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June 30, 2016
117088-00001

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

Cape Cod Commission
Attn: John Idman, Esq., Chief Regulatory Officer
P.O. Box 226
3225 Main Street
Barnstable MA 02630

Re: Herring River Restoration Project, Final EIS/EIR
EEA No. 14272

Secretary Beaton and Attorney Idman:

This office represents the Chequessett Yacht & Country Club, Inc. (CYCC) and, on its behalf, respectfully submits these written comments concerning the Final Environmental Impact Statement/Final Environmental Impact Report (FEIS/FEIR) for the above-referenced Herring River Restoration Project (hereinafter, "the Project"). These comments are submitted in anticipation of the Joint Review Hearing presently scheduled for June 30, 2016, and conducted pursuant to Section 2(d)(ii) of the Cape Cod Commission's Enabling Regulations Governing Developments of Regional Impact, the Massachusetts Environmental Policy Act (MEPA), G.L. c. 30, §§61, 62-62H, and the Memorandum of Understanding Between the Cape Cod Commission and the Secretary of Massachusetts Office of Energy and Environmental Affairs.

As the owner of over a hundred acres of property located directly adjacent to the Project area, CYCC is an important stakeholder in these public hearings. According to the FEIS/FEIR, there will be extensive flooding throughout the CYCC property if certain of the alternatives are implemented. In particular, if Alternatives B and D are implemented, approximately 30-32 acres of the CYCC property will either have to be cleared, graded and planted (Option 1), or alternatively will have to be filled and reconstructed (Option 2), to create new facilities in place

of those lost to flooding as a result of the Project. During this reconstruction period (presently estimated to take at least 20 months), the CYCC will have to be closed, resulting in significant lost revenues and lost access for its membership.

While the FEIS/FEIR concludes that Alternative C will not cause the flooding predicted with Alternatives B and D, CYCC's expert hydrologist, Dr. Bruce Jacobs, has concluded that there is not sufficient data to support this conclusion. A copy of a report Dr. Jacobs prepared for CYCC after reviewing the FEIS/FEIR is attached hereto and incorporated herein as Exhibit A. In his report, Dr. Jacobs notes that Project proponents concede there will be upstream impacts as a result of the implementation of Alternative C, yet no suggested mitigation measures are provided for abating those impacts. In particular, due to the flat topography within the floodplain, groundwater-surface water interactions not considered in the proponent's analyses, and because the mean water surface elevation within the Lower Herring River is expected to increase by approximately 2 feet as a result of the proposed Mill Creek dike, Dr. Jacobs anticipates greater impacts within the Mill Creek subbasin than projected by the Project proponents. In addition, Dr. Jacobs notes that the FEIS/FEIR includes only the summary version of the Hydrodynamic Modeling Report utilized by the Project proponents to support the conclusion that Alternative C will not cause flooding at CYCC. Without that Report, a thorough engineering review of the methodologies and underlying assumptions cannot be undertaken.

It must be noted that the Project proponents have worked extensively with CYCC for over a year to ascertain the projected impacts of the various alternatives, and to devise protection measures intended to mitigate those impacts to the greatest extent possible. We understand that, through the Adaptive Management Process (AMP), the Project proponents hope to proceed in phases over the course of several years, allowing them to monitor each phase, collect and analyze data from the monitoring, assess problems that might develop during each phase, design and implement solutions to address those problems, and make adjustments as needed to adjust outcomes. Given the scope and complexity of this Project, the AMP provides the Project proponent with a great deal of flexibility and we understand why it is favored by the proponents.

Unfortunately, while it might provide flexibility for the Project proponents, it results in a great deal of uncertainty for the other stakeholders. At this stage of Project planning, the bulk of the details regarding the AMP are unknown and, as such, it cannot be concluded that the proffered alternatives (B, C or D) will not adversely impact CYCC. As noted by Dr. Jacobs, the Project's proposed "overlapping and redundant protection" measures (itemized on Page 291 of the FEIS/FEIR) are highly subjective and contain no objective means of ascertaining when those measures should be implemented. There are no benchmarks against which conditions can be measured to ascertain when impacts rise to a level requiring mitigation. Although monitoring is

suggested, no parameters are provided to establish quantitative and objective criteria for when and what mitigation will be triggered.

While the FEIS/FEIR suggests that these details will be memorialized in separate agreements between the affected landowners and the Project proponents, the Project proponents have no legal authority to enter into binding agreements regarding these details unless and until funding is appropriated to satisfy those contractual obligations. It is, therefore, imperative that the details regarding the "overlapping and redundant protection" measures be considered as part of any thorough analysis of the Project, including this Joint Review. At a minimum, these details must be included within the Project permit applications, and the permits should be conditioned on their implementation, as well as conditioned upon the requirement that funding be appropriated and escrowed in amounts sufficient to cover the mitigation and protection work, before construction on the Project commences. Indeed, unless funding for potential response actions is secured prior to Project implementation, the AMP approach does not work.

This concludes our general written comments submitted on behalf of the CYCC. Please also refer to the technical comments prepared by Dr. Jacobs on behalf of CYCC, enclosed herewith as Exhibit A.

Thank you and please do not hesitate to contact us should you have any questions.

Very truly yours,

Eliza Z. Cox

Eliza Z. Cox

Sarah Turano-Flores / eac

Sarah A. Turano-Flores

cc: Cape Cod National Seashore and the Herring River Restoration Committee
99 Marconi Site Road, Wellfleet, MA 02667

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EXHIBIT A

EI LLC
33 Clark Road, No. 1
Brookline, Massachusetts 02445
617-308-7074

June 30, 2016

Ms. Sarah A. Turano-Flores
Nutter McClennen & Fish LLP
1471 Iyannough Road
Hyannis, MA 02601

Dear Ms. Sarah A. Turano-Flores:

Per your request I have reviewed the Herring River Restoration Project Final Environmental Impact Statement / Environmental Impact Report (FEIS/EIR) dated May 2016. The report describes the project proponent's evaluation of the environmental impacts resulting from the implementation of Alternatives B, C, and D. The alternatives differ in the proposed configuration and operation of gates in the Chequesset Neck Road dike and in the proposed mitigation strategies for the Mill Creek sub-basin and other low-lying properties. Alternative B proposes a somewhat lower tidal range than Alternatives C and D. Alternative C would include the construction of a dike at the mouth of Mill Creek that would be equipped with a flap gate outlet to allow for discharge of water from Mill Creek during the relatively short portions of the tidal cycle when the water level in the Herring River would be sufficiently lower than the water level within Mill Creek to allow for flow through the flap gate. Alternative D would be equipped with gates that allow tidal flows upstream into the Mill Creek subbasin. Alternatives B and D include upstream mitigation activities within the Mill Creek sub-basin designed to allow for continued use of the golf course at the Chequesset Yacht and Country Club.

Herein are my comments on the FEIR/FEIS as they pertain to impacts on the Chequesset Yacht and Country Club within the Mill Creek sub-basin.

- The FEIS/EIR is inconsistent in its assessment of impacts to Mill Creek under Alternative C. Typically, the FEIS/EIR asserts as on page 285, that "Under alternative C, no changes attributable to the project would be expected within the Mill Creek sub-basin. The addition of a dike at Mill Creek would block tides, and flood proofing of the golf course and other individual properties in the Mill Creek sub-basin would not be needed." Elsewhere as in Section 2.5.2 this presumption of no-impact is contradicted in the acknowledgement of potential impacts upstream of the proposed dike under Alternative C: "Given the generally flat land surface of the flood plain and naturally occurring high water table, mechanical pumping may be necessary at times to facilitate freshwater drainage." Also, as noted in the executive summary of the hydrodynamic model, "Simulations of freshwater storm events in the Mill Creek sub-basin indicated that proposed alternatives would decrease the ability of the additional water to drain

from the system." No evaluation seems to have been made of the depth, duration, or frequency of flooding that would result from the implementation of the Alternative C system.

- The no-impact finding for Alternative C fails to take into account the impacts within the Mill Creek sub-basin that would result from a greater than 2-foot increase in the mean water surface elevation within the Lower Herring River relative to existing conditions. The anticipated post-construction water elevation outside the Mill Creek dike under the Alternative C condition is 1.68 feet (Section 3.2.1, Fuss & O'Neill, 2016). The existing mean water elevation is approximately -0.9 feet (Figure ES-9, WHG, 2012). Presuming that there is no increase in the water elevation within Mill Creek – as presumed by the project proponents – the duration of the tidal period over which the Lower Herring River will be low enough to allow discharge from Mill Creek is likely only to be several hours (see for example Figure ES-8 of WHG, 2012). Further, increased water elevations on the downstream side of the dam will increase the inward flux of groundwater towards CYCC that will likely discharge to the portions of Mill Creek upstream of the proposed dike on Mill Creek. A conceptual Mill Creek dike design has been produced by the proponents. The design-report alludes to seepage calculations, but fails to present a calculation of seepage flows through or under the dam. The anticipated no-impact projections for the Mill Creek sub-basin fail to take into account the compromised outflows of water from Mill Creek and the complicated groundwater – surface water interactions that will govern the post-construction water elevation in Mill Creek.

- The FEIS/EIR describes the hydrodynamic model executed by the Woods Hole Group as playing a central role in development of the restoration plan (pg. 17 and elsewhere) and references to model results are made throughout the document. The report's Table of Contents and the text refer to Appendix B as the Hydrodynamic Modeling Report. In fact, Appendix B represents only an Executive Summary of the Hydrodynamic Modeling Report as noted in the text contained in Appendix B. The attached Appendix B is typical of an Executive Summary, in providing a brief summary of findings without providing for a detailed discussion that would allow for a thorough engineering review of the methodologies and underlying assumptions. For instance, a discussion of simulations of storm events in the Mill Creek sub-basin on Page ES-14 notes impacts to water elevations within Mill Creek. The discussion fails however to describe the duration or intensity of the simulated events or the anticipated return period of the simulated events. It also fails to describe the initial and bounding conditions within the Herring River. Hydraulics of flow through the flap valve itself would be a highly complex function of the upstream and downstream water elevations and merits some discussion in and of itself. Further discussion on the same page refers to the evaluation of impacts of sea level rise on groundwater levels in the Mill Creek sub-basin, however the method and underlying hydrogeologic conditions used in those evaluations are not reported. A complete review of the modeled conditions and the reported conclusions is only possible with sufficient documentation of the executed simulation conditions. The full report that presumably contains this information was not made available on release of the FEIS/EIR and is not readily available through other sources on the internet.

- In the discussion of Mitigation of Low-lying Property Impacts in Section 4.10.5, references are made to "overlapping and redundant protection" afforded by monitoring of the tide range and

water levels during the initiation of the opening of Chequesset Neck Road Dike. These statements carry no quantitative targets for assessment of impacts and are as such highly dependent on a subjective judgments of impacts. As noted in this section, the exact nature of monitoring will be specified as components of landowner agreements to be resolved between individual property owners and another unspecified party.

My opinions described above draw on both my formal education and my work experience that includes tens of projects in the area of water resources engineering. I have a Ph.D. in Environmental Engineering, awarded in 1998 by the Massachusetts Institute of Technology Department of Civil and Environmental Engineering. I have been a Registered Professional Engineer in the field of Civil Engineering for the past 24 years and am currently serving as Vice President of the Boston Society of Civil Engineers Section. I have attached a copy of my resume that describes my engineering experience in more detail.

Sincerely,

Bruce Jacobs

Bruce Jacobs, P.E., Ph.D.

BRUCE L. JACOBS

EDUCATION

1998	Ph.D.	Environmental Engineering	Massachusetts Institute of Technology
1987	M.S.	Water Resources Engineering	Massachusetts Institute of Technology
1985	B.S.	Civil Engineering	Wayne State University

PROFESSIONAL HISTORY

2016 – date	EI LLC
1998 - 2016	HydroAnalysis, Inc.
1999 - 2000	Northeastern University
1994 - 1998	Massachusetts Institute of Technology
1987 - 1994	Camp, Dresser & McKee
1984	US Army Corps of Engineers

REGISTRATION

Professional Engineer, Massachusetts

REPRESENTATIVE EXPERIENCE

As an environmental engineering consultant, Dr. Jacobs has broad experience in hydrology and environmental water quality, environmental subsurface site characterization and remedial design, and the generation and the application of numerical models in support of these efforts. Dr. Jacobs is an expert in the application of numerical models for ground-water, hydrologic, and hydraulic analysis, is the developer of the visualization code, EnviroInsite, and is the co-author of Camp Dresser & McKee's proprietary ground-water visualization software. Dr. Jacobs has also contributed to a variety of ground- and surface-water quality studies. These studies include well capture-zone analysis, modeling the impact of channel modifications on stream water quality, and performing statistical analysis of streamflow. Dr. Jacobs is the current chair of the Boston Society of Civil Engineers Section branch of the Environmental Water Resources Institute.

Ground-water Analysis and Modeling

Developed ground-water flow and transport model for determination of travel times to Wilmington, Massachusetts water supply wells.

Served on peer review panel for regional, transient ground-water flow model prepared by South Florida Water Management District. Important issues addressed included calibration indices, methods for calibration of transient models, sensitivity analysis procedures and interpretation, and modeling of surface water – ground water interaction.

Created flow and transport model of regional aquifer at Los Alamos National Laboratory. Prepared impulse response functions for interactive assessment and ranking of health risks from multiple sources.

Prepared assessment of modes of transport through vadose zone at Los Alamos National Laboratory and provided guidance on use of vadose zone characterization strategies.

Provided expert witness testimony in case involving the depletion of water table due to leaking infrastructure. Evaluated multiple causes of water table depletion and timing of impacts.

Constructed models to support site characterization and remedial design at numerous ground-water contamination sites nationwide including regional studies, Superfund sites, capture zone analysis, and pump test assessment.

Lead site characterization and design of ground-water monitoring program for China Petroleum Corporation tank farm in Kaohsiung, Taiwan.

Simulated measures to alleviate saltwater contamination inland of a system of injection wells at West Coast Basin Barrier, Southern California. Modeled operation of Dominguez Gap Barrier injection wells and tested alternative strategies to improve effectiveness of barrier in reducing salt water intrusion in Southern California.

Surface Water / Water Supply

Analyzed overflows of Fitchburg, Massachusetts combined sewer system and assisted in conceptual design of projects to reduce overflows through system expansion, separation of storm and sanitary sewers, and additional system storage.

Evaluated spatial distribution of contaminants within Wilmington, Massachusetts water distribution system. Adapted water distribution model to determine spatial distribution of contaminants that were introduced at water supply wells. Recreated historical system configurations by modification of existing model data and applied to determine change of exposure concentrations over time.

Optimized design and operation of flood gate-reservoir system in Singapore. Involved consideration of both water supply and safety issues, the application of HEC1 and enhancement of in-house FORTRAN code for simulation of receiving basin operation.

Developed network simulation model for long range planning of San Francisco water supply system. Simulations used to assess facilities expansion and siting and improvement of system operations incorporating hydraulic constraints, reservoir operating rules, unit cost functions, and distributed demand.

Assessed spatial distribution of contaminants in water distribution system using University of Kentucky codes for hydraulic modeling and transport, Tucson, Arizona.

Performed river quality simulations of Tiete River in Brazil using QUAL2.

Software Development

Extensive experience in the development and maintenance of C++ and FORTRAN software applications. Developed decision support system for analysis of water quality including database, mapping and model interface (STORM) capabilities. Developed pre/post-processors for water hammer simulation code of US Army Corps of Engineers (WHAMO) and EPA Water Quality Analysis and Simulation Program (WASP).

Responsible for maintenance and development of graphic interface to CDM ground-water numerical models; author of three-dimensional plotting, grid generation, and database query capabilities.

Expert Testimony

Dr. Jacobs has provided deposition testimony in the following:

Charles Dumbaugh v. MDC, BW&SC, MWRA, City of Boston and CR Maguire, Inc. (Mass., Suffolk County)

American Motorists Insurance Co. v. Stewart Warner (U.S. District Court, Northern District of Illinois)

Courtroom testimony was provided in the following cases:

Phyllis Madanian v. Michael Prendergast and Madeleine Prendergast (Mass. Middlesex County, Superior Court Department Civil Action No. MICV2006-00003).

Indian Brook Cranberry Bogs, Inc. and Wanda Jane Warmack v. Board of Appeals of the Town of Plymouth, Peter Conner, William Sims, Patrick Mulvey-Welsh, in their capacity as members of the Plymouth Boards of Appeals, and Sawmill Development Corp. (Mass., Plymouth County, Land Court Department, Misc. Case No. 06-322281).

First Class, LLC, and Perfection Fence Corp. v. Carl Russell, Karen Tepper, Joseph Kelleher, Edwin Parsons, and Michael Harrington as they are members of the Town of Marshfield Zoning Board of Appeals and Town of Marshfield (Mass., Plymouth County, Land Court Department of the Trial Court, Misc. Case No. 333504).

Appeal of groundwater discharge permit awarded to Sawmill Development Corporation by the Massachusetts Department of Environmental Protection (Massachusetts Department of Environmental Protection, Office of Appeals and Dispute Resolution, Docket No. 2014-016).

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Surampalli, R. S.K. Ong, E. Seagren, J. Nuno and S. Banerji, editors, *Natural Attenuation of Hazardous Wastes,* American Society of Civil Engineers, 2004. (ISBN 0-7844-0740-1)
Chapter 3.4, "Modeling of Natural Attenuation" by B. Jacobs, R. Fitzgerald and F. Wilhelm-Miralles.

Jacobs, B.L. and L.W. Gelhar. "Effective Properties of Two-phase Flow in Heterogeneous Aquifers", *Water Resources Research,* 41 (1), 2005.

Novotny, Vladimir and Paul Brown, editors. Cities of the Future: Towards integrated sustainable water and landscape management. ISBN 1843391368. IWA Publishing, London, England. September 2007.
"Ground Water and Cities" by Peter Shanahan and Bruce L. Jacobs.

Durant, J.L., B. Jacobs, and P. Shanahan, "Historical Inputs of N-nitrosodimethylamine to the Public Drinking Water Supply in Wilmington, Massachusetts," In: Roger W. Babcock, Jr. and Raymond Walton, editors, Proceedings of The World Environmental & Water Resources Congress, May 12-16, 2008, Honolulu, Hawai'i. American Society of Civil Engineers, Reston, Virginia.

Till, J., H. Grogan, L. Hay-Wilson, J. Rocco, A. Rood, B. Jacobs, and P. Shanahan, "Overview of Environmental Transport Models Contained in the Risk Analysis, Communication, Evaluation, and Reduction (RACER) Software Tools at Los Alamos National Laboratory," WM2009: HLW, TRU, LLW/ILW, Mixed, Hazardous Wastes & Environmental Management, March 1-5, 2009, Phoenix, Arizona (accepted)

Jacobs, B. "Chapter 1: Introduction" in *International Manual on the Hydraulics of Wells,* edited by Ahmed, N., American Society of Civil Engineers, 2014.