Appendix E

Public Comment Supporting Documents

The supporting documentation listed in this table was submitted as part of the public record but did not include specific comments on the Proposed Action or Draft GEIS.

Document	Commenter Number	Commenter Providing Documentation	Date Received
Community Journal Letter	Written Commenter, #9	Hope Olinsky	9/2/19
Alternative On-Site Wastewater Treatment Systems Review	September 5th Hearing, #3	Jodi Giglio	9/5/19
An Independent Report on Sewage Disposal Practices and Policies Relating to the Groundwater Supply in Suffolk County, New York	September 5th Hearing, #6	Royal Reynolds	9/5/19
"REWATS" Factsheet	September 6th Hearing, #11	Robert Bender	9/6/19
US District Court, Western District of Washington at Seattle, Case No. C16-0950RSL, The Coalition to Protect Puget Sound Habitat v. US Army Corps of Engineers, et. al.	Written Commenter, #45	Robert M. Wemyss	10/6/19

Dear Sir or Madam:

Dear Sir or Madam: I have written this letter multiple times as each time I find out more about the County's Wastewater Plan; and it becomes more befuddling as I learn more. One layer of befuddlement is a deficiency of evidence.

I do not see, after viewing the **Draft of the General Environmental Impact Statement** (DGEIS), released for public view, how the actions proposed in the plan are necessary. This 552-page document is supposed to present to the public why this plan is needed and of what it consists. What you will see, repeatedly, in it are the terms *"estimate," "prediction"* and *"modeling."*

No data tables; any percentages included from measures taken do not seem to warrant the dramatic nature of the solution being put forth by the County.

Another layer of befuddlement is the unrealistic expense to be burdened on homeowners. Installation of this new septic system averages, they say, $20,000 to include engineering, vendor, and permit costs.

The County advertises grant money for part of that, but they have no funding source for it, and, even if one does exist, funding is only given to those people "eligible," whoever that is. Costs remaining are to be absorbed by the property

continued on page 5

Dear Sir or Madam...

continued from page 1

owner as a 15-year, 3% interest loan which has a $10,000 borrowing limit.

Not mentioned in all this are the costs to repair landscape, space required for the system, and the cost of keeping the new system maintained. These new systems need multiple tanks accessible from the surface and a drain-field; ponder the dimensions of the area needed for such a system if you have a small yard. Even for the "small-space" systems this septic system is like burying a coffin plus a few tables.

These systems also require a $300 annual maintenance contract; have a cost of $30-$200 per part needing replacement, increase in annual electric costs of $57-266, and need to be pumped out at a (today cost) of $300-500 every 3-5 years. This all starts in 2024 if you are in a County-labeled "Phase II" area, with other areas following on a timeline where a changeover will be mandated if the County deems your current cesspool a failure or if you simply wish to sell your house.

Additionally, there is no evidence as to the performance, or reliability aspects, of these new septic systems, nor a comparison to cesspool function. The layers are vast and cannot be addressed in a simple letter or article. I encourage, and hope, people will spend some time going to the County site: **Reclaim Our Water (www.reclaimourwater.info)** and read about what is on tap for them and view the cost estimates.

Look at this plan from a perspective of a person trying to see evidence for a series of actions; do not just accept quotes driven by emotion played on a backdrop of meadow grass as enough.

I encourage people to read the July 31,2019 ***Newsday*** article by Rick Brand and David Schwartz: *"Suffolk Officials Unveil $4 Billion Plan to Fight Nitrogen Pollution in Surface Waters"* as it presents many of the complexities relevant to this wastewater proposal.

I also encourage people to consider alternatives starting with educating people on easy ways to reduce nitrogen waste. Organic fertilizers, weed control, plant and insect sprays have grown tremendously in availability in recent years. All-organic products on property for routine care are wonderful and safe for people, pets, and the environment.

Likewise, cesspools work well if treated routinely with natural biologics, which digest the material in them. A cesspool is largely stable over time and has a negligible annual cost. Businesses should be connected to sewer systems to adequately handle their waste needs. See what this alone does in a number of years by recording data and addressing areas that need it rather than a county-wide punishment.

Groups, with opposing interests, should be involved in this plan in order to develop a more balanced approach and to verify if predictions from estimates and models are even accurate. *(See page 1 for how to place your comments and opinions.)* ***Jennifer Cameron***

Hardest Working States

With Americans working an average of almost 1,800 hours per year and the average worker using only 54% of their available vacation time, the personal-finance website WalletHub reports 2019's **Hardest-Working States in America**

In order to determine where Americans work the hardest, the data set ranges from average work week hours to share of workers with multiple jobs to annual volunteer hours per resident. Top 20 Hardest-Working States in America are:

1	North Dakota	11	New Hampshire
2	Alaska	12	Oklahoma
3	South Dakota	13	Kansas
4	Texas	14	Iowa
5	Nebraska	15	Minnesota
6	Hawaii	16	Tennessee
7	Wyoming	17	Georgia
8	Colorado	18	Utah
9	Virginia	19	Louisiana
10	Maryland	20	[illegible]

From Jodi Baglio From Martin Trent

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County of Suffolk
Steven Bellone
Suffolk County Executive

Department of Health Services

Commissioner James L. Tomarken, MD, MSW, MPH, MBA, FRCPC, FACP

Division of Environmental Quality, Walter Dawydiak, Jr., P.E., J.D. Acting Director

Office of Ecology, Martin Trent, Chief Public Health Sanitarian

PROGRAMS & TECHNOLOGIES APPROVED IN New Jersey, Maryland, Massachusetts & Rhode Island & Their Potential Applicability to Suffolk County, NY

Alternative On-Site Wastewater Treatment Systems Review of PROGRAMS & TECHNOLOGIES APPROVED IN NJ, MD, MA & RI & Potential Applicability to Suffolk County, NY

Summary

This summary reviews alternative onsite wastewater treatment systems (OWTS) programs and data from four nearby states: New Jersey, Maryland, Massachusetts and Rhode Island. OWTS programs for reducing nitrogen in wastewater in these states are primarily designed to replace substandard systems in priority areas in close proximity (200-1,000 feet) to the shore. In the New Jersey Pinelands, the systems are required for new construction together with one acre density to achieve a target of 2 mg/L total nitrogen in groundwater.

Replacing failed and substandard systems either with operable conventional or alternative OWTS should reduce pathogen and nitrogen inputs to ground and surface waters. At this point, because only a relatively small number of alternative systems have been installed in each of the jurisdictions examined and due to a lack of more comprehensive monitoring, there is no data available to show a subregional groundwater nitrogen or surface watershed improvement.

This technology review is a step in the process of implementing the DHS goal of making these systems available as-of-right in 2014, if feasible. Suffolk County's prior poor experience with denitrifying sewage systems at commercial facilities, which remains unresolved, is sufficient reason to proceed with caution when considering implementation of alternative onsite wastewater treatment systems. The current Request for Proposals regarding alternative treatment systems will evaluate regional and subregional impacts of nitrogen reduction strategies and conduct a cost/benefit analysis of potential alternatives.

Nitrogen Reduction Capability - Sewage effluent monitoring data from the state programs indicates that alternative OWTS are generally capable of reducing nitrogen by 50% as compared to a conventional sewage disposal system. Overall, 60 to 65% of the systems installed and monitored in NJ and MA consistently met their targeted nitrogen reductions. Conversely, this means that 35 to 40% of the systems did not.

Reliability – The inability to treat wastes during power interruptions must be recognized as a significant liability of OWTS for Suffolk County residents in comparison to gravity flow conventional sewage systems. Households connected to the public water supply continue to produce sewage during an electric outage. Requiring additional emergency storage in a septic tank, a gravity bypass or automatically activated standby power generation can mitigate the issue, but would add substantially to the system's cost and area required. Seasonally occupancy presents treatment challenges that reduce nitrogen reduction efficiency.

Operation & Maintenance - OWTS are complex treatment systems containing mechanical and electrical components that are not required for a conventional septic system. In order to ensure a functioning system, the states report that an operation and maintenance contract is a necessity for the life of each OWTS installation.

Cost – Actual installation costs including the treatment unit and installation, 5 year service package, engineering, electrical connections, and septage pumping as needed were an average of $32,064 for New Jersey's program. Massachusetts reported a range from $24,000 to $28,000 not including the 5 year service contract, with annual O&M costs of $1,250-$3,200. Suffolk County estimated the average

cost at $25,000 to $41,500 for OWTS installations. The cost of a typical conventional sewage system in Suffolk County is $5,080 with an annual O&M of $160. Cost per pound of nitrogen removed by an OWTS is reported by a March 2013 Cape Cod Commission study as nearly double that of a centralized wastewater collection and treatment system.

OWTS Program Funding – In each state, programs to replace substandard sewage disposal systems are subsidized with either: low interest loans, tax credits or grants that can cover up to the full cost of the systems.

Program Oversight - The states require a Responsible Management Entity (RME) for system tracking, monitoring and to ensure operation and maintenance contracts are in effect. Deed covenants are also required so that future property owners are aware of their responsibility to maintain the systems.

Systems Acceptable for Use in Suffolk County – Alternative systems that could be utilized in Suffolk County are defined by the New York State Department of Health *Residential Onsite Wastewater Treatment Systems Design Handbook* (2012) and must comply with NSF Standard 245 or equivalent testing. There are 17 systems currently meeting the NSF 245 standard (four of which have undergone extensive field testing for approval in MA, NJ or MD) and five additional (non- NSF) systems with the highest state certification rating approved in Massachusetts, New Jersey and Rhode Island that potentially could be approved for installation in Suffolk County as systems meeting the equivalent testing requirement for a total of 22 systems.

Additional Future Considerations - Should OWTS be found to be cost effective and reliable, certain procedural requirements need to be met in order to allow their installation within the county. The SCDHS standards for *Approval of Plans and Construction – Sewage Disposal Systems for Single Family Residences* must be amended, SEQRA review performed, and approvals of the county Board of Health and New York State Department of Health obtained. A Responsible Management Entity would be required to be identified or established for system tracking, monitoring and to ensure operation and maintenance contracts are in effect for each installation.

Background

The Suffolk County Department of Health Services (SCDHS) has been involved in the development and "pilot" testing of alternative onsite wastewater treatment systems (OWTS) for more than 30 years. Beginning in the 1970s, SCDHS was on the forefront of evaluating systems such as the advanced denitrification system (a.k.a."super cesspool ") that was installed and pilot tested at the Brookhaven National Laboratory. One result of the pilot was that the use of methanol in the denitrification process proved to be a drawback incompatible with the use of the system for single family residences. Comprehensive pilot testing of several other alternative systems was later conducted at Setauket Knolls Condominiums. At the time, these systems were found to be promising from a technology perspective, but still impractical for wider scale implementation. In the 1990s, a first generation of denitrifying sewage systems were approved by SCDHS for installation at commercial establishments in order to accommodate increased density. Despite their early promise, most of these systems failed and were eventually replaced by conventional sewage treatment systems. The density issue at these failed systems remains unaddressed today.

As a follow-up to the Comprehensive Water Resources Management Plan, the SCDHS in 2010 initiated a companion study on the state-of-the-art of alternative onsite sewage disposal systems. In June 2013, SCDHS and consulting engineers Holzmacher, McLendon & Murrell (H2M) issued a report on the first phase of the investigation of Alternative On-Site Sewage Disposal Systems which resulted in the approval of two additional technologies for small package commercial wastewater treatment plants. These sewage treatment plants typically process flows from 1,000 to 15,000 gallons per day (gpd) and can consistently meet 10 mg/L TN in the treated effluent when properly operated and maintained. Single family residential systems were also evaluated in the study, but none were found that could economically treat a single household's wastewater to the 10 mg/L total nitrogen (TN) standard.

The SCDHS Division of Environmental Quality is continuing its evaluation of alternative OWTS with this review of programs and technologies in four nearby states: New Jersey, Maryland, Massachusetts and Rhode Island. These states have pilot tested residential onsite systems and implemented programs to utilize alternative OWTS technologies that generally have the capability to reduce TN in treated sewage effluent by 50% when compared to conventional sewage disposal systems. The goal in the New Jersey Pinelands is to limit TN in groundwater to 2 mg/L through the use of density standards by requiring both a minimum lot size of one acre together with the installation of an alternative OWTS. New Jersey's program seeks to limit TN in treated sewage effluent to 14 mg/L in order to achieve its goal. In comparison, Massachusetts and Rhode Island use a standard for the treatment process to result in no more than 19 mg/L TN in the treated sewage effluent, while Maryland requires a minimum 50% reduction from an assumed influent strength of 60 mg/L resulting in 30 mg/L in the effluent.

The SCDHS seeks to use the results and experiences of the programs in these states to determine if alternative systems are feasible for application in Suffolk County. The basic questions to be answered are, do alternative OWTS reliably produce a 50% reduction in nitrogen over conventional septic systems and if so, can it be accomplished at a reasonable cost? If shown to be cost effective, the use of these systems is being considered primarily as a means to help reduce nitrogen inputs to groundwater in order to provide greater protection of surface water quality in the Peconic, Long Island Sound and South Shore estuaries.

In order to help address nitrogen from residential sewage sources, the SCDHS intends to issue a Request for Proposals to further evaluate OWTS, conduct modeling on the groundwater nitrogen concentrations under different scenarios and conduct cost-benefit analyses for watersheds of the Peconic Estuary, Long

Island Sound and South Shore Estuary Reserve. The study will ask whether a 50% reduction in nitrogen from residential sewage sources is a sufficient reduction to improve surface water quality indices such as dissolved oxygen and the occurrence of harmful algal blooms, or is centralized or decentralized sewering of higher density areas more cost effective. If implemented, which areas will show the greatest benefit, e.g. Maryland gives priority to replacing septic systems within 1,000 feet of the shore while Rhode Island seeks to replace cesspools within 200 feet of tidal waters. Based upon the findings and cost benefit analyses, additional regulations regarding the installation of alternative OWTS may be promulgated in order to provide a greater degree of protection to surface waters.

Review of NJ, MD, MA & RI Programs

The universe of those systems which have achieved the highest certification approvals for nitrogen reduction in any of the four states consists of the following 11 systems or variations from the same manufacturer. Six of these systems have also gained USEPA ETV or NSF Standard 245 certifications. Several additional systems are currently undergoing pilot testing in these states. System processes are described in Appendix A.

Table 1

Model	Manufacturer	Treatment Process	Design Capacity	Certification or Approval
Advantex AX20 & RT	Orenco Systems Inc	Textile filter/packed bed	500	
Amphidrome	F R Mahony & Assoc	Submerged attached growth SBR	400	EPA ETV
Bioclere	Aquapoint Inc	Fixed film trickling filter	400	EPA ETV
Micro FAST	Bio-Microbics Inc	Aerobic fixed film/activated sludge	500-1500	NSF 245
Hoot BNR	Hoot Aerobic Systems	Biological nutrient removal	500-1,000	
Recirc. Sand Filter	(generic)	Recirculating Sand Filter	Var.	
RetroFAST	Bio-Microbics Inc	Submerged attached growth	375	EPA ETV
RUCK	Ruck Systems	Single pass sand filter	<2,000	
SeptiTech 400D	Septi Tech Inc	Fixed film trickling filter	440 -1500	ETV & 245
Singulair TNT & Green	Norweco Inc	Extended aeration	500-1500	NSF 245

Testing & Certification

Maryland's approval is certification that the OWTS effluent can meet 30 mg/L TN, whereas approved technologies with MA and RI certification can meet 19 mg/L TN. In NJ the effluent standard is 14 mg/L TN.

New Jersey

Alternate Design Treatment Systems Pilot Program

NJ requires an engineering review, system monitoring and certification to NSF Standard 245 to gain approval. In the New Jersey Pinelands, unsewered residential development using a conventional septic system is permitted on minimum 3.2 acre parcels. Use of an advanced treatment system allows the minimum lot size to be reduced to a minimum of 1.0 acre. The NJDEP adopted revised Standards for Individual Subsurface Sewage Disposal Systems in April 2012 allowing alternative OWTS for the first time statewide. The standards mirror the Pinelands Commission requirements and require local county health departments to maintain records and provide annual reports to NJDEP. The program applies primarily to new construction and funding reimbursement or incentives are not currently available.

1. Three (3) systems have gained administrative approval and have undergone pilot field testing.
    a. Amphidrome

   b. Bioclere
   c. FAST
2. Two (2) systems use have been suspended or eliminated for failure to meet NJ requirements.
   a. Ashco RFS
   b. Cromaglass
3. Four (4) additional systems have been approved for pilot testing. None have been installed as of August 2013.
   a. Hoot ANR
   b. SeptiTech
   c. BioBarrier
   d. Busse Green MBR
4. NJ maintains records of complete system installation costs. Average installation cost for all installed systems in NJ is $32,064.

Maryland

Bay Restoration Fund Best Available Technology & Field Verified Technology

1. MD systems must undergo the Environmental Protection Agency's - Environmental Technology Verification (ETV) Program, NSF 245 Certification or other equivalent third party testing, and for each technology includes field sampling of twelve (12) installations for 4 consecutive quarters for a total of 48 samples. No more or less will be used in the field trial. A standard of 60 mg/L TN is assumed as the influent value. The arithmetic mean effluent concentration must be 30 mg/L or less to be certified. Until completion of the field verification, the technologies are given a conditional approval which can be revoked based upon effluent analyses.

   Each county government in Maryland is responsible for collecting a "septic" fee from every household. The Bay Restoration Fee (BRF) is $60 per year per user of a septic system or sewer connection. Of the 420,000 septic systems in Maryland, 52,000 systems are located within the "Critical Area," defined as land within 1,000 feet of tidal waters. Using the BRF, the Maryland Department of the Environment has upgraded over 3,000 septic systems to nitrogen removing systems. Households with incomes of less than $300,000 are eligible for 100% grant assistance. The septic replacement program is implemented by local County Health Departments.

2. Seven (7) systems have gained conditional approval
   a. Advantex AX20
   b. Advantex AX20RT
   c. SeptiTech M400D
   d. Hoot BNR
   e. RetroFAST
   f. Singulair TNT
   g. Singulair Green
3. Five (5) additional systems have been approved for pilot testing.
   a. Amphidrome
   b. Bioclere
   c. Bionest
   d. Hoot ANR
   e. Nitrex

Massachusetts

Barnstable County Department of Health & Environment Innovative/Alternative Septic Systems

1. MassDEP has a three-tiered approval process for new technologies: Piloting, Provisional Use, and General Use. Piloting involves installation of a technology at 15 sites monitored for 18 months. Piloting is considered successful if a minimum of 75% meet TN removal targets for 12 months. Under Provisional Use Approval, a minimum of 50 installations must be evaluated for a period of 3 years. Provisional Use is considered successful if at least 90% of the systems perform properly. Systems are then certified for General Use and additional monitoring and reporting are not required by the state, but may be by the local BOH. Once the technology has received General Use approval, responsibility for plan review and approval is shared by MassDEP and the local BOH at any individual site.

   Massachusetts provides a tax credit of up to 40%, to a maximum of $6,000, for the cost of design and construction of failed or replacement systems.

   The Massachusetts DEP restricts sewage design flow to 440 gallons per acre per day although many towns on Cape Cod have zoning or Board of Health regulations that restrict wastewater loading to 330 gpd/acre. Parcels of less than an acre in size are limited proportionally in their sewage flow: half acre (20,000 sf) lots are limited to a 220 gpd design flow, meaning only a 2 bedroom home can be constructed.

2. Three (3) systems have gained General Use approval for nitrogen reduction and have completed field testing.
   a. Generic recirculating sand filter - Generic (25 mg/L TN) up to 10,000 GPD
   b. RUCK - (19 mg/L TN) up to 2,000 GPD
   c. FAST - (19 or 25 mg/L TN) up to 2,000 GPD - residential flows only
3. Four (4) systems have been approved for Provisional Use
   a. Amphidrome
   b. Bioclere (2000-10000 gpd)- has reached limit for installed systems
   c. FAST (2000-10000 gpd)
   d. Nitrex
4. Six (6) additional systems have been approved for pilot testing
   a. Bio Barrier MBR WWT System
   b. Nitrex Plus
   c. OMNI-Cycle System
   d. OMNI Recirculating Sand Filter System
   e. RID Phosphorus Removal System
   f. RUCK CFT

Rhode Island

Rhode Island Department of Environmental Management (RIDEM)

1. RIDEM approves Alternative/Experimental Technologies through a technical review system and field testing. Alternative systems have two classes of certification. The highest approval, Class I must have at least four consecutive years of quality performance data which clearly demonstrate that all applicable standards have been met. A Class I system must also have been approved for at least four consecutive years in Rhode Island or at least three other jurisdictions. A Class II certification is issued to technologies that have at least two years of field performance data, and is renewable every five years until Class I status is achieved. System components also

have two classes of certification. An approval is documented in the form of a Certification which is signed by the Chief of the Permitting Section in the Office of Water Resources. The Certification lists design requirements or restrictions placed on the technology and any sampling and reporting requirements.

In Rhode Island a fund exists to assist homeowners with the costs of replacing substandard or inadequate systems in communities that have created a wastewater management district. A Community Septic System Loan Program (CSSLP) is used by participating towns to provide low interest loans to homeowners to cover the costs associated with septic system repairs and upgrades. Loans of up to $10,000 are available to residents who meet eligibility criteria.

2. Seven (7) systems have been listed by RIDEM as approved for nitrogen reduction although only Advantex has achieved Class I certification. The other systems are Class II and continue field testing procedures.
    a. Advantex AX
    b. Amphidrome
    c. Bioclere
    d. FAST
    e. Nitrex
    f. RUCK
    g. Singulair DN
    h. Generic recirculating sand filter

3. The Rhode Island Cesspool Act of 2007 (RIGL § 23-19.15) mandates that all cesspools located within 200 feet of tidal water area must be abandoned and the home upgraded with a new onsite wastewater treatment system or connected to available municipal sewer lines. Financial assistance in the form of low-interest loans is available through the Clean Water Finance Agency.

Number of Systems Installed & Monitored in Single Family Residences

The number of systems currently installed at single family residences in each state is listed in the Table 2 below. Systems serving multiple residential units and commercial properties are not included in the Massachusetts number and would double their total. Information from RI has been requested, but not yet received. With the exception of Maryland, where system installation costs are heavily subsidized, the number of single family residential systems installed is generally small, despite the programs' existence for a decade or more in most jurisdictions. The experience of the mature OWTS programs in other states would indicate that cost and maintenance issues are major factors in the program's success and suggests that creative funding alternatives are critical to improving ground and surface water quality.

Table 2

State	# SF Systems	As of Date
MA	750	July 2012
NJ	236	Aug 2013
MD	~3,000	2013
RI	Not available	Sept 2013

The types of systems approved or being pilot tested in each state and the percent of those systems meeting nitrogen reduction targets are listed in Table 3 below.

Table3

Median Effluent TN Concentration & Percent Reduction Reported in State Monitoring Programs

(Shading indicates technology approved in that State)

OWTS	MA[1]				NJ[2]			MD[4]			RI[5]
	# Systems Monitored	Median TN Effluent mg/L	TN<19 mg/L	TN<25 mg/L	# Systems Monitored	Median TN Effluent mg/L	TN<14 mg/L	# Systems Monitored	Mean TN Effluent mg/L	MD Mean Reduction	Data not available
Recirc. Sand Filter	16	18.3	56%[1]	63%[1]							*
RUCK	20	19.1	45%[1]	70%							*
FAST (NSF 245)	449	12.7	78%[1]	92%	21	21.4	58%[3]				*
Amphidrome	7	13.7	100%	100%	74	11.9	86%				*
Bioclere	41	13.4	80%	93%	41	11.2	51%				*
Advantex	30	13.3	83%	87%				24	14.5-17	71-76%	*
SeptiTech (NSF 245)	44	17.0	59%	77%				12	20	67%	
Hoot BNR	1	12.7	100%	100%				12	21	64%	
RetroFast	0		-	-				12	25.4	57%	
Singulair (NSF 245)	99	14.0	90%	95%				12	27	55%	*
Nitrex	0		-	-							*
Total Systems Monitored	707				136			72			

1. RSF obtained MA General Use Approval at 25 mg/L, RUCK & FAST systems have MA General Use Approval at 19 mg/L
2. NJ standard is 14 mg/L TN
3. FAST in NJ pilot program does not have final approval due to inability to meet NJ TN standard consistently
4. MD Bay Restoration Field Verification Data – Mean Percent TN Reduction Using 60 mg/L influent
5. Advantex is the only Class I approved system in RI. Other systems highlighted are Class II and are undergoing additional field testing

OWTS System Costs

Table 3 indicates that alternative OWTS are capable of reducing nitrogen when they are designed, installed, operated, and maintained in accordance with each system's approvals. However, the systems are more complex, require a higher level of maintenance and are more expensive to operate and maintain than a conventional septic system. They often include pumps, aerators, fans and other mechanical parts, which increase the initial cost of the system and add costs for electricity to run the system.

Table 4 shows the results of the SCDHS study of Alternate On-Site Treatment Systems (Dec 2012) conducted by H2M which estimated costs for two OWTS considered for use in Suffolk County as compared to a conventional sewage treatment system.

Table 4
Suffolk County Estimates

OWTS	Est. Total Cost	Annual O&M
BioMicrobics' MicroFAST	$25,000	$1,700
Lombardo Assoc. Nitrex	$41,500	$1,400
Conventional Septic System	$5,080	$160

The Alternate Design Treatment Systems Pilot Program, State of New Jersey (August 5, 2013) reported average total costs of actual installations of alternative OWTS including: treatment unit, 5 year service package, engineering, electrical connections, septage pumping as needed and installation. The average total cost was $32,064, ranging from $29,633 to $35,265 for the four systems listed.

Table 5
New Jersey Average Total Costs

OWTS	# of systems included	Total Cost
Amphidrome	64	$31,492
Bioclere	47	$31,866
Cromaglass	41	$35,265
FAST	23	$29,633

The State of Maryland provides manufacturer estimates that include purchase, installation and 5 year service package. These costs do not include engineering, electrical or septage pumping and are therefore less reflective of the actual total costs to the customer. This is illustrated in the 37% increase from the manufacturer's estimate in MD to actual costs in NJ for the Amphidrome system and 90% increase in the Bioclere system from the manufacturer's estimate in MD to actual costs in NJ.

Table 6
Maryland Manufacturer Estimates

OWTS	Estimated Cost[1]		OWTS	Estimated Cost[1]
Retrofast	$9,405		Bionest SOLO	$13,219
Singulair	$11,079		Hoot ANR	$15,607
Hoot BNR	$11,954		Bioclere	$16,750

Advantex	$12,300		Nitrex	$17,000
SeptiTech	$13,056		Amphidrome	$22,921

1. Manufacturer's estimate does not include engineering, electrical & septage pumping

Massachusetts Total System Costs

A March 2013 study from the Cape Cod Commission shows costs for individual OWTS from $24,000-$28,000 (not including the 5 year service contract) and annual O&M of $1,250-$3,200. These costs are comparable with the costs reported by H2M for Suffolk County and by the NJ Pinelands if the additional cost of the required service contract is included. Cost per pound of nitrogen removed is reported in the study as nearly double that of a centralized wastewater collection and treatment system. It states that individual OWTS should be considered viable only for low density areas where less than 50% N reduction is necessary to achieve the desired environmental benefit.

There may be significant variability in individual system costs due to variations in sites and materials such as the cost and quantity of soil and stone fill, piping, labor, and excavation, trucking and engineering costs. Consumers may expect an average system to cost $32,000 to $33,000, based upon the reported average actual total costs in NJ of $32,064, third party estimates average of $33,250 for Suffolk County and those reported by the Cape Cod Commission.

Table 7

Jurisdiction	Program Funding
New Jersey Pinelands	Low interest loans are available in areas in which the governing body has adopted local ordinances that require "septic system management" programs with direct governmental or institutional over sight.
Maryland	The Bay Restoration Fee (BRF) is $60 per year per user of a septic system or sewer connection in the state. Households with incomes of less than $300,000 are eligible for 100% grant assistance.
Massachusetts	The state provides a tax credit of up to 40%, to a maximum of $6,000, for the cost of design and construction of replacement systems. Low interest loans are available from an appropriation of $30 million to the Massachusetts Department of Environmental Protection.
Rhode Island	A state fund, the Community Septic System Loan Program (CSSLP) is used by participating towns to provide low interest loans to homeowners to cover the costs associated with septic system repairs and upgrades. Loans of up to $10,000 are available to residents who meet eligibility criteria.

The average OWTS cost is nearly 10% of the median sales price of a home in Suffolk County, reported as $347,750 for August 2013 (Newsday, MLS 9/13/2013). Potential impacts to real estate transactions would likely result if a new regulation were considered to require installation of an alternative OWTS upon property transfer. The average OWTS costs may approach that of traditional sewering of higher density areas in Suffolk County, particularly if costs for long term monitoring and administration to ensure the OWTSs are properly maintained are factored in. The benefit of an approximately 50% reduction in nitrogen from an alternative OWTS should be weighed in light of the theoretical 100% sewage nitrogen removal from traditional sewering (with discharge out of the area of concern) at a comparable cost.

Operation & Maintenance Issues

Monitoring and maintenance are of primary consideration when considering the long term operation of nitrogen reducing wastewater treatment units. The Barnstable County Department of Health report, *Performance of Innovative Alternative Onsite Septic Systems for the Removal of Nitrogen1999-2007* succinctly summed up operation and maintenance issues.

> "Towns that contemplate the wide scale use of I/A systems to address nutrient issues should understand that the oversight of operation and maintenance of I/A systems is an essential part of ensuring a level of success. Quite simply, I/A systems that are not regularly inspected and occasionally monitored will not achieve treatment objectives."

To avoid OWTS failures, septic tanks usually require periodic pumping. Pumping and the cost of disposal at a sewage treatment plant can add significantly to O&M costs and should be required as part of any O&M contract. All mechanical and electrical components are subject to failure with time and replacement also should be standard in the O&M agreements.

In RI many instances of freeze-up of bottomless sand filters were met with suggestions to deepen the layer of overlying gravel, insure a location that receives adequate sunlight, increase pitch of transport lines, and a recommendation not to start systems during coldest months of year.

The use of two systems previously approved for use at single family homes have been suspended or eliminated for failure to meet New Jersey installation and nitrogen removal targets: Ashco RFS and Cromaglass.

It is reported that seasonally home occupancy presents treatment challenges that significantly reduce nitrogen reduction efficiency in many systems. The diminution of nitrogen reducing ability in seasonal or vacation homes nullifies the primary environmental benefit sought and with OWTS cost considerations, eliminates any advantage over conventional sewage systems.

Requiring a standby power generation during electric power outages for alternative OWTS to continue to process sewage would add substantially to an already high cost. The experience in other states largely does not adequately address the issue for Suffolk County. For example, in New Jersey septic regulations require systems that rely on anything other than gravity to move wastewater through a system to have at least one day of storage capacity in the event of a power outage or mechanical breakdown. However, the NJ regulation to require a volume reserve or a backup power source was not applied to alternative OWTS based upon two factors according to their program's director. A primary concern was the added cost of standby power generation. In addition, the majority of homes in the Pinelands that use onsite systems for wastewater management also rely on individual water supply wells. The reasoning in NJ is that if the power is out, the well doesn't supply water and the loading to the septic system ceases.

Rhode Island requires power interrupt alarms to notify residents the system is inoperable. Recent Massachusetts approvals require either additional emergency storage sufficient for 24 hours flow, or an independent standby power source that activates automatically when power is interrupted.

Although tens of thousands of homes in eastern Suffolk County still rely on private wells, the vast majority of homes in the county are served by public water. Consequently, during an electric power outage sewage continues to be produced.

States with OWTS programs have recognized that there is little guarantee that property owners will keep maintenance contracts in effect over the long term. The only way to ensure that maintenance contracts are purchased, and that systems are monitored, is for the permitting agency to have a mandatory tracking program for alternative systems. There is a significant financial incentive for a facility or homeowner to discontinue service contracts, or even disconnect treatment units. The permitting agency must also consider the issue of change of ownership at properties where alternative technologies are installed. Because these technologies require continuing financial obligations from owners for maintenance and monitoring, it is essential that a potential buyer be aware of these obligations before they purchase the property. In the programs examined, a deed covenant is required as means of ensuring notification upon property transfer. The covenants may add to legal costs for the installations.

High Groundwater Conditions

A shallow depth to groundwater presents challenges to proper system siting in order to achieve adequate treatment of the sewage and to prevent migration of bacteria and viruses. A minimum vertical separation distance of the bottom of the stone underlying the soil absorption system (SAS) above the (seasonal) high ground-water elevation is established by each jurisdiction reviewed. The limiting factor is considered to be the leaching system. When the depth to ground water is inadequate the land owner is required to raise the grade and install retaining walls as necessary. Regarding treatment systems in shallow groundwater, systems that use plastic tanks may float and rise up out of the ground if the water table elevation is high enough. Therefore concrete tankage is indicated in high groundwater areas and flood plains, or antibuoyancy equipment is required to anchor the unit.

Table 8
Minimum SAS Vertical Separation Above Groundwater

Jurisdiction	Separation	Special Conditions
Maryland	4 feet	MD may grant a variance to 3 feet for Wisconsin At Grade SAS with a minimum 2 acre lot
Massachusetts	4-5 feet	MA may grant a variance to 3 feet for approved alternative OWTS provided there is no increase in density allowed
New Jersey	4 feet	Minimum 1 acre lot with approved alternative OWTS
Rhode Island	3 feet	
Suffolk County	3 feet	2 foot separation allowed for high groundwater conditions

In Massachusetts the minimum vertical separation distance of the bottom of the stone underlying the soil absorption system above the high ground-water elevation is required to be (a) four feet in soils with a recorded percolation rate of more than two minutes per inch; or (b) five feet in soils with a recorded percolation rate of two minutes or less per inch. For systems with a design flow of 2,000 gpd or greater, the separation to high groundwater is calculated after adding the effect of groundwater mounding to the high groundwater elevation.

The following is an excerpt from Barnstable County, MA web site:

"Research summarized by Yates (1987) and others clearly indicates a positive relationship between hydraulic loading rate and the breakthrough of viruses to the groundwater. In 1991,

under a grant from EPA, the Buzzards Bay Project commissioned our department to research the literature relative to vertical separation and horizontal setbacks to determine whether there was a technical foundation for increased setbacks (generally 100 ft to wetlands and watercourses) that had been adopted by many towns on the Cape and in the Buzzards Bay Watershed. We determined, using a compilation of studies and a correction factor calculated using a study conducted by Dr. James Vaughn in the similar soils of Long Island, that a loading rate of 0.75 gallons per square foot per day (with 5 ft. vertical separation of leaching facility to groundwater), would give reasonable assurance in most situations that viruses would not enter the groundwater. In the event that viruses did enter the groundwater, we recommended that the horizontal setback distance requirement of 100 ft. be maintained. Pleasantly coincidental was the fact that independently a loading rate of 0.74 gal/sq ft./day for sandy soils was adopted in the revised Title 5 in 1995."

"Vaughn, J. M., E. F. Landry, L. S. Baranosky, C. A. Beckwith, M. C. Dahl, N. C. Delihas. 1978. Survey of human virus occurrence in wastewater recharged groundwater on Long Island. AppL Environ. Microbiol. 36: 47-51. Secondary- and tertiary-treated effluent was applied to recharge basins in sandy unconsolidated soil. Viruses were detected in groundwater where the recharge basins were located less than 35 feet (10.6 m) above the aquifer. Lateral entrainment of viruses to 45.7 m was noted at one site."

Hydraulic Loading rates can be reduced by using low pressure distributed leaching fields. These systems are not gravity systems they require a pump to dose the leaching field. High loading rates like precast leaching pits have small footprints but require large separation distances. With very low loading rates such as a pressure distributed leaching field consideration may be given to reducing the separation distance. The tradeoff is the low pressure systems require a large area of land, they are not passive systems, they require filtered effluent and they require periodic maintenance.

Systems such as the Advantex, certified by Maryland and Rhode Island, cite their "shallow bury" ability to be installed in difficult situations because of effluent filtration and ultraviolet disinfection prior to discharge. The Busse treatment system (NSF 245 certified) is designed to be installed in a building interior such as a basement or garage and claims due to advanced membrane bioreactor technology that the effluent discharge is of sufficiently hygienic condition to be re-used as irrigation water or requiring only a small drainfield.

There is no panacea to which treatment systems work best in high groundwater conditions (and on small lots). Conditions vary from site to site as to sewage flow, parcel size, soil conditions, distance to surface waters or wetlands and depth to groundwater, and a treatment system and soil absorption system will often need to be individually designed to determine the best fit. For any shallow treatment or leaching systems, winter freeze-up must be a guarded against.

NYSDOH Requirements
Residential Onsite Wastewater Treatment Systems Design Handbook (2012) and Appendix 75A

NYSDOH refers to alternative systems with nitrogen reduction capability as Enhanced Treatment Units (ETUs) and has specific requirements regarding their use.

1. ETUs for nitrogen reduction must be certified as a Class I unit meeting NSF Standard 245 or equivalent (see Table 9).
2. Have a minimum daily design flow of 400 gpd.
3. An effluent filter meeting NSF Standard 46 prior to the discharge outlet.
4. The absorption system following an ETU shall be of the same design as follows a septic tank.

Table 9
NSF 245 Approved Nitrogen Reduction OWTS
as of December 17, 2013

NSF 245 Approved Nitrogen Reduction OWTS			
Manufacturer[1]	**System Model[1]**	**Capacity (GPD)[1]**	**State Cert.**
Acquired Wastewater Technologies	Cajun Aire Advanced Poly 500	500	
Bio-Microbics Inc	BioBarrier	500-1,500	
Bio-Microbics Inc	MicroFast	500-1,500	MA, NJ
Bionest Technologies Inc	OT-40 to OT-150	400-1,500	
Busse Innovative Systems	MF-B-400	400	
Delta Environmental Products	Ecopod E50 to E150	500-1,500	
Ecological Tanks Inc	AA500 & AS600	500-600	
Flugelin LLC DBA PekaSys	Bubbler CRB1-400 to CRB-1400	400-1,400	
Hoot Aerobic Systems Inc	ANR-450	450	
Hydro-Action Industries	AN-400 & AN-500	400-500	
Norweco Inc	Hydo-Kinetic 600	500-600	
Norweco Inc	Singulair Green TNT	500-600	MD
Norweco Inc	Singulair TNT-500 to TNT-1500	500-1,500	MD
Norweco Inc	Singulair TNTLP-500 to TNTLP-1000	500-1,000	
Norweco Inc	Singulair TNTOP-500- TNTOP-1000	500-1,000	
Norweco Inc	Singulair TNTOR-500- TNTOR-600	500-600	
SeptiTech LLC	N-M400 to N-M1500	500-1,500	MD

1. Eleven manufacturers of 70 approved products from 400-1,500 GPD

In order to insure continuing proper operation and maintenance, all jurisdictions require a Responsible Management Entity (RME) and/or a maintenance and service contract for the life of the system. The NYSDOH Design Handbook states unequivocally (page 45), "The NYSDOH and LHDs will neither approve nor disapprove RMEs." If a sanitary code amendment to allow ETU use in Suffolk County is considered, a municipal entity (town, village) should be encouraged to act as the RME, but in all cases the sanitary code should require a maintenance and service contract for the life of the system.

Retrofitting OWTS installations on very small sized lots presents issues of maintaining physical separation distances to property lines, buildings, wetlands and surface waters that cannot always be adequately addressed in compliance with Suffolk County and NYSDOH standards. These areas should be considered for installation centralized or decentralized sewers through SCDPW community studies.

Continual improvement in nitrogen removal technology should be encouraged. NSF Standard 245 certifies 50% reduction of TN. Although, Suffolk County's initial study found only one system with the capability to produce effluent at 10 mg/l TN (at very high cost), creation of an additional NSF standard

for units capable of a higher degree of treatment, e.g. 75% TN removal, and the potentially large market of thousands of conventional systems in the county may help drive the technology forward in future years.

Applicability to Suffolk County

Suffolk County's own poor experience with denitrifying sewage systems at commercial facilities two decades ago is sufficient reason to proceed with caution on accepting alternative onsite wastewater treatment systems, particularly those without a prior track record in Suffolk County for reliably serving single family residential development.

The nitrogen reducing systems that could currently be allowed for installation in Suffolk County are defined by the New York State Department of Health *Residential Onsite Wastewater Treatment Systems Design Handbook* (2012) and must comply with NSF Standard 245 or equivalent testing. The 17 systems meeting NSF 245 are listed in Table 9.

The 17 systems currently with NSF 245 approval could be used in Suffolk County, if the Standards for Sewage Disposal Systems for Single Family Residences were amended to permit it. In addition for the states reviewed, Class I or General Use approvals have been obtained by five other systems: Recirculating Sand Filters and RUCK in MA, Amphidrome and Bioclere in NJ, and Advantex in RI (see Table 10). Meeting the highest level of certification in these states could be considered complying with meeting the meaning of "equivalent testing" under NYSDOH requirements. This interpretation omits three additional systems approved in MD because of their minimum treatment requirement is to meet 30 mg/L TN in the effluent for certification. The MD systems may be capable of further nitrogen reduction, but it is difficult to justify the cost of systems for installation in Suffolk County which are certified to only incrementally reduce nitrogen concentrations beyond that of a conventional sewage system. NJ, MA and RI highest certifications require a total nitrogen reduction to 14, 19 and 19 mg/L TN, respectively.

TABLE 10
Non-NSF Approved Systems
in NJ, MA, MD & RI

General Use or Class I Certified for Nitrogen Reduction			
Manufacturer	**System Model**	**Capacity (GPD)**	**State**
Recirculating Sand Filter	(generic)	variable	MA
RUCK		<2,000	MA
Orenco Systems, Inc.	AdvanTex AX20	500	MD, RI
Orenco Systems, Inc.	AdvanTex AX20-RT	500	MD
Hoot Aerobic Systems, Inc.	Hoot BNR		MD
Bio-Microbics Inc.	RetroFAST		MD
F.R. Mahoney & Associates, Inc	Amphidrome		NJ
Bioclere	Aquapoint.3, LLC		NJ

In the absence of NSF 245 certification or the equivalent, Suffolk County would need to establish a piloting program and approval process for alternative OWTS for non-certified systems and/or require a BOR variance for each system and technology applying for use.

In addition to the 22 alternative OWTS with either or both NSF 245 and state certifications, there are currently 10 systems (see Table 11) undergoing field testing in various state programs. As these systems are vetted and approved, they may also be considered for potential future use in Suffolk County.

Table 11
Non-NSF 245 Systems in Field Testing
in NJ, MA, MD & RI

General Use or Class I Certified for Nitrogen Reduction			
Manufacturer	**System Model**	**Capacity (GPD)**	**State**
Hoot Aerobic Systems, Inc.	Hoot ANR		MD, NJ
Lombardo Associates, Inc.	Nitrex		MA, MD, RI
AquaKlear, Inc.	AquaKlear AK6S245		MD
Orenco Systems, Inc.	AdvanTex AX20-RT	500	RI
F.R. Mahoney & Associates, Inc	Amphidrome		MA, RI
Bioclere	Aquapoint.3, LLC		MA, RI
Recirculating Sand Filter	(generic)		RI
Siegmund Environmental Services	Siegmund Singulair & Green HDPE	500-1,500	RI
Orenco Systems, Inc.	AdvanTex AX20	500	MA
Waterloo Biofilter Systems, Inc.	Biofilter	<2,000	MA

Other manufacturers and new technologies undergoing research and development are continually advanced as potential solutions for reliable sewage treatment with nitrogen reduction. Some of these systems may be suitable for Long Island soil and climate conditions, but the necessary certifications to comply with New York State Department of Health requirements must be satisfied.

Implementation of a voluntary OWTS program requires amendment of the SCDHS standards for *Approval of Plans and Construction – Sewage Disposal Systems for Single Family Residences* to permit use of alternative onsite sewage disposal systems within the county, SEQRA review and approvals of the county Board of Health and New York State Department of Health; program administration and oversight; recording of deed covenants; and identification of a Responsible Management Entity for system tracking, monitoring and to ensure operation and maintenance contracts are in effect for each installation.

APPENDIX A
Process descriptions excerpted from RIDEM and other sources.

AdvanTex®

The AdvanTex® AX-RT Series (the AX20-RT, AX25-RT and other smaller or larger-scale versions of the technology is a recirculating textile filter treatment system. It is contained within a single fiberglass tank installed with the access panel at grade. It is preceded by a two-compartment septic tank and discharges to a leachfield. The RIDEM recognizes the System as capable of achieving effluent concentrations of less than or equal to 19 mg/L total nitrogen (TN) when configured in Mode 3 and 20 mg/L or less for TSS and BOD; based on TSS & BOD reductions.

Amphidrome®

The Amphidrome® system utilizes two tanks and one submerged attached growth bioreactor, called the Amphidrome® reactor. The first tank, the anoxic/equalization tank, is where the raw wastewater enters the system. The tank has an equalization section, a settling zone, and a sludge storage section. It serves as a primary clarifier before the Amphidrome® reactor. This Amphidrome® reactor consists of the following four items: underdrain, support gravel, filter media, and backwash trough. The underdrain, constructed of stainless steel, is located at the bottom of the reactor. It provides support for the media and even distribution of air and water into the reactor. The underdrain has a manifold and laterals to distribute the air evenly over the entire filter bottom. The design allows for both the air and water to be delivered simultaneously--or separately--via individual pathways to the bottom of the reactor. As the air flows up through the media, the bubbles are sheared by the sand, producing finer bubbles as they rise through the filter. On top of the underdrain is 18" (five layers) of four different sizes of gravel. Above the gravel is a deep bed of coarse, round silica sand media. The media functions as filter, significantly reducing suspended solids and provides the surface area for which an attached growth biomass can be maintained.

Bioclere

The Bioclere system is essentially a modified trickling filter positioned over a clarifier. Effluent from the septic tank enters Bioclere and is pumped up to the top of the insulated unit where it is evenly distributed over the surface of the filter media. Biochemical oxidation takes place as the water trickles through the filter and over the biological film that grows on the surface of the filter media. Oxygen is supplied to the system through a small axial fan located in the top of the housing. The system is capable of significantly reducing biological oxygen demand (BOD5) and total suspended solids (TSS) in the effluent.

Busse

Modular design for installation in building interiors or underground tank using membrane bioreactor technology with biological treatment and membrane filtration. The Busse utilizes two steps, pre-treatment and aeration to treat the wastewater. The first step is pretreatment which serves as wastewater storage, in which biologically degradable coarse material is dissolved and the non-dissolving components are separated from the wastewater by an aerated sieve. Water, from which the coarse material has been separated, is pumped to the aeration section of the Busse module. In this step, the organic matter in the wastewater is biologically degraded by microorganisms and oxygen. In addition to this, the wastewater is treated physically by microfiltration membranes.

FAST

The FAST (Fixed Activated Sludge Treatment) system is an aerobic wastewater treatment system that utilizes an aerobic fixed film process that is a combination of the conventional trickling filter and activated sludge processes. The FAST system is designed to be installed within a two-compartment tank where the first compartment provides a primary settling zone for incoming sewage and the second houses the actual FAST system. The system contains submerged media that provide surfaces for microbial growth. Aeration and circulation are provided by a blower that pumps air into a draft tube that extends down the center of the tank. The system is capable of significantly reducing biological oxygen demand (BOD5), total suspended solids (TSS), and total nitrogen in the effluent.

Nitrex™

The Nitrex Filter performs a treatment step as part of a multi-component onsite wastewater treatment system. The Nitrex Filter is preceded by a nitrifying advanced pretreatment system designed to convert organic nitrogen and/or ammonium to nitrate, prior to the Nitrex Filter performing the denitrification step. Any advanced treatment system used in conjunction with a Nitrex Filter must also be a RIDEM approved A/E Technology and must be approved by the Vendor for use with the Nitrex Filter. The term "NitrexTM Filter" shall mean the media-filled tank and associated components and controls produced by the Vendor to cause denitrification. The term Nitrex Filter System shall mean the Nitrex Filter and the advanced pretreatment system. The Nitrex Filter provides a carbon source in the form of wood media for heterotrophic bacteria operating in an anerobic environment to reduce the nitrate to nitrogen gas. Nitrified effluent is piped into the bottom of the Nitrex Filter and moves vertically through the media under a slight pressure head caused by gravity or pressure; the denitrified effluent is then discharged to a drainfield. The pretreatment system used in advance of the Nitrex Filter must be designed, installed, operated and maintained in accordance with the terms of the certification issued by the RIDEM for use of that system. This RIDEM certification was revised February 23, 2012 and the Nitrex Filter System may not be used with a BSF or PSND until further notice.

Recirculating Sand Filter

Wastewater, having received primary treatment in a septic tank or equivalent unit, flows by gravity to a recirculation (mixing) tank. In doses controlled by both a programmable timer and float switch, the mixed fresh wastewater and partially treated filter effluent is applied to a bed of coarse sand (fine gravel) media. This mixed wastewater is dispersed over the filter surface in a PVC distribution network surrounded in pea stone. Wastewater trickles down through the sand media, where biological treatment occurs. The treated effluent is collected in an underdrain at the bottom of the filter and discharged back to the recirculation tank. There most of it mixes with incoming wastewater, a small amount gets discharged to the drainfield, and the cycle begins again. Typically, a buoyant-ball check valve is used to control discharge and recirculation. Treated wastewater is discharged to a drainfield for additional treatment. The system is capable of significantly reducing biological oxygen demand (BOD5), total suspended solids (TSS), and total nitrogen in the effluent. The technology is targeted for use in critical resource areas and is intended to be used with shallow pressurized drainfields.

RUCK

The System consists of two septic tanks, a pump chamber, a RUCK filter and a carbon source unit. The first septic tank (pre-RUCK filter) collects all wastewater from the facility building sewer. Effluent from the first septic tank flows by gravity to a pump chamber that pressure doses the RUCK filter. The filter construction includes alternating layers of sand and stone, plastic indrains installed within the sand layer and an impermeable liner. The effluent from the RUCK filter is collected in the underdrain system and piped by gravity to the second septic tank (post RUCK filter). A carbon source unit adds carbon to this

tank which mixes with the nitrified effluent. The nitrogen reduced effluent is then discharged to a soil absorption system. The System is vented at two locations, through a roof vent on the facility and through a surface vent located at the filter.

SeptiTech

SeptiTech is an aerobic biological trickling filter, with a two-tank design with a primary anoxic tank (a septic tank) followed by the aerobic trickling filter tank (the SeptiTech processor tank). Raw wastewater enters and passes through the primary anoxic tank to a reservoir beneath treatment media in the aerobic processor tank. The wastewater is aerated and sprayed onto the media; a programmable logic controller (PLC) controls the timing and sequence of the recirculation of wastewater in the lower collection reservoir. A portion of the wastewater is pumped back to the septic tank; this process is self-adjusting based on demand and is controlled by the PLC. Treated wastewater is time dosed to a leachfield.

Singulair

The Singulair wastewater treatment system is a self-contained three-chambered treatment system utilizing primary treatment (settling), mechanical aeration, clarification, and flow equalization to achieve treatment. Wastewater from the building enters the primary settling chamber through an inlet tee, and then enters an aeration chamber. In the aeration chamber, an aspirator at the bottom of a shaft disperses air radially as fine bubbles provide oxygen for the biomass and vertically mix chamber contents. The wastewater in the aeration chamber passes through to the clarification chamber for final settling of solids. A portion of the clarified wastewater is recirculated back to either the inlet pipe (building sewer) or into the primary chamber for denitrification. Treated wastewater passes through an effluent filter as it exits the system and is then gravity fed to the leachfield. The RIDEM recognizes the System as capable of achieving effluent concentrations of 30 mg/L for both TSS and BOD and less than or equal to 19 mg/L TN. Where site conditions and design flow accommodate, Norweco Singulair Green® 500 may be used in place of the concrete Singulair tank.

Submitted by Roy Reynolds

An Independent Report on Sewage Disposal Practices and Policies Relating to the Groundwater Supply In Suffolk County, New York

by Roy Reynolds, PE
March 10, 2019

"A complex combination of physical, chemical, and biological phenomena occur from the entrance of domestic wastes into a subsurface sewage disposal system, and through the system, the unsaturated soil, and the saturated soil. Sorption, dilution, diffusion, chemical reaction, precipitation, filtration and biodegradation phenomena take place in varying degrees."

-Long Island Groundwater Pollution Study (1969)

In the beginning, Man created the Outhouse
In the end, Sewers depleted the Water Supply

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Introduction

My colleagues and I have completed a review of the sewage disposal practices in Suffolk County, which we had undertaken several years ago. The purpose of this report is to evaluate the sewage disposal practices in Suffolk County; and to present recommendations for a long range policy and plan for sewage disposal. Hopefully, our public officials will take these recommendations into consideration and establish a sustainable sewage disposal policy that prevents the depletion of our groundwater supply.

As part of this endeavor we reviewed numerous reports and studies involving water supply and sewage disposal. [See References, p.14] Of these references, two particular documents have been singled out to provide a platform for developing a sustainable sewage disposal policy in Suffolk County. The two reports that we focused on are the 2017 report "***Groundwater Resources Management Plan***", prepared by The Long Island Commission for Aquifer Protection supported by Nassau and Suffolk Counties [LICAP Report], and the 2016 report "***Long Island South Shore Estuary Reserve Eastern Bays Project: Nitrogen Loading, Sources and Management Options***", prepared by Stony Brook University and funded by the Department of State [Eastern Bays Report]. We prepared written reviews of both these documents which are available through the links: LICAP Report Review and Eastern Bays Report Review]. It is recommended that the reader familiarize him or herself with these documents. These documents have been made part of this policy report and will be referenced to substantiate various statements and conclusions.

In the review process, we evaluated the use of **sewage treatment plants**(STPs) and **on-site wastewater disposal systems (OWTSs)**; and how they impact the groundwater supply. The discussion of on-site systems includes both **conventional septic systems** and **innovative/ alternative on-site wastewater treatment systems** (I/A OWTSs). A large part of the discussion focuses on overcoming the lack of understanding about septic systems and the naturally occurring sewage treatment processes here on Long Island. First, we will look at the lessons learned from Nassau County's STPs and sewering program.

Nassau County's failure should be a lesson for Suffolk County

Our review of the LICAP Report, provided a good platform to focus on the relationship of water supply and sewage disposal practices in Nassau and Suffolk Counties. Lessons learned in Nassau County serve as a warning for Suffolk. Based upon the information in the LICAP Report, Nassau County is facing an ongoing water crisis involving the depletion of its groundwater supply; as the Nassau County water suppliers have exceeded the "sustainable yield". [Reference LICAP Report Review, pg. 4] The majority of Nassau County's population is served by sewers. In effect, Nassau County's sewer systems with their coastal discharges are depleting the groundwater supply; which is at the root of the problem. The majority of the water pumped from the ground in Nassau County is discharged through sewer outfalls to coastal waters and not recharged back into the groundwater. **Suffolk County is following in the foot-steps of Nassau County by expanding its sewer districts and discharging into coastal waters through sewer outfalls.** This discharge is resulting in more and more water being wasted or lost. In the long run, such practices are not sustainable; and are already showing detrimental effects

including: lowering of water table levels, reduction in stream flow, loss of surface water features and ecosystems that depend on them, reduction in coastal discharge, change in bay salinity, shifts in contaminant migration paths, a shift in the saltwater interface and the potential for saltwater intrusion, change in recharge zone boundaries and the rate of groundwater flow. [See LICAP Report Review, pgs. 3-6] Realizing the impacts from sewering, we considered the option of using conventional septic systems as a long range solution for sewage disposal in Suffolk County; but first we had to understand them.

Understanding Conventional Septic Systems

There are three basic alternatives for sewage disposal in Suffolk County: STPs, I/A OWTSs and conventional septic systems. Historically, conventional septic systems have been the predominant treatment in Suffolk County. [Reference LICAP Report Review, pg. 10] However recently, Suffolk County has strongly encouraged the elimination of conventional septic systems, in favor of STPs and I/A OWTSs. [Reference LICAP Report Review, pgs. 6-8] Before making decisions about the use of conventional systems, it is important to have a clear understanding of the workings of conventional systems, their benefits and the treatment processes involved.

There are benefits to using conventional septic systems.

There are benefits to using conventional septic systems and maintaining consistency in their designs. The design of conventional septic systems has been "standardized" over the last 50 years to include a septic tank, precast leaching pools and access for maintenance. The standardization of designs for conventional septic systems assures that the regulators, contractors and homeowners have a clear understanding of what is expected, how the system operates and how it can be repaired. The few times Suffolk County strayed from standardized systems and embarked on alternative system programs, they created maintenance problems and hydraulic failures on a large scale. Examples of this were the "aeration tanks", "plastic insert tanks" and "commercial subsurface denitrification systems". [Suffolk County Comprehensive Plan, p. 8-16]

The benefits of using the conventional septic systems include the relatively low cost for installation and maintenance. In addition, the systems are simple in operation, requiring no pumps or mechanical devices, and their standardization makes them relatively easy to understand and service. Conventional systems recharge water back to the aquifer, off-setting groundwater depletion and fostering water conservation. In addition, the treatment of the effluent is dependent on natural processes in the system and surrounding soils, which are relatively fool proof when compared to mechanical systems. Further discussion of this can be found at LICAP Report Review (pgs. 6-8 & 10-12) and hereafter.

Conventional septic systems foster water conservation

One of the overlooked benefits of using conventional septic systems is that they encourage water conservation. There probably isn't a homeowner in Suffolk County, who has a septic system that isn't concerned about it failing and "backing up". These homeowners are aware that if they use too much water, the septic systems (with limited holding capacities) are more subject to filling up and backing up into their homes. These homeowners tend to conserve water by limiting its use within their house; including shorter shower times, using water conservation devices and

preventing leaking faucets and toilets. On the other hand, homeowners connected to sewers have no such incentive to limit their water usage, since wastewater disposal is someone else's problem and they do not see the consequences of excessive water usage. Many homeowners anguish over the prospect of their septic systems failing ("fecal phobia"); and could use support in maintaining and upgrading them. Before establishing sewage disposal policies that affect the use of conventional systems, it is necessary to understand how they work and why they fail.

How does a conventional septic system treat wastewater?

The average homeowner may not understand what their septic system consists of or how it works; but is essential that public officials do. The 1969 ***Long Island Groundwater Pollution Study*** recognized the treatment processes of a septic system as: *"A complex combination of physical, chemical, and biological phenomena that occur from the entrance of domestic wastes into a subsurface disposal system, and through the system, the unsaturated soil, and the saturated soil. Sorption, dilution, diffusion, chemical reaction, precipitation, filtration and biodegradation phenomena take place in varying degrees."* (pg. 1-5). It is therefore frustrating that 50 years later, public officials are making statements such as "*conventional septic systems provide little to no reduction of contaminants poured down the drain or flushed.*" [LICAP Report Review, p. 7] Such statements demonstrate the ignorance surrounding septic systems, and the need for more education and understanding. The typical **conventional septic system** in Suffolk County consists of a septic tank and leaching pools. The septic tank is designed to detain the wastewater from the home and capture the floatable and settleable solids (such as toilet paper, grease, feces and other organic material). Besides the physical removal of this solid matter, the septic tank also "digests" some of the organic matter contained in the wastewater. [Septic Tank Overview] The effluent from the septic tank then flows into the leaching pool(s) where additional settling and treatment occurs. Along the walls and bottom of the leaching pools a "slime layer" or "biological mat" forms, which promotes secondary treatment, removing dissolved and suspended organic materials. Besides providing secondary treatment, the leaching pool can provide tertiary treatment, removing inorganic compounds, and substances, including nitrogen. As much as a 35% reduction in nitrogen has been reported [Eastern Bays Report , pg. 43]

Once the wastewater passes through the bio-mat, it enters the surrounding soils, where it is further treated through processes such as aeration, filtration, adsorption and absorption. Eventually, the remaining effluent enters the groundwater system, where it is subject to dilution and further tertiary treatment, depending on the soil conditions and groundwater chemistry. A portion of the effluent will eventually migrate to shorelines where it will enter the surface waters, after passing through hyporheic zones that provide additional tertiary treatment. [See Eastern Bays Report Review, p. 7]

We need to know more about wastewater treatment and septic systems

Conventional septic systems provide treatment for certain wastewater contaminants, but we need to know more. Studies have shown that "**shallow groundwater systems**" provide a good degree of treatment for certain wastewater contaminants. [See references 1, 21, 22, 27, 31] In areas of shallow groundwater (i.e., a water table generally less than 10 feet below grade

surface), conventional septic systems are designed to maintain the leaching lines or pools above the groundwater table. Generally, these systems do not extend more than five feet below grade. The majority of the coastal areas along the south shore of Suffolk County (and Nassau County) are considered shallow groundwater areas; and many have exhibited groundwater chemistry and soil conditions that are conducive to naturally occurring denitrification. In studies of "shallow groundwater systems", the samplings of groundwater plumes have demonstrated a relationship between nitrogen removal and the presence of certain parameters, including low concentrations of dissolved oxygen, high concentrations of dissolved organic carbon and denitrifying bacteria. [See Xu Review] The studies have shown the ability of the shallow groundwater systems to treat contaminants such as nitrogen, COD, BOD and pathogens; however, many public officials have ignored this phenomenon and dismissed this natural water purification process. Further investigations are needed to re-confirm this phenomenon of naturally occurring denitrification in our coastal areas. [Eastern Bays Report Review, pgs. 4, 5 &12] Once this relationship between shallow groundwater areas and naturally occurring denitrification is clarified, then better decisions can be made in respect to the appropriateness of using sewers, I/A OWTSs or conventional systems in these areas. With this in mind, **Suffolk County should reevaluate its decision to promote and mandate the use of I/A OWTSs and sewers in coastal areas; which already provide naturally occurring denitrification.**

Furthermore, there is a void of information about the treatment processes in "**deep systems**" located in areas where the groundwater table is deep below the ground surface. These systems, for the most part, consist of leaching rings that extend well below the ground surface, some stacked as deep as twenty feet. Due to their depth, it is surmised that these systems operate mostly under anaerobic conditions, raising questions about their treatment processes. We need to know the extent and limitations for treatment of wastewater by conventional septic systems. Although the systems and surrounding soils have been shown to reduce or remove suspended solids, pathogens, nitrogen, COD and BOD; there are other contaminants, such as household solvents, pharmaceuticals and personal care products (PPCPs), that may pass through the bio-mat and eventually make its way to the groundwater. Also of concern are contaminants that are being found in groundwater, which are not normally associated with domestic wastewater; these include 1,4-Dioxane, Perfluorinated Compounds, Pesticides and Volatile Organic Chemicals. It is important to investigate these contaminants and their treatment in conventional septic systems, as well as I/A OWTSs and STPs; before making decisions about their appropriateness. Is it really necessary to ban certain household products because they have trace amounts of solvents? Are conventional septic systems able to retain trace amounts of solvents through absorption by scum (fats, soaps)? Are biological processes in the systems able to break down these trace amounts of contaminants? Once we have more empirical information about the ability of the septic systems to treat domestic wastewater [not based on theoretical modeling], we can make more informed decisions about sewage disposal policies and the need for I/A OWTSs and STPs.

Failure of septic systems

It is important for public officials to understand why septic systems "fail"; and how such failures can influence sewage disposal policies and homeowners. Septic systems have a limited life span and over time will hydraulically fail ("back-up" or "overflow"). These failures are usually due to

clogging, structural failure or soil saturation. **Clogging** can occur when the bio-mat or slime layer become so dense that water can not pass into the surrounding soil through the leaching pool walls or bottom; hence there is an eventual sewage back-up (hydraulic failure). Solutions to clogging include "aeration" of the leaching pools, adding chemicals or replacing leaching pools.

Besides clogging, septic systems can fail due to **saturated soil conditions**. In areas where the leaching pools are subject to flooding or shallow groundwater, the leaching pools may not be able to leach (discharge) properly. When the soil surrounding the leaching pools becomes saturated, wastewater will tend to back-up in the septic system; unable to over come the water pressures in the saturated soil. Solutions to these types of failures include diverting surface drainage away from the system and/or elevating the leaching facilities so they are not influenced by groundwater or saturated soil conditions. In extreme cases, relocating the system may be necessary.

There are many existing septic systems that were built prior to the 1970's without septic tanks and with block pool systems that are prone to **structural failure**, including collapse. There are also situations where systems settle during use, rendering them non functional and structurally unsound. The normal solution for structural failures is filling in or removing the failed components and replacing them. For old block pool systems, replacement of the entire system is recommended in conformance with standards; they should be considered as an immediate safety hazard. In spite of the interim failures, it is not uncommon for homeowners to get 40 years out of a conventional septic system, with a little help.

Guidance is needed for the repair and maintenance of existing septic systems

It is important that public officials understand the situation that homeowners are put into when their septic systems fail. With a failed system, they can not flush toilets, do laundry, wash dishes or use other water in their homes. In the meantime, homeowners are adding all types of chemicals to try and fix their problems, when what they really need to do is upgrade their systems. The decision on repair and maintenance is usually a reaction to the failure; with the homeowners under pressure to make a decision. Sometimes it as simple as unclogging a pipe; but more likely with older systems, the problems stem from clogged or collapsed leaching facilities. There are thousands of existing systems that do not have septic tanks, have dangerous block pools and require continuous treatment to prevent sewage back-ups. When offered solutions, the homeowner will most likely opt for the fastest and least expensive solution and not necessarily the best.

It is understandable, when a homeowner is offered an $800 chemical "treatment" (e.g., adding sulfuric acid) versus a $3,000 leaching pool addition or a $7,000 total replacement, they are more apt to go for the $800 "fix". Unfortunately, "you get what you pay for"; the $800 chemical treatment may buy another few years of life from the sewage disposal system, but subsequent chemical treatments will be less effective over time, until there is irreversible clogging; requiring structural additions. Besides being a short term solution to the sewage disposal problem, if not used properly, chemical treatments can be harmful to the septic system and groundwater supply. It would be helpful if Suffolk County made an effort to educate homeowners and aid them in maintaining their systems, so the systems remain viable and cost effective.

With changes in Article 6 of the Suffolk County Sanitary Code, the county appears to be encouraging the upgrade of older systems, though they are not exactly offering help. Article 6 now states that after July 1, 2019 you need a permit to upgrade an existing system, if it fails. What is meant by "upgrade" is open for interpretation. Installing septic tanks, where none exist, and replacing failed leaching pools would be a positive step forward, both to the homeowner and the environment. Such upgrades will be expensive (though not as expensive as installing the I/A OWTSs or sewers); and homeowners need support, both financially and technically, to upgrade their systems. Rather than septic systems being excluded from grant programs, and focusing only on sewers and I/A OWTSs, Suffolk County should support the upgrade of the thousands of existing septic systems, which have outlived their expected lifetime and which need replacement and upgrading. Upgrading these systems to conventional standards is an alternative that in many situations will improve wastewater treatment and provide more practical benefits than installing I/A OWTSs or sewers. Such fundamental upgrades will improve the ability of the septic systems to treat contaminants such as nitrogen, COD, BOD and pathogens and provide better access for maintaining and monitoring the systems. Suffolk County should turn its energy towards setting up a program with funding and aid for failed septic systems, where appropriate. Such a program must not be onerous (time consuming, red tape, surveys, fees, etc.), considering that many of the upgrades need to be done on an emergency basis (sewage backing-up). There's an old adage involving septic system installations, "We bury our mistakes." A good regulatory program is designed to correct mistakes, before they are buried. It is essential that there be trained technical staff, such as sanitarians or engineers, acting as advisors/inspectors to assure that the upgrades are properly designed and installed.

So what's gone wrong with sewage disposal policies in the past?

Prior to formulating sewage disposal policies for Suffolk County, public officials should look to the past. It appears that the primary driving force for sewering Nassau and Suffolk Counties has been economic development. With the installation of sewers, properties have been more intensely developed, creating higher density projects and increasing opportunities for developers. When sewers are installed, the limits on development, imposed by the limitations of on-site sewage disposal systems, are removed; and developers are freed to seek higher density zoning and increase the population densities and size of businesses. Historically, the installation of sewers has led to more urbanized environments. The urbanization of Queens and Nassau County are prime examples of this process; as sewers and poor planning have turned these once rural communities into high population density areas. As a result, it is no surprise that Queens "ran out of water" and Nassau is facing a water crisis; both exceeded their sustainable yields. Previous bad decisions about sewage disposal have resulted in the depletion of our groundwater supply and have caused harmful impacts on our estuaries. [Reference LICAP Report Review, pgs. 3-6] Knowing these ramifications, why is Suffolk County continuing to campaign for more of the same?

The campaign for sewering

Historically, the problem that public officials have faced, trying to expand sewers, is that the public does not want to pay for them. In addition, many view such expansions as harmful to the

character of their communities (urbanization) and only benefiting developers. On the other hand, many are experiencing problems with septic system failures; and they are more inclined to vote for them. In any event, public officials are faced with the task of convincing the majority of taxpayers to pay for the sewers. The concept of protecting the groundwater supply is a good tool to accomplish this. In Suffolk County, public officials have used nitrogen from septic systems to create a crisis; claiming it to be the largest threat to our water supply and environment (dubbing it as "Public Enemy #1"). This nitrogen crisis provides the reason to eliminate septic systems and install sewers (or I/A OWTSs).

This campaign for sewering, using septic systems as the culprit, is nothing new. Nassau County had used it to promote its massive sewering program in the 1960's; and Suffolk County used it most recently in its campaign in 2018 to expand the southwest sewer district. So, is nitrogen from septic systems really the culprit?

The claims about nitrogen are disconcerting.

In light of the recent campaign for sewers, we reviewed the claims by Suffolk County that nitrogen from septic systems was "Public Enemy #1". In doing so, we found a disturbing pattern of conjecture and manipulation, which exaggerated the role of nitrogen from septic systems. In one case, we found at least six assumptions that were changed in a computer modeling program, which increased the importance of nitrogen in groundwater. [Reference Eastern Bays Report Review, pgs. 3-9] In other cases, we found studies that showed the potential of septic systems to remove nitrogen and other contaminants (on par with STPs), [Eastern Bays Report Review, pgs. 4, 5 &12] which were ignored and dismissed by Suffolk County. [Coordinated response to EBR Review] [Comments on Response to EBR Review]

The attack on septic systems was stepped up when Suffolk County officials realized that there was federal grant money available as a result of Hurricane Sandy. Suffolk County joined with New York State to use the concept of nitrogen contamination from septic systems to acquire federal grant money and fund the installation of sewers. [Reference 1/21/19 Newsday Article]

In the grant process, New York State asserted that nitrogen leaching from septic systems was "degrading marshlands" and thereby decreasing coastal resiliency to storms (such as Hurricane Sandy). They theorized that if the nitrogen from conventional septic systems was eliminated, the marshlands (wetlands) would be improved; thereby increasing the coastal resiliency. This relationship was the basis for acquiring their federal grants. In our review, we found no evidence that properly operating conventional septic systems were "degrading marshlands"; or that eliminating them would have a beneficial impact on the estuaries. Case in point: Over the last 50 years, septic systems have been eliminated on a massive scale by sewering along the south shore of Nassau and Suffolk Counties; but their elimination has **not** proven to increase the health of the estuaries. [Reference LICAP Report Review, pg. 9] It is obvious that there are other influences more directly affecting the wetlands.

There are many other factors that may influence the health of the wetlands, which include: direct discharge of pollutants, loss of buffer areas, rising sea-level, increased water temperatures, poor circulation, mosquito ditching, filling of flood plains, hardening of the shorelines and the use of

herbicides and pesticides. In any event, Suffolk County succeeded in its 2018 campaign to expand the Southwest Sewer District by using the threat of nitrogen contamination; the ends will likely not justify the means. In the long run, such expansions will increase the coastal discharge of our water supply and prove detrimental on several public health and environmental levels. [Reference LICAP Report Review, pgs. 3-6]

Conventional septic systems have proven to be effective.

Over the last 30 years, conventional septic systems, installed in accordance with Article 6 of the Suffolk County Sanitary Code and its Construction Standards, have proven to be effective. As stated in the **2015 Suffolk County Comprehensive Water Resources Management Plan** (the Plan), *"Wellfields with contributing areas that comply with the population density goals established by Article 6 all meet the target nitrate concentrations".* For the most part, samples from selected wellfields indicated average nitrogen concentrations below 6 mg/l, which were within the target concentrations for Article 6. [Suffolk County Comprehensive Plan, Section 3] These relatively low concentrations were found even though many of the selected wellfields had contributing areas with population densities that exceeded those allowed under Article 6 (i.e., more than one dwelling per half acre). In addition, many of the contributing areas had dwellings that were being serviced by substandard septic systems (e.g., "cesspools"). The relatively low nitrogen concentrations, found in the groundwater of these high density areas, implies that septic systems are more effective than originally assumed. Replacing substandard systems with standard systems (septic tanks with leaching facilities) will facilitate the ability of the septic systems to treat contaminants, such as nitrogen, COD, BOD and pathogens. [See pages 4-6 for a discussion of septic system benefits and treatment.]

Furthermore, as discussed in the [LICAP Report Review, pg.11], the average nitrogen concentrations of the groundwater in Suffolk County's supply wells ranged between 1.76 and 3.58 mg/l-N, which are within the drinking water standard of 10mg/l-N. Are achieving lower nitrogen concentrations from I/A OWTSs really necessary; and are conventional septic systems capable of achieving the goal of protecting the groundwater? Why is the county designating the coastal areas, with their natural denitrification potential, as priority areas for installing I/A OWTSs; and not the deep recharge areas that are the main source of our drinking water supply? Until the need for alternative systems is proven and these questions are definitively answered, the County must rethink embarking on a program that mandates I/A OWTSs throughout the County.

So, what are Sewage Treatment Plants discharging?

So far this report has discussed wastewater treatment by conventional septic systems, but what about STPs? What are they discharging? The law requires that effluent from Sewage Treatment Plants (STPs) be periodically sampled and analyzed for certain parameters. In its 2017 report, *"STP 2016 Performance Evaluation"*, SCDHS reported results of sampling from STP effluents, which included total N, BOD, Suspended Solids, Fecal Coliform and pH. [See 2016 STP Report] The STP plants are regulated under the terms and conditions of their State Pollution Discharge Elimination System (SPDES) Permit, which requires inspections and sampling. Data for contaminants such as pharmaceuticals, personal care products (PPCPs), 1,4-Dioxane, Perfluorinated Compounds, Pesticides and Volatile Organic Chemicals was not included in the

report, since it was not required as part of the performance evaluation. However, there is a need for analyses to know if any of these (or other relevant contaminants) are present or discharged into the groundwater and the coastal waters through STPs. [Suffolk County Comprehensive Plan, Section 8] The results of any studies should be presented in a public report prior to making decisions on expanding sewer districts and STPs.

Prevention is worth a pound of cure

What we had found surprising in the LICAP Report was the lack of distinct recommendations to acquire land in the water budget areas. It makes sense to limit development in areas that serve as our water supply; thereby reducing the risk of pollutants impacting it. The Suffolk County Comprehensive Plan (pg. 3-24) concluded that "*Nitrate levels were lowest in wells with contributing areas comprised primarily of open space.*" Acquiring land for groundwater protection (open space) is the best way to do this and should be a priority. [See Comments LICAP Hearing]

"..to-day the latest work on sewage disposal shows us that our forefathers, in using the cesspool, were using, unawares, a most efficient method for the disposal of solid putrefying substances."

-Lemuel P. Kinnicutt, *The Cesspool*, October 1900.

Recommended Sewage Disposal Policies and Actions

Foremost in Suffolk County's sewage disposal policies should be actions that protect our water supply; this includes quantity and quality. Protecting the groundwater goes hand in hand with public health and protecting the estuaries and coastal waters. Economic Development is also an important concern, but secondary to a safe water supply. The sewage disposal practices in Suffolk County have regressed into de-facto policies that are not sustainable in respect to the water supply. In order to maintain a safe and potable water supply, Suffolk County must recognize the need to limit development, and take appropriate measures to assure a sustainable water supply. The following is a discussion of recommended steps and policies for achieving this goal.

1. **Suffolk County must take action to stop Nassau County from drawing groundwater from Suffolk County (over 9 MGD).** The over development in Nassau County and its pumping of water is inadvertently drawing groundwater underground from Suffolk County into Nassau County along the common border. As documented, Nassau County will be needing more water in the future and Suffolk County is already planning to supply it. Suffolk County must compel Nassau County to limit development and curtail the discharge of treated water through its sewage treatment plants into coastal waters; this discharge (loss of water) is at the root of the groundwater supply problem. Since Nassau County has been unable to curtail its groundwater loss of its own volition, action against Nassau County appears to be necessary to protect Suffolk County's groundwater supply. [LICAP Report Review, pgs. 4 & 5]
2. **Suffolk County must take action to stop the expansion of sewer districts in Suffolk County that discharge treated water into the coastal waters.** Discharges into coastal waters have been shown to deplete groundwater by not recharging water back into the groundwater supply. Such expansions of districts and losses of water, when considered individually, do not appear to be of great environmental significance; but when considered cumulatively, they have a disastrous effect on the groundwater supply and estuaries. [LICAP Report Review, pg. 6]
3. **Suffolk County must require all new projects with sewage treatment facilities in Suffolk County to recharge treated effluent back into the aquifer.** In the past, all new projects or developments located outside of existing sewer districts, were required to construct sewage disposal facilities that treated and recharged the effluent back into the groundwater (aquifer). However, this has been circumvented by allowing projects (outside a district) to connect into sewer districts that have coastal outfalls. This results in the effluent being discharged to coastal waters; further depleting groundwater. Such connections from outside the districts should not be permitted unless proven to be a public health emergency. These sewer connections, when considered individually, do not appear to be of great consequence, but when considered cumulatively, will have a detrimental effect on the groundwater supply and the estuaries.
4. **Suffolk County must reject the practice of "blanket sewering" that prevails in Nassau County and some areas of Suffolk.** In the past, sewers have been "blindly "constructed in areas where sewers were not necessary, primarily to promote economic development. Many communities are in need of sewering because of inherent groundwater or soil

conditions which have caused on-site septic systems to hydraulically fail (i.e., back-up or overflow). Such areas include those with high population densities, shallow groundwater, poor drainage and limited land areas, which physically restrict the installation and operation of on-site septic systems. Groundwater elevations, soil conditions, drainage issues and population densities are factors that must be taken into account when making determinations about eliminating on-site systems and installing sewers. Suffolk County needs policies that require investigations and evaluations of existing conditions and septic systems, before making decisions about sewering an area. [discussion, page 6]

5. **Suffolk County must stop promoting large centralized sewer districts.** The expression "don't put all your eggs in one basket" can be applied to large centralized sewer districts that depend on one sewage treatment plant and one outfall pipe. If something happens to the treatment plant or to the outfall, large regions would be without sewage disposal, causing the backup of sewage and a public health crisis. Suffolk County (as well as Nassau County) have demonstrated a lack of foresight and good planning in this regard. Ironically, Nassau County is in the process of abandoning its Bay Park Treatment Plant outfall and transporting all its effluent to the Cedar Creek Plant outfall. If something happens to the Cedar Creek outfall (or the transmission line to it) most of Nassau's population will be without sewage disposal.
6. **Suffolk County must take action to curtail increases of sewage production within existing sewer districts that discharge to coastal waters.** Changes in zoning, building use or the construction of new developments can increase sewage production (gallons per day) within existing sewer districts. These increases can be subtle and go "under the radar", since in many cases the changes do not require any additional sewerage infrastructure, other than perhaps a sewer connection. Such increases in the production of wastewater in districts with coastal outfalls, ultimately end up increasing discharges to coastal waters. These increases, when considered individually, may not appear to be significant; but cumulatively, can result in major impacts to the groundwater supply. Within these outfall districts, Suffolk County must take a hard stand against zoning changes, changes in use and projects that increase wastewater production. Until this is done, such sewer districts will continue to exponentially deplete the groundwater supply.
7. **Suffolk County must confirm its sewage disposal policy in respect to the practice of using conventional septic systems.** Recently, Suffolk County has designated septic systems and their nitrogen production, as the primary threat to the groundwater supply in Suffolk County. Based upon what is known about conventional systems, this position appears to be unsubstantiated. It is incumbent upon Suffolk County to review its present sewage disposal practices, which primarily involve the treatment and recharge of wastewater through septic systems. These systems have benefits: besides being economical to construct and operate, they encourage water conservation and assure a balanced recharge of treated water; promoting the sustainability of the groundwater supply. Rather than disregarding the benefits of conventional systems and veering away from their use based upon misinformation, Suffolk County should take measures to further investigate these systems, draw informed conclusions and then make decisions as to their appropriateness. [pgs. 4 & 8]
8. **Suffolk County officials must stop exaggerating the public health and environmental significance of nitrogen from conventional septic systems.** Based upon misinformation, public officials have conducted a campaign to promote the expansion of sewer districts and the construction of I/A OWTSs in Suffolk County. This campaign included a pattern of data

manipulation; used to exaggerate the "nitrogen problem" and to incorrectly designate conventional septic systems as a primary source of nitrogen pollution to the estuaries. This relationship between conventional septic systems and the estuaries has not been proven; and was presented by Suffolk County and New York State in their efforts to obtain federal grant money for sewers. Suffolk County's policies, involving the need for sewering should be based on informed decisions, not exaggerations, misinformation or presumptions. [page 8]

9. **Suffolk County must re-confirm its responsibility to provide sewage disposal support for all residents in Suffolk County, including those using septic systems.** Similar to the support given to residents in sewer districts, residents still served by septic systems should be be given support for wastewater disposal. Rather than excluding septic systems from maintenance programs, and focusing only on sewers and I/A OWTSs, Suffolk County should address the thousands of existing conventional systems, which have outlived their expected lifetime and which need replacement and upgrading. Upgrading these systems to conventional standards is an alternative that in many situations will improve wastewater treatment and provide more practical benefits than installing I/A OWTSs or sewers. Such fundamental upgrades will improve the ability of the conventional systems to treat contaminants (such as nitrogen, COD, BOD and pathogens) and improve access for maintenance and monitoring. Suffolk County should set up a program of funding to aid and foster the use of conventional septic systems, where appropriate. Such a program could include grants or septic system maintenance districts, where septic systems within the district would be eligible for routine funding of maintenance and replacement. It is essential that there be trained technical staff, such as sanitarians or engineers, acting as advisors/ inspectors to assure that the upgrades are properly designed and installed. [Page 7]
10. **Suffolk County must fill the gap of knowledge concerning conventional septic systems and their ability to treat the contaminants found in domestic wastewater.** More research is needed about conventional septic systems before veering away from the use of these systems. Unfortunately, Suffolk County has not focused on the ability of conventional septic systems to treat domestic wastewater. There are studies that indicate that conventional systems provide primary, secondary and tertiary degrees of treatment, which has been disregarded by Suffolk County officials. Suffolk County has not done in depth studies on the quality of effluent contained in plumes from conventional systems; instead relying on computer models to predict what will happen to the effluent. Empirical studies that capture and analyze the effluent in the unsaturated and saturated zones (with tracers) are necessary before making decisions on alternative methods of sewage disposal. [Pages 5 & 6]
11. **Suffolk County must further investigate the treatment of wastewater by conventional systems in areas of shallow groundwater and reevaluate the use of AWTSs in these areas.** Septic systems located in shallow groundwater areas have exhibited some of the best treatment of wastewater, rivaling that of STPs. These "shallow groundwater systems" are designed to maintain the leaching facilities (leaching lines or pools) above the groundwater table. Generally, the systems do not extend more than five feet below the ground surface. Studies of such systems have shown a relationship with nitrogen removal and their location in shallow groundwater areas. The majority of the coastal areas along the south shore are considered shallow groundwater areas and have exhibited groundwater chemistry and soil conditions that are conducive to naturally occurring denitrification. The studies have shown the ability of the shallow groundwater systems to treat contaminants such as nitrogen, COD, BOD and pathogens. Further investigations should be conducted to re-confirm the

phenomenon of natural denitrification in shallow groundwater areas (such as coastal areas). Once this relationship of natural denitrification in shallow groundwater areas is confirmed, then better decisions can be made in respect to the appropriateness of using sewers, I/A OWTSs or conventional systems. Suffolk County should reevaluate its decision to promote and mandate the use of I/A OWTSs in coastal areas in consideration of what is already known about naturally occurring denitrification in these areas. [page 5]

12. **Suffolk County must further investigate the treatment of wastewater by "deep" conventional septic systems.** In areas that area not restricted by shallow groundwater conditions, septic systems are installed deeper into the ground. These "deep systems", for the most part consist of a septic tank and leaching pools (stacked up) that extend well below the ground surface, some as deep as twenty feet. There is a void in information about the treatment processes in deep systems. Due to their depth, it is surmised that these systems operate under mostly anaerobic conditions, raising questions about their treatment processes. These types of systems need to be studied so they can be better understood, and so that better informed decisions can be made as to their appropriateness. [page 6]
13. **Suffolk County should focus on protecting the groundwater supply by obtaining land in the water budget areas.** It makes sense to prevent development in areas that contain our water supply; thereby reducing the risk of pollutants impacting it. Acquiring land for groundwater protection (open space) should be a priority. [page 10]
14. **Suffolk County should conduct a thorough investigation of all STPs to determine what contaminants are being treated and what is being discharged.** There is a need to know what contaminants are present in STP influent, the effectiveness of treatment and what contaminants are being discharged into the groundwater or the coastal waters. At present the SPDES permits for STPs only require sampling and analysis for a few parameters. These parameters only include total N, BOD, Suspended Solids, Fecal Coliform and pH. There are many other contaminants of interest, which need to be investigated. The results of any investigations should be presented in a public report, prior to Suffolk County making decisions on expanding sewer districts and STPs. [page 10]

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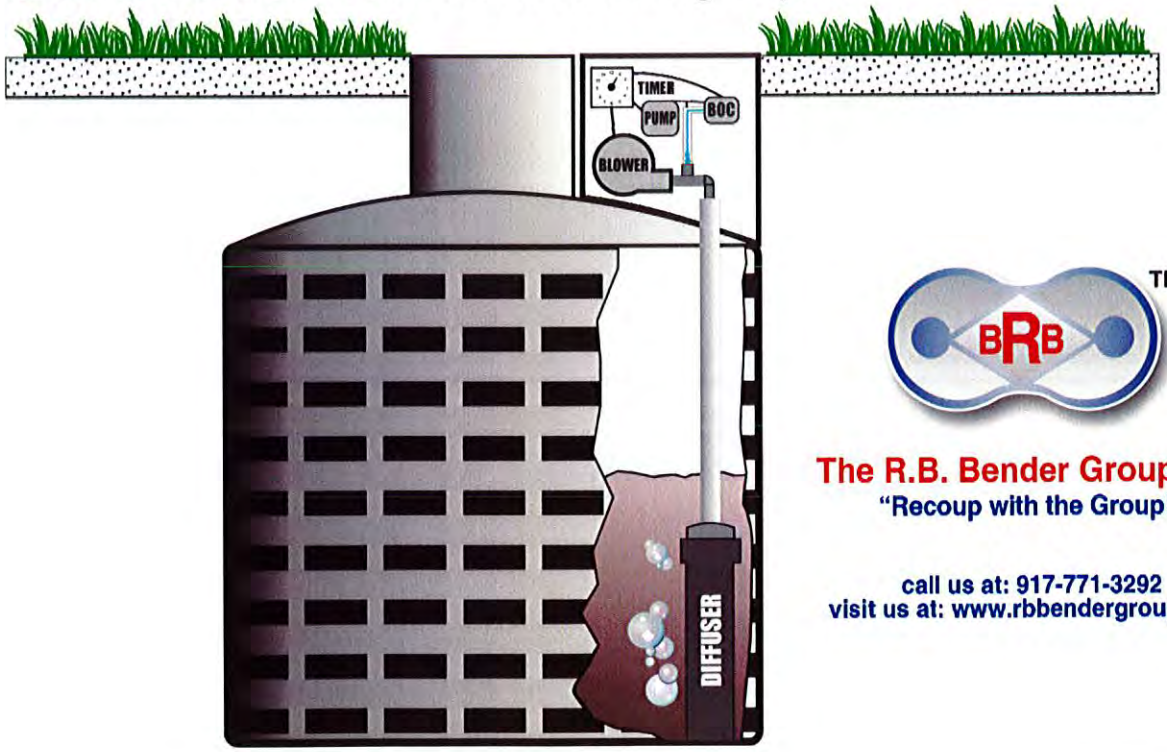

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UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF WASHINGTON
AT SEATTLE

THE COALITION TO PROTECT PUGET SOUND HABITAT,

Plaintiff,

v.

U.S. ARMY CORPS. OF ENGINEERS, *et al.*,

Defendants,

and

TAYLOR SHELLFISH COMPANY, INC.,

Intervenor - Defendant.

Case No. C16-0950RSL

CENTER FOR FOOD SAFETY,

Plaintiff,

v.

U.S. ARMY CORPS OF ENGINEERS, *et al.*,

Defendants,

and

PACIFIC COAST SHELLFISH GROWERS ASSOCIATION,

Intervenor - Defendant.

Case No. 17-1209RSL

ORDER HOLDING NWP 48 UNLAWFUL IN THE STATE OF WASHINGTON AND REQUESTING ADDITIONAL BRIEFING

This matter comes before the Court on cross-motions for summary judgment filed by the parties and intervenors in the above-captioned matters. Dkt. # 36, # 44, and # 45 in C16-

0950RSL; Dkt. # 31, # 43, and # 44 in C17-1209RSL. The Court has also considered the Swinomish Indian Tribal Community's submission in a related case, C18-0598RSL (Dkt. # 28). Plaintiffs challenge the U.S. Army Corps of Engineers' issuance of Nationwide Permit 48 ("NWP 48") authorizing discharges, structures, and work in the waters of the United States related to commercial shellfish aquaculture activities. Plaintiffs argue that the Corps failed to comply with the Clean Water Act ("CWA"), the National Environmental Policy Act ("NEPA"), and the Endangered Species Act ("ESA") when it reissued NWP 48 in 2017. They request that the decision to adopt NWP 48 in Washington[1] be vacated under the Administrative Procedures Act ("APA") and that the Corps be required to comply with the environmental statutes before issuing any new permits or verifications for commercial shellfish aquaculture in this State.[2]

BACKGROUND

The CWA authorizes the Army Corps of Engineers to issue permits for the discharge of dredged or fill material into the navigable waters of the United States. 33 U.S.C. § 1344(a). If the Corps determines that activities involving discharges of dredged or fill material "are similar in nature, will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment," it may issue general permits on a state, regional or nationwide basis permitting the activities for a five year period. 33

[1] The Coalition to Protect Puget Sound Habitat seeks to bar the use of NWP 48 only in Puget Sound.

[2] The Court finds that one or more members of plaintiff Center for Food Safety has/have standing to pursue the CWA, NEPA, and ESA claims based on their concrete, particularized, and imminent injuries arising from activities in Washington that are permitted under the 2017 version of NWP 48.

U.S.C. § 1344(e). "[T]he CWA imposes substantive restrictions on agency action" (Greater Yellowstone Coalition v. Flowers, 359 F.3d 1257, 1273 (10th Cir. 2004)): if "the effect of a general permit will be more than minimal, either individually or cumulatively, the Corps cannot issue the permit" (Wyoming Outdoor Council v. U.S. Army Corps of Eng'rs, 351 F. Supp. 2d 1232, 1255-57 (D. Wyo. 2005)). General permits often impose requirements and standards that govern the activities undertaken pursuant to the permit, but they relieve operators from the more burdensome process of obtaining an individual, project-based permit.

In 2017, the Corps reissued NWP 48, thereby authorizing "the installation of buoys, floats, racks, trays, nets, lines, tubes, containers, and other structures into navigable waters of the United States. This NWP also authorizes discharges of dredged or fill material into waters of the United States necessary for shellfish seeding, rearing, cultivating, transplanting, and harvesting activities." NWP003034. The nationwide permit authorizes(a) the cultivation of nonindigenous shellfish species as long as the species has previously been cultivated in the body of water at issue, (b) all shellfish operations affecting ½ acre or less of submerged aquatic vegetation, and (c) theall operations affecting more than ½ acre of submerged aquatic vegetation if the area had been used for commercial shellfish aquaculture activities at any point in the past 100 years. NWP003034-35.[3]

In addition to the CWA's requirement that the Corps make "minimal adverse effect" findings before issuing a general permit, "NEPA imposes procedural requirements on federal agencies to analyze the environmental impact of their proposals and actions." O'Reilly v. U.S.

[3] The 100-year look back provision was not in the 2012 version of NWP 48.

Army Corps of Engr's, 477 F.3d 225, 228 (5th Cir. 2007). Federal agencies are required to do an environmental assessment ("EA") of their proposed action, providing a brief discussion of the anticipated environmental impacts and enough evidence and analysis to justify a no-significant-impact determination. 40 C.F.R. § 1508.9. If the agency, after conducting an EA, is unable to state that the proposed action "will not have a significant effect on the human environment," a more detailed and comprehensive environmental impact statement ("EIS") must be prepared. 40 C.F.R. § 1508.11 and § 1508.13.[4]

The Corps' EA regarding the 2017 reissuance of NWP 48 is presented in a Decision Document dated December 21, 2016. NWP003034-3116. An additional condition was later imposed by the Seattle District through its Supplemental Decision Document dated March 19, 2017. COE 127485-611. The Court has considered both Decision Documents to the extent they reflect the Corps' analysis of the anticipated environmental impacts of issuing the nationwide permit and imposing the additional regional condition. The Decision Documents set forth the Corps' discussion of anticipated environmental impacts and the evidence and analysis justifying its determination "that the issuance of [NWP 48] will not have a significant impact on the quality of the human environment," making an EIS unnecessary under NEPA. NWP003106. The Decision Documents also reflect the Corps' determination that the "activities authorized by [NWP 48] will result in no more than minimal individual and cumulative adverse effects on the aquatic environment" for purposes of the CWA. NWP003107. The Seattle District, for its part, concluded that if it added a regional condition preventing the commercial harvest of clams by

[4] "Impact" and "effect" are used interchangeably in the regulations and are deemed synonymous. 40 C.F.R. § 1508.8.

means of hydraulic escalator equipment and evaluated proposed activities as they were verified under the reissued permit, the effects of the permitted activities would be individually and cumulatively minimal. COE 127592-93.

Plaintiffs argue that these conclusions must be invalidated under the APA because the record does not support the Corps' conclusions regarding the environmental effects of individual shellfish aquaculture activities or their cumulative impacts and the EA does not accurately describe the anticipated environmental impacts of NWP 48 or otherwise justify a no-significant-impact determination. Under the APA, a reviewing court must set aside agency actions, findings, or conclusions that are "arbitrary, capricious, an abuse of discretion, [] otherwise not in accordance with law" or "without observance of procedure required by law." 5 U.S.C. § 706(2)(A) and (D). Agency action is arbitrary and capricious "if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise." Motor Vehicle Mfrs. Ass'n v. State Farm Mut. Auto. Ins. Co., 463 U.S. 29, 43 (1983). Although agency predictions within the agency's area of expertise are entitled to the highest deference, they must nevertheless have a substantial basis in fact. Ctr. for Biological Diversity v. Zinke, 900 F.3d 1053, 1067 (9th Cir. 2018). In determining whether a decision is supported by substantial evidence in the record, the Court will not substitute its own judgment for that of the agency but rather considers whether the decision is based on relevant evidence that a reasonable mind might accept as adequate to support the agency's conclusion.

San Luis & Delta-Mendota Water Auth. v. Jewell, 747 F.3d 581, 601 (9th Cir. 2014).[5]

DISCUSSION

Having reviewed the submissions of the parties and the administrative record, and having heard the arguments of counsel, the Court finds that there is insufficient evidence in the record to support the agency's conclusion that the reissuance of NWP 48 in 2017 would have minimal individual and cumulative adverse impacts on the aquatic environment for purposes of the CWA and that the Corps' environmental assessment does not satisfy NEPA's requirements. Although the minimal impacts finding is repeated throughout the Corps' Decision Document (see NWP003038, NWP003045-46, NWP003049, NWP003051, NWP003091, NWP003107), it is based on little more than (1) selectively chosen statements from the scientific literature, (2) the imposition of general conditions with which all activities under nationwide permits must comply, and (3) the hope that regional Corps districts will impose additional conditions and/or require applicants to obtain individual permits if necessary to ensure that the adverse impacts will be minimal. Each of these considerations is discussed below.

(1) Effects Analysis

At various points in its analysis, the Corps acknowledges that commercial shellfish aquaculture activities can have adverse environmental impacts. See NWP003040 (commercial

[5] Plaintiffs also argue that the agency action should be invalidated because the Corps (a) failed to analyze a reasonable range of alternative actions in the EA, (b) failed to allow for meaningful public participation, and (c) failed to re-initiate consultation with expert wildlife agencies under the ESA when the 2017 version of NWP 48 was modified to increase the acreage on which commercial shellfish production was authorized, failed to incorporate assumed conservation measures and conditions, and failed to analyze the impacts of pesticides on endangered species. Because the Court finds that the Corps violated the CWA and NEPA, it has not considered these alternative theories for why NWP 48 should be invalidated.

shellfish aquaculture activities "have some adverse effects on the biotic and abiotic components of coastal waters, including intertidal and subtidal areas"); Id. (noting that "at a small spacial scale (e.g., the site directly impacted by a specific aquaculture activity) there will be an adverse effect."); NWP003041 (acknowledging "some impacts on intertidal and subtidal habitats, fish, eelgrass, and birds"); NWP003042 (recognizing that "commercial shellfish aquaculture activities do have some adverse effects on eelgrass and other species that inhabit coastal waters"); COE 127559 (stating that "marine debris is a serious impact on the marine environment"); COE 127570 (acknowledging "potential adverse impacts" to riffle and pool complexes); COE 127584 (noting that "[c]ommercial shellfish aquaculture activities can result in conversion of substrates (e.g. mudflats to gravel bars), impacts to submerged aquatic vegetation, alteration in aquatic communities from native to non-native shellfish species, and water quality impacts from harvest activities"). It concludes that these impacts are no more than minimal, however, (a) when considered on a landscape rather than a site-by-site scale, (b) because the relevant ecosystems are resilient, and (c) because the impacts are "relatively mild" in comparison "to the disturbances and degradation caused by coastal development, pollution, and other human activities in coastal areas." NWP003040 and NWP003044.

(a) Scale of Impacts Evaluation

In determining the potential effects of a proposed discharge of dredged or fill material in an aquatic environment, the Corps is required to determine the nature and degree of the environmental impact the discharge will have, both individually and cumulatively. "Consideration shall be given to the effect at the proposed disposal site of potential changes in substrate characteristics and elevation, water or substrate chemistry, nutrients, currents,

circulation, fluctuation, and salinity, on the recolonization and existence of indigenous aquatic organisms or communities." 40 C.F.R. § 230.11(e) (emphasis added). Ignoring or diluting site-specific, individual impacts by focusing solely on a cumulative, landscape-scale analysis is not consistent with the governing regulations.

(b) Resilient Ecosystems

The Decision Document issued by Corps Headquarters acknowledges that "[t]he effects of commercial shellfish aquaculture activities on the structure, dynamics, and functions of marine and estuarine waters are complicated, and there has been much discussion in the scientific literature on whether those effects are beneficial or adverse." NWP003040. Relying in large part on a paper published by Dumbauld and McCoy for the U.S. Department of Agriculture in 2015, the Corps concluded that the individual and cumulative impacts of the activities authorized by NWP 48 would be minimal "because the disturbances caused by these activities on intertidal and subtidal ecosystems are temporary and those ecosystems have demonstrated their ability to recover from those temporary disturbances." NWP003045-46.[6]

[6] The Corps also cites a 2009 paper co-written by Dumbauld, which it describes as "a review of empirical evidence of the resilience of estuarine ecosystems and their recovery (including the recovery of eelgrass) after disturbances caused by shellfish aquaculture activities." NWP003044. The Corps relies on the 2009 Dumbauld paper to support its conclusion that commercial shellfish production can have beneficial impacts on some aspects of the aquatic environment. See NWP003406 ("Many species co-exist with commercial shellfish aquaculture activities and many species benefit from these activities."); NWP003086 (noting improved water and habitat quality at moderate shellfish population densities); NWP003087 ("Activities authorized by this NWP may alter habitat characteristics of tidal waters. Some species of aquatic organisms will benefit from those changes, while others will be adversely affected."); NWP003104 ("Sessile or slow-moving animals in the path of discharges of dredged or fill material and aquaculture equipment may be destroyed. Some aquatic animals may be smothered by the placement of fill materials. Some aquatic organisms will inhabit the physical structure created by equipment used for commercial shellfish aquaculture activities."). The fact that there are environmental winners and losers when activities authorized under NWP 48 are undertaken does not resolve the issue of whether the

Dumbauld and McCoy's research cannot justify such a broad, sweeping conclusion regarding the resilience of entire ecosystems in both the intertidal and subtidal zones. According to the Corps' own summary of the paper, the authors evaluated only the effects of oyster aquaculture activities on submerged aquatic vegetation. NWP003044. The paper itself shows that Dumbauld and McCoy were studying the effects of intertidal oyster aquaculture on the seagrass *Zostera marina*. There is no discussion of the impacts on other types of aquatic vegetation, on the benthic community, on fish, on birds, on water quality/chemistry/structures, or on substrate characteristics. There is no discussion of the subtidal zone. There is no discussion regarding the impacts of plastic use in shellfish aquaculture and only a passing reference to a possible side effect of pesticide use. The Corps itself does not remedy these deficiencies: although it identifies various resources that will be adversely impacted by issuance of the national permit (along with resources that may benefit from shellfish production), it makes virtually no effort to characterize the nature or degree of those impacts. The Decision Document's "Impact Analysis" consists of little more than an assurance that district engineers will consider the direct and indirect effects caused by the permitted activity on a regional or case-by-case basis. NWP003073-74.

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proposed agency action has more than minimal impacts or obviate the need for a "hard look" at all impacts, beneficial and adverse. Native Ecosys. Council v. U.S. Forest Serv., 428 F.3d 1233, 1238-39 (9th Cir. 2005). The 2009 review clearly shows, and the Corps acknowledges, that at least some aquatic species and characteristics are adversely affected by commercial shellfish aquaculture. The Ninth Circuit, faced with a similar situation under NEPA, noted that "even if we had some basis for assuming that [the agency's] implementation of the BiOp would have exclusively beneficial impacts on the environment, we would still lack a firm foundation for holding that [the agency] need not prepare an EA and, if necessary, an EIS." San Luis & Delta-Mendota Water Auth. v. Jewell, 747 F.3d 581, 652 n.52 (9th Cir. 2014).

Under the CWA, the Corps must find that the proposed activity "will cause only minimal adverse environmental effects when performed separately, and will have only minimal cumulative adverse effect on the environment" before it issues a general permit. 33 U.S.C. § 1344(e). Under NEPA, the Corps is required to "[b]riefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact." 40 C.F.R. § 1508.9(a)(1). The agency is required to take a "hard look" at the likely environmental impacts of the proposed action and prepare an EA to determine whether the impacts are significant enough to necessitate the preparation of an EIS. Native Ecosys. Council, 428 F.3d at 1238-39. The analysis, though brief, "must be more than perfunctory" and must be based on "some quantified or detailed information; . . . [g]eneral statements about possible effects and some risk do not constitute a hard look absent a justification regarding why more definitive information could not be provided." Klamath-Siskiyou Wildlands Ctr. v. Bureau of Land Mgmt., 387 F.3d 989, 993-94 (9th Cir. 2004) (alteration in original, citations omitted).

In this case, the Corps acknowledged that reissuance of NWP 48 would have foreseeable environmental impacts on the biotic and abiotic components of coastal waters, the intertidal and subtidal habitats of fish, eelgass, and birds, the marine substrate, the balance between native and non-native species, pollution, and water quality, chemistry, and structure, but failed to describe, much less quantify, these consequences. The Corps cites the two Dumbauld papers for general statements regarding the positive or negative effects of shellfish aquaculture on certain aquatic resources or characteristics (focusing on seagrass), but it makes no attempt to quantify the effects or to support its conclusion that the effects are no more than minimal.

Even if the health and resilience of seagrass were the only concern - and, as discussed

above, it is not - the 2015 Dumbauld and McCoy paper cannot reasonably be interpreted as evidence that seagrass is only minimally impacted by commercial shellfish aquaculture. As noted above, the paper evaluated only the effect of oyster aquaculture. In that context, it recognized the research suggesting that oyster aquaculture has direct impacts on native seagrasses at the site of the activity and in short temporal spans. These impacts are then ignored by both Dumbauld and the Corps in favor of a landscape, cumulative analysis which, as discussed above, is inadequate. Just as importantly, NWP 48 authorizes the discharge of dredged and fill material from not only oyster operations, but also from mussel, clam, and geoduck operations carried out on bottom substrate, in containers, and/or on rafts or floats. Thus, Dumbauld and McCoy did not evaluate, and drew no conclusions regarding, the impact that many of the activities authorized by NWP 48 would have on seagrass (much less other aquatic resources). The Seattle District, for its part, acknowledged the breadth of species and cultivation techniques that are encompassed in the phrase "commercial shellfish aquaculture." A draft cumulative impact assessment generated in February 2017 dedicated twenty-five pages to discussing the wide range of work and activities covered by NWP 48 and noting the species-dependent variability in cultivation techniques, gear, and timing. COE 125591-616.[7] These variations gave rise to a wide array of effects on the aquatic habitat (COE 125635-36), none of which is acknowledged or evaluated in the national Decision Document. In its Supplement, the Seattle District noted:

[7] The Corps acknowledges that the draft regional impact assessment "was a NEPA-level analysis," but faulted the author because that level of analysis should be performed by Headquarters for a nationwide permit. COE 125856. No comparable analysis is included in the national Decision Document, however.

> The impacts to eelgrass from aquaculture can be temporary, depending on the activity, because the habitat conditions themselves (elevation, water quality, etc.) are not permanently altered which allows eelgrass to eventually recover given sufficient time. In Washington State, the timeframe for recovery has been documented to be about 5 years depending on the activity and other factors. For example, when a geoduck farm is seeded it is covered with tubes and nets for 2 or more years and then the tubes and nets are removed until harvest, 3-5 years later. The eelgrass would have died back under the nets, had a chance to return when nets were removed, and then eelgrass is disturbed/removed again when harvest occurs. While this process allows for eelgrass return at the site, the frequency of disturbance and relatively long recovery times result in a local habitat condition where eelgrass more often than not is either not present or present at a much reduced functional state. This effect would persist as long as aquaculture is occurring at the site. In some cases, such as when nets are placed over planted clam beds, any eelgrass is likely to be permanently smothered and not recover. This is because of the permanence of the nets, which are only removed between harvest and the next planting cycle. The time between harvest and planting may only be a matter of weeks or months. Other impacts are discussed in the national decision document. This existing cycle of impacts to eelgrass represents the existing environment from aquaculture activities authorized under NWP [48] 2012; and these or similar effects may continue if verification under NWP 48 2017 is requested and received.

COE 127587-88.

Agency predictions within their areas of expertise are entitled to the highest deference, but they must have a substantial basis in fact. The Corps recognized that certain shellfish operations would displace eelgrass entirely for extended periods of time. In some cases, nets are used to smother the vegetation, precluding any chance of recovery. Where smothering nets are not in use, the eelgrass may recover to some extent, but was not likely to return to is full functional state before being disturbed and/or removed again for the next harvest or seeding

activity. The impacts of commercial shellfish aquaculture on eelgrass (and presumably on all species that rely on eelgrass) would continue as long as the permitted activity continued. Under the 2017 version of NWP 48, a significant number of additional acres that were not cultivated under the 2012 NWP could be put into shellfish aquaculture if the area had been commercially productive during the past 100 years. See COE 118145-49; COE 127584. Any such "reopened" beds could result in additional losses of seagrass and the benefits it provides. COE 127589 ("[F]or many current operations, verification under NWP 2017 will create no appreciable change to the baseline environmental conditions, and the impacts will be minimal both individually and cumulatively.[8] For other operations, however, activities may create a change in current conditions, for example if activities are proposed on land populated with recovered eelgrass."). The national Decision Document does not quantify the periodic and permanent losses of seagrass[9] or the impact on the wider aquatic environment. A reasonable mind reviewing the

[8] By quoting this portion of the Seattle District Supplement, the Court is not adopting its reasoning. National, regional, and state permits issued under the authority of the CWA last for only five years. When a NWP is reissued, the environmental impacts of the agency action logically include all activities conducted under the auspices of the permit, regardless of whether those operations are brand new or are simply "verified" as covered by the reissued NWP. The governing regulations expressly impose upon the Corps the obligation to consider the ongoing effects of past actions when conducting a cumulative impacts analysis. 40 C.F.R. § 1508.7. See Ohio Valley Envtl. Coalition v. Hurst, 604 F. Supp. 2d 860, 886-87 (S.D. W. Va. 2009) (rejecting the Corps' *post hoc* rationalization that past authorizations of moutaintop mining had no continuing effects and noting that, in the court's "common sense judgment," "[t]hese losses and impacts do not exist in a vacuum; they are not corrected or cured every five years with the renewal of a new nationwide permit. Nor do these accumulated harms become the baseline from which future impacts are measured. Before authorizing future activities with such tremendous impacts, the Corps must at least consider the present effects of past activities . . . .").

[9] The cumulative impacts of reissuing NWP 48 are to be analyzed in accordance with 40 C.F.R. § 230.7(b)(3), pursuant to which the Corps must predict "the number of activities expected to occur until the general permit expires." NWP003043. The Corps' estimates of how many acres are likely to be cultivated under the reissued national permit vary widely, however. The estimate provided in Section

record as a whole would not accept Dumbauld and McCoy's limited findings regarding the landscape-level impact of oyster cultivation on a species of seagrass in the intertidal zone as support for the conclusion that entire ecosystems are resilient to the disturbances caused by shellfish aquaculture or that the impacts of those operations were either individually or cumulatively minimal.

(c) Impacts of Other Human Activity

Although the Corps does not rely on this line of reasoning in opposing plaintiffs' motions for summary judgment, its Decision Document is replete with various forms of the following statement: "[c]ommercial shellfish aquaculture activities are a minor subset of human activities that affect coastal intertidal and subtidal habitats and contribute to cumulative effects to those coastal habitats." NWP003041. See also NWP003040; NWP003042-44; NWP003061; NWP003068; NWP003075-76; NWP003081; NWP003083-85. To the extent the Corps' minimal impacts determination is based on some sort of comparison between the environmental impacts of shellfish aquaculture and the environmental impacts of the rest of human activity (see

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7.2.2 of the Decision Document states that NWP 48 will be utilized 1,625 times over the five-year period, resulting in impacts to approximately 56,250 acres of water. NWP003098. Those numbers are reportedly based on past uses of the NWP plus an estimate of the number of activities that did not require pre-construction notification and were not voluntarily reported to the Corps district. Id. According to the Seattle District, however, over 56,000 acres of marine tidelands were permitted under the 2012 version of NWP 48 in Washington State alone, and that number was only going to increase under the 2017 version. COE 127590. Recognizing the long history of commercial shellfish operations in the State's waters and the 100-year look back for identifying "existing" operations, the Seattle District estimated that 72,300 acres of Washington tidelands could be authorized for commercial shellfish production under the 2017 NWP 48. COE 127590-92. Thus, even if Headquarters had attempted to quantify the proposed action's impacts on seagrass (or any other aquatic resource) before reissuing NWP 48, its data regarding past uses of the permit was incorrect and its estimates of future uses are suspect.

NWP003046 (commercial shellfish aquaculture activities "cause far less change to the environmental baseline than the adverse effects caused by development activities, pollution, and changing hydrology that results from the people living and working in the watersheds that drain to coastal waters . . ."); NWP003078 ("[T]here are many categories of activities that contribute to cumulative effects to the human environment. The activities authorized by this NWP during the 5-year period it will be in effect will result in no more than minimal incremental contributions to the cumulative effects to these resource categories."); NWP003081 ("The activities authorized by this NWP will result in a minor incremental contribution to the cumulative effects to wetlands, streams, and other aquatic resources in the United States because, as discussed in this section, they are one category of many categories of activities that affect those aquatic resources.")), the analysis is inadequate. NEPA and the CWA were enacted because humans were adversely affecting the environment to a noticeable and detrimental extent. See 42 U.S.C. § 4331(a) (Congressional recognition of "the profound impact of man's activity on the interrelations of all components of the natural environment"); 33 U.S.C. § 1251(a) ("The objective of [the CWA] is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters."). Noting that a particular environmental resource is degraded is not an excuse or justification for further degradation. The Corps must analyze the individual and cumulative impacts of the proposed activity against the environmental baseline, not as a percentage of the decades or centuries of degrading activities that came before.

The Corps makes a similarly untenable argument whenever the use of pesticides in a shellfish operation permitted under NWP 48 is discussed. While acknowledging that these substances are used and released into the environment during permitted activities, the Corps

declines to consider the environmental impacts of pesticides because they are regulated by some other entity. See NWP003077. Even if the Corps does not have jurisdiction to permit or prohibit the use of pesticides, it is obligated to consider "other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." NWP003074 (quoting 40 C.F.R. § 1508.7). The Corps' decision to ignore the foreseeable uses and impacts of pesticides in the activities it permitted on a nationwide basis does not comport with the mandate of NEPA or with its obligations under the CWA. Having eschewed any attempt to describe the uses of pesticides in commercial shellfish aquaculture or to analyze their likely environmental impacts, the decision to permit such activities through NWP 48 cannot stand.

(2) General Conditions of NWP 48

In making its minimal impact determinations, the Corps relied in part on the general conditions imposed on all nationwide permits. NWP003072. According to the Corps, the prohibitions it has imposed against impacts on the life cycle movements of indigenous aquatic species (general condition 2), spawning areas (general condition 3), migratory bird breeding areas (general condition 4), concentrated shellfish beds (general condition 5), and endangered or threatened species (general condition 18), and the requirements that permittees use non-toxic materials (general condition 6) and confer with other regulatory agencies as needed (general condition 19) will ensure that the individual and cumulative environmental effects of NWP 48 are minimal. Even if the Court were to assume that the general conditions will be universally heeded, regulatory fiat does not satisfy NEPA's requirement that the EA contain "sufficient evidence and analysis for determining whether to prepare an environmental impact statement or

a finding of no significant impact." 40 C.F.R. § 1508.9(a)(1). The general conditions are just that: general. They apply to all NWPs and do not reflect a "hard look" at the environmental sequellae of commercial shellfish aquaculture. For purposes of the CWA, the general conditions on which the Corps relies do not necessarily prohibit substantial impacts: general condition 3, for example, precludes the most destructive of activities in spawning areas but leaves unregulated many activities that could significantly impact those areas. In addition, the general conditions relate to only some of the environmental resources the Corps acknowledges are impacted by the permitted activities and do not address the cumulative impacts of commercial shellfish aquaculture at all. 40 C.F.R. § 1508.7 ("Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.").

The Court does not intend to suggest, and is not suggesting, that the general terms and conditions imposed on a nationwide, regional, or state permit cannot be relevant to and supportive of a finding of minimal impacts. They are simply too general to be the primary "data" on which the agency relies when evaluating the impacts of the permitted activities.

(3) Regional Conditions and District Engineers

Any permit authorizing activities on a nationwide level runs the risk of sanctioning activities that have more than minimal environmental impacts. In order to safeguard against that risk, regional district engineers have the discretionary authority to modify, suspend, or revoke the NWP within a particular region or class of waters, to add regional conditions to the NWP, to impose special conditions on a particular project, and/or to require an applicant to seek an individual permit. NWP003037 (citing 33 C.F.R. §§ 330.4(e) and 330.5). Although permittees may generally proceed with activities authorized by an NWP without notifying the district

engineer, (33 C.F.R. § 330.1(e)(1)), general condition 18(c) requires the submission of a pre-construction notification ("PCN") if the proposed activity may affect or is in the vicinity of a species listed or habitat designated as critical under the ESA. Because all aquaculture operations in the State of Washington occur in waters where there are threatened/endangered species and/or critical habitat, applicants who seek to operate under the auspices of NWP 48 in this State must submit a PCN and obtain a "verification" that the activity falls within the terms of the permit and that the requirements of the ESA have been satisfied. COE 127592. "For a project to qualify for verification under a general permit, a Corps District Engineer must conclude that it complies with the general permit's conditions, will cause no more than minimal adverse effects on the environment, and will serve the public interest." Sierra Club v. U.S. Army Corps of Eng'rs, 803 F.3d 31, 39 (D.C. Cir. 2015) (citing 33 C.F.R. §§ 330.1(e)(2), 330.6(a)(3)(i)).

There is nothing arbitrary, capricious, or unlawful about having the regional district engineer review site-specific proposals to "cement [Headquarters'] determination that the projects it has authorized will have only minimal environmental impacts." Ohio Valley Envtl. Coalition v. Bulen, 429 F.3d 493, 501 (4th Cir. 2005). Tiering the review and decision-making tasks is permissible, but there must be a national decision document that actually evaluates the impacts of the proposed activity in light of any regional conditions imposed. The problems here are that the Corps' minimal impact determinations were entirely conclusory and the regional conditions that it assumed would minimize impacts were not in place at the time NWP 48 was adopted. The record is devoid of any indication that the Corps considered regional data, catalogued the species in and characteristics of the aquatic environments in which commercial shellfish aquaculture activities occur, considered the myriad techniques, equipment, and

materials used in shellfish aquaculture, attempted to quantify the impacts the permitted activity would likely have on the identified species and characteristics, or evaluated the impacts of the as-yet-unknown regional conditions.

Faced with incredible diversity in both the environment and the activities permitted under NWP 48, the Corps effectively threw up its hands and turned the impact analyses over to the district engineers. The "Impact Analysis" section of the national Decision Document simply reiterates the district engineer's powers to revoke, modify, or condition the NWP and directs the district engineers to make minimal adverse environmental effects determinations after considering certain factors. NWP003073-74. Its "Cumulative Effects" analysis bluntly acknowledges that "[i]t is not practical or feasible to provide quantitative data" regarding the cumulative effects of NWP 48 other than the estimated number of times the permit will be used. NWP003081.

Because a nationwide analysis was impossible, the task of conducting a cumulative impacts analysis in specific watersheds was devolved to the district engineers. NWP003077. Even where adverse impacts are acknowledged, the Corps ignores its obligation to analyze and quantify them, instead relying on the district engineers to perform the analysis on a project-by-project basis. In the context of the public interest discussion regarding impacts to fish and wildlife, for example, the Corps recognizes that NWP 48 may "alter the habitat characteristics of tidal waters," that "[s]ome species of aquatic organisms will benefit from those changes, while other species will be adversely affected," and that equipment used in commercial shellfish operations may impede bird feeding activities and trap birds." NWP003087. It then states:

The pre-construction notification requirement[] provides the district engineer with

> an opportunity to review those activities and assess potential impacts on fish and wildlife values and ensure that the authorized activity results in no more than minimal adverse environmental effects.

Id. This abdication of responsibility is not authorized under the CWA or NEPA.[10]

As discussed in the preceding sections, Headquarters' prediction that the issuance of NWP 48 would have minimal individual and cumulative impacts on the environment, though repeatedly stated in the Decision Document, is not based on relevant evidence that a reasonable mind might accept as adequate to support the agency's conclusion, and the inclusion of general permit conditions does not obviate the need to analyze the impacts of proposed federal action. Thus, the Corps' impact analyses are based in large part on the hope that district engineers will mitigate any adverse environmental effects by revoking NWP 48, imposing regional or project-based conditions, and/or requiring an applicant to seek an individual permit. In this context, the Court finds that the Corps may not rely solely on post-issuance procedures to make its pre-issuance minimal impact determinations. See Bulen, 429 F.3d at 502 ("We would have substantial doubts about the Corps' ability to issue a nationwide permit that relied solely on post-

[10] The Corps' analysis with regards to plastic debris discharged into the marine environment is even more problematic. The Corps acknowledges the many public comments raising concerns about the introduction of plastics into the marine food web, but relies on the fact that "[d]ivision engineers can impose regional conditions to address the use of plastics" in response to these concerns. NWP003402. The Seattle District, for its part, declined to quantify the impact of plastics, instead noting that "it would not be a practicable solution to regionally condition NWP 48 to not allow the use of PVC and HDPE gear as there are no current practicable alternatives to use of the materials." COE 127559. The CWA requires the Corps to make minimal adverse effect findings before issuing a general permit. If, as appears to be the case with regards to the discharge of plastics from the permitted operations, the Corps is unable to make such a finding, a general permit cannot issue. The Corps has essentially acknowledged that it needs to individually evaluate the impacts of a particular operation, including the species grown, the cultivation techniques/gear used, and the specific location, before it can determine the extent of the impacts the operation will have.

issuance, case-by-case determinations of minimal impact, with no general pre-issuance determinations. In such a case, the Corps' 'determinations' would consist of little more than its own promise to obey the law.").

CONCLUSION

A nationwide permit can be used to authorize activities involving the discharge of dredged or fill material only if the Corps makes a determination that the activity will have only minimal individual and cumulative adverse effects on the environment. In issuing NWP 48, the Corps has opted to interpret the "similar in nature" requirement of 33 U.S.C. § 1344(e)(1) broadly so that all commercial shellfish aquaculture activities in the United States could be addressed in a single nationwide permit. That choice has made assessing the impacts of disparate operations difficult: the Corps essentially acknowledges that the permitted activity is performed in such different ways and in such varying ecosystems that evaluating impacts on a nationwide level is nearly impossible. It tries to avoid its "statutory obligations to thoroughly examine the environmental impacts of permitted activities" by promising that the district engineers will do it. Hurst, 604 F. Supp. 2d at 901-02. The Court finds that the Corps has failed to adequately consider the impacts of commercial shellfish aquaculture activities authorized by NWP 48, that its conclusory findings of minimal individual and cumulative impacts are not supported by substantial evidence in the record, and that its EA does not satisfy the requirements of NEPA and the governing regulations.

For all of the foregoing reasons, plaintiffs' motions for summary judgment (Dkt. # 36 in C16-0950RSL and Dkt. # 31 in C17-1209RSL) are GRANTED and defendant's and intervenors' cross-motions (Dkt. # 44 and # 45 in C16-0950RSL and Dkt. # 43 and # 44 in C17-1209RSL)

are DENIED. The Corps' issuance of a nationwide permit, at least with respect to activities in the waters of the State of Washington, was arbitrary and capricious and not in accordance with NEPA or the CWA. Pursuant to 5 U.S.C. § 706(2), the Court holds unlawful and sets aside NWP 48 insofar as it authorizes activities in Washington.

The only remaining issue is whether NWP 48 should be vacated outright to the extent it has been applied in Washington, thereby invalidating all existing verifications, or whether equity requires that the permit be left in place while the agency performs an adequate impact analysis and environmental assessment to correct its unlawful actions. Idaho Farm Bureau Fed'n v. Babbitt, 58 F.3d 1392, 1405 (9th Cir. 1995).

> Although not without exception, vacatur of an unlawful agency action normally accompanies a remand. Alsea Valley All. v. Dep't of Commerce, 358 F.3d 1181, 1185 (9th Cir. 2004). This is because "[o]rdinarily when a regulation is not promulgated in compliance with the APA, the regulation is invalid." Idaho Farm Bureau Fed'n[, 58 F.3d at 1405]. When equity demands, however, the regulation can be left in place while the agency reconsiders or replaces the action, or to give the agency time to follow the necessary procedures. See Humane Soc. of U.S. v. Locke, 626 F.3d 1040, 1053 n.7 (9th Cir. 2010); Idaho Farm Bureau Fed'n, 58 F.3d at 1405. A federal court "is not required to set aside every unlawful agency action," and the "decision to grant or deny injunctive or declaratory relief under APA is controlled by principles of equity." Nat'l Wildlife Fed'n v. Espy, 45 F.3d 1337, 1343 (9th Cir. 1995) (citations omitted).

All. for the Wild Rockies v. United States Forest Serv., 907 F.3d 1105, 1121 (9th Cir. 2018). Courts "leave an invalid rule in place only when equity demands that we do so." Pollinator Stewardship Council v. U.S. E.P.A., 806 F.3d 520, 532 (9th Cir. 2015) (internal quotation marks and citation omitted). When determining whether to leave an agency action in place on remand,

we weigh the seriousness of the agency's errors against "the disruptive consequences of an interim change that may itself be changed." Cal. Cmties. Against Toxics v. U.S. E.P.A., 688 F.3d 989, 992 (9th Cir. 2012). In the context of environmental regulation, courts consider whether vacating the invalid rule would risk environmental harm and whether the agency could legitimately adopt the same rule on remand or whether the flaws were so fundamental that it is unlikely the same rule would result after further analysis. Pollinator Stewardship, 806 F.3d at 532.

Despite the fact that both plaintiffs clearly requested vacatur as the remedy for unlawful agency action, defendants provided very little evidence that would justify a departure from the presumptive relief in this APA action. The federal defendants state that additional briefing as to remedy should be permitted once the seriousness of the agency's error is determined. The intervenors assert that vacatur would cause disruption in the Washington shellfish farms and industry, including significant impacts to employees and the communities in which they live. Neither tact is compelling. The substantive defects in the agency's analysis when adopting the 2017 NWP are significant, the existing record suggests that adverse environmental impacts will arise if NWP 48 is not vacated, and, given the nature of the analytical defects and record evidence that seagrass is adversely impacted in the immediate vicinity of shellfish aquaculture, it seems unlikely that the same permit could issue following remand. As for the disruptive consequences to Washington businesses, employees, and communities, more information is required. As plaintiffs point out, shellfish growers can apply for individual permits (as they did before 2007). In addition, the Court has the equitable power to allow a period of time in which growers can avail themselves of that process before the existing verifications would be

invalidated or to fashion some other equitable remedy to minimize both the risks of environmental harm and any disruptive consequences.

While the current record does not support deviation from the presumptive remedy for an APA violation, the Swinomish Indian Tribal Community has requested an opportunity to be heard regarding the scope of the remedy. C18-0598RSL (Dkt. # 28). Swinomish also challenge the Corps' minimal impacts analyses in reissuing NWP 48, but, unlike the plaintiffs in the above-captioned matters, does not seek vacatur of verifications or permits issued under the NWP. The Court will accept additional briefing regarding the appropriate remedy.

Because there is a presumption in favor of vacatur, defendants, intervenors, and Swinomish will be the moving parties and may file motions, not to exceed 15 pages, regarding the appropriate relief for the APA violations discussed above. Only one motion may be filed in each of the three cause numbers at issue, C16-0950RSL, C17-1209RSL, and C18-0598RSL. The motions, if any, shall be filed on or before October 30, 2019, and shall be noted for consideration on November 15, 2019. Plaintiffs' responses, if any, shall not exceed 15 pages. Replies shall not exceed 8 pages.

The Clerk of Court is directed to docket a copy of this order in Swinomish Indian Tribal Community v. Army Corps of Engineers, C18-0598RSL.

Dated this 10th day of October, 2019.

Robert S. Lasnik
United States District Judge