boards in the photograph (circa 2004) included on the cover of the ENF and this SEIR.

FoRH #11: *c. the implication from the SMAST Technical Memo (January, 2016) that there was a dramatic worsening of the Cedar Pond water quality during the summer of 2015. The data gathered by the Center for Coastal Studies indicate that this was due to an anomalous algae bloom in August of last year which could as easily have resulted from increased cormorant defecation as from anything related to the salinity of the water.*

Response: This comment is similar to FoRH #2 and is covered above. However, there is no evidence that there were additional cormorants in 2015 versus prior years and the algal bloom documented in the 2016 *Technical Memorandum* showed chlorophyll levels (a proxy for phytoplankton population) began to increase in late June and were generally higher than similar 2012 monitoring throughout the recording period and into September. The peak of these concentrations constitutes a bloom (10X higher than same time in 2012), but the sustained higher levels throughout July to September are consistent with the other measures indicating worse conditions throughout 2016 compared to 2012.

FoRH #12: *Given these major flaws in the Town's response to the MEPA request for an ENF, as reflected in the LEC Environmental Consultants Report, we maintain that it would be inappropriate and perhaps illegal to prevent salt water from entering Cedar Pond at this time, and that the preferred alternative is to maintain it in its saline condition. Cedar Pond has been increasingly saline since 2004, more than a decade, and we continue to believe that changing this salt pond to a fresh/brackish system is in violation of the MA Wetlands Protection Act, Chapter 131, Section 40, which prohibits alteration of a saltwater wetland in a manner that would affect the fisheries in that wetland. The Town of Orleans has not shown the water quality in Cedar Pond*

has worsened under the saline condition, nor is there evidence that nitrogen from the Pond has led to worsening water quality in Rock Harbor.

Response: Cedar Pond does not qualify as a Salt Pond based on the definition detailed under 310 CMR 10.33(2) of the WPA Regulations and the historical evidence reviewed in the EENF. LEC confirmed this with MassDEP Wetlands prior to filing the ENF.

Project compliance with WPA Regulations was extensively reviewed within the EENF. To reiterate, the reinstallation of the weir boards is proposed as an ecological restoration project to improve water quality within Cedar Pond, restore diadromous fish habitat, and protect adjacent forested wetland habitat. Weir boards had been in place for multiple decades following the construction of Route 6 in the late 1950's and installation of the culvert and outlet control structure within the northeastern portion of the Pond.

The monitoring completed before and during the preparation of the Cedar Pond Management Plan and submitted and discussed in the EENF and this SEIR document the worsening water quality within Cedar Pond with increased salinity levels, including that reviewed above in response to FoRH #2.

As for Rock Harbor, the increase in nitrogen loading resulting from loss of nitrogen removal efficiency of Cedar Pond has resulted in a gradual increase in TN level in Rock Harbor once changes in hydrodynamics due to dredging are taken into account. During the "stable" hydrodynamics period 2007 through 2014, the TN level in Rock Harbor appears to show a gradual increase of approximately 10%-15%, based on the graph provided by FoRH, as discussed in the above response to FoRH #4.

FoRH #13: *An appropriate management plan for maintenance of Cedar Pond as a saline estuary of Cape Cod Bay needs to be implemented immediately. It should include the following steps:*

1. the removal of the cormorant perch above the pond, in order to eliminate the nitrogen that the birds deposit into the pond every summer. Until this major source of nitrogen is removed it will be impossible to assess the impacts of other mitigating efforts on water quality.

Response: The Town is working to resolve the roosting cormorant issue as a separate matter (see above). However, the predominant nutrient contributed by the cormorants is phosphorus.

FoRH #14: *2. the construction of a berm between old Cedar Pond road and the northwest shoreline of the Pond. This berm should contain several culverts containing flapper valves that permit fresh water from the cedar swamp to flow into the Pond but prevent any salt water from*

the Pond to flow west into the swamp. This low cost solution will protect the adjoining swamp and any species that might be living within it.

Response: Refer to Response to FoRH #7.

FoRH #15: *3. continued monitoring of water quality over the next five years. Monitoring on a five year schedule will allow time for the power lines above the Pond to be buried and an assessment of the water quality changes resulting from that major alteration. If the data do not show water quality improvements in Cedar Pond that meet the criteria set by the Town of Orleans and the Commonwealth of Massachusetts, then a full analysis of other alternatives can be undertaken, ranging from further opening the Pond to salt water flushing by insertion of larger culverts under Rt. 6 and Rock Harbor Road to the reinsertion of the pen boards to reduce Pond salinity.*

Response: The specific means and timeline for resolving the cormorant issue is not settled. Addressing the cormorant issue will not alone address the water quality issues associated with Cedar Pond. The Town is proposing to implement the Adaptive Operations and Maintenance Plan to regularly assess progress toward meeting Cedar Pond restoration goals. Monitoring results will dictate future potential adjustment management strategies.

7.3 Cape Cod Commission

The March 1, 2016 Cape Cod Commission (CCC) letter reviews the ENF, including the July 2013 *Cedar Pond Water Quality Management Plan* and follow-up Technical Memorandums (10/10/14 and 1/14/16). The CCC states:

CCC #1: *Installation of the boards will reduce saltwater flow to the pond, effectively reducing pond salinity to a brackish system (1-4 ppt). As such, it is anticipated that Cedar Pond will begin to attenuate nitrogen year-round and will no longer seasonally contribute nitrogen to the already-impaired Rock Harbor system. Restoring Cedar Pond's ability to attenuate nitrogen and thus reduce nitrogen loading to the nitrogen-impaired Rock Harbor aligns with Section 208 Areawide Water Quality Management Goals. In addition, lowering the salinity in Cedar Pond will enable Cedar Pond to support spawning herring. Also at the brackish concentration, Cedar Pond will no longer serve as a potential threat to the adjacent Atlantic White Cedar Swamp whose ecosystem could be harmed by saltwater intrusion.*

CCC staff support this proposed project and suggest that additional recommendations from the SMAST 2013 report appear to be a reasonable approach to restoring water quality and ecosystem of Cedar Pond.

Response: The Town appreciates CCC's support of the project and will continue to work on improving water quality objectives for Cedar Pond, most notably resolving the roosting cormorant issue.

7.4 Carolyn L. Kennedy

The March 15, 2016 letter submitted by Carolyn L. Kennedy, Chair of the Orleans Marine and Fresh Water Quality Task Force provides support for the project.

Comment: In conclusion, Ms. Kennedy states that *Cedar Pond has become increasing eutrophied to the point of high instability of the pond ecosystem. Wide-spread summer anoxia threatens to create further habitat damage. The pond is unusable for swimming, fishing, or boating. Abutters have suffered for many years from attempts to remove the cormorants. The Town has completed stormwater remediation improvements along adjacent roads. The extensive research that has gone into this process is listed on page 5 of this letter.*

It is now time to move ahead with the Cedar Pond Management Plan and start the water quality improvement process.

MEPA approval of the Order of Conditions from the Conservation Commission and Town's plan will enable this process to begin.

Response: Carolyn Kennedy and the Orleans Marine and Fresh Water Quality Task Force have been active participants and advocates in preparation of the MEPA materials.

7.5 Division of Marine Fisheries

In the March 15, 2016 Division of Marine Fisheries letter, the following comments were raised for consideration:

DMF #1: *The weir board installation described in this ENF is designed to reduce salinity and improve nitrogen attenuation within Cedar Pond, not reduce nitrogen inputs into this aquatic system. MarineFisheries continues to recommend the development of strategies for source reduction. Deterrence of cormorant roosting over Cedar Pond should partly address nitrogen source reduction (Cedar Pond Water Quality Management Plan P. 38), and MarineFisheries encourages continued development of complementary strategies to reduce other nitrogen sources. A discussion of potential nitrogen sources other than cormorants (e.g., septic inputs [2]) would be beneficial.*

Response: As stated above, the Town continues to work on addressing the cormorant issue. A May 1, 2017 trial date is currently set in Orleans District Court with Eversource.

Section 3.9.2 (above) addresses imminent stormwater improvements along Route 6 immediately proximate (north) to Cedar Pond to improve water quality. Furthermore, future sewering of Locust Road via the Town's forthcoming Comprehensive Wastewater Management Plan will also reduce nutrient loading from septic systems in the immediate Cedar Pond watershed.

DMF #2: *As an Ecological Restoration Project with target goals of improving water quality and restoring diadromous fish habitat, the management plan should include a detailed water quality monitoring plan to assess the impacts of the proposed modification. If successful, the proposed overall management plan would restore water quality and manipulate salinity to provide spawning habitat for white perch and alewives. The management plan should include target thresholds for relevant water quality parameters and contingency plans for board removal if target goals are not met through the proposed management plan. If salinity manipulation is not successful in improving water quality, alternative approaches should be documented in the overall management plan that include improvements to marine resources through enhanced tidal exchange.*

Response: As described above, the Town already has an adaptive management monitoring program for Cedar Pond ready to be activated following the approvals for the reinstallation of the weir boards. The monitoring program includes the installation of two continuous monitoring devices (sondes) located at shallow and deep depths programmed for high frequency recording (10-15 minute intervals) of water column temperature, salinity, water level, and chlorophyll. Data is to be retrieved every three months and at that time, temperature and dissolved oxygen profiles, clarity reading, and water quality samples from Cedar Pond and flow and water quality samples from the downgradient creek would also be collected.

Data would be reviewed semi-annually, including comparison to past monitoring records, and summarized in a technical memorandum. Each technical memorandum will provide a regular assessment of progress toward water quality goals and any recommended changes in monitoring or management. All results would be reported to and coordinated with the Town of Orleans Marine and Fresh Water Quality Task Force and Town of Orleans Director of Planning & Community Development.

DMF #3: *As noted in the ENF (P. 3), an adaptive Operations and Maintenance Plan should be developed in consultation with MarineFisheries to ensure that the proposed work is consistent with its stated goals of improving water quality and restoring diadromous fish habitat. For the latter goal, boards will need to be manipulated to allow for spring and fall migrations of diadromous fishes in and out of Cedar Pond.*

Response: The "Fishway Operations and Maintenance Plan" (Appendix B) was developed by DMF in coordination with the Town, LEC, and CSP/SMAST. Board height will be adjusted and monitored to allow for spring and fall diadromous fish migration. Diadromous fish migration will also be evaluated over the first three years following weir board reinstallation and DMF will be consulted on whether board height adjustments are prudent to maximize the potential success for fish passage, while balancing water quality goals.

7.6 Coastal Zone Management

The following reviews comments from the March 15, 2016 letter from the Office of Coastal Zone Management.

CZM #1: *CZM attended the March 1, 2016 MEPA site visit, and is familiar with the Town's water quality monitoring efforts in Cedar Pond. The Cedar Pond ecosystem has been considerably altered over the past century. The pond currently has significantly degraded water quality, which is well documented in the ENF. CZM supports the Town's goals to improve water quality, protect the adjacent white cedar pond, and potentially support or restore diadromous fish habitat, and believes the success of this project will depend upon careful implementation of adaptive management efforts.*

CZM recommends that the EIR contain detailed information regarding the proposed adaptive management plan. This plan should: clearly state goals of the structure management tied to ecological (e.g. fish passage) or water quality parameters; specify the initial weir board elevation (normal) setting based on the local knowledge and data submitted through the permit process; describe storm or other non-normal management scenarios (when/why storm settings may be triggered), and; propose transects to gather information relating to vegetation, water level, pore water salinity, water column salinity parameters (transects do not need to be established and sampled prior to filing). These transects should be related to ecological goals of project. CZM also recommends that the Town establish a technical advisory group to help, on a routine schedule, with the execution of the operation of the structure.

Response: The adaptive Fishway Operations and Maintenance Plan (Appendix B) is reviewed in detail in Section 3.1. Beyond restoring diadromous fish habitat, additional ecological goals are discussed in Section 3.2, while water quality goals are covered under Section 3.3. The Plan restates the recommended initial 1.45 m (NAVD88) board height based on their review of all available water level and tidal datasets to slowly reduce salinity levels with the ultimate target level of 1-4 ppt similar to pre-existing conditions (prior to 2007).

Monitoring, including specific data collection and contingency plans are reviewed under Section 3.5. Two continuous monitoring devices (sondes) will be positioned at shallow and deep depths,

programmed for high frequency recording (10-15 minute intervals) of water column temperature, salinity, water level, and chlorophyll. Data is to be retrieved every three months and at that time, temperature and dissolved oxygen profiles, clarity reading, and water quality samples from Cedar Pond and flow and water quality samples from the downgradient creek system will also be collected.

The Town will be responsible for management of adjusting the weir boards during the seasonal diadromous fish migration time periods. Monitoring conducted by CSP/SMAST will be compiled and reviewed with the Town, Orleans Marine and Fresh Water Quality Task Force, and DMF to determine whether supplemental adjustments are necessary, while balancing ecological and water quality restoration goals.

CZM #2: *The Plan currently calls for the installation of boards to 1.45 meters NAVD88 at the existing outlet control structure. The Plan states that installation of these boards will result in a maximum projected increase in pond water levels of approximately 3.5 inches. CZM is concerned that this increase may affect the septic systems of the surrounding houses, thereby increasing nutrient inputs to the pond. The EIR should document and analyze the potential for water quality impacts, if any, that may result.*

Response: Surrounding residential septic systems and the potential for increased nutrient loading associated with minimal projected increases in Cedar Pond water levels were discussed in Section 3.8. In summary, the single-family residential septic systems adjacent to Cedar Pond, especially those homes off Locust Road, sit at elevations much higher than existing or potential new Pond water levels. Based on BOH records, the majority of the systems are documented to maintain at least 5 feet of separation from the SAS to high groundwater. Thus, a minimal fluctuation of 3.5 inches in Cedar Pond and any influence on surrounding groundwater elevations is not anticipated to have an impact on the surrounding septic systems or increase nutrient loads to the Pond. Furthermore, the Town is working on plans to extend a municipal sewer line down Locust Road for the surrounding residential homes to connect and abandon the individual septic systems.

CZM #3: *One goal of the Plan is to improve and manage the water quality to establish favorable conditions for diadromous fish (alewife, white perch, American eel) migration, spawning, and nursery habitat. The Plan states that when suitable conditions are restored, seasonal migratory fish passage will be enabled through the opening of the weir boards or the installation of a fish ladder. The structural design, operation and management of the outlet control structure will have considerable impact on the effectiveness of supporting a healthy diadromous fish population in the pond. CZM recommends that the Town work with DMF in designing the outlet control structure for fish passage. The EIR should contain information relating to the design of the fish passage device to be incorporated into the outlet control structure.*

Response: Through discussions with DMF, seasonal migratory fish passage will be provided immediately and throughout the re-establishment of the weir boards. A fish ladder is not currently proposed and no modifications to the outlet control structure are currently contemplated. Specific adjustments during the seasonal diadromous fish migratory time periods are reviewed in Section 3.1 and the Fishway Operations and Maintenance Plan (Appendix B).

CZM #4: *The proposed project may be subject to CZM federal consistency review.*

Response: The Town will work with CZM to review the applicability of federal consistency review. As reviewed above and within the EENF, the re-establishment of the weir boards does not involve any modifications to the outlet control structure and future weir board adjustment will follow DMF recommendations based off the *MA DMF Technical Report TR-47: Recommended Time of Year Restrictions (TOYs) for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts (April 2011, revised January 2015).*

7.7 Judith Scanlon

The March 15, 2016 letter submitted by Judith Scanlon, Citizen Volunteer and Orleans Volunteer Herring Count Coordinator provides support for the project. Judith Scanlon is also Chair of the Orleans Shellfish and Waterways Advisory Committee and Vice Chair of the Orleans Marine and Fresh Water Quality Task Force.

Comment: In conclusion, Ms. Scanlon states that *I strongly support the goals set forth in the approved CPMP* (Cedar Pond Management Plan). *Orleans must meet the requirements established in the Clean Water Act and various state water quality standards. The Town/BOS have taken a pro-active approach in order to do this. The Town can manage the pond and improve water quality if it is a low salinity/brackish system as this provides more choices for future management options. It can take steps to restore the herring spawning habitat, and improve spawning habitat for the existing population of white perch which are presently struggling there. Restoring the pond to a low salinity/brackish system will provide protection of the adjacent wetlands and Atlantic White Cedar swamp, and greatly reduce the amount of nitrogen that is now being exported to the Rock Harbor creek system, returning this natural process of nitrogen attenuation to the way it was before 2007. It is unclear to me why members of the Friends of Rock Harbor would not support the CPMP if they truly care about the ecological health of this area. Obviously more public education is needed, and misinformation identified and corrected. What is not needed, are more studies and more delays in beginning to restore the ecological health of Cedar Pond.*

Response: Judith Scanlon has provided a wealth of knowledge and materials that have assisted in the preparation of the MEPA materials.

7.8 Department of Environmental Protection

The following reviews comments from the March 22, 2016 letter from the Massachusetts Department of Environmental Protection.

DEP #1: *The ENF indicates in the Wetlands, Waterways and Tidelands Section III that the project is exempt from Chapter 91 Licensing due to its location within the Route 6 MassDOT right-of-way (ROW). Generally, only bridge projects funded through the Transportation Bond Bill would be exempted from Chapter 91 licensing. Therefore the project is not exempt for this reason. The Waterways Regulations at 310 CMR 9.05(3(c) indicate that a license would not be required for the "continuation of any existing, unauthorized public service project, provided that no unauthorized structural alteration or change in use has occurred subsequent to January 1, 1984…" The Waterways Program would not consider the removal or the reinstallation of weir boards in the outlet control structure as a substantial structural alteration. MassDEP recommends that the Proponent contact the Waterways Program, Southeast Regional Office to determine if the project meets the criteria of 9.05(3)(c) and whether the installation of the weir boards would require a Minor Project Modification pursuant to 9.22(3).*

Response: As stated above in Section 2.2.2, LEC has communicated with the Southeast Regional Waterways Program to review compliance with 310 CMR 9.05(3)(c) and 9.22(3). Following review, MassDEP relayed that a Minor Project Modification would be the more appropriate course of action. LEC and the Town will continue to work with MassDEP for issuance of the Minor Project Modification once the Final MEPA Certificate is issued.

DEP #2: *The Wetlands Program has reviewed the ENF for EEA No. 15474 and offers the following comments. The Program is currently reviewing the proposed re-installation of the weir boards at the outlet control structure of Cedar Pond. The Program's review is the result of an appeal, by a citizen's group, of the Orleans Conservation Commission's Order of Conditions approving the proposal. For Wetlands, Waterways & Tidelands projects, provided a permit is required, "alteration of resource areas above certain thresholds establishes the need for MEPA review. On September 1, 2015, the Wetlands Program sent the Town of Orleans notification of the requirement to file the ENF and a request for additional information. The Program determined that the proposal exceeded the threshold for MEPA review found at 301 CMR 11.03(3). It has since been noted that the project lies within the Inner Cape Cod Bay ACEC. Therefore the proposal exceeds the MEPA review threshold at 301 CMR 11.03(11).*

In the request for additional information, the Wetlands Program asked for an inventory of the existing flora and fauna within Cedar Pond; a comparison of the current flora and fauna with historic inventory of the pond inhabitants prior to the salinity increase; a projection of the

species anticipated to occupy the pond if the proposed management plan is implemented; and a plan of the existing wetland resource areas and how those areas may be impacted by the proposed management plan.

Response: Through on-going discussions and a November 5, 2015 meeting with MassDEP, the requested information from the September 1, 2015 letter was included in the submitted EENF.

DEP #3: *With respect to the proposed water quality management plan, it is unclear to the Wetlands Program how the use of Cedar Pond as a nutrient sink will improve overall pond water quality.*

Response: Observations from the 2015 monitoring showed that conditions within Cedar Pond had worsened since 2012, representing a highly degraded system that is showing the highest levels of eutrophication and moving toward even higher degradation due to the higher salinities it is now experiencing. Reinstallation of the boards in the inlet control structure to lower salinity conditions should restore better water quality conditions, such as those that have been measured in the past.

Reducing salinity levels will increase nitrogen attenuation in Cedar Pond, thus reducing nitrogen loading to Rock Harbor. Reducing sediment nutrient regeneration within Cedar Pond is reviewed within the July 2013 *Cedar Pond Water Quality Management Plan*; however, no measures are currently proposed for implementation.

DEP #4: *…Additionally, the proposal to install the weir boards will not address the salinity levels in the deeper portions of the pond. At this time, the Town has stated that the current proposal does not include any plan for remediation of the deeper pond waters.*

Response: As stated within the EENF and throughout the SEIR, reestablishment of the weir boards will result in a gradual freshening of the upper water column in Cedar Pond, with a slower freshening of the saltier bottom waters to restore pre-existing conditions.

DEP #5: *…The Town also notes in the ENF that they are pursuing another proposal to address nutrient loading from avian sources. The details of which have not been finalized.*

Response: Refer to Section 2.2.1.

DEP #6: *In the ENF and Supplement, the Town states that they will develop an Operations and Maintenance Plan. The Wetlands Program believes that the details of the O&M Plan are necessary to condition any proposed changes to Cedar Pond's water quality regime*.

Response: Refer to Sections 3.1 and 3.6.

DEP #7: *It appears that the project exceeds the MEPA review threshold found at 301 CMR 11.03(3)(a)1.b. – alteration of ten or more acres of any other wetlands. The MEPA Regulations, at 301 CMR 11.02(2), do not define the term "alter". However, the MEPA Regulations at 301 CMR 11.02(2), do not define the term "alter". However, the MEPA Regulations at 301 CMR 11.02(2) shall have the meaning given to the terms by any statutes, regulations, executive orders or policy directives governing the subject matter of the term. The Wetlands Protection Act Regulations at 310 CMR 10.04 define the term Alter to mean changing the condition of any Area Subject to Protection under M.G.L. c. 131 § 40. Examples of alterations include, but are not limited to the following: (a) the changing of pre-existing drainage characteristics, flushing characteristics, salinity distribution, sedimentation patterns, flow patterns and flood retention areas; (b) the lowering of the water level or water table; (c) the destruction of vegetation; (d) the changing of water temperature, biochemical oxygen demand (BOD), and other physical, biological or chemical characteristics of the receiving water. Given that Cedar Pond is 15+/- acres in size as stated in the ENF and that the project purpose is to change salinity, BOD and other physical, biological or chemical characteristics of Cedar Pond, it is unclear to the Wetlands Program why the project proponent believes that the project does not meet or exceed the mandatory EIR threshold*.

Response: As reviewed in the EENF Supplemental Materials submitted on March 8, 2016, salinity changes within the 15.1± acre Cedar Pond resulting from the reinstallation of the weir boards trigger the mandatory EIR threshold for alteration of greater than 10 acres of other wetlands under 301 CMR 11.03(3)(a)1.b. Reestablishment of the weir boards will result in salinity levels slowly decreasing over time with a gradual freshening of the upper water column and slower freshening of the saltier deeper waters. The Town is not currently proposing to pump any deeper waters out of Cedar Pond.

DEP #8: *Based upon the information provided, the Bureau of Waste Site Cleanup (BWSC) searched its databases for disposal sites and release notifications that have occurred at or might impact the proposed project area…There are not listed MCP disposal sites located at or in the vicinity of the proposed project area that might impact the site*.

Response: So noted.

DEP #9: *Construction and operation activities shall not cause or contribute to a condition of air pollution due to dust, odor, or noise.*

Response: Reinstallation and maintenance of the weir boards will not cause or contribute to a condition of air pollution due to dust, odor, or noise.

DEP #10: *The "Certificate of the Secretary of Energy and Environmental Affairs on the Environmental Notification Form" may indicate that this project requires further MEPA review and the preparation of an Environmental Impact Report. Pursuant to the MEPA Regulations, 301 CMR 11.12(5)(d), the Proponent will prepare Proposed Section 61 Findings to be included in the EIR in a separate chapter updating and summarizing proposed mitigation measures. In accordance with 301 CMR 11.07(6)(k), this chapter should also include separate updated Section 61 Findings for each State agency that will issue permits for the project. The draft Section 61 Findings should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsibility for implementation, and contain a schedule for implementation.*

Response: Refer to Section 6 and Appendix F.

8. Summary

The reinstallation of the weir boards in Cedar Pond is proposed as an ecological restoration project to improve water quality within Cedar Pond, restore diadromous fish habitat, and protect adjacent forested wetland habitat. The Town of Orleans has studied and monitored the Cedar Pond ecosystem for over 15 years and developed the *Cedar Pond Water Quality Management Plan* with CSP/SMAST to achieve proposed ecological and water quality goals. Existing conditions within Cedar Pond are worse now than the prior lower saline conditions. Replacing the weir boards will slowly freshen and restore Cedar Pond back to pre-existing brackish conditions with the ultimate targeted salinity of 1-4 ppt.

In coordination with DMF, an adaptive Fishway Operations and Maintenance Plan has been developed and included within this SEIR to allow for unimpeded seasonal diadromous fish migration. Reducing salinity levels will restore the currently impaired anadromous spawning and nursery habitat of Cedar Pond.

As proposed, the project will serve to protect the interests of the Wetland Resource Areas associated with Cedar Pond and comply with the performance standards enumerated within the WPA Regulations (310 CMR 10.00). In addition to restoring diadromous fish habitat, supplemental ecological goals involve protecting the westerly abutting forested wetland habitat, including the 13± acre Atlantic White Cedar Swamp and potential vernal pool habitat. Reestablishing the weir boards will increase nitrogen attenuation in Cedar Pond and therefore reduce nitrogen loading to Rock Harbor.

Water quality and diadromous fish migration will be monitored and evaluated to determine whether board height adjustments are prudent to maximize the potential success for fish passage,

while balancing water quality goals. The proposed review and monitoring will allow the Town and other interested stakeholders to regularly assess progress toward meeting Cedar Pond restoration goals and adjust management strategies as necessary. It is anticipated that other future improvements around the Pond will also contribute to improving water quality.

Appendix A

EENF Certificate, dated March 25, 2016

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Charles D. Baker
GOVERNOR

Karyn E. Polito
LIEUTENANT GOVERNOR

Matthew A. Beaton
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1081
http://www.mass.gov/eea

March 25, 2016

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS ON THE EXPANDED ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Cedar Pond Water Quality Management Plan
PROJECT MUNICIPALITY	: Orleans
PROJECT WATERSHED	: Cape Cod
EEA NUMBER	: 15474
PROJECT PROPONENT	: Town of Orleans
DATE NOTICED IN MONITOR	: February 10, 2016

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G. L. c. 30, ss. 61-62I) and Section 11.06 of the MEPA regulations (301 CMR 11.00), I have reviewed the Expanded Environmental Notification Form (EENF) and hereby determine that this project **requires** a Mandatory Environmental Impact Report (EIR). The Proponent submitted an EENF to support a request to file a Single EIR, rather than a Draft and Final EIR, pursuant to Section 11.06(8) of the MEPA regulations. I hereby grant this request. The Proponent should submit a Single EIR in accordance with the Scope included in this Certificate, which is limited to clarifying wetland issues.

Project Description

As described in the Expanded Environmental Notification Form (EENF), the Project involves replacing weir boards that were removed from an existing outlet control structure in 2004. In 2007, Cedar Pond Creek was cleared of debris and sediment and the stream bed was lowered and widened in several locations resulting in higher levels of tidal flow into the Pond.

The purpose of the project is to improve water quality within Cedar Pond by reducing its salinity, to restore diadromous fish habitat, and to protect adjacent forested wetland habitat. Bacteria levels, eutrophication and low dissolved oxygen contribute to poor water quality. The proposed work includes replacing weir boards within the outlet control structure to establish an initial elevation of 1.45 meters. This board elevation was selected based on a review of tidal elevations in Cedar Pond and downgradient creeks to reduce salinity levels with a target salinity concentration goal of 1-4 parts per thousand (ppt). This board elevation will increase water levels by approximately 3.5 inches and limit most incoming tides from entering the Pond. The Cedar Pond Water Quality Management Plan included in the EENF also calls for pumping salt water out of the deepest portion of the pond into Cedar Pond Creek and reducing the double-crested cormorant population roosting on overhead power lines during late summer. Birds will be discouraged from roosting by illuminating them using hand-held, non-lethal lasers.

The Town of Orleans (Town) will develop an Adaptive Operations and Maintenance Plan to guide adjustment of board heights based on water level and salinity monitoring. The Plan will be developed in consultation with the Division of Marine Fisheries (DMF).

Project Site

The project site is the 15± acre-Cedar Pond, which is located southwest of the Orleans Rotary and is bounded by Route 6 (Mid-Cape Highway) to the north. Single-family residences abut the Pond to the east and south. A large forested wetland system (Bordering Vegetated Wetland) is located to the west and separated by an abandoned roadway (Cedar Pond Road). It is characterized as an Atlantic White Cedar Swamp. Overhead electric lines extend over the northeastern portion of the Pond, continuing to the west and east, parallel to Route 6. An outlet control structure, consisting of a concrete headwall, is located within the northeastern portion of the Pond and connected to an approximately 3 foot wide culvert underneath Route 6. The outlet control structure was installed during the construction of Route 6, although no there are no documented permits authorizing this work. Cedar Pond Creek extends north of Route 6 and under Rock Harbor Road, ultimately becoming Rock Harbor Creek which flows into Rock Harbor and Cape Cod Bay.

The project site is located in the Inner Cape Cod Bay Area of Critical Environmental Concern (ACEC). Cedar Pond and Rock Harbor Creek have been identified by DMF as diadromous fish habitat for alewife (*Alosa pseudoharengus*), white perch (*Morone americanus*) and American eel (*Anguilla rostrata*).

Historical evidence suggests that Cedar Pond was initially a fresh waterbody and managed as part of an alewife fishery/herring run. Weir boards had been in place within the outlet control structure since the construction of Route 6 in the late 1950's until 2004 when the boards were reportedly removed. Tidal flow was substantively increased into the Pond following extensive debris and sediment removal within the downgradient Cedar Pond Creek north of Rock Harbor Road in January 2007. These changes in 2007 have increased salinity levels (from 6 ppt to over 21 ppt) within the Pond.

Permitting and Jurisdiction

The project is subject to MEPA review and a mandatory Environmental Impact Report (EIR) pursuant to 301 CMR 11.03 (3)(a)(1)(b) and 11.03 (11)(b) because it requires a State Agency Action and will alter more than ten acres of wetlands and the project is located within a designated ACEC. The project requires a Superseding Order of Conditions (SOC) from the Massachusetts Department of Environmental Protection (MassDEP). The Orleans Conservation Commission's issued an Order of Conditions for the project which was appealed by a group of citizens. The project may be subject to federal consistency review from the Massachusetts Office of Coastal Zone Management (CZM). Although not indicated in the EENF, the project may require a Chapter 91 License from MassDEP.

Because the Town is not seeking Financial Assistance from the Commonwealth, MEPA jurisdiction is limited to those aspects of the project that are within the subject matter of required or potentially required permits that may, directly or indirectly, cause Damage to the Environment as defined in the MEPA regulations. These include land, wetlands, water quality, rare species, and greenhouse gases (GHG).

Environmental Impacts and Mitigation

The project will permanently alter[1] 15 acres of acres of Land Under Water (LUW). The purpose of the project is to restore water quality in the Pond through changes in salinity, biochemical oxygen demand (BOD), and other physical and chemical characteristics. I note that the Town's intention is to reestablish and improve conditions that were present prior to the unauthorized removal of the weir boards. Installation of the weir boards and management of the Pond will not result in direct impacts.

Mitigation measures proposed include improving and managing the water quality to establish favorable conditions for diadromous fish (alewife, white perch, American eel) migration, spawning, and nursery habitat. The EENF states that when suitable conditions are restored, seasonal migratory fish passage will be enabled through the opening of the weir boards or the installation of a fish ladder.

Single EIR Request

Subsequent to the filing of the EENF, the Town requested a two-week extension of the EENF comment period (to March 15, 2016) and provided supplemental information in support of a request to file a Single EIR, rather than a Draft and Final EIR, pursuant to Section 11.06(8) of the MEPA regulations. For the purposes of this Certificate, this supplemental information in combination with the original filing materials is referred to as the EENF.

[1] "Alter" is defined in the Wetlands Regulations as changing the condition of any area subject to protection under M.G.L. c. 131, § 40 (310 CMR 10.04).

A Single EIR may be allowed, provided that the EENF: a) describes and analyzes all aspects of the project and all feasible alternatives, regardless of any jurisdictional or other limitation that may apply to the Scope; b) provides a detailed baseline in relation to which potential environmental impacts and mitigation measures can be assessed; and, c) demonstrates that the planning and design of the Project use all feasible means to avoid potential environmental impacts. The EENF included documentation to support this request.

Review of the EENF

The EENF described existing conditions, provided a detailed project description including programmatic and physical elements, included existing and proposed conditions plans, identified environmental resources and proposed impacts, and identified measures to avoid, minimize and mitigate environmental impacts. It included the *Cedar Pond Water Quality Management Plan* (Attachment G) and associated Technical Memorandums (Attachments H & I) prepared by the Coastal Systems Group, School for Marine Science and Technology (CSP-SMAST), University of Massachusetts Dartmouth.

The *Water Quality Management Plan* provides a detailed review of: a) current conditions; b) conditions measured prior to 2007; and c) conditions if the Pond were converted back to its pre-existing freshwater system. The Plan concludes that if the weir boards are not replaced, water quality will continue to degrade and impacts to the abutting forested wetland system and the diadromous spawning and nursery habitat for alewife and white perch (Atlantic White Cedar Swamp) will intensify.

A goal of the project is to reverse impacts to the Atlantic White Cedar Swamp which includes loss of white cedar trees and stressed red maple trees. According to the EENF reducing salinity levels will serve to protect the Atlantic white cedar trees abutting the Pond, as well as the red maple trees and shrubs overhanging the embankments. The proliferation of common reed stands is not anticipated considering the presence of the overhanging woody vegetation along the majority of the Pond's shoreline. Reduced salinity levels may also facilitate re-establishment of the aquatic vegetation previously identified in the Pond, including pondweed (*Potamogeton spp.*), bladderwort (*Utricularia spp.*), and white water lily (*Nymphaea alba*).

The project is also intended to restore anadromous fish habitat within Cedar Pond for alewife and white perch. Increased salinity levels have stressed both populations which are historically associated within Cedar Pond. White perch have been most recently documented within the Pond in November 2015; however current population sizes of both species are unknown. As noted above, reducing salinity levels within the Pond will serve to enhance potential alewife or white perch spawning and nursery habitat. According to the EENF, when suitable anadromous fish spawning and nursery habitat conditions are restored, seasonal migratory fish passage in the spring and fall months will be enabled through the opening of weir boards or the installation of the fish ladder.

The *Water Quality Management Plan* concludes that Cedar Pond's ability to provide nitrogen attenuation of watershed loads has been eliminated and nitrogen will continue to be exported to the impaired Rock Harbor.

To attain water quality goals, the Town proposes to implement the following measures in sequence that will be followed by monitoring, assessment, and adjustment, as needed: a) restore the boards in the Cedar Pond water control structure to a height that allows only highest tides to enter the pond; and b) pump out the salt water in the deepest portion of the pond. The height of the boards will be determined by evaluation of the outlet structure and comparison to tidal information.

The EENF included an alternative analysis, noting project design criteria and physical and environmental constraints associated with the property. Specifically, the EENF included an analysis of: a No-Action Alternative a Berm Alternative; and, a Preferred Alternative.

The EENF indicated that the No-Action alternative was dismissed because it would not improve water quality. The No-Action alternative would leave Cedar Pond as a saline waterbody at salinity levels from 6 ppt to over 21 ppt. Existing salinity levels are not conducive to anadromous alewife or white perch spawning or nursery habitat. Furthermore, increased salinity levels threaten the adjacent freshwater vegetated wetland and associated wildlife habitat, including potential vernal pool habitat. Comments from the Cape Cod Commission support the project. Comments from CZM support the goals of the project while stressing the importance of an adaptive management plan.

The Friends of Rock Harbor comment letter questions the water quality goals and requests additional analysis of maintaining Cedar Pond as a saline waterbody. This alternative was considered in the *Water Quality Management Plan* and dismissed. The Town provided supplemental information addressing this alternative and noted that the *Plan* concluded that lower salinity will improve oxygen levels and lower nitrogen concentrations, in addition to achieving the ecosystem goals established by the Town (e.g., diadromous fish habitat restoration and forested wetland habitat protection) to produce a restored and more resilient ecosystem.

In addition, informal comments provided during the MEPA site visit suggested that potential concerns with impacts to the White Atlantic Cedar Swamp could be mitigated through construction of a berm within the abandoned section of Cedar Pond Road and installation of several culverts containing flapper valves to permit fresh water flow into the pond. The Berm Alternative was dismissed because it would result in permanent impacts to BVW and the ACEC.

Conclusion

Based on a review of the EENF, comment letters and criteria for granting a Single EIR, I have determined that the request for a Single EIR has merit. The EENF provided a sufficiently-detailed environmental baseline, provided a thorough discussion of the project's programmatic and physical elements, included a sufficient alternatives analysis, and identified potential impacts and measures to avoid, minimize and mitigate those impacts. The Preferred Alternative can be carried forward into the Single EIR. The Single EIR must present detailed information regarding the proposed Adaptive Operations and Maintenance Plan. This plan should clearly state goals in terms of ecological (e.g. fish passage) and water quality parameters as outlined below.

SCOPE

General

The Single EIR should follow Section 11.07 of the MEPA regulations for outline and content, as modified by this Scope.

Project Description and Permitting

The Single EIR should include a detailed description of the proposed project and describe any changes since the filing of the EENF. If changes are proposed, the Single EIR should include updated site plans for existing and post-development conditions at a legible scale. It should provide a brief description and analysis of applicable statutory and regulatory standards and requirements, and describe how the project will meet those standards. It should include a list of required State Permits, Financial Assistance, or other State approvals and provide an update on the status of each of these pending actions.

The EENF indicates that the project is exempt from c. 91 Licensing due to its location within the Route 6 right-of-way (ROW), which is under the jurisdiction of Massachusetts Department of Transportation (MassDOT). However, MassDEP comments indicate that this exemption only extends to bridge projects funded through the Transportation Bond Bill. The Town should determine if the project meets the criteria of 9.05(3)(c) and present its findings in the Single EIR.

Wetlands

The Single EIR should present detailed information regarding the proposed Adaptive Operations and Maintenance Plan. This plan should clearly state goals of the Plan in terms of ecological (e.g. fish passage) and water quality parameters; describe how storm events have been incorporated and identify associated management scenarios; and identify type and frequency of data collection to support project goals including vegetation, water level, pore water salinity, and water column salinity parameters. The Single EIR should also identify potential changes to wetland resource areas. In addition, it should identify contingency plans if monitoring does not demonstrate progress toward water quality goals.

I strongly encourage the Town to establish a technical advisory group to support the development and the implementation of the Adaptive Operations and Maintenance Plan.

The Single EIR should clarify the use of Cedar Pond as a nutrient sink within the context of the *Cedar Pond Water Quality Management Plan* as requested by MassDEP, CZM and DMF. Additionally, the proposal to install the weir boards will not address the salinity levels in the deepest portions of the pond and the Town has stated that it currently has no further plan for their remediation beyond pumping out this area. The Town also notes in the EENF that it is pursuing another proposal to address nutrient loading from avian sources, the details of which have not been finalized. The Adaptive Operations and Maintenance Plan must contain details necessary to

condition any proposed changes to Cedar Pond's water quality regime and should propose conditions for consideration by permitting agencies.

The installation of boards is expected to result in a maximum projected increase in pond water levels of approximately 3.5 inches. This may affect the septic systems of the surrounding homes, and thereby increase nutrient inputs to the pond. The Single EIR should address whether re-establishment of pond elevations will affect septic systems and analyze nutrient levels in the pond.

Fisheries Habitat

The *Water Quality Management Plan* includes a goal to establish favorable conditions for diadromous fish (alewife, white perch, American eel) migration, spawning, and nursery habitat. The *Water Quality Management Plan* indicates that when suitable conditions are restored, seasonal migratory fish passage will be enabled through the opening of the weir boards or the installation of a fish ladder. The structural design, operation and management of the outlet control structure will have a considerable impact on the effectiveness of supporting a healthy diadromous fish population in the pond. The Town should work with DMF to design the outlet control structure for fish passage and the Single EIR should present conceptual designs that could be incorporated into the outlet control structure.

Greenhouse Gas Emissions

The GHG Policy specifically includes a de minimis exemption for projects that are expected to produce minimal GHG emissions. This project appears to be consistent with the de minimis exemption; however, the Single EIR should formally request and document the project's applicability for this exemption.

Mitigation/Draft Section 61 Findings

The Single EIR should include a separate chapter summarizing proposed mitigation measures. This chapter should also include draft Section 61 Findings for each State Agency that will issue permits for the project. The Single EIR should contain clear commitments to implement mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

Responses to Comments

The Single EIR should contain a copy of this Certificate and a copy of each comment letter received. In order to ensure that the issues raised by commenters are addressed, the Single EIR should include direct responses to comments to the extent that they are within MEPA jurisdiction. This directive is not intended to, and shall not be construed to enlarge the scope of the Single EIR beyond what has been expressly identified in this certificate.

Circulation

In accordance with Section 11.16 of the MEPA Regulations and as modified by this Certificate, the Proponent should circulate a hard copy of the Single EIR to each State and Town Agency from which the Proponent will seek permits. A copy of the Single EIR should be made available for review at the Orleans Public Library.

March 25, 2016
Date

Matthew A. Beaton

Comments received:

02/26/2016 The Friends of Rock Harbor
03/01/2016 Cape Cod Commission
03/15/2016 Carolyn Kennedy
03/15/2016 Division of Marine Fisheries
03/15/2016 Massachusetts Office of Coastal Zone Management
03/15/2015 Judith Scanlon
03/22/2016 Massachusetts Department of Environmental Protection – SERO

To: Secretary Matthew A. Beaton

EOEA, Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Date: February 26, 2016

From: The Friends of Rock Harbor

LEC File #: TOO/15-11.01

Re: Cedar Pond Water Quality Management Plan, Orleans, MA: Response to the Environmental Notification Form prepared by LEC Environmental Consultants and dated January 29, 2016

CC: Daniel Gilmore, Wetlands and Waterways Programs, MA Dept. of Environmental Protection, 20 Riverside Dr., Lakeville, MA 02347
Orleans Conservation Commission
Orleans Water Quality Task Force
George Meservey, Orleans Planning Director
John Kelly, Town Administrator, Orleans
Carolyn Kennedy, Orleans Water Quality Task Force
Brian T. Madden, Wildlife Specialist, LEC Environmental Consultants, 12 Resnik Road, Unit 1, Plymouth, MA 02360
Board members, Friends of Rock Harbor

Dear Secretary Beaton:

A number of flaws in this Environmental Notification Form (ENF) make it imperative that the Friends of Rock Harbor, the original petitioners for Departmental Action, correct the record and urge that a full and complete management plan be developed by the Town of Orleans for Cedar Pond.

When the Cedar Pond Water Quality Management Plan (CPWQMP) was developed originally for the Town of Orleans (2013), it did not include a comprehensive analysis of the two primary alternative futures for Cedar Pond: 1) continuation as a saline estuarine water body within the tidal reach of Cape Cod Bay, or 2) alteration into a brackish water body sealed off from the effects of Cape Cod Bay. Instead the CPWQMP made the case only for the brackish alternative.

The flaws in this ENF flow directly from the fact that the LEC Consultants were responding to a management plan that was in itself insufficient. Therefore we have organized our response to the ENF as a consideration of the saline estuarine alternative. After critiquing the ENF from this perspective we outline briefly what we maintain would be a sensible series of steps to be taken by the Town of Orleans to manage Cedar Pond over the next five years.

If the original CPWQMP had done a full alternatives analysis, then the LEC consultants would have been likely to consider the following facts:

a. evidence that the water quality in Cedar Pond has in fact has not declined since removal of the pen boards in 2004 and cleaning of Rock Harbor Creek in 2007. The Report fails to even acknowledge the existence of a 2014 study by Amy Costa of the Center for Coastal Studies and sponsored by the Orleans Pond Coalition (Costa, 2014) the findings of which relate specifically to the saline alternative; that is, the health of the water body as a salt water pond. (See Appendix 1). The findings show that the total nitrogen in Cedar Pond has not increased as the pond has become more saline, except as a result of a single algae bloom in late summer, 2015. Additionally, water clarity is improving (Figure 2, Appendix 1) and increased mixing events are introducing oxygen into the deeper waters of the pond (Figure 3, Appendix 1) that were previously believed to be anoxic during most of the summer and fall. The findings directly contradict the repeated claim made in the ENF report that the pond has become increasingly impaired as its salinity has increased. The failure to consider them stems from the fact that the original CPWQMP did not fully consider the advantages along with any shortcomings of the saline alternative.

b. The LEC report fails to report the presence of anadromous and salt water species that have been documented in Cedar Pond as recently as 2014. These species include striped bass, blue fish, blue claw crabs, shrimp, and barnacles. This oversight is again a function of the bias toward the brackish alternative found in the original CPWQMP.

c. Had the LEC been able to consider the salt water alternative, its authors might then have used existing data to properly test the hypothesis that such an alternative would lead to increased nitrogen levels in Rock Harbor. Although the LEC report transmits the faulty CPWQMP assertion of this claim, data collected by the Town of Orleans Water Quality Task Force between 2004 and 2014 *show no such increase.* See Appendix 2, which shows a steady *decline* in total nitrogen (TN) and no change in dissolved organic nitrogen between 2003-2014. The hypothesis that the increased salinity of Cedar Pond has led to a decline in water quality at Rock Harbor is not valid. Not considered by the report is the capacity of Rock Harbor marsh to absorb nitrogen as it leaves Cedar Pond and travels through the marsh to the harbor.

d. Full consideration of the salt water alternative would also have led to the question of whether fish kills had occurred during the past five years, during which the water has become increasingly saline. The fact is that no such fish kills have taken place, in contrast to the brackish condition, during which fish kills were a repeated occurrence with a major fish kill in 2001 prior to removal of flashboards and a less significant kill in 2008 when the pond was transitioning from brackish to the higher salinity; (Eichner, Howes, and Schlezinger, 2013).

e. While giving no consideration to the positive impacts of keeping Cedar a salt water pond, the LEC authors proceed to put forward the claims of negative impact related to the saline alternative originally proffered by the CPWQMP that are open to question. These include the following:

1) that establishment of a herring run is feasible.

Whether or not such a run existed in the past, we contend that a herring run is untenable under present circumstances, even in a brackish condition. Successful reestablishment of a herring run by inserting flashboards is highly unlikely, given the negligible elevation difference between

Cedar Pond and Rock Harbor marsh and the documented overflow of salt water *over the top of* the flashboards during seasonal high tides in Cape Cod Bay (which will intensify as sea levels in the Bay rises due to climate change). Also note a 1989 letter from the Department of Marine Fisheries included in our Appeal stating that a herring run is not feasible: "...the present flow and the potential spring flow from Cedar Pond is much too small to adequately support an Anadromous fish run."

2) that the salt water condition will damage a white cedar swamp northwest of the Pond. This swamp is better characterized by its predominant species as a red maple swamp. The few white cedar remaining and all other species can easily be protected by the Town of Orleans simply by building an earthen berm along what was once Cedar Pond road with several culverts containing flapper valves that will allow the fresh water from the swamp into Cedar Pond by keeping any saline water from the Pond from flowing west into the swamp.

3) that a possible vernal pool is threatened by salt water. Visual inspection indicates that a considerable amount of fresh water from the swamp to the west gathers along the remains of Cedar Pond road and currently is inhibited from flowing directly into Cedar Pond by blockage of the culverts that once passed under the old road. There is no verification that this is a vernal pool, although this possibility cannot be ruled out. As stated above, the simple and inexpensive solution for the Town is to build an earthen berm along the old road that includes several culverts containing flapper valves to permit fresh water flow into the Pond.

We challenge several other claims made in the ENF prepared by LEC Environmental Consultants:

a. that the insertion of the pen boards will not lead to erosion. Although there may be no discernible effects on the Pond shoreline, the effect on the banks of Rock Harbor creek where it exits the Pond and at the Rock Harbor Road culvert will be considerable. Even with the boards out we are seeing erosion of the banks on either side of the Rock Harbor Road culvert, and this impact will grow when water backs up because it cannot enter the Pond. In addition, an Orleans resident with land bordering the creek is experiencing flooding of his property during seasonal high tides that is likely to worsen if tidal waters cannot enter Cedar Pond.

b. that specified fresh water plant species existed prior to 2007. This claim is not backed by anything except hearsay evidence.

c. the implication from the SMAST Technical Memo (January, 2016) that there was a dramatic worsening of the Cedar Pond water quality during the summer of 2015. The data gathered by the Center for Coastal Studies indicate that this was due to an anomalous algae bloom in August of last year which could as easily have resulted from increased cormorant defecation as from anything related to the salinity of the water.

Given these major flaws in the Town's response to the MEPA request for an ENF, as reflected in the LEC Environmental Consultants Report, we maintain that it would be inappropriate and perhaps illegal to prevent salt water from entering Cedar Pond at this time, and that the preferred alternative is to maintain it in its saline condition. Cedar Pond has been increasingly saline since 2004, more than a decade, and we continue to believe that changing this salt pond to a fresh/brackish system is in violation of the MA Wetlands Protection Act, Chapter 131, Section 40, which prohibits alteration of a saltwater wetland in a manner that would affect the fisheries in that wetland. The Town of Orleans has not shown the water quality in Cedar Pond

has worsened under the saline condition, nor is there evidence that nitrogen from the Pond has led to worsening water quality in Rock Harbor.

An appropriate management plan for maintenance of Cedar Pond as a saline estuary of Cape Cod Bay needs to be implemented immediately. It should include the following steps:

1. the removal of the cormorant perch above the pond, in order to eliminate the nitrogen that the birds deposit into the pond every summer. Until this major source of nitrogen is removed it will be impossible to assess the impacts of other mitigating efforts on water quality.

2. the construction of a berm between old Cedar Pond road and the northwest shoreline of the Pond. This berm should contain several culverts containing flapper valves that permit fresh water from the cedar swamp to flow into the Pond but prevent any salt water from the Pond to flow west into the swamp. This low cost solution will protect the adjoining swamp and any species that might be living within it.

3. continued monitoring of water quality over the next five years. Monitoring on a five year schedule will allow time for the power lines above the Pond to be buried and an assessment of the water quality changes resulting from that major alteration. If the data do not show water quality improvements in Cedar Pond that meet the criteria set by the Town of Orleans and the Commonwealth of Massachusetts, then a full analysis of other alternatives can be undertaken, ranging from further opening the Pond to salt water flushing by insertion of larger culverts under Rt. 6 and Rock Harbor Road to the reinsertion of the pen boards to reduce Pond salinity.

Appendix 1: Cedar Pond Water Quality

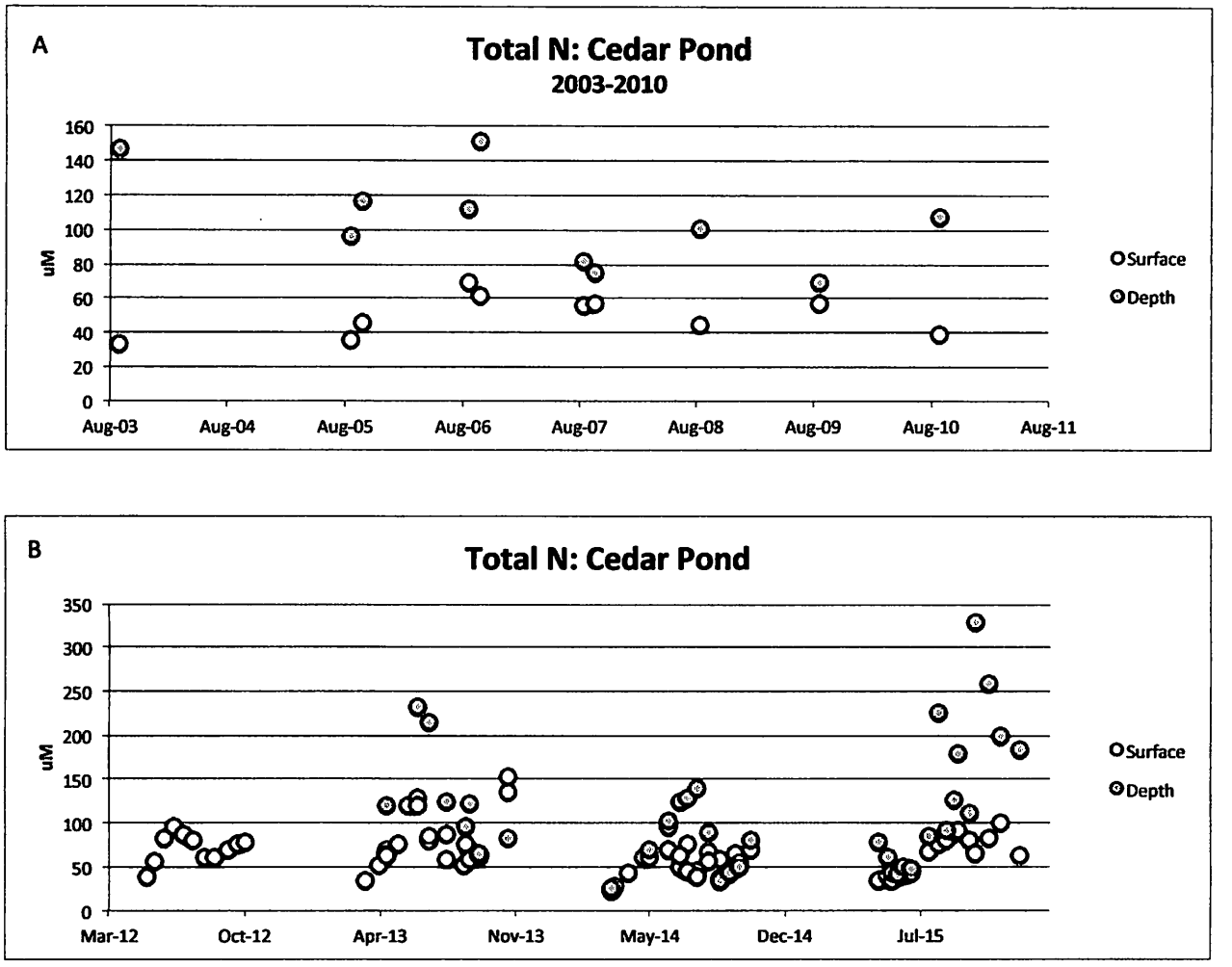


Figure 1. Total nitrogen concentrations measured in Cedar Pond. A) Data collected by the Town of Orleans WQTF since 2003. B) Data collected by the Center for Coastal Studies since 2012.

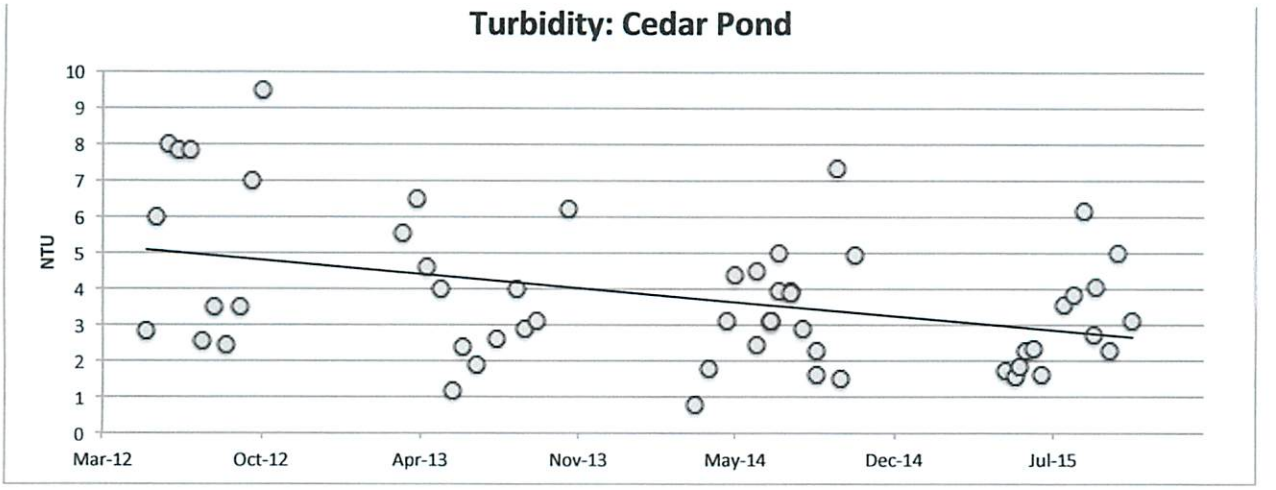


Figure 2. Turbidity levels measured in Cedar Pond since 2012 by the Center for Coastal Studies.

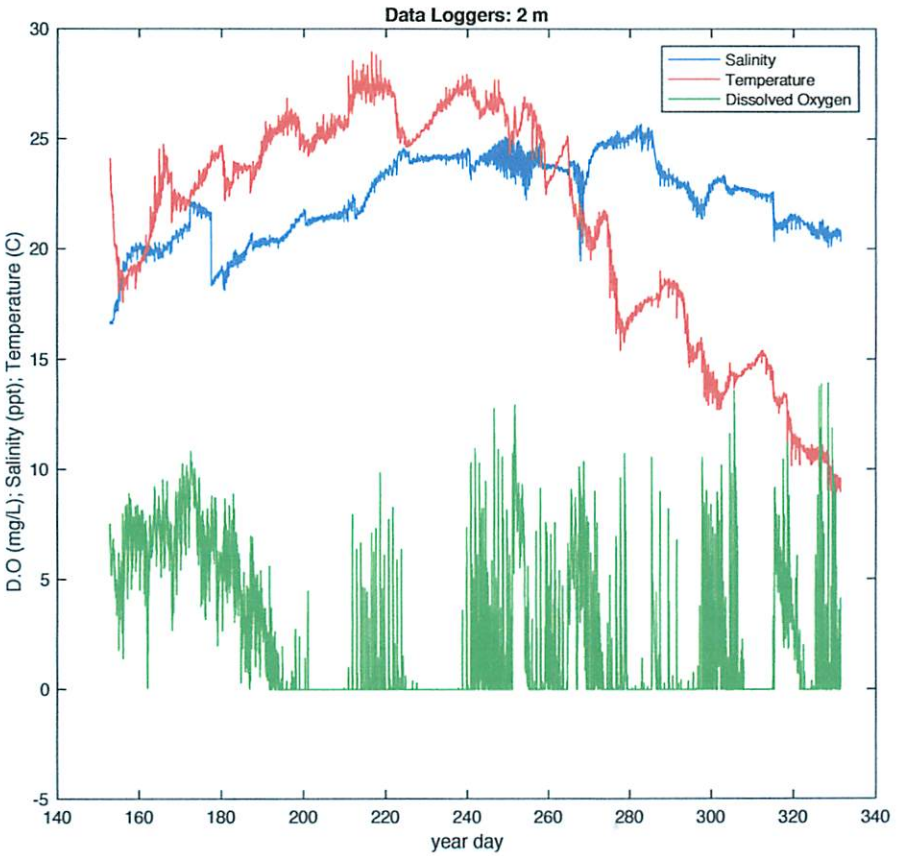


Figure 3. Data recorded by loggers placed at 2 m depth in Cedar Pond showing several mixing events which introduced dissolved oxygen into deeper waters of the pond previously believed to be anoxic.

Appendix 2: Rock Harbor Water Quality

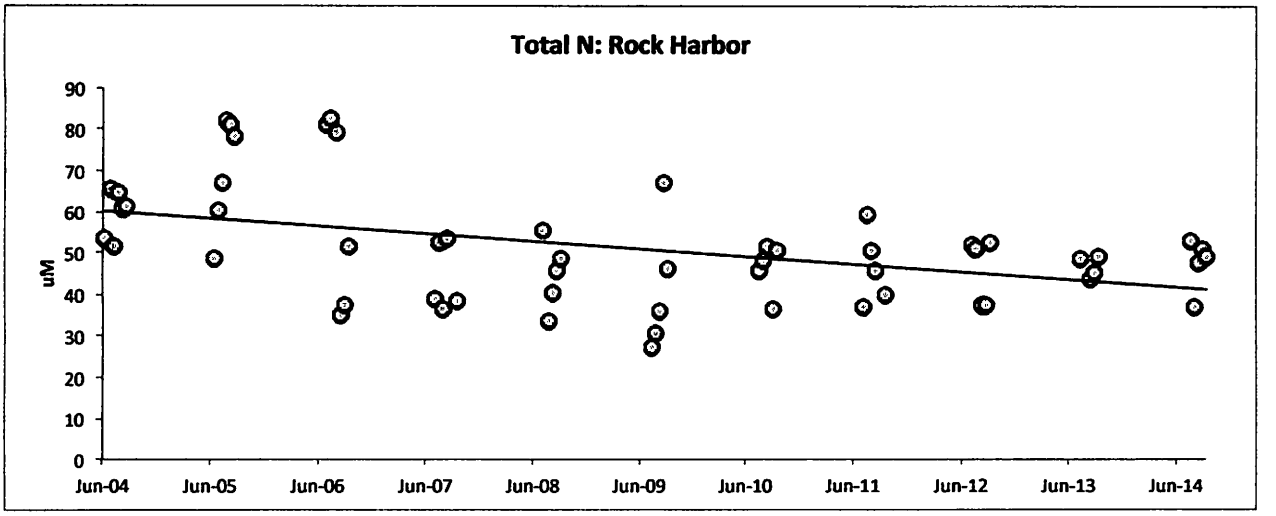


Figure 1. Total N concentrations measured in Rock Harbor. Data collected by the Town of Orleans WQTF since 2003.

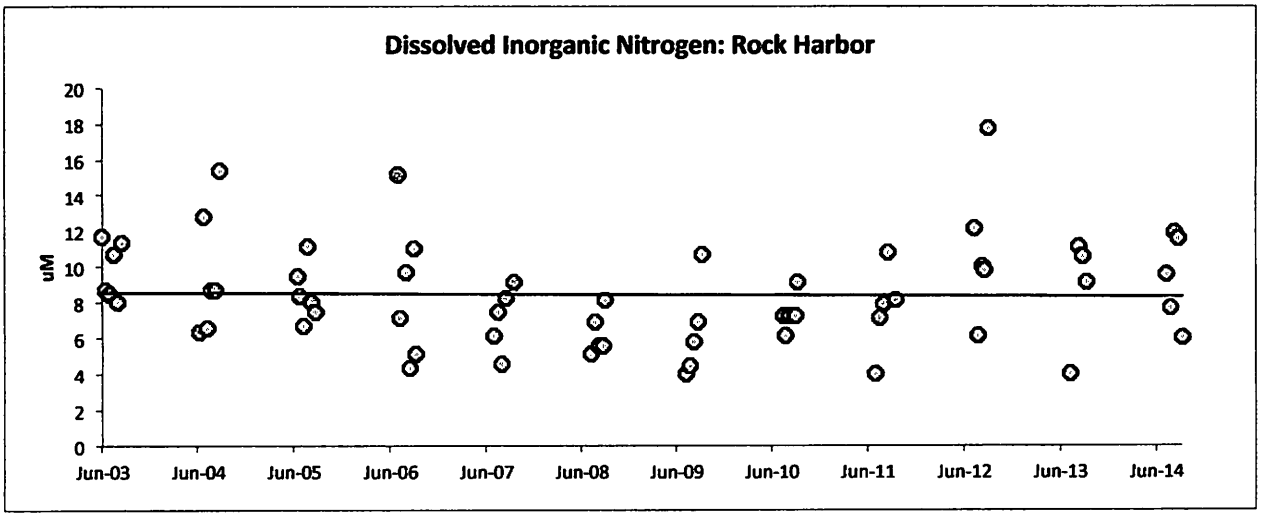


Figure 2. Dissolved inorganic nitrogen concentrations measured in Rock Harbor. Data collected by the Town of Orleans WQTF since 2003.

3225 MAIN STREET • P.O. BOX 226
BARNSTABLE, MASSACHUSETTS 02630

(508) 362-3828 • Fax (508) 362-3136 • www.capecodcommission.org

CAPE COD
COMMISSION

By Electronic Mail

March 1, 2016

Matthew A. Beaton, Secretary
Executive Office of Energy and Environmental Affairs (EEA)
Attn: MEPA Office, Anne Canaday, Analyst
100 Cambridge Street, Suite 900
Boston, MA 02114

Re: ***Environmental Notification Form - EEA No. 15474***
Cedar Pond Water Quality Management Plan- Town of Orleans
(CCC Project No. 16003)

Dear Secretary Beaton:

Cape Cod Commission staff has reviewed the ENF on the above-referenced project as a water quality management initiative, and provides the following water resource comments.

Cedar Pond lies within the Rock Harbor Watershed, a nitrogen-impaired watershed requiring a 59% reduction in total nitrogen load according to the Massachusetts Estuaries Project (MEP). The MEP analysis for Rock Harbor was conducted in 2007 and at the time of the MEP report, Cedar Pond was considered a brackish pond, providing nitrogen attenuation at a rate of 58%, effectively reducing nitrogen load to Rock Harbor. However, various interventions over time have resulted in increased salinity of the pond. With the increase in salinity, changes have occurred to its biogeochemistry, governing how nutrients interact within the Cedar Pond system. Currently, the pond exhibits evidence of nutrient impairment and acts as a net source of nitrogen to Rock Harbor during early summer.

Ortho-photos from 1947 indicate the pond was historically a freshwater system, likely unaffected by nitrogen concentrations. At that time, a flapper valve in Rock Harbor Creek (later replaced by a weir) inhibited tidal flow into Cedar Pond. A storm damaged the Rock Harbor Creek weir in 2005, but it wasn't until debris was cleared from the creek in 2007 that salt water was allowed to flow freely into Cedar Pond. A review of historical water quality data confirms that following the 2007 clearing, water quality parameters in Cedar Pond began to shift from exhibiting characteristics of a brackish regime to developing characteristics of a more saline regime.

In 2012, SMAST synthesized historical data and collected new data to further characterize the Cedar Pond system. Evidence of higher tidal exchange was evidenced by higher salinity measurements: on average, salinity measurements in Cedar Pond outflow increased from 7.5 ppt in 2007 to 20.9 ppt. in 2012. Additionally, increases in shallow chlorophyll-a concentrations

(a proxy for algae growth) and decreases in water clarity were indicative of nutrient impairment. Through measurements of both total nitrogen (TN) and total phosphorous (TP), SMAST found the eutrophying nutrient in Cedar Pond to be both nitrogen and phosphorous; the nutrient ratio is still in the range where addition of either nutrient could lead to phytoplankton blooms and worsen water quality conditions.

The proposed project intends to reinstall weird boards at the Cedar Pond Outlet to Rock Harbor Creek in order to inhibit tidal flows. The boards will be set at a height so as to allow only the highest tides to dispense saltwater into Cedar Pond. According to the ENF, the Town proposes to develop an adaptive O&M Plan for adjusting board height based on continuous monitoring of pond heights and salinity.

Installation of the boards will reduce saltwater flow to the pond, effectively reducing pond salinity to a brackish system (1-4 ppt). As such, it is anticipated that Cedar Pond will begin to attenuate nitrogen year-round and will no longer seasonally contribute nitrogen to the already-impaired Rock Harbor system. Restoring Cedar Pond's ability to attenuate nitrogen and thus reduce nitrogen loading to the nitrogen-impaired Rock Harbor aligns with Section 208 Areawide Water Quality Management Goals. In addition, lowering the salinity in Cedar Pond will enable Cedar Pond to support spawning herring. Also at the brackish concentration, Cedar Pond will no longer serve as a potential threat to the adjacent Atlantic White Cedar Swamp, whose ecosystem could be harmed by saltwater intrusion.

CCC staff support this proposed project and suggest that the additional recommendations from the SMAST 2013 report appear to be a reasonable approach to restoring the water quality and ecosystem of Cedar Pond.

Thank you for the opportunity to provide comments on the above-referenced ENF. Cape Cod Commission staff is available and happy to answer any questions about these comments.

Sincerely,

Patty Daley
Deputy Director

Cc: Project File
Brian Madden, LEC, Project Consultant via email
George Meservey, Orleans Town Planner via email
Town of Orleans Cape Cod Commission representative via email

Secretary Matthew A. Beaton
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 200
Attn: MEPA Office
Boston, MA 02114

Subject: ENF, Cedar Pond, Orleans

March 15, 2016

Dear Secretary Beaton:

This letter is in support of the Town of Orleans and the effort by our community to move forward with the restoration of Cedar Pond. Specifically, we are responding to the ENF filed for Cedar Pond in Orleans, Massachusetts, the statements and questions during the site visit on March 1, 2016, and flawed assertions about the project by Friends of Rock Harbor.

Cedar Pond, named for the adjacent Atlantic White Cedar swamp, is surrounded by swampy wetlands with a narrow creek winding northward through salt marsh habitat to Rock Harbor on Cape Cod Bay.

Because of its 15-acre size it is defined as a Great Pond by the Commonwealth and appears in the *Massachusetts Year 2014 Integrated List of Waters* (303 [d] list) because of its high levels of Chlorophyll-a, low Saturated Dissolved Oxygen and Oxygen, Dissolved. It is unfit for swimming or boating. It has had a number of documented fish kills; has measured anoxia throughout a number of summers; and is impacted by large cormorant flocks that roost on the regional transmission lines that span the pond. Discussion of fish and wildlife issues are continued below.

Historical Perspective

Historic information indicates that Cedar Pond was originally a freshwater kettle pond left by the glaciers. A number of documents and maps show its freshwater origins:

- The Commonwealth was petitioned in 1837 to license a herring run in the creek leading to Cedar Pond.
- Articles and photos from 1920 show a commercial ice house operation on the pond.
- Cedar Pond was used as the irrigation water source for adjacent cranberry bogs that were located where the nearby Stop & Shop and its parking lot now stand.

All of these would have required the pond to be fresh water.

The pond has been changed by the number of human actions that have adversely impacted its freshwater ecosystem. For the construction of Route 6 in the 1950's, several acres of the northern edge of the pond were filled in. Powerlines in the roadway layout were moved to span the pond. The pond's outlet creek was changed to drain through a pipe under the highway. A water-level control structure was constructed at the edge of the pond at that time.

An earth-mound berm and flapper valve spanning the salt marsh north of the pond were constructed in the late 1800's. The upper marsh between Rock Harbor Road and the berm was partially filled in to

become a vegetable farm. When the flapper valve and berm failed, salt water moved closer to the pond.

In 2007, a group of volunteers cleaned out debris that had accumulated in the creek in the upper marsh and used a backhoe to lower and widen the stream bed in several locations. This project was approved under an Administrative Review, but clearly involved more substantial alterations that should have triggered an EIR. This effort, with the intent of increasing fish passage, allowed a greater volume of salt water to reach the pond and significantly changed the salinity to a level now unusable by herring. Frogs and turtles have disappeared.

Water Quality Concerns

Cedar Pond has been in decline for a number of years. A letter on file dated 1995 documents the impact of defecation by roosting Double-crested Cormorants on the water quality. There has been a protracted discussion about remediation with a succession of utility companies that have owned the over-water power lines. Recently Eversource has agreed to bury the lines under the pond to remove this bird roosting site which attracts over 600 birds each evening in late summer and fall. $1.1 million in funding is currently being sought. Removal of the power lines will, over time, help water quality. However, decades of nutrient-rich sediments have been deposited under the power lines. The oxygen demand of the sediments causes severe anoxia in the pond each summer. The nutrients feed a profusion of aquatic plants (and now marine algae) that die and recycle into the sediments each year. Bacterial contamination is also high. This has made the pond virtually unusable by abutting property owners and the public.

Monitoring data show that over the period from 2002 to 2014 the salinity has increased, precipitously since the 2007 creek clean-out. This has made the pond nitrogen-sensitive, destroyed habitats for species that need fresher waters, destroyed the spawning resource for diadromous fish, killed off shoreline Atlantic White Cedars and threatened the rare adjacent Atlantic White Cedar swamp. Indicator species of freshwater that were present in 2003 (waterlilies), 2006 (duckweed) are no longer present. They have been replaced by murky water and foaming mats of algae that make paddling a kayak or canoe a challenge!

The shoreline vegetation that is present today still reflects the pond's freshwater origins (see species listed in the LEC ENF report). The shoreline and Atlantic White Cedar swamp to the west contain approximately 150 Atlantic White Cedar trees. The current salinity of the pond has stressed the shoreline trees including red maples and now several dead Atlantic White Cedars. The Atlantic White Cedar swamp habitat is threatened by variable water height and salinity in the pond. Currently, during lunar high tide cycles the surface water flowing from the swamp toward the pond has been seen to reverse its flow thereby carrying saline pond water back into the swamp. To suggest, as the appealer has, that the swamp be protected by a berm and flapper valves would be inconsistent within current ACEC and Wetland Protection Act goals and is likely to be un-permittable. A berm would block public and utility company access. These are examples of why the 2007 alteration should have been more thoroughly reviewed.

Decreasing salinity will restore diadromous spawning grounds. The current inventory of wildlife in the pond include estuarine species that survive in a wide variety of salinities. In its past lower salinity state, the pond was spawning habitat for herring (documented in 2005) and for white perch that seek

freshwater or water with low salinity in reproductive portions of the life cycles. White perch are still present but at the upper limit of their salinity tolerance for spawning.

Several fish kills have been documented in Cedar Pond due to its unstable condition. It is difficult to attribute these to particular circumstances other than anoxic conditions due to warm water temperatures, algal respiration and decay, biological oxygen demand, or a combination of factors that occurred during each incident.

The Town of Orleans has been working on the details of its Comprehensive Wastewater Management Plan throughout the past 15 years. A plan was overwhelmingly passed by Town voters in 2011, but continuing studies and refinement of the plan have delayed full implementation. In order to move forward with remediation of freshwater ponds, the Marine and Fresh Water Quality Task Force, a Town committee, has taken on the task of analyzing specific ponds and making recommendations to the Board of Selectmen for remediation strategies. Cedar Pond has been sampled continuously since 2002 and was chosen by the Task Force as the pond with the most significant water quality issues.

UMASS Dartmouth, School of Marine Science and Technology (SMAST) has served as marine and aquatic science advisors to the Town since 2000. The Town has been engaged in discussions about the fragility of the Cedar Pond ecosystem for many years. SMAST deployed continuously recording sondes in the pond during the summers of 2009, 2012 and 2015, measuring dissolved oxygen, temperature, and salinity at high frequencies. Despite higher salinity, there are still two layers of water in the pond that do not readily mix. During the course of all the measurements water quality has declined. This was further reinforced in the summer of 2015 when the bottom layer was consistently anoxic with 84% of the readings between June and September at less than the MassDEP regulatory minimum.

In 2012, the Town engaged SMAST to further study Cedar Pond and make recommendations on management alternatives to return it to a healthy ecosystem. The resulting management plan was approved by the Board of Selectmen in 2013 following public hearings. In is present condition, the pond is sensitive to all the incoming nitrogen in the groundwater basin, to nutrients provided by cormorant excrement, and to sediment regeneration. The plan takes a management approach to return the pond to low salinity brackish conditions that existed prior to 2007 where the spawning habitats will be restored, cormorants will be managed, the swamp will be protected, and nitrogen will be less of an issue. A similar approach was used in Oyster Pond in Falmouth, MA and has succeeded in creating a healthy ecosystem at that location. This approach was chosen as the best alternative – one that would allow management toward a healthy ecosystem and work in coordination with the Town's sewering plan.

Current Situation

The current decision before MEPA is to allow replacement of removable pen boards in the water control structure at Cedar Pond. This is a beginning step in the plan. This does not "seal off" the pond. It allows the accumulating groundwater and precipitation to exit the pond and a controlled amount of salt water to enter the pond during high tide cycles. This approach will maintain a more consistent surface level for abutters concerned about flooding of their properties from in-coming tides. This was a major consideration of the management plan. Along with the implementation of further steps in the plan, this will lead to a low salinity, brackish pond with improved water quality. The entire plan should also have a positive impact of water quality in Rock Harbor.

The Town is also working with MA Department of Marine Fisheries to ensure that pen board management will attain the goal of restoring a diadromous fish run.

The appealer also notes creek bank erosion (outside the pond) north of Route 6. The cause of this erosion adjacent to Rock Harbor Road should be checked by highway engineer. It is not a function of the water control structure at Cedar Pond but the size of the culvert under the road and the creek clean-out efforts in 2007 that created additional water pressure at the culvert on an in-coming tide. Water is forced through the culvert at an unnaturally high velocity and bank scouring occurs as a result.

Conclusion

Cedar Pond has become increasing eutrophied to the point of high instability of the pond ecosystem. Wide-spread summer anoxia threatens to create further habitat damage. The pond is unusable for swimming, fishing, or boating. Abutters have suffered for many years from attempts to remove the cormorants. The Town has completed stormwater remediation improvements along adjacent roads. The extensive research that has gone into this process in listed on page 5 of this letter.

It is now time to move ahead with the ***Cedar Pond Management Plan*** and start the water quality improvement process.

MEPA approval of the Order of Conditions from the Conservation Commission and Town's plan will enable this process to begin.

Thank you for your consideration.

Carolyn L. Kennedy

Chair, Marine and Fresh Water Quality Task Force, Orleans

cc: Anne Canaday, MEPA Environmental Analyst

Daniel Gilmore, DEP, Wetlands and Waterways Program

John Kelly, Town Administrator, Orleans

George Meservey, Planning Director, Orleans

Brian Madden, LEC Environmental Consultants

Orleans Conservation Commission

Orleans Marine and Fresh Water Quality Task Force

Friends of Rock Harbor

The following studies have been conducted on Cedar Pond for the Town:

2003 : ***Cedar Pond Restoration of Herring Run,*** Orleans Water Quality Task Force

2007: ***Linked Watershed-Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Rock Harbor Embayment System, Orleans, MA .*** This MEP for Rock Harbor documented the groundwater basin and land use patterns in the watershed.

2007: ***Review and Interpretation of Orleans Freshwater Pond Volunteer Monitoring Data,*** documents the anoxia in the bottom waters of the pond while "the shallowest waters on average are supersaturated, which is usually indicative of extensive algal photosynthesis." (pg 66) The study recommends further analysis as part of the Massachusetts Estuaries Project.

2010: ***Rock Harbor Creek, Restoration Feasibility Study,*** Applied Coastal Research and Engineering. Documents the hydraulics and elevation of the creek from Rock Harbor to Cedar Pond.

2011: Cormorant population studies, Orleans Marine and Fresh Water Quality Task Force, 2011, 2012, 2015.

2013: ***Cedar Pond Management Plan,*** SMAST/UMASS Dartmouth.

2013: Documentation of Atlantic White Cedars adjacent to Cedar Pond, Orleans Marine and Fresh Water Quality Task Force.

2014: ***CSP/SMAST Technical Memorandum: Board Height Recommendation for Cedar Pond Outlet: Task 1 of Cedar Pond Adaptive Management and Monitoring Program.***

Roadway Water Quality Improvements surrounding Cedar Pond:

2008: MASS-DOT installed leaching basins along Route 6 adjacent to north side of Cedar Pond.

2011: Stormwater drains along Locust Road (south side of Cedar Pond) were remediated with infiltration basins to eliminate direct roadway discharge and its associated nutrients from flowing into Cedar Pond.

Cedar Pond

Water Quality Management Plan

Goals:

To re-establish in Cedar Pond a healthy pond ecosystem that meets state standards for water quality.

To return Cedar Pond to a low salinity, brackish pond to attenuate nitrogen input.

To create passage for diadromous* fish for migration and spawning.

To respect the concerns of abutters for flood protection and return of recreation potential to the pond.

Steps:

1. **Limit salt water intrusion into the pond.**
   - **Action:** Short-term, replace degraded pen boards in the control structure within Cedar Pond and continue to manage structure for migratory fish species.
   - **Timing:** September 2013

2. **Disperse population of double-crested cormorants roosting on NSTAR wires that span the pond in order to reduce nutrient introduction from droppings.**
   - **Action:** Meet with NSTAR to reach consensus on solutions for cormorant dispersal. Work with USDA to determine equipment and personnel costs and implementation plan.
   - **Timing:** ASAP to put plan in action for spring 2014.

3. **Design and carry out water quality monitoring plan for Cedar Pond.**
   - **Action:** Contact consultant for cost estimate for plan preparation.
   - **Timing:** Fall 2013

4. **Augment salinity reduction by pumping highly saline, bottom water from Cedar Pond into Rock Harbor Creek during winter months.**
   - **Action:** RFP for engineering pumping system. Identify regulatory requirements and costs.
   - **Timing:** Fall 2013 into Winter 2014

5. **Survey Atlantic white cedar swamp for parcel ownership and dominant tree species.**
   - **Action:** WQTF to conduct survey of swamp and investigate ecological restoration.
   - **Timing:** Fall 2013

6. **Design and implement water control and fish passage structures to ensure water level control within pond, flood protection for abutters, and diadromous fish passage (e.g. white perch, herring, American eel).**
   - **Action:** Initiate discussions with appropriate state and federal agencies regarding feasibility. Create future year work plan including grant applications for funding.
   - **Timing:** Winter 2014

7. **Evaluate potential to treat pond sediments to decrease nutrient releases and improve water quality.**
   - **Action:** Continue water quality monitoring to determine appropriate future actions and timing.
   - **Timing:** Future consideration after decreased salinity and cormorant dispersal has been accomplished.

(*Diadromous describes species of fish that migrate between fresh and salt water as part of their life cycle.)

Commonwealth of Massachusetts

Division of Marine Fisheries

251 Causeway Street, Suite 400
Boston, Massachusetts 02114
(617) 626-1520
fax (617) 626-1509

David E. Pierce
Director

Charles D. Baker
Governor
Karyn E. Polito
Lieutenant Governor
Matthew A. Beaton
Secretary
George N. Peterson, Jr.
Commissioner
Mary-Lee King
Deputy Commissioner

March 15, 2016

Secretary Matthew A. Beaton
Executive Office of Energy and Environmental Affairs (EEA)
Attn: MEPA Office
Anne Canaday, EEA No. 15474
100 Cambridge Street, Suite 900
Boston, MA 02114

Dear Secretary Beaton:

The Division of Marine Fisheries (*MarineFisheries*) has reviewed the Environmental Notification Form (ENF) by the Town of Orleans for the Cedar Pond Water Quality Management Plan. This ENF specifically relates to weir board installation to an elevation of 1.45 meters. The goal of the board installation is to limit most tidal inflow as part of a plan to reduce Cedar Pond salinity to a target range of 1-4‰. Overall project goals are listed as water quality improvement, restoration of diadromous fish habitat, and protection of adjacent forested wetland habitat. Existing marine fisheries resources and potential project impacts to these resources are outlined in the following paragraphs.

Cedar Pond, via Rock Harbor Creek, has been identified by *MarineFisheries* as diadromous fish habitat for alewife (*Alosa pseudoharengus*), white perch (*Morone americanus*) and American eel (*Anguilla rostrata*) [1]. The ENF notes documented observations of alewives (2001, 2004) and white perch (2001, 2015) in Cedar Pond.

MarineFisheries offers the following comments for your consideration:

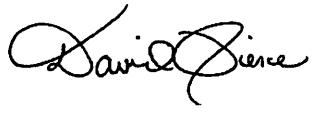
- The weir board installation described in this ENF is designed to reduce salinity and improve nitrogen attenuation within Cedar Pond, not reduce nitrogen inputs into this aquatic system. *MarineFisheries* continues to recommend the development of strategies for source reduction. Deterrence of cormorant roosting over Cedar Pond should partly address nitrogen source reduction (Cedar Pond Water Quality Management Plan P. 38), and *MarineFisheries* encourages continued development of complementary strategies to reduce other nitrogen sources. A discussion of potential nitrogen sources other than cormorants (e.g., septic inputs [2]) would be beneficial.
- As an Ecological Restoration Project with target goals of improving water quality and restoring diadromous fish habitat, the management plan should include a detailed water quality monitoring plan to assess the impacts of the proposed modification. If successful, the proposed overall management plan would restore water quality and manipulate salinity to provide spawning habitat for white perch and alewives. The management plan should include target thresholds for relevant water quality parameters and contingency plans for board removal if target goals are not met through the proposed management

plan. If salinity manipulation is not successful in improving water quality, alternative approaches should be documented in the overall management plan that include improvements to marine resources through enhanced tidal exchange.

- As noted in the ENF (P. 3), an adaptive Operations and Maintenance Plan should be developed in consultation with *MarineFisheries* to ensure that the proposed work is consistent with its stated goals of improving water quality and restoring diadromous fish habitat. For the latter goal, boards will need to be manipulated to allow for spring and fall migrations of diadromous fishes in and out of Cedar Pond.

Questions regarding this review may be directed to John Logan in our New Bedford office at (508) 990-2860 ext. 141.

Sincerely,



David E. Pierce
Director

cc: Orleans Conservation Commission
Brian Madden, LEC Environmental
Christopher Boelke, Sue Tuxbury & Alison Verkade, NMFS
Robert Boeri, CZM
Ed Reiner, EPA
Ken Chin, DEP
Richard Lehan, DFG
John Sheppard, Brad Chase, Kathryn Ford, Christian Petitpas, DMF

References

1. Evans NT, Ford KH, Chase BC, Sheppard J (2011) Recommended Time of Year Restrictions (TOYs) for Coastal Alteration Projects to Protect Marine Fisheries Resources in Massachusetts. Massachusetts Division of Marine Fisheries Technical Report, TR-47.
2. Costa A (2014) A Study of Cedar Pond and the Rock Harbor Estuary. Submitted to Orleans Pond Coalition. http://www.orleanspondcoalition.org/PDFs/WaterTesting/Cedar_Pond_OPC_FinalReport_Rev1.pdf.

DP/JL/BC/sd

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY AND ENVIRONMENTAL AFFAIRS
OFFICE OF COASTAL ZONE MANAGEMENT
251 Causeway Street, Suite 800, Boston, MA 02114-2136
(617) 626-1200 FAX: (617) 626-1240

MEMORANDUM

TO: Matthew A. Beaton, Secretary, EEA
ATTN: Anne Canaday, MEPA Unit
FROM: Bruce Carlisle, Director, CZM
DATE: March 15, 2016
RE: EEA-15474, Cedar Pond Water Quality Management Plan, Orleans

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The Massachusetts Office of Coastal Zone Management (CZM) has completed its review of the above-referenced Environmental Notification Form (ENF), noticed in the *Environmental Monitor* dated February 10, 2016. CZM supports the Town's request for a single EIR and offers the following comments.

Project Description

The proposed project involves replacing weir boards removed from an existing outlet control structure in 2004. The outlet control structure was apparently installed during the construction of Route 6 although no permitting information is available. Cedar Pond Creek was cleared of debris in 2007, allowing the re-establishment of tidal flow into the pond on incoming high tides. The stated purpose of the project is to improve water quality within Cedar Pond by reducing the salinity of the pond, restore diadromous fish habitat, and protect adjacent forested wetland habitat. The proposed work includes inserting weir boards within the outlet control structure to an initial elevation of 1.45 m (NAVD88). This board elevation will limit most tides from entering the Pond. The Town is proposing to develop an adaptive Operations and Maintenance Plan for adjusting board heights based on water level and salinity monitoring post-installation in consultation with the Division of Marine Fisheries (DMF). The Cedar Pond Water Quality Management Plan ("Plan") also calls for pumping out salt water from the deepest portion of the pond into Cedar Pond Creek and reducing the double-crested cormorant population roosting on overhead power lines during late summer by illuminating the birds using hand-held, non-lethal lasers.

The project received an Order of Conditions (OOC) from the Orleans Conservation Commission in June, 2015. That OOC was appealed, and the Town is currently awaiting a Superseding Order of Conditions from MassDEP. MEPA has determined that the project requires the development of a mandatory Environmental Impact Report, and the Town has requested a single EIR for this project.

Project Comments

CZM attended the March 1, 2016 MEPA site visit, and is familiar with the Town's water quality monitoring efforts in Cedar Pond. The Cedar Pond ecosystem has been considerably altered over the past century. The pond currently has significantly degraded water quality, which is well documented in the ENF. CZM supports the Town's goals to improve water quality, protect the adjacent white cedar pond, and potentially support or restore diadromous fish habitat, and believes the success of this project will depend upon careful implementation of adaptive management efforts.

Outlet Control Structure Operations and Management Plan

CZM recommends that the EIR contain detailed information regarding the proposed adaptive management plan. This plan should: clearly state goals of the structure management tied to ecological (e.g. fish passage) or water quality parameters; specify the initial weir board elevation (normal) setting based on the local knowledge and data submitted through the permit process; describe storm or other non-normal management scenarios (when/why storm settings may be triggered), and; propose transects to gather information relating to vegetation, water level, pore water salinity, water column salinity parameters (transects do not need to be established and sampled prior to filing). These transects should be related to ecological goals of project. CZM also recommends that the Town establish a technical advisory group to help, on a routine schedule, with the execution of the operation of the structure.

The Plan currently calls for the installation of boards to 1.45 meters NAVD88 at the existing outlet control structure. The Plan states that installation of these boards will result in a maximum projected increase in pond water levels of approximately 3.5 inches. CZM is concerned that this increase may affect the septic systems of the surrounding houses, thereby increasing nutrient inputs to the pond. The EIR should document and analyze the potential for water quality impacts, if any, that may result.

One goal of the Plan is to improve and manage the water quality to establish favorable conditions for diadromous fish (alewife, white perch, American eel) migration, spawning, and nursery habitat. The Plan states that when suitable conditions are restored, seasonal migratory fish passage will be enabled through the opening of the weir boards or the installation of a fish ladder. The structural design, operation and management of the outlet control structure will have considerable impact on the effectiveness of supporting a healthy diadromous fish population in the pond. CZM recommends that the Town work with DMF in designing the outlet control structure for fish passage. The EIR should contain information relating to the design of the fish passage device to be incorporated into the outlet control structure.

The proposed project may be subject to CZM federal consistency review. For further information on this process, please contact, Robert Boeri, Project Review Coordinator, at 617-626-1050 or visit the CZM web site at www.state.ma.us/czm/fcr.htm.

BKC/bb/sm

cc: Stephen McKenna, CZM Cape & Islands Regional Coordinator
Brian Madden, LEC Environmental Consultants, Inc.
John Kelly, Town Manager, Town of Orleans
Jim Mahalla, MassDEP

Secretary Matthew Beaton
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 200
ATTN: MEPA OFFICE
Boston, MA02114

March 15, 2016

Subject: Cedar Pond Orleans, EEA#15474

Dear Secretary Beaton:

I am a marine biologist, and as a citizen volunteer in the Town of Orleans, I have been involved with Cedar Pond water quality and management efforts since 2001. I am writing you during the 14 day public comment period following the ENF that the Town of Orleans filed with your office, and the subsequent site visit by various state agencies held on March 1, 2016. During the site visit I was extremely surprised, and actually shocked to hear that a Environmental Impact Report (EIR) may be required for the replacement of a few weir boards on an existing weir board control structure. The Town of Orleans has already taken the initiative years ago to ensure that the appropriate studies were conducted in order to develop a technically sound Cedar Pond Management Plan (CPMP), which contained well researched steps that must be taken in order to begin to restore the ecological health of Cedar Pond. These management goals include lowering salinity to improve water quality and restore diadromous fish spawning habitat (herring, white perch), protecting the adjacent Atlantic White Cedar Swamp from salt water intrusion, restoring natural nutrient attenuation that was occurring when Cedar Pond was a low salinity system (58% nitrogen attenuation), and dispersing the large number of Cormorants that roost on overhead utility wires.

HISTORY

It was clear while listening to questions raised during the March 1 Cedar Pond site visit, that not everyone present was familiar with the factual history of Cedar Pond. To understand the CPMP, one needs an understanding of the history of this Great Pond and some of the more recent hydrological events and subsequent management plan development and implementation efforts.

We know enough about the history of Cedar Pond to know that historically it was a freshwater pond, and that it had been "man-altered" at different times over the past 150 years, and that an Alewife fishery was established in Cedar Pond in 1837 (ATTACHMENT 1- a-c). According to the wording contained in a petition submitted by a group of citizens in Orleans and Eastham and submitted to the Commonwealth, this was to be done by opening up and deepening "a small drain" running out of the pond that eventually discharged to Rock Harbor Creek, to let enough water out that was sufficient for Alewife to pass through and into the pond. This petition was granted.

An aerial photo taken in 1947 shows Cedar Pond before several acres of the pond was filled in by the State, for the new Rt. 6 highway (ATTACHMENT 2). The dike in the salt marsh and the large cranberry bogs for which Cedar Pond provided the water for freshwater irrigation are visible. An article in the March 3, 2000 Cape Codder newspaper gives some additional history about those cranberry bogs and the icehouse that used to be on Cedar Pond (ATTACHMENT 3). It includes a photo on an early 1900's postcard. In the foreground you can see Pickerelweed (freshwater plant). Herring were spawning in Cedar Pond as recently as 2005, when salinities were much lower. However, now salinity has increased and herring can no longer successfully spawn in Cedar Pond. White perch are still present (verified in November, 2015), but spawning success is probably reduced as optimum spawning salinity for this species is much lower than exists now.

The Town of Orleans has a long history of supporting management and restoration of its existing historical diadromous fishways. In 1995, through the Massachusetts Riverways Act, it established a group called the Orleans Anadromous Fish Council which had 75 citizen volunteers. Their first project was to clear the Cedar Pond run to Rock Harbor Creek of brush that blocked the stream (ATTACHMENTS 4a, 4b). A public notice issued by the US ACOE on October 12, 1999, in response to a request by the MA Division of Marine Fisheries for a ACOE permit for "the maintenance, repair and replacement of existing 180 fishways on Massachusetts coastal streams", included on the list, the concrete wood/weir at Cedar Pond (ATTACHMENTS 5a, 5b). .

In 2007, based on a "suggestion" by a now retired state employee, that lowering the stream bed in places by a minimum of 18" would improve fish passage, well intentioned individuals used shovels and a small back-hoe to dig

out some areas of the marsh creek and upper Cedar Pond stream. This stream clean-out was approved by the Orleans ConsCom under an Administrative Review (AR), and was repeated in 2008 (ATTACHMENTS 6 +a-i). Unfortunately the appropriate studies were not conducted which would have evaluated the possible effects of these efforts on the surrounding ecosystem. As a result, tidal influx reaching the pond increased resulting in a rather significant increase in salinity within Cedar Pond. What started out as an effort to improve herring passage and water quality, actually did neither. In less than 10 years, monitoring data shows that Cedar Pond has gone from being an impaired brackish water system, to an even more impaired marine system. Herring spawning habitat is gone, certain species of freshwater aquatic plants observed and documented prior to 2007 are gone, and the saline pond water is now threatening the Atlantic White Cedar swamp. Surface water exchanges have been observed during certain recent storm events, going both ways (e.g., swamp water draining to the pond, and the pond water flowing into the swamp). We cannot change things that happened in the past, but we can certainly take the steps that are needed now to begin to improve the ecological health of Cedar Pond and its surrounding environs.

Back in the 1990's, in response to requests by certain conservation commissions and shellfish officers concerning the maintenance of existing herring runs and fishways, the MA EOEA, Department of Natural Resources set forth a policy which stated:

> " Work which involves repair of fish ladders, incidental clearing of brush and debris from streams, and opening of any entrance to ponds and streams which have become blocked with sand, would be exempt under the Wetlands Regulations, Paragraph 2.2 Agriculture Use, which includes the raising and breeding of fish and shellfish. This would not include any deepening or widening of streams beyond the existing widths and depths and would also not include any new construction of fish ladders other than replacing in kind what now exists" (ATTACHMENT 7).

So it is my interpretation that this means that at least at that time, replacement of weir boards which are known to have been be present at the Cedar Pond cement/wood weir, and the subject of this Appeal, would be allowed. A MA DMF 2011 Technical Report (TR-16) further describes the control structure, and documents the historical presence of herring and white perch.

WHERE DO WE GO NOW?

During the development of the Cedar Pond Management Plan (CPMP) in 2013, thirteen years of water quality data were reviewed and evaluated, elevation and tidal measurements made, and different scenarios evaluated (freshwater, brackish, marine), before determining the best management strategy needed for restoring the ecological health of Cedar Pond. As part of this process, public hearings were also held. Evaluations of all water quality data and the associated studies were done by qualified scientists who have done extensive coastal monitoring studies on Cape Cod. Interpretation of the data and development of the CPMP were done by scientists who are locally, as well as internationally recognized as coastal systems experts. A draft, and then final Plan was issued to the Town where it went through a public hearing and review prior to receiving Board of Selectmen approval. Funding for plan implementation was approved at Town Meeting. It took another year to receive regulatory approval for the replacement of the weir boards from the MA DOT (ATTACHMENT 8a, b, c), and Orleans ConsCom, with a letter of support from MA Division of Marine Fisheries (ATTACHMENT 9). This Management Plan even has the attention of MA Representative Sarah Peake, who has participated in public meetings on the subject since 2011 (ATTACHMENT 10).

The Town is committed to continuing the required monitoring efforts and associated studies following weir board replacement. This has been a long process, but all done comprehensively, openly, and correctly. So I guess I now find myself a little confused. As a pond on the state's 303 (d) list of impaired water bodies, it is my understanding that the state requires towns to take the steps necessary to improve water quality in these ponds. The Town of Orleans has taken the initiative to do this for Cedar Pond. A significant amount of staff time and resources have been allocated over the past 15 years with expenditures approaching $100K for all the associated studies. And citizen volunteers like myself have also invested hundreds of hours of our time supporting this effort. The CPMP has received support and approval of the regulatory bodies listed above, as well as the Orleans Marine & Freshwater Quality Task Force and Orleans Shellfish & Waterways Advisory Committee.

The 2007 Cape Codder article "Icy Fun in the Herring Run" describes a well intentioned, but not properly researched effort to improve fish passage and increase tidal flushing (ATTACHMENT 11). Some of these same citizen volunteers who participated in the "stream cleanout" back then which significantly contributed to the rapid salinity increase, are the same ones who filed the Appeal which halted the town's implementation of the weir board

replacement, and stopped the town from finally initiating the long awaited restoration and management steps contained in the CPMP. Unfortunately they are technically misinformed, and operating on an ideology that is not based on scientific facts. Do these individuals realize that the Town will not be able to manage Cedar Pond to improve the ecological health of this pond under existing water quality conditions if it remains a marine system? They must assume that if the flashboards are replaced and cormorants dispersed, that tidal flushing will allow water quality to improve, and the pond will become a healthy estuarine system. Unfortunately this is not true. The pond sediments contain nutrient laden guano that has been piling up there for several decades. And since the elevation of the bottom of the pond, in relation to Cape Cod Bay does not provide for sufficient tidal flushing in Cedar Pond, water quality will remain poor unless the pond is restored to a low salinity-brackish system where more management options are available. Measurements have shown that existing tidal ranges in Cedar Pond are at most, only a few inches. If the Town of Orleans cannot move forward with its CPMP, will the state be willing to step in and fix the health of Cedar Pond if they do not allow the Town of Orleans to proceed with the weir board replacement?

In the 1950's, one might ask, why else would the state spend the money to have a control structure be built, and boards put in after several acres of the pond were filled in during the construction of Route 6, if it was not to maintain the pond's freshwater status after they altered the original stream and pond connection? It was a historical fishway and the MA DMF still considers Cedar Pond diadromous fish habitat. Furthermore, there have also been successful restoration projects on Cape Cod where ponds that have become more saline, have been "restored" to low salinity/brackish water systems, and herring and white perch spawning habitat re-established (Oyster Pond, Falmouth, MA, ATTACHMENT 12).

In closing, I strongly support the goals set forth in the approved CPMP. Orleans must meet the requirements established in the Clean Water Act and various state water quality standards. The Town/BOS have taken a pro-active approach in order to do this. The Town can manage the pond and improve water quality if it is a low salinity/brackish system as this provides more choices for future management options. It can take steps to restore the herring spawning habitat, and improve spawning habitat for the existing population of white perch which are presently struggling there. Restoring the pond to a low salinity/brackish system will provide protection of the adjacent wetlands and Atlantic White Cedar swamp, and greatly reduce the amount of nitrogen that is now being exported to the Rock Harbor creek system, returning this natural process of nitrogen attenuation to the way it was before 2007. It is unclear to me why members of the Friends of Rock Harbor would not support the CPMP if they truly care about the ecological health of this area. Obviously more public education is needed, and misinformation identified and corrected. What is not needed, are more studies and more delays in beginning to restore the ecological health of Cedar Pond.

I am including some additional old newspaper articles as an Appendix, to further highlight just how many years Orleans has been involved in efforts to restore Cedar Pond. I have also included the most recent Tech Memo (1-14-16) issued by the School of Marine Science and Technology (SMAST), on the Cedar Pond continuous monitoring they have been conducting there, and my earlier letter submitted to Dan Gilmore at MA DEP. I am hoping that all the materials provided can assist your agency with rendering a decision. Considering all we have learned from all the studies that have been conducted over the past 15 years, I cannot see that anything can be gained by now requiring the Town of Orleans to do an EIR. Different management strategies were evaluated. Existing conditions within Cedar Pond are known, measurements of what is happening since salinity has significantly increased have been taken. Measurements of what was happening when the pond was a low salinity/brackish system were also taken. The Town of Orleans has a good management plan to begin restoring the ecological health of Cedar Pond. For the state to now require a costly EIR and say more information is needed, is in my opinion, unfair and unnecessary. I encourage you to waive the requirement for a EIR, approve the replacement of the wooden weir boards, and continue to work with the Town of Orleans on this environmentally important project.

Respectfully,

Judith Scanlon, Citizen Volunteer, and Orleans Volunteer Herring Count Coordinator

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

March 22, 2016

Mathew A. Beaton,
Secretary of Environment and Energy
Executive Office of Environmental Affairs
ATTN: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: ENF Review EOEEA # 15474 - ORLEANS. Cedar Pond Water Quality Management Plan at Cedar Pond

Dear Secretary Beaton,

The Southeast Regional Office of the Department of Environmental Protection (MassDEP) has reviewed the Environmental Notification Form (ENF) for the proposed Cedar Pond Water Quality Management Plan located at Cedar Pond, Orleans, Massachusetts (EOEEA # 15474). The project proponent provides the following information for the project:

The proposed restoration project involves replacing weir boards within the outlet control structure. The purpose of the project is to improve water quality within Cedar Pond, restore diadromous fish habitat, and protect adjacent forested wetland habitat as developed under the *Cedar Pond Water Quality Management Plan*, prepared by the Coastal Systems Program at the School of Marine Science and Technology, University of Massachusetts-Dartmouth and endorsed by the Orleans Board of Selectmen and Orleans Marine and Fresh Water Quality Task Force.

Actual proposed work is limited to inserting weir boards within the outlet control structure to an initial elevation of 1.45 m (NAVD88). This board elevation limits most tides entering the Pond. The Town is proposing to develop an adaptive Operations and Maintenance Plan for adjusting board heights based on water level and salinity monitoring post-installation in consultation with the Division of Marine Fisheries. No other work is proposed.

Wetlands and Waterways

The SERO Waterways Program offers the following comments on the ENF submitted by the Town of Orleans for the implementation of the Cedar Pond Water Quality Management Plan.

The ENF indicates in the Wetlands, Waterways and Tidelands Section III that the project is exempt from Chapter 91 Licensing due to its location within the Route 6 MassDOT right-of- way (ROW). Generally, only bridge projects funded through the Transportation Bond Bill would be exempted from Chapter 91 licensing. Therefore the project is not exempt for this reason. The Waterways

This information is available in alternate format. Call Michelle Waters-Ekanem, Diversity Director, at 617-292-5751. TTY# MassRelay Service 1-800-439-2370
MassDEP Website: www.mass.gov/dep

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Regulations at 310 CMR 9.05(3)(c) indicate that a license would not be required for the "continuation of any existing, unauthorized public service project, provided that no unauthorized structural alteration or change in use has occurred subsequent to January 1, 1984...". The Waterways Program would not consider the removal or reinstallation of the weir boards in the outlet control structure as a substantial structural alteration. MassDEP recommends that the Proponent contact the Waterways Program, Southeast Regional Office to determine if the project meets the criteria of 9.05(3)(c) and whether the installation of the weir boards would require a Minor Project Modification pursuant to 9.22(3).

The Wetlands Program has reviewed the ENF for EEA No. 15474 and offers the following comments. The Program is currently reviewing the proposed re-installation of the weir boards at the outlet control structure of Cedar Pond. The Program's review is the result of an appeal, by a citizen's group, of the Orleans Conservation Commission's Order of Conditions approving the proposal. For Wetlands, Waterways & Tidelands projects, provided a permit is required, "alteration" of resource areas above certain thresholds establishes the need for MEPA review. On September 1, 2015, the Wetlands Program sent the Town of Orleans notification of the requirement to file the ENF and a request for additional information. The Program determined that the proposal exceeded the threshold for MEPA review found at 301 CMR 11.03(3). It has since been noted that the project lies within the Inner Cape Cod Bay ACEC. Therefore the proposal exceeds the MEPA review threshold at 301 CMR 11.03(11).

In the request for additional information, the Wetlands Program asked for an inventory of the existing flora and fauna within Cedar Pond; a comparison of the current flora and fauna with an historic inventory of the pond inhabitants prior to the salinity increase; a projection of the species anticipated to occupy the pond if the proposed management plan is implemented; and a plan of the existing wetland resource areas and how those areas may be impacted by the proposed management plan.

With respect to the proposed water quality management plan, it is unclear to the Wetlands Program how the use of Cedar Pond as a nutrient sink will improve the overall pond water quality. Additionally, the proposal to install the weir boards will not address the salinity levels in the deeper portions of the pond. At this time, the Town has stated that the current proposal does not include any plan for the remediation of the deeper pond waters. The Town also notes in the ENF that they are pursuing another proposal to address nutrient loading from avian sources. The details of which have not been finalized. In the ENF and Supplement, the Town states that they will develop an Operation and Maintenance Plan. The Wetlands Program believes that the details of the O&M Plan are necessary to condition any proposed changes to Cedar Pond's water quality regime.

It appears that the project exceeds the MEPA review threshold found at 301 CMR 11.03(3)(a)1.b. - alteration of ten or more acres of any other wetlands. The MEPA Regulations, at 301 CMR 11.02(2), do not define the term "alter". However, the MEPA Regulations at 301 CMR 11.02 (1) Undefined Terms state that any term not defined in accordance with 301 CMR 11.02(2) shall have the meaning given to the term by any statutes, regulations, executive orders or policy directives governing the subject matter of the term. The Wetlands Protection Act Regulations at 310 CMR 10.04 define the term Alter to mean changing the condition of any Area Subject to Protection under M.G.L. c. 131, § 40. Examples of alterations include, but are not limited to the following: (a) the changing of pre-existing drainage characteristics, flushing characteristics, salinity distribution, sedimentation patterns, flow patterns and flood retention areas; (b) the lowering of the water level

or water table; (c) the destruction of vegetation; (d) the changing of water temperature, biochemical oxygen demand (BOD), and other physical, biological or chemical characteristics of the receiving water. Given that Cedar Pond is 15+/- acres in size as stated in the ENF and that the project purpose is to change the salinity, BOD and other physical, biological or chemical characteristics of Cedar Pond, it is unclear to the Wetlands Program why the project proponent believes that the project does not meet or exceed a mandatory EIR threshold.

The Wetlands Program looks forward to working with the Town of Orleans and other stakeholders to protect Cedar Pond's wetland resource areas and the associated interests of the Wetlands Protection Act and to insure that any project does not result in Damage to the Environment

Bureau of Waste Site Cleanup

Based upon the information provided, the Bureau of Waste Site Cleanup (BWSC) searched its databases for disposal sites and release notifications that have occurred at or might impact the proposed project area. A disposal site is a location where there has been a release to the environment of oil and/or hazardous material that is regulated under M.G.L. c. 21E, and the Massachusetts Contingency Plan [MCP – 310 CMR 40.0000].

There are no listed MCP disposal sites located at or in the vicinity of the proposed project area that might impact the site. Interested parties may view a map showing the location of BWSC disposal sites using the MassGIS data viewer (Oliver) at: http://maps.massgis.state.ma.us/map_ol/oliver.php Under "Available Data Layers" select "Regulated Areas", and then "DEP Tier Classified 21E Sites". The compliance status and report submittals for specific MCP disposal sites may be viewed using the BWSC Waste Sites/Reportable Release Lookup at: http://public.dep.state.ma.us/SearchableSites2/Search.aspx

The Project Proponent is advised that if oil and/or hazardous material are identified during the implementation of this project, notification pursuant to the Massachusetts Contingency Plan (310 CMR 40.0000) must be made to MassDEP, if necessary. A Licensed Site Professional (LSP) should be retained to determine if notification is required and, if need be, to render appropriate opinions. The LSP may evaluate whether risk reduction measures are necessary if contamination is present. The BWSC may be contacted for guidance if questions arise regarding cleanup.

Air Quality

Construction and operation activities shall not cause or contribute to a condition of air pollution due to dust, odor or noise. To determine the appropriate requirements please refer to:

310 CMR 7.09 Dust, Odor, Construction, and Demolition
310 CMR 7.10 Noise

Proposed s.61 Findings

The "Certificate of the Secretary of Energy and Environmental Affairs on the Environmental Notification Form" may indicate that this project requires further MEPA review and the preparation of an Environmental Impact Report. Pursuant to MEPA Regulations 301 CMR 11.12(5)(d), the Proponent will prepare Proposed Section 61 Findings to be included in the EIR in a separate chapter updating and summarizing proposed mitigation measures. In accordance with 301 CMR 11.07(6)(k), this chapter should also include separate updated draft Section 61 Findings for each State agency that will issue permits for the project. The draft Section 61 Findings should contain clear commitments to implement mitigation measures, estimate the individual costs of each

proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation.

Very truly yours,

Jonathan E. Hobill,
Regional Engineer,
Bureau of Water Resources

JH/GZ

Cc: DEP/SERO

ATTN: Millie Garcia-Serrano, Regional Director
David Johnston, Deputy Regional Director, BWR
Maria Pinaud, Deputy Regional Director, BAW
Gerard Martin, Acting Deputy Regional Director, BWSC
Jennifer Viveiros, Deputy Regional Director, ADMIN
Allen Hemberger, Site Management
Jim Mahala, Chief, Wetland and Waterways
Dan Gilmore, Wetlands and Waterways
David Hill, Wetlands and Waterways

Appendix B

Fishway Operations and Maintenance Plan

Commonwealth of Massachusetts

Division of Marine Fisheries

251 Causeway Street, Suite 400
Boston, Massachusetts 02114
(617) 626-1520
fax (617) 626-1509

David E. Pierce, Ph.D.
Director

Charles D. Baker
Governor
Karyn E. Polito
Lieutenant Governor
Matthew A. Beaton
Secretary
George N. Peterson, Jr.
Commissioner
Mary-Lee King
Deputy Commissioner

FISHWAY OPERATIONS AND MAINTENANCE PLAN

WORKING DRAFT

Location: Cedar Pond, Orleans, Massachusetts

Latitude and Longitude: 41.7963 N and 69.9915 W.

Property Owner: Town of Orleans
19 School Road
Orleans, MA 02653

Contact: Tom Daley, Director, Dept. of Public Works, 508-240-3700 x 363

Watershed Information: Cedar Pond in Orleans receives tidal flow through a regulated outlet at Route 6. Cedar Pond Creek flows from the 15-acre Cedar Pond to Rock Harbor Creek that connects to Rock Harbor on Cape Cod Bay. Cedar Pond provides spawning and nursery habitat for river herring and has supported a historic river herring run, with sparse observations of herring in recent years. Diadromous white perch and American eel are presently known to occur in Cedar Pond. Water quality degradation and rising salinity are considered recent threats to the Cedar Pond herring run. Cedar Pond restoration efforts are underway with the Town of Orleans working cooperatively with the University of Massachusetts, School for Marine Science & Technology (SMAST) to improve water quality sufficient to restore habitat for migratory fish.

The Cedar Pond Management Plan (SMAST, 2013) recommends outlet regulation to allow a pond surface elevation of 1.45 m (NAVD88) to reduce salinity and restore herring habitat. The plan proposes an adaptive management approach with a target salinity of 1–4 ppt to provide the widest range of water quality and aquatic life improvements, while supporting diadromous fish life history. The Management Plan was approved by the Town of Orleans Conservation Commission and the Board of Selectmen.

SMAST will provide continuous monitoring of water quality in Cedar Pond during 2017–2019 on behalf of the Town of Orleans. Any proposed change to board height in response to water conditions in Cedar Pond will require approval of the Division of Marine Fisheries (*MarineFisheries*). This Operation and Maintenance plan is intended to serve as a three-year Working Draft to allow additional monitoring by SMAST and fish passage observations from each year and to allow operational modifications for the benefit of aquatic life and fish passage in Cedar Pond. The Town of Orleans is interested in future cooperative efforts with MassDOT to replace the culvert and outlet with a new water control structure and fishway that is optimized to meet natural resource goals for Cedar Pond.

Fishway Specifications: The pond outlet structure (1.0 m height and 1.5 m width) at Cedar Pond was installed in the late 1950s as part of a culvert (approximately 23 m length and 0.9 m diameter) designed to convey flows under the newly constructed Route 6. The culvert had multiple stoplog slots that degraded over time and were removed. Presently, the culvert outlet has a single stoplog slot that controls Cedar Pond outflow. The culvert bottom elevations (NAVD88) are 0.75 m on the creek side and 0.30 m at the pond outlet (2% negative slope). Without stoplog management, average flood tides would enter the pond daily.

Regulatory Authority: The owner of the fish way is responsible for repairing, operating, and maintaining fish passage facilities as prescribed in M.G.L. Chapter 130 §19. MassDOT retains a right-of-way for Route 6 that passes over the culvert, and has authorized the Town of Orleans to manage the fishway (MassDOT letter, October 16, 2014). The Town has a Memorandum of Agreement with *MarineFisheries* to manage the Cedar Pond run under local control (M.G.L. Chapter 130 §94).

Water Withdrawal Permissions: None.

Water Discharge Data: No continuous flow gauge is present; however, the Cedar Pond Management Plan (2013) does have discharge calculations based on depth logger measurements.

Fishway Operation

1.) The Cedar Pond outlet water control boards shall be maintained to allow the seasonal migration of diadromous fish while meeting the Cedar Pond Management Plan's aquatic resource goals. This will be accomplished by targeting a year-round pond level of 1.45 m (NAVD88) and adjusting the outlet board height seasonally to allow fish passage. During the upstream river herring migration from March 15 to June 30, the board height will be reduced to allow at least 6 inches of water depth to flow over the top board at all times. During the juvenile herring emigration period of July 1 to November 15, the board height will be adjusted to allow at least 2 inches of water depth to flow over the top board at all times.

2.) These operations will result in periodic inputs of salt water into the pond during storms/high tide events. During the three-year working draft period, monitoring will determine if the operations in #1 provide suitable fish passage and water quality targets, and adjustments may be made in consultation with the Town of Orleans, SMAST, and *MarineFisheries.*

3.) A staff gauge shall be installed on the pond wall of the Cedar Pond control structure and surveyed to a fixed benchmark. The pond target of 1.45 m (NAVD88) should be related to the staff gauge. During each site visit during the migratory period, the pond level should be recorded using the staff gauge and the tide stage, number of boards in stoplog slots, and flow depth over the exit weir should also be recorded.

4.) Maintenance or repairs to the structure should occur outside these migration periods.

Fishway Maintenance

1.) The Town of Orleans has agreed to maintain the Cedar Pond water control structure. The outlet will be inspected each year at the start of both the adult and juvenile herring migration periods and at a minimum of twice monthly during the migratory periods.

2.) The tidal channel below the Route 6 culvert running downstream past Rock Harbor Road and to the salt marsh should be inspected each year at the start of the adult herring migration period and monthly through June 30 to remove debris and ensure that safe and efficient passage of sea-run fish is possible.

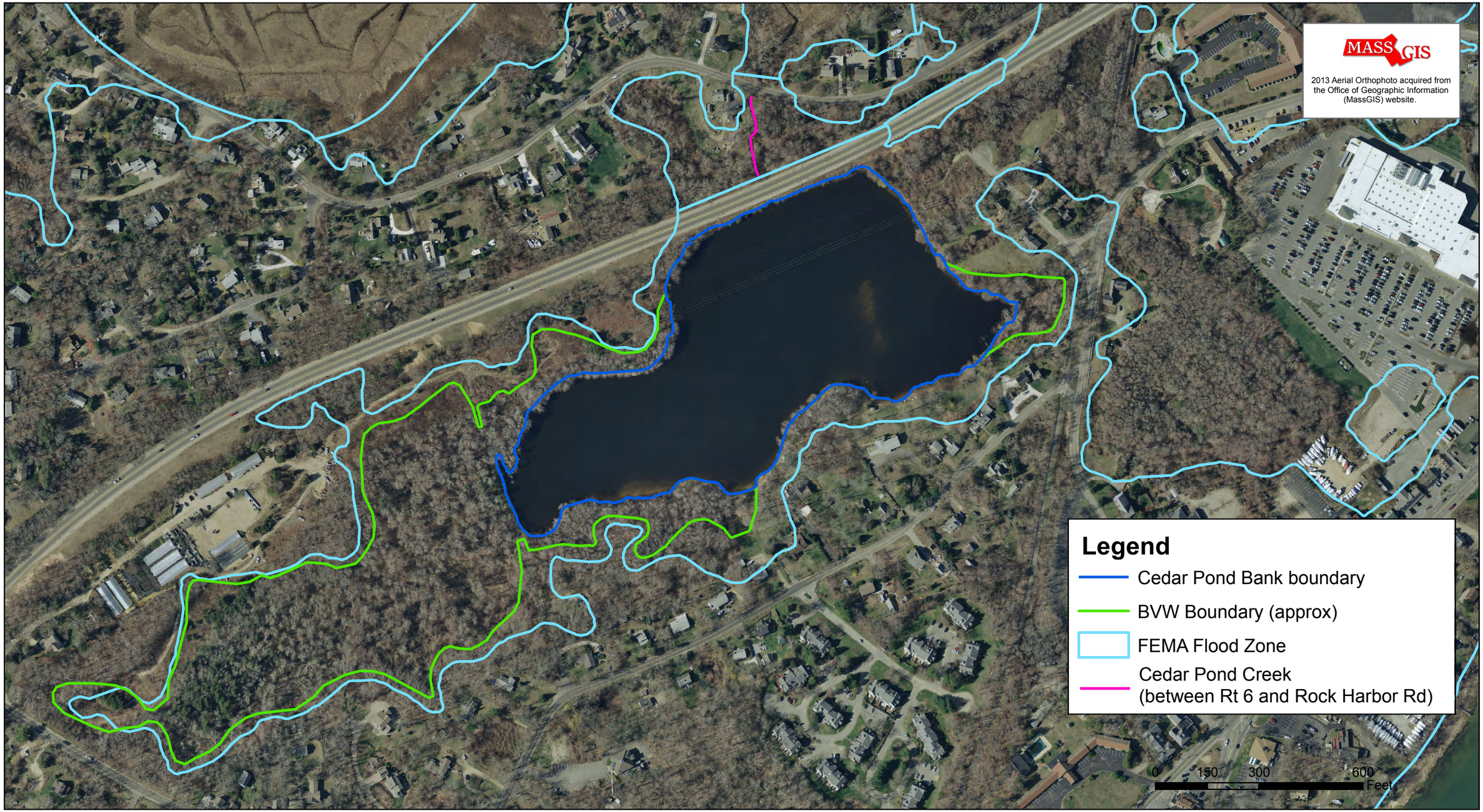
Monitoring & Reporting: The Town of Orleans is encouraged to maintain annual records that document events related to the river herring run and fishway O&M that may assist future efforts to manage fish passage at Cedar Pond. If a significant problem occurs that could impact successful fish passage, the Town of Orleans should contact *MarineFisheries* (Brad Chase, 508-990-2860 x118, brad.chase@state.ma.us).

Prepared: February 13, 2017 **By:** Bradford C. Chase, *MarineFisheries*

Approved: Daniel J McKiernan for David E. Pierce, *MarineFisheries,* Director

Appendix C

Wetland Resource Area, prepared by LEC, dated October 30, 2015



LEC
LEC Environmental Consultants, Inc.
Plymouth, MA
508.746.9491
www.lecenvironmental.com

Wetland Resource Area Map

Cedar Pond
Orleans, MA

N

October 30, 2015

Appendix D

Residential Septic System Map, prepared by LEC, dated February 20, 2017

LEC Environmental Consultants, Inc.

Plymouth, MA
508.746.9491
www.lecenvironmental.com

Residential Septic System Map

Cedar Pond
Orleans, MA

N

February 20, 2017

Appendix E

Distribution List

Distribution List
(ENF Commenters)

Secretary Matthew A. Beaton (2) Executive Office of Energy and Environmental Affairs Attn: MEPA Office 100 Cambridge Street, Suite 900 Boston, MA 02114
Department of Environmental Protection Southeastern Regional Office Attn: MEPA Coordinator 20 Riverside Drive Lakeville, MA 02347
Coastal Zone Management Attn: Project Review Coordinator 251 Causeway Street, Suite 800 Boston, MA 02114
Cape Cod Commission 3225 Main Street Barnstable, MA 02630
Division of Marine Fisheries (South Shore) Attn: Environmental Reviewer 1213 Purchase Street - 3rd Floor New Bedford, MA 02740-6694
Friends of Rock Harbor c/o Sheila Bonnell P.O. Box 1092 South Orleans, MA 02662
Carolyn L. Kennedy Chair, Orleans Marine and Fresh Water Quality Task Force c2kenn2@verizon.net
Judith Scanlon Citizen Volunteer and Orleans Volunteer Herring Count Coordinator nolnacsj@aol.com

Appendix F

Mitigation/Draft Section 61 Findings

MA Department of Environmental Protection

Wetlands & Waterways Program

Proposed Section 61 Findings & Mitigation

Project Name: Cedar Pond Water Quality Management Plan

Project Location: Cedar Pond, Orleans

Project Proponent: Town of Orleans

EEA File No.: 15474

Date Noticed in Monitor: April 19, 2017

Permit: Superseding Order of Conditions (DEP File # SE 54-2286)
Minor Project Modification, 310 CMR 9.22(3)

Project Description: The Town of Orleans is proposing to re-install weir boards in the outlet control structure within the northeastern portion of Cedar Pond. Weir (flash or pen) boards had been in place within the outlet control structure for numerous decades since the construction of Route 6 in the late 1950's until 2004 when the boards were reportedly removed. Anthropogenic activities within downstream conditions have increased tidal flow into Cedar Pond in recent years, altering Pond salinity characteristics, hydrology/hydrodynamics, and associated water quality, and wetland habitats. Water quality conditions have worsened in recent years.

The Town is proposing to implement an adaptive Fishway Operations and Maintenance Plan in coordination with the Division of Marine Fisheries (DMF) to manage the weir boards and allow for unimpeded seasonal diadromous fish migration, while balancing water quality restoration goals. Specific management and monitoring details, including responsibilities are reviewed below.

Environmental Impacts and Mitigation: The project will alter the salinity, biochemical oxygen demand (BOD), and other physical and chemical characteristics of the 15.1± acre Cedar Pond by reinstalling the pre-existing weir boards.

Reestablishment of the weir boards is proposed as an ecological restoration project to reduce salinity levels to pre-existing conditions (targeted 1-4 ppt) to: 1) improve water quality within Cedar Pond, 2) restore diadromous fish habitat, 3) protect adjacent forested wetland habitat (potential vernal pool habitat and Atlantic White Cedar Swamp), and 4) increase nitrogen attenuation in Cedar Pond and therefore reduce nitrogen loading to downgradient Rock Harbor. Reducing salinity levels will restore the currently impaired anadromous spawning and nursery habitat of Cedar Pond.

The weir boards set at 1.45 m (NAVD88) will be adjusted to allow for the seasonal migration of diadromous fish. Specifically, from March 15th to June 30th during the upstream river herring migration,

the board height will be reduced to allow at least 6 inches of water depth to flow over the top board. During the juvenile herring emigration period of July 1st to November 15th, the board height will be adjusted to allow at least 2 inches of water depth to flow over the top board.

The Town (Department of Public Works Staff in coordination with DMF and the Orleans Planning and Conservation Offices) will maintain weir boards. The outlet control structure will be inspected in early March and late June of each year prior to board adjustment during the seasonal migration periods. Monitoring site inspections will be conducted a minimum of twice a month during the migratory periods. Board heights may be adjusted during these site inspections to ensure appropriate water depths flowing over the top board as detailed above.

A staff gauge will be affixed to the outlet control structure at an established benchmark elevation. Water levels will be recorded at each site inspection, in addition to documenting other general observation notes (e.g., tide stage, number of boards, and flow depth over the top board).

The Town of Orleans has an agreement in place with the Coastal Systems Program at the School of Marine Science and Technology, University of Massachusetts-Dartmouth (CSP/SMAST) to implement a Cedar Pond Adaptive Management Monitoring Program (AMMP) following the approval of board reinstallation. AMMP details include installation of two continuous monitoring devices programmed to record key factors in the restoration strategy, including temperature, salinity, water levels, and chlorophyll. Data will be retrieved from the devices every three months and will be accompanied by collection of temperature and dissolved oxygen profiles, clarity reading, and water quality samples from Cedar Pond and flow and water quality samples from Rock Harbor Creek. Sampling techniques and laboratory analysis will follow QA/QC procedures approved by MassDEP and US EPA in the MEP QAPP.

Under the AMMP, these measurements will be used to assess progress toward the salinity target for Cedar Pond, as well as improvements in water quality and lower nutrient export to Rock Harbor. Diadromous fish migration results will also be evaluated over this time period and DMF will be consulted on whether board height adjustments are prudent to maximize the potential success for fish passage, while balancing water quality goals.

A semi-annual technical memorandum and an annual report on the AMMP results will be presented to the Town of Orleans Marine and Fresh Water Quality Task Force and Town of Orleans, Director of Planning & Community Development. As specified in the AMMP, the semi-annual technical memo will briefly: 1) review data collected during the previous six months, 2) compare the data to previously collected data, 3) evaluate progress toward salinity and water quality goals, and 4) provide recommendations for any modifications to management activities. The AMMP annual report will summarize all data collected under the AMMP and address similar issues within a yearly context. Both the technical memorandum and annual report findings will be publicly presented before the Town of Orleans Marine and Fresh Water Quality Task Force. The first year of the AMMP is currently funded at $22,445 with anticipated changes in subsequent years depending on monitoring results, progress toward goals, and community response.

Findings: Now, therefore, the Massachusetts Department of Environmental Protection, Wetlands & Waterways Program, having reviewed the MEPA filings for the Cedar Pond Water Quality Management Plan, including the mitigation measures above, finds pursuant to Massachusetts General Law Chapter 30, Section 61 that the implementation of the aforesaid measures, all practicable and feasible means and measures will have been taken to avoid or minimize potential damage from the project to the environment.

Department of Environmental Protection (Wetlands & Waterways Program)

_____

By (Name/Title)

_____

Date