

March 15, 2019

Deirdre Buckley, Director
Massachusetts Environmental Policy
Act Office
Executive Office of Energy and
Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Re: Notice of Project Change for Town of Orleans Comprehensive Wastewater Management Plan; **EEA#14414**

Dear Ms. Buckley:

On behalf of our client, the Town of Orleans, AECOM respectfully submits the enclosed Notice of Project Change (NPC) in accordance with 301 CMR 11.10(1). One original signed version, one copy of the original, and one electronic version are enclosed for review under the Massachusetts Environmental Policy Act (MEPA) regulations.

The enclosed NPC describes a change to Orleans' Comprehensive Wastewater Management Plan (CWMP) regarding the performance of additional wastewater planning efforts since the 2011 CWMP approval. The Town's recent planning efforts have resulted in the identification of a hybrid approach to addressing the Town's wastewater management needs, combining Traditional and Non-Traditional nutrient management technologies. Non-Traditional Technology Demonstration Projects have been implemented to assess the feasibility of nitrogen removal and evaluate the amount of removal achievable by each Non-Traditional Technology. The Town may eventually propose replacing part of the originally envisioned sewer area with a combination of Non-Traditional Technologies if the Massachusetts Department of Environmental Protection (MassDEP) approves nitrogen removal credits based on Demonstration Project monitoring data, which are still being collected. The Town of Orleans has elected to contract with an Aquaculture Contractor to continue growing oysters in Lonnie's Pond in a private aquaculture operation, while MassDEP's decision is pending. The Town plans to submit monitoring data to MassDEP as required by the 2018 Pleasant Bay Watershed Permit, in order to gain consensus regarding a nitrogen removal credit for aquaculture. If MassDEP approves a nitrogen removal credit for Non-Traditional Technologies, then the Town would evaluate modifying its proposed sewerage plan to include Non-Traditional Technologies and would submit an additional NPC to MEPA at that time regarding the proposed change to its CWMP.

Monitoring results to date for the Permeable Reactive Barriers Demonstration Project at Eldredge Park and for the oyster aquaculture Demonstration Project in Lonnie's Pond, which have been provided to the MassDEP, are provided in Attachments 4 and 5, respectively. Due to the size of these reports, the documents are provided electronically on an enclosed disk, rather than in hard copy. The results of the monitoring are summarized in the text of the enclosed NPC. The reports in their entirety will be provided to any individual or agency upon request, in electronic format.

The NPC is being concurrently circulated in accordance with 301 CMR 11.10(7). If you have any questions regarding this NPC, please contact me at (978) 905-2968.

Yours sincerely,



Jennifer Doyle-Breen
Associate Vice President

AECOM

T: 9789052968

E: jennifer.doyle-breen@aecom.com

Enclosure

cc: John Kelly, Town of Orleans
George Meservey, Town of Orleans
Thomas Parece, AECOM
NPC Distribution List (see Attachment 5 of NPC)

NOTICE OF PROJECT CHANGE

Town of Orleans Comprehensive Wastewater Management Plan (CWMP) Non-Traditional Technologies for Nitrogen Removal

Submitted to:

**Executive Office of Energy and Environmental Affairs
Massachusetts Environmental Policy Act Office**

Prepared for:

Town of Orleans

March 2019

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Figure 1c: 2018 Wastewater Treatment & Disposal Facilities

Attachment 2 - Orleans Water Quality Advisory Consensus Plan

Attachment 3 - Demonstration Projects Implemented to Date

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Figure 3b: PRB Demonstration Location of Eldredge Park

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Attachment 8 – NPC Distribution List

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs ■ MEPA Office

For Office Use Only
Executive Office of Environmental Affairs

MEPA Analyst:

Phone: 617-626-

Notice of Project Change

The information requested on this form must be completed to begin MEPA Review of a NPC in accordance with the provisions of the Massachusetts Environmental Policy Act and its implementing regulations (see 301 CMR 11.10(1)).

EEA # 14414		
Project Name: Orleans Comprehensive Wastewater Management		
Street Address: Herring Brook Way (Lonnie's Pond aquaculture), and Eldredge Park Way (PRB site)		
Municipality: Orleans	Watershed: Cape Cod	
Universal Transverse Mercator Coordinates:	Lonnie's Pond:	
	Latitude: 41.782222 Longitude: -69.976389	
	Eldredge Park:	
	Latitude: 41.770000 Longitude: -69.989444	
Estimated commencement date: April 2020	Estimated completion date: December 2023	
Project Type: Wastewater Management	Status of project design:	40-85 %complete
Proponent: Town of Orleans		
Street Address: 19 School Road		
Municipality: Orleans	State: MA	Zip Code: 02653
Name of Contact Person: Jennifer Doyle-Breen		
Firm/Agency: AECOM	Street Address: 250 Apollo Drive	
Municipality: Chelmsford	State: MA	Zip Code: 01824
Phone: 978-905-2968	Fax: 978-905-2101	E-mail: Jennifer.doyle-breen@aecom.com

With this Notice of Project Change, are you requesting:

a Single EIR? (see 301 CMR 11.06(8)) Yes No

a Special Review Procedure? (see 301CMR 11.09) Yes No

a Waiver of mandatory EIR? (see 301 CMR 11.11) Yes No

a Phase I Waiver? (see 301 CMR 11.11) Yes No

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?

301 CMR 11.03(11)(b) Areas of Critical Environmental Concern (ACEC). Project within a designated ACEC.

Which State Agency Permits will the project require?

Massachusetts Division of Marine Fisheries (DMF) Certification of Aquaculture License
 MassDEP Wetlands Protection Act Local Order of Conditions

Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres:

None for Aquaculture and PRB. The Town of Orleans applied for a \$45 million State Revolving Fund (SRF) loan for sewerage downtown, building the wastewater treatment plan, and building the pipeline for effluent

disposal, and has been placed on the 2019 Intended Use Plan (IUP) for financing.

PROJECT INFORMATION

In 25 words or less, what is the project change?

The Town is evaluating the use of Alternative Technologies for nitrogen removal, including aquaculture, Permeable Reactive Barriers (PRBs), and Nitrogen Reducing Biofilters (NRBs).

See full project change description beginning on page 3.

Date of publication of availability of the ENF in the Environmental Monitor: (Date: May 6, 2009)

Was an EIR required? Yes No; if yes,
was a Draft EIR filed? Yes (Date:) No
was a Final EIR filed? Yes (Date:) No
was a Single EIR filed? Yes (Date: 12/2010) No

Have other NPCs been filed? Yes (Date:10/31/2018) No

If this is a NPC solely for lapse of time (see 301 CMR 11.10(2)) proceed directly to

ATTACHMENTS & SIGNATURES.

PERMITS / FINANCIAL ASSISTANCE / LAND TRANSFER

List or describe all new or modified state permits, financial assistance, or land transfers not previously reviewed: **dd w/ list of State Agency Actions (e.g., Agency Project, Financial Assistance, Land Transfer, List of Permits)**

Massachusetts Division of Marine Fisheries (DMF) certification of an aquaculture license was not originally envisioned as part of the project.

Are you requesting a finding that this project change is insignificant? A change in a Project is ordinarily insignificant if it results solely in an increase in square footage, linear footage, height, depth or other relevant measures of the physical dimensions of the Project of less than 10% over estimates previously reviewed, provided the increase does not meet or exceed any review thresholds. A change in a Project is also ordinarily insignificant if it results solely in an increase in impacts of less than 25% of the level specified in any review threshold, provided that cumulative impacts of the Project do not meet or exceed any review thresholds that were not previously met or exceeded. (see 301 CMR 11.10(6)) Yes No; if yes, provide an explanation of this request in the Project Change Description below.

FOR PROJECTS SUBJECT TO AN EIR

If the project requires the submission of an EIR, are you requesting that a Scope in a previously issued Certificate be rescinded?
 Yes No; if yes, provide an explanation of this request_____.

If the project requires the submission of an EIR, are you requesting a change to a Scope in a

previously issued Certificate?

Yes No; if yes, provide an explanation of this request _____.

SUMMARY OF PROJECT CHANGE PARAMETERS AND IMPACTS

Summary of Project Size & Environmental Impacts	Previously reviewed	Net Change	Currently Proposed
LAND			
Total site acreage	27 ac	+0.37 ac*	27.37 ac
Acres of land altered	1.6 ac	0*	1.6 ac
Acres of impervious area	4 ac	0	4.0 ac
Square feet of bordering vegetated wetlands alteration		0	
Square feet of other wetland alteration		+6 sf	
Acres of non-water dependent use of tidelands or waterways		0	
STRUCTURES			
Gross square footage	59,200 sf	0	59,200 sf
Number of housing units	0	0	0
Maximum height (in feet)	25 ft	0	25 ft
TRANSPORTATION			
Vehicle trips per day	26	0	26
Parking spaces	12	0	12
WATER/WASTEWATER			
Gallons/day (GPD) of water use	640,000	0	640,000
GPD water withdrawal	0	0	0
GPD wastewater generation/ treatment	504,000 gpd	0	504,000 gpd
Length of water/sewer mains (in miles)	74.91 mi	0	74.91 mi

***Total site area is increasing due to addition of the aquaculture project at Lonnie’s Pond. The PRB is a below-ground feature; there are no surface or physical features associated with the PRB installation. The emulsified vegetable oil is introduced via direct push injection and no physical structures remain in the ground after the injections. The only physical structures associated with the PRB are 42 2-inch diameter monitoring wells, which are all flush mounted and occupy less than one square foot of ground surface.**

Does the project change involve any new or modified:

1. conversion of public parkland or other Article 97 public natural resources to any purpose not in accordance with Article 97? Yes No

2. release of any conservation restriction, preservation restriction, agricultural preservation restriction, or watershed preservation restriction? Yes No

3. impacts on Rare Species? Yes No

4. demolition of all or part of any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth?
Yes No

5. impact upon an Area of Critical Environmental Concern? Yes No

If you answered 'Yes' to any of these 5 questions, explain below:

PROJECT CHANGE DESCRIPTION (attach additional pages as necessary). The project change description should include:

- (a) a brief description of the project as most recently reviewed
- (b) a description of material changes to the project as previously reviewed,
- (c) if applicable, the significance of the proposed changes, with specific reference to the factors listed 301 CMR 11.10(6), and
- (d) measures that the project is taking to avoid damage to the environment or to minimize and mitigate unavoidable environmental impacts. If the change will involve modification of any previously issued Section 61 Finding, include a draft of the modified Section 61 Finding (or it will be required in a Supplemental EIR).

(a) Brief description of the project as most recently reviewed

The project described in the 2010 CWMP/SEIR included a 20-year phased construction of a wastewater collection system, new WWTF, and implementation of non-structural program elements to achieve reductions in nitrogen loadings to coastal embayments. In October 2018, a Notice of Project Change was submitted to MEPA to modify the effluent discharge location. The 2010 CWMP/SEIR Figure 11-1, Figure 1a in Attachment 1, illustrates the currently proposed, and most recently reviewed, build condition for sewer installation throughout the Town of Orleans. Figure 1b in Attachment 1 illustrates the detailed sewer system layout for the first phase of the project, as well as the effluent disposal location at Lots Hollow Road, which was described in the 2018 NPC approved by the Secretary of Environmental Affairs. Approximately 74 miles of sewer and a 0.64 million gallons per day (mgd) WWTF have been proposed to treat wastewater from 2,800 properties along Pleasant Bay, Town Cove, and the Nauset and Rock Harbor watersheds. The project described in the 2010 CWMP also included an adaptive management plan (AMP) to facilitate compliance with Total Maximum Daily Load (TMDL) requirements.

As described in the CWMP/SEIR and confirmed in the 2018 NPC, the proposed sewers would be located within existing roadway rights-of-ways. The Town's sewer project would not directly impact BVW resources, but sewer line routes may encroach in the 100-foot buffers of regulated wetland resource areas and result in temporary impacts to the wetland buffer zone area as well as Land Subject to Flooding (BLSF). The effluent disposal site is located at 32 Lots Hollow Road, which is located south of the Route 6 and Route 6A cloverleaf, approximately 4,840 feet (0.91 miles) from the WWTF on Overland Way. The effluent disposal site was evaluated through a hydrogeologic evaluation. A reserve effluent disposal site is located nearby at 43 Lots Hollow Road, as depicted in Figure 1c in Attachment 1. Based on site conditions, subsurface soils encountered, a wick loading test, and groundwater model results, a minimum of 500,000 gpd can be discharged at either Lots Hollow site.

(b) Description of material changes to the project as previously reviewed

The material changes to the project since it was previously approved by MEPA include:

- Additional wastewater planning efforts since the 2011 CWMP approval, through the Town of Orleans' Water Quality Advisory Panel (OWQAP) and cooperative work with the Pleasant Bay Association
- Non-Traditional (NT) Demonstration Projects for nitrogen removal and future Amended CWMP NPC
- Lonnie's Pond private aquaculture operation
- Pleasant Bay Watershed Permit issuance

These changes are described below.

Wastewater Planning Efforts since 2011 CWMP Approval

Since the CWMP was approved in 2011, the Town has allocated funds each year through the Town meeting process in order to advance the planning and implementation of agreed upon solutions and projects. Subsequent to the CWMP approval in 2011, the Cape Cod Commission (CCC) began to develop an update to the 1978 Water Quality Management Plan for the region in accordance with Section 208 of the federal Clean Water Act due to the impairment of water quality in coastal waters resulting from excess nitrogen. The 208 Plan Update identified a number of recommendations to improve water quality in coastal waters surrounding Cape Cod and identified potential alternative technologies to achieve improvements, such as aquaculture, floating constructed wetlands, permeable reactive barriers, and others. The update to the 208 Plan was approved by MassDEP and US EPA in 2015, and included a matrix of potential alternative approaches to achieving nitrogen reductions in coastal waters. The alternative approaches were identified as NT Technologies.

In 2014, the OWQAP was convened to achieve consensus and build widespread community support for a customized, affordable water quality management plan for the Town. The panel consisted of stakeholder representatives (Orleans Selectmen and representatives of engaged citizen constituencies) and liaisons from key Town boards and commissions, organizations, neighboring towns, and regional, state, and federal partners. Following the issuance and approval of the 208 Plan Update, the OWQAP began investigating alternative, NT Technologies as part of the solution to its wastewater management needs. Between 2014 and 2015, the OWQAP met numerous times to discuss potential Traditional and NT approaches to wastewater management. As part of this process, a written Consensus Agreement and associated Consensus Plan figure were developed in 2015 that identified a hybrid approach combining both Traditional and NT nutrient management technologies that would provide Orleans with an alternative, more cost effective strategy for managing wastewater and reducing nitrogen in the Rock Harbor, Nauset Marsh, Pleasant Bay, Namskaket, and Little Namskaket Watersheds. The Consensus Plan developed through the OWQAP is provided in Attachment 2.

The NT Technologies initially identified in the Consensus Plan include Permeable Reactive Barriers (PRBs), floating constructed wetlands, shellfish aquaculture, and coastal habitat restoration reefs. Since the development of the final Consensus Agreement and Plan, the OWQAP continued to meet and report on the progress of implementation until 2017.

Non-Traditional Demonstration Projects and Future Amended CWMP NPC

As indicated above, NT Technologies were identified in the OWQAP Consensus Plan as

a potential component of the Town's overall wastewater management solution. Of the NT Technologies originally identified and evaluated, PRBs and aquaculture were progressed to the Demonstration Project (DP) stage and have been implemented over the past few years (see Figure 3a). The results are currently under evaluation for full-scale implementation. However, no decisions have been made in regard to full-scale implementation as additional review and discussion with MassDEP is needed to confirm the amount of nitrogen removal credit that might be assigned to each NT Technology. Nitrogen Reducing Barriers (NRBs) have also been identified as a NT Technology that warrants further review and consideration through the implementation of a DP. Floating constructed wetlands were also considered, but it was determined that there are insufficient data available to verify the effectiveness of floating constructed wetlands for nitrogen removal in estuarine environments; thus, this technology is not being considered for implementation in Orlean's estuaries and embayments at this time.

For each DP, the Town plans to compile three years of nitrogen removal data for MassDEP review and request a determination at that time of whether the NT Technology could be assigned a nitrogen removal credit. If a nitrogen removal credit is agreed upon, then the Town may propose replacing part of the originally envisioned sewer area outlined in the 2010 CWMP with a combination of NT technologies. However, it is still premature for the Town to propose any change to the sewerage plan outlined in the 2010 CWMP.

Each of the NT Technologies under consideration and the status of the NT DPs are briefly summarized below.

Permeable Reactive Barriers (PRBs)

There is one existing PRB DP at Eldredge Park, as illustrated in Figure 3b in Attachment 3. PRBs are a passive treatment technology, designed in this application to intercept and treat nitrate in groundwater through biological denitrification before groundwater reaches downgradient surface waters. The PRB treatment zone is located in the groundwater saturated zone below the water table, where amendments are added to form the PRB. PRBs are typically oriented perpendicular to the direction of groundwater flow and rely on the natural groundwater gradient to carry the contaminant through the PRB. The system is permeable because the amendments added are designed not to interfere with groundwater flow.

The PRB in-situ (in place in the ground) treatment method typically introduces a carbon food substrate into the groundwater, allowing naturally occurring microbes in the groundwater to consume the carbon substrate while respiring oxygen and creating anoxic (without oxygen) conditions favorable for denitrifying bacteria. Under anoxic or anaerobic conditions, maximum energy is gained by microbes using nitrate as an electron acceptor (denitrification reaction). Nitrate is the preferred electron acceptor to soil microbes after oxygen is consumed. This process of bacterial metabolism results in the conversion of nitrate to inert nitrogen gas and requires both anoxic conditions and sufficient food substrate for bacterial growth.

The PRB DP is oriented cross-gradient northwest to southeast, perpendicular to the northeasterly groundwater flow direction, and the PRB is approximately 110 feet long. During this demonstration test, direct-push methods were used to place emulsified vegetable oil substrate in the subsurface as the carbon food source. Direct-push injection is a method of soil boring modified with a down-hole injection screen and tubing used for placement of organic carbon electron donor emulsified vegetable oil substrate.

The PRB is a below-ground feature. The direct-push injections are delivered at temporary injection points that are sealed following injection, and no physical structures remain in the ground after the injections. The only physical structures associated with the PRB are 42 2-inch diameter monitoring wells, which are all flush mounted and occupy less than one square foot of ground surface.

Injections were performed in November 2016. Quarterly sampling has been ongoing since January 2017 and is expected to be completed in late fall 2019. Monitoring results to date are reported in the quarterly monitoring reports included in Attachment 4. Data collected include the lateral and vertical movement of the emulsified vegetable oil through the ground, the extent of nitrogen reduction in the groundwater, and the migration path location of the groundwater plume. The Town is currently evaluating additional potential locations for PRBs; however, no final locations have yet been determined.

Oyster Aquaculture

The Town conducted an oyster aquaculture DP in Lonnie's Pond for three years, between 2016 and 2018, to evaluate nitrogen uptake under various oyster stocking density scenarios and to determine logistics of implementing oyster aquaculture. Lonnie's Pond, shown in Figure 3c in Attachment 3, was identified as the preferred location for the Town's first shellfish DP based on a few key factors, including: the Town's strong desire to improve the environmental conditions in the Town's terminal ponds, many of which include anoxic, muddy sediments; and the expected ability to monitor water quality and other impacts caused by shellfish in this semi-closed sub-embayment.

Nitrogen removal was evaluated both by monitoring change in nitrogen content in oysters from the beginning to end of the growing season each year, as well as removal through sediment denitrification. Results to date have indicated that there is some uncertainty regarding nitrogen removed through sediment denitrification; however, direct nitrogen uptake by the oyster biomass was well documented between 2016 and 2017 and consistent with nitrogen removal rates documented in other studies. Analysis of the 2018 data is currently underway.

A telescoping auger system, shown in Figure 3d in Attachment 3, was developed to keep the rectangular array of bags in a horizontally fixed location relative to the bottom as the tide moved through a range of over 4 feet on a daily basis, and a range of over 6 feet during storm surges. During the 2016 DP, this system constrained the corners of the field to a typical movement of under ± 2 feet and the center of the edges between augers to a typical movement of under ± 4 feet. In addition to providing an orderly layout that facilitated monitoring of oyster growth, this dense array configuration kept the oysters in a more consistent physical location to facilitate denitrification studies. The bags were accessible by kayak for maintenance and monitoring operations, and full rows of 17 bags could also be pulled out of the field for splitting or full field measuring operations.

A photograph of the 2017 oyster fields fully populated with bags is shown in Figure 3e in Attachment 3.

In Year 1 of the DP, approximately 200,000 First Year (Y1) and Second Year (Y2) oysters were deployed in Lonnie's Pond.¹ In Year 2, the combined number of Y1 and Y2 oysters

1. Y1 are those oysters beginning the year as seed oysters approximately 2 - 3 millimeters (mm) in size and

was increased to approximately 600,000. The oysters were placed in floating bags with various stocking densities. Data from Year 1 (2016) and Year 2 (2017) of the DP indicate that the oysters in the project grew well and at a rate that is typical for Cape Cod oysters. The 2016 laboratory results indicated that the nitrogen content for Y1 and Y2 oysters was 10.5 percent and 10.3 percent, respectively. The results indicated that the DP removed 25.9 kilograms (kg) of nitrogen by uptake (increased biomass) in 2016 and 28.1 kg in 2017, thus showing favorable results in achieving nitrogen reduction via the use of shellfish to meet TMDL requirements and total nitrogen reduction targets. The 2016 and 2017 Annual Reports are provided in Attachment 5.

Year 3 (2018) of the DP was approximately twice as big as Year 2 (2017). This larger design facilitated evaluation of nitrogen uptake in adjacent high-density fields of Y2 oysters as well as mixed Y1-Y2 fields. In addition, the expanded layout involved installing an oyster field in the northeast part of the pond. In DP Year 3 (2018), a total of 2,040 6-millimeter (-mm) diamond mesh bags were distributed in four fields containing 510 bags each. Data analysis of the Year 3 nitrogen uptake is still underway.

The first three years of the aquaculture DP were conducted under the Town's municipal aquaculture permit. As a result, the oysters grown were not able to be sold. Instead, the Town put oysters of sufficient size out for harvest by residents. Smaller oysters that were not yet of harvestable size were traded to other Cape Cod towns in exchange for larger oysters and/or quahogs that were then made available to Orleans residents for harvest.

Nitrogen Reducing Biofilters

The NRB system is an innovative alternative for septic systems to reduce nitrogen concentrations from wastewater discharge. The system consists of a horizontal layer of sandy soils overlying a layer of sand mixed with finely ground wood that is dosed with septic tank effluent using a low pressure system. The technology was initially piloted at the Barnstable County Test Center and site-specific testing at individual lots was determined to be warranted. A site selection process is currently underway to identify locations for NRB DPs in Orleans; however, no sites have yet been selected.

Lonnie's Pond Private Aquaculture

While awaiting direction from MassDEP regarding nitrogen reduction credits that might be attributed to aquaculture operations, the Town has elected to contract with a third party to continue aquaculture operations at Lonnie's Pond in 2019 and potentially beyond. This new phase of the aquaculture DP will allow continued collection of nitrogen removal and water quality data. In the fall at the end of the oyster growing season, the oysters will be removed from Lonnie's Pond, and the aquaculture contractor will be responsible for determining a destination for the oysters outside of the watershed. The Aquaculture Contractor will be responsible for purchasing, transporting, installing, maintaining and removing the shellfish. Oysters will be grown in the same manner as conducted during the DP. A floating bag setup similar to that used in the DP is to be used, although the oyster density may be varied based on growth results.

Attachment 6 illustrates the configuration that will be used for the floating bags. During Year 1, the deployment will occupy an area of 0.37 acres (or 2% of the pond area). This area is the same surface coverage as utilized during the DP. During Years 2 and 3, the deployment area will remain 0.37 acres, but will shift to other locations within the overall

growing throughout one season. Y2 are those oysters that are in their second year of growth.

deployment area, as shown in Attachment 6. Rotation of deployment areas will occur to encourage additional nitrogen reductions and avoid use of the same areas for more than two consecutive years. Deployment areas will be adjusted and reviewed annually based on the oyster count needed to attain nitrogen removal.

The Town is also procuring a monitoring contractor that will be responsible for weighing the oysters at the beginning and end of the deployment period, conducting nitrogen analyses of the oyster shell/tissue, and conducting water quality monitoring.

The key components of the contracted aquaculture operation are listed below.

- The Aquaculture Contractor is expected to produce greater than 23,400 kg of net increase in weight of oysters over the time that the oysters are grown in Lonnie's Pond. Based on DP results, this amount of oysters should remove 75 kg of total nitrogen. To accomplish this goal, approximately 5.5 million 2- to 3-mm Year 1 seed oysters will be deployed in Lonnie's pond by June 1 in floating spat bags. Subsequent to initial deployment, the best growing oysters will be transferred to 2,040 6-mm mesh bags, such that there will be 1,000 oysters per bag.
- Oysters will be maintained over the growing season and removed in the late fall, when they will be transferred to a location outside of the watershed for growth to market/harvestable size and sale.
- The Aquaculture Contractor will use the gear from previous years, supplied by the City. Any additional gear necessary beyond what is provided from previous years for oyster aquaculture will be procured or fabricated by the Aquaculture Contractor, but will be black to minimize visual impacts.
- The deployment areas are not accessible by foot and will instead be accessed by kayaks or other small craft, similar to the access method implemented during the DP.
- The Aquaculture Contractor will develop a plan for restoring shellfish if significant numbers of oysters die or are lost before August 1 in any given year, including the time needed for re-deployment.
- A response to any catastrophic events (e.g., significant shellfish die-off, anticipated weather event, or significant gear destruction) will be coordinated with the Town and Monitoring Contractor.
- Gear will be installed in the spring and removed in late fall, with gear removed by two weeks after the oysters are moved each year, but no later than December 15, except with permission of the Orleans Natural Resource Manager (or designee).
- Oysters must be certified disease-free prior to removal from Lonnie's Pond. Permission must be obtained from Massachusetts Division of Marine Fisheries (MassDMF) and the Orleans Natural Resource Manager (or designee) to move the oysters to a new site.
- The Contractor must notify the Town of any survival or growth concerns, including

signs of disease.

- A commitment has been made to address abutters' concerns, including visual impacts, minimizing noise, restricting work hours, and restricting vehicle parking to only one vehicle and trailer at the Lonnie's Pond boat ramp. Prior to each deployment, a meeting with the Aquaculture Contractor and abutters will be held so that any concerns can be voiced.
- The selected Aquaculture Contractor is scheduled to meet with the Board of Selectmen in late March 2019 to seek approval of an aquaculture license from the Town. Subsequently, the Aquaculture Contractor will seek a Division of Marine Fisheries certification of the Town license.
- The Aquaculture Contractor is responsible for obtaining approval for the project by filing an Army Corps of Engineers Pre-Construction Notification Form as well as either a Notice of Intent (NOI) or Request for Determination of Applicability (RDA) with the Orleans Conservation Commission.
- The Monitoring Contractor will submit a Lonnie's Pond Nitrogen Management Quality Assurance Project Plan (QAPP) to the Town and, following Town review, to MassDEP for approval to confirm MassDEP acceptability of results for TMDL compliance. The Monitoring Contractor will also be responsible for preparing both a Semi-Annual Technical Memorandum and a Lonnie's Pond Aquaculture/TMDL Annual Report.
- Water quality grab sampling will be conducted every two weeks between June 15 and September 15 in each of the three years. It is envisioned that volunteers will continue to collect this portion of the Lonnie's Pond sampling. Collected grab samples will be assayed for the following parameters: nitrate+nitrite, ammonium, total dissolved nitrogen, particulate nitrogen, ortho-phosphorus, chlorophyll a, pheophytin a, and particulate carbon.
- Field measurements for total depth, temperature, dissolved oxygen, and clarity/Secchi will be recorded in the center of Lonnie's Pond.
- Two continuous monitoring devices will be installed at two depths (0.5 meters and 3.5 meters). Both devices will have the following probes: dissolved oxygen, depth, salinity, temperature, and chlorophyll-a. The devices will be installed in late May/early June and removed in September to coincide with the critical compliance period. The device will be programmed to record readings every 15 minutes.
- At the beginning of the growing season, the Aquaculture Contractor will coordinate with the Monitoring Contractor to measure the total weight and estimate the total population of oysters deployed in Lonnie's Pond. At the end of the growing season, the Aquaculture Contractor will coordinate with the Monitoring Contractor to weigh all the oysters as they are removed from Lonnie's Pond.

- Shellfish sampling will be conducted by the Monitoring Contractor to measure the amount of nitrogen retained and removed through removal of oysters at the end of each growing season. A representative sample of one hundred (100) shellfish will be collected, weighed, and analyzed for nitrogen twice during the shellfish season in batches of no more than 10 oysters, once at the beginning of the growing season prior to deployment and once at the end of the growing season. Comparison of the nitrogen content in the pre- and post-growing season samples combined with the weight and post-growing count will determine the amount of nitrogen removed by shellfish in Lonnie's Pond.

Pleasant Bay Watershed Permit

Lonnie's Pond is a terminal pond located in the upper reaches of Pleasant Bay (see Figure 3c in Attachment 3) and is subject to the MassDEP 2007 total maximum daily load (TMDL) requirement for nitrogen, as outlined in the May 2007 report titled *Final Pleasant Bay System Total Maximum Loads for Total Nitrogen*. Pleasant Bay is the largest estuary on Cape Cod, and is within the designated Pleasant Bay Area of Critical Environmental Concern (ACEC). The Pleasant Bay system is located in multiple municipalities, including Orleans, Chatham, Brewster and Harwich. These communities have joined together to form the Pleasant Bay Alliance (PBA), which has been working to identify nitrogen loading to Pleasant Bay from each municipality and associated nitrogen reduction strategies. In 2018, the PBA developed the *Pleasant Bay Targeted Watershed Management Plan* (TWMP, May, 2018), which documents the mitigation measures that each municipality plans to implement to reduce its share of nitrogen contribution to Pleasant Bay, in accordance with TMDL requirements. One of the ongoing projects identified in the 2018 TWMP is oyster aquaculture in Lonnie's Pond.

In August 2018, MassDEP issued a Watershed Permit authorizing work needed to implement the recommendations in the TWMP in order to achieve water quality improvements and habitat restoration goals developed by the PBA. The 2018 MassDEP permit is the first Watershed Permit issued in the Commonwealth. The Watershed Permit establishes performance standards and timeframes under an adaptive management framework for many of the actions outlined in the TWMP, including aquaculture at Lonnie's Pond. The Watershed Permit identifies that nitrogen removal credit will be based on the following:

1. Tracking of oysters harvested and their wet weights
2. Sampling of harvested oysters to determine average dry weight and nitrogen content
3. Water quality sampling with analysis for temperature, salinity, transparency, alkalinity, nitrogen species (nitrate, ammonia, total Kjeldahl nitrogen, dissolved organic nitrogen, particulate organic nitrogen), chlorophyll-a, pheophytin-a, and dissolved oxygen

The Watershed Permit indicates that the monitoring data should be included in an annual reporting of nitrogen removal activities, and that the first four years of data should be summarized in a report that presents the data and nitrogen load reduction that has occurred, based on harvested oyster weight and associated average nitrogen content. In addition, the load reduction estimates shall be supported by data showing

improvements in water quality based on sampling results. The Town of Orleans plans to submit monitoring data to MassDEP as required by the Watershed Permit in order to gain consensus regarding a nitrogen removal credit for aquaculture. After this consensus is reached with MassDEP, the Town would then be in a position to propose implementation of full-scale aquaculture for TMDL compliance, if appropriate, and potentially reduction in the areas identified for sewerage in the 2010 CWMP.

(c) If applicable, the significance of the proposed changes, with specific reference to the factors listed in 301 CMR 11.10(6)

Since the proposed change involves additional project sites and a new permit not previously anticipated, this NPC is not requesting a Determination of Insignificance and therefore the factors listed 301 CMR 11.10(6) have not been evaluated in detail. As indicated above, the PRB DP does not trigger any MEPA review thresholds or require any state permits. The impacts of the Lonnie's Pond Aquaculture project have been described above. NRB locations have not yet been determined; however, no impacts to protected resources are anticipated.

(d) Measures that the project is taking to avoid damage to the environment or to minimize and mitigate unavoidable environmental impacts. If the change will involve modification of any previously issued Section 61 Finding, include a draft of the modified Section 61 Finding (or it will be required in a Supplemental EIR).

The previously reviewed CWMP/SEIR and 2018 NPC identified measures to avoid damage to the environment or minimize and mitigate unavoidable environmental impacts, as summarized below. The addition of Lonnie's Pond aquaculture will not involve modification of any previously issued mitigation measures or Section 61 Finding. Mitigation measures that will be employed either during the construction period and once the facility is operational include:

- Restricting sewer construction work to the period of October to May to avoid periods of high traffic;
- Segmenting sewer work on public streets to avoid protracted closures;
- Designing sewer lines and pump station to avoid floodplains and to minimize encroachment on the buffers of wetlands and other protected resource areas;
- Restricting work hours on construction sites near residential areas;
- Requiring contractors to implement dust control measures;
- Erosion and siltation controls at all construction sites as part of site-specific stormwater management plans;
- Compliance with all terms of Orders of Conditions for work in wetland buffers;
- Installation of odor and noise control systems on operating equipment and facilities;
- Implementation of policies that restrict potential odor-generating activities to times of the day with the least impact;
- Compliance with applicable standards for construction activities near historic structures;
- Facility siting to avoid, minimize, and mitigate impacts to habitat of rare and endangered species, including compliance with all NHESP conditions;
- Facility site design to include vegetated berms and to maximize natural buffers;

- Selection of wastewater treatment equipment to minimize energy use and maximize nitrogen removal; and
- Adoption of bylaws and regulations to ensure a "growth neutral" program.

Additional mitigation measures that will be implemented specifically at Lonnie's Pond include:

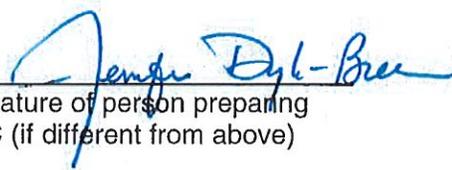
- Work to address abutters concerns as much as possible, including visual impacts, minimizing noise, restricting work hours, and minimizing vehicle parking at the boat ramp. It is anticipated that as in the DP, use of the boat ramp will be restricted to one side of the ramp and that black floating mesh bags will be used to minimize visual impacts.
- Minimize impacts to the substrate (fill) by the use of narrow diameter telescoping pole anchors. These anchors occupy much less area of the substrate than blocks.

ATTACHMENTS & SIGNATURES

Attachments:

1. Secretary's most recent Certificate on this project
2. Plan showing most recent previously-reviewed proposed build condition
3. Plan showing currently proposed build condition
4. Original U.S.G.S. map or good quality color copy (8-1/2 x 11 inches or larger) indicating the project location and boundaries
5. List of all agencies and persons to whom the proponent circulated the NPC, in accordance with 301 CMR 11.10(7)

Signatures:

3/14/19		3/14/19	
Date	Signature of Responsible Officer or Proponent	Date	Signature of person preparing NPC (if different from above)

John Kelly
Name (print or type)

Jennifer Doyle-Breen
Name (print or type)

Town of Orleans
Firm/Agency

AECOM
Firm/Agency

19 School Rd
Street

250 Apollo Drive
Street

Orleans, MA 02653
Municipality/State/Zip

Chelmsford, MA 01824
Municipality/State/Zip

(508) 240-3700 x 415
Phone

(978) 905-2968
Phone