OFFICE OF ADJUDICATIONS

IN THE MATTER OF	*: APPLICATION NO. 200401781*
LEYLAND ALLIANCE LLC	
(Madison Landing)	*: JANUARY 16 , 2008*

PROPOSED FINAL DECISION

I

SUMMARY

Leyland Alliance, LLC (Leyland/applicant) has filed an application with the Department of Environmental Protection[1] (DEP/department) for a permit to discharge wastewaters from its planned adult, residential development (project) to be constructed on property located at 1362 Boston Post Road in Madison (Town). General Statutes §22a-430; Regs., Conn. State Agencies §§22a-430-3 and 22a-430-4. Specifically, the applicant intends to construct and operate an on-site, advanced wastewater treatment and renovation system (Zenon system) to treat domestic sewage wastewater generated by the development for discharge to the ground water in the South Central Shoreline watershed.

The DEP published a tentative determination to approve this application and a draft permit has been prepared that would authorize the discharge (Attachment A). Hearings on the application were held in Madison for the receipt of public comment and were continued at the DEP in Hartford. The parties to this proceeding are the applicant, DEP staff, and intervening parties Dr. William B. McCullough and Carol Altieri (intervenors).

The applicant has demonstrated that the application and the terms and conditions of the draft permit are consistent with all applicable statutory and regulatory standards.

[1] Bureau of Materials Management and Compliance Assurance, Water Permitting and Enforcement Division.

§22a-430; §§22a-430-1 through 22a-430-8. If constructed and operated as proposed, this wastewater treatment system will protect the waters of the state from pollution.

The applicant has demonstrated that its proposed activities are consistent with all applicable goals and policies of the Connecticut Coastal Management Act and that such activities incorporate all reasonable measures mitigating any adverse impacts on coastal resources. §22a-98. The applicant has also incorporated best management practices endorsed by the DEP to control the discharge consistent with the objectives of the Connecticut Water Quality Standards for the Hammonasset River.

The intervenors have failed to meet their burden of proof that the proposed treatment system violates the Connecticut Environmental Protection Act (CEPA). Specifically, the intervenors have not established a prima facie case that the proposed system is inconsistent with the statutes and regulations governing discharges to the waters of the state. The intervenors have also failed to establish a prima facie case that the proposed discharge will unreasonably pollute or impair the on-site and adjacent tidal wetlands, the Hammonasset River or the Clinton Harbor estuary.

I recommend that the applicant be authorized to submit plans and specifications for its proposed treatment system. Upon approval of the applicant's plans, I recommend issuance of the draft permit (Attachment A).

II

DECISION

A
FINDINGS OF FACT

The following findings of fact are based on a review of the entire record of this proceeding, a determination of the credibility and the weight to be given to competing evidence, and on reasonable inferences drawn from the evidence. Stipulated proposed findings of fact were submitted by the parties and have been incorporated into these findings where appropriate.

1
Background/Procedural History

1. Leyland's application for a discharge permit was received by the department on June 9, 2004. Following its review of the application, including engineering reports and technical support data, the DEP determined that the proposed wastewater treatment system met its design requirements and published a tentative determination to issue the permit on December 15, 2006. Staff has submitted into the record a draft permit that would authorize the proposed discharge. This draft permit would allow a maximum daily flow of 52,500 gallons per day (gpd) of wastewater and provides that this discharge is restricted by and shall be monitored in accordance with the requirements set out in the permit. (Exs. DEP-1, 2, 8a, ex. APP-1; test. W. Herzig, 5/24/07, p. 1626.)

2. Leyland previously submitted a coastal site plan review application to the Madison Planning and Zoning Commission as part of the local permitting process. The coastal site plan was subsequently referred to the DEP Office of Long Island Sound Programs (OLISP) for review and comment. Following a determination by OLISP that the planned project appeared to be consistent with the applicable standards and policies of the Connecticut Coastal Management Act[2], the Madison Planning and Zoning Commission issued its approval of the coastal site plan on May 28, 2004, at the same time the Town approved a special exception permit for 127 dwelling units. (Exs. APP-1, 56, 60.)

3. During the local permitting process, the Town retained environmental engineers Nathan L. Jacobson & Associates and Woodard & Curran to independently review the applicant's on-site data collection, conceptual model for ground water flow, predictive ground water modeling and analyses of the impacts of the discharge to the adjacent tidal marsh. These independent reviewers considered and commented on many of the

[2] General Statutes §§22a-90 through 22a-113c.

intervenors' issues raised during the local proceedings that the intervenors have again raised in this proceeding.[3] (Exs. APP-10, 60; test. 5/17/07, S. Haydock, pp. 490-491, S. Warren, p. 545.)

4. An organized group of residents and citizens who have actively opposed the project in the local proceedings since 2001 have submitted numerous petitions opposing the discharge permit. Representatives of the group Stop Griswold Over-Development (SGOD) have met with the Commissioner and members of DEP staff and have submitted technical materials intended to refute the applicant's site characterization and its conclusions regarding the possible adverse environmental impacts of the discharge. (Ex. DEP-4; test. W. McCullough, 5/11/07, pp. 277-281, test. W. Herzig, 5/24/07, p. 1626, test. C. Fitting, 6/1/07, pp. 1759, 1760.)

5. A petition requesting a public hearing on the application was timely filed on January 9, 2007.[4] On February 15, 2007, Dr. William McCullough and Carol Altieri were each granted intervening party status pursuant to General Statutes §22a-19.[5] A site visit was conducted on April 5, 2007, at which all parties were represented. The hearing commenced in Madison on April 11, 2007, for the purpose of receiving public comment on the application, and continued in Hartford on various dates in May and June 2007. Post-hearing submissions were filed on July 13, 2007, including stipulated and disputed proposed findings of fact and conclusions of law. (Exs. DEP-3, 4, exs. APP-35, 36, 38, 39.)

[3] Intervenors' expert Robert Schreiber testified during the local permitting proceedings. On behalf of the town of Madison, consultants Woodard & Curran considered the intervenors' claims regarding the applicant's determination of the site hydraulic conductivity, freshwater impacts of the discharge to tidal wetlands, water table response to the discharge, extent of ground water flow to Long Island Sound, ground water impacts to Bradley Creek, and the impacts of pharmaceuticals in the waste stream. (Ex. APP-10; test. R. Schreiber, 5/24/07, pp. 1536, 1537.)

[4] All documents pertaining to the procedural history that are not specifically cited as exhibits are contained in the docket file maintained by the Office of Adjudications and are part of the administrative record in this matter. General Statutes §4-177(d).

[5] Altieri and McCullough, both active members of SGOD, petitioned for party status as individuals. SGOD did not file a petition to intervene in these proceedings.

6. The applicant is a limited liability company and maintains its principal place of business in Tuxedo, New York. The applicant has not been convicted in any jurisdiction of a criminal violation of environmental law; has not suffered the imposition of any civil penalty in any state or federal administrative proceeding; and has not been issued any order or adverse judgments by any state or federal court or any state or federal administrative agency. (Exs. APP-1, 3.)

2
Project Overview

7. The applicant proposes to build a 127-unit active adult residential development for occupancy by persons fifty-five years of age and older on the site of the former Griswold Airport at 1362 Boston Post Road in Madison. The project includes sixty-eight single-family detached homes, thirty-five single-family attached town houses, and twenty-four condominium apartment units with community buildings and a pool. A total of 350 bedrooms are included in the proposed development. The local permit requires the applicant to establish a 100-foot buffer zone between the upland development and the tidal wetlands boundary on the site and to develop, "in concert or consultation with the DEP", a comprehensive phragmites control plan. (Exs. APP-1, 60; test. J. Whitcomb, 5/9/07, pp. 123,124.)

8. The proposed treatment system for wastewater from all homes and community buildings is a Zenon membrane bioreactor, an alternative treatment system manufactured by General Electric. The applicant concluded from its initial site assessment that the site was not suitable for conventional wastewater systems and that an engineered wastewater treatment system was necessary to comply with regulatory requirements, particularly nitrogen removal. The applicant cannot connect to a municipal sanitary sewer line because there are no public sewers available to serve the site. The applicant initially proposed an Amphidrome® system for wastewater treatment. Subsequently, the applicant modified its permit application and proposed the Zenon system based on the systems's strong track record of nitrogen removal. (Exs. APP-1, 3, 28, 60; test. 5/9/07, M. Sherman pp. 40-43, test. J. Whitcomb, p. 139.)

3
Site Resources

9. The project site is located south of Route 1 in Madison and is surrounded to the east, west and south by state-owned land, to the southeast by land developed for commercial uses, and to the west by land developed for residential uses including Young's Village, a community of seasonal homes. Of the site's forty-two acres, approximately thirty-two acres are upland[6] and approximately ten acres are tidal wetlands associated with the Hammonasset River tidal estuary. (Exs. APP-1, 3, ex. INT-1B1; test. W. McCullough, 5/11/07, pp. 263, 264.)

10. The site is located within the South Central Shoreline Watershed, adjacent to the lower reaches of the Hammonasset River, Bradley Creek, and tidal wetlands on the Hammonasset State Park property. Healthy, productive salt marshes are present along the perimeter of the southwestern and southeastern parts of the property. An unnamed drainage ditch tributary to Bradley Creek lies along the southwest boundary of the site. A seaplane channel is located at the northeastern corner of the property and a system of mosquito trenches,[7] cut deeply into the marsh deposits, extends from the upland south toward Bradley Creek and east to the River. (Exs. APP-1, 2, 13, exs. INT-1B1, 69; test. S. Haydock, 5/17/07, p. 482, test. L. Dunbar, 5/22/07, p. 1211.)

11. The segment of the Hammonasset River adjacent to the property has a surface water classification of SB, which indicates that this section of the River is not supporting one or more of the designated uses[8] specified for the River by the Connecticut Water Quality Standards.[9] As required by the Federal Clean Water Act, the lower Hammonasset River

[6] The portion of the property that lies to the north and west of the tidal wetland/marsh boundary. (Test. S. Haydock, 5/17/07, p. 466.)
[7] Trenches of various sizes and depths installed by the DEP that are designed to drain standing water. (Test. S. Haydock, 5/17/07, p. 481.)
[8] Such uses include: providing habitat for marine fish, other aquatic life and wildlife; commercial shellfish harvesting; recreation, industrial water supply; and navigation. (Ex. DEP-11.)
[9] Standards of water quality adopted by the DEP pursuant to General Statutes §22a-426 that are intended to support the restoration and maintenance of the chemical, physical and biological integrity of Connecticut surface waters. (Ex. DEP-11.)

is therefore included in the DEP list of impaired waters.[10] (Exs. DEP-11, 16; test. W. Herzig, 5/24/07, p. 1630.)

12. The ground water on the site is classified as "GA impaired with a goal of GA". The classification of GA refers to an "area of existing private water supply wells or an area with the potential to provide water to public or private water supply wells" that is suitable for drinking without treatment. "GA impaired" means that the ground water may not currently be meeting this GA standard, however, the goal for the area is to attain GA classification. Permitted discharges to GA ground water include treated domestic sewage. (Exs. DEP-8a, 11; test. W. Herzig, 5/24/07, pp. 1627, 1628.)

13. The salt marsh is subject to twice-daily tidal flushing, which creates a level of saturation at the marsh surface. The marsh is at elevation two feet near the eastern boundary of the site along the Hammonasset River and closer to four feet at the upland border. The volume of water exchange in the tide (tidal prism) in the estuary is roughly three to four billion liters. (Test. 5/17/07, S. Haydock, p. 483, S. Warren pp. 569, 570.)

14. Different plant communities characterize the higher and lower portions of the salt marsh system adjacent to the site. The high marsh, which dominates the system, borders the site closest to the upland and along the creeks and the mosquito trenches. Most of the cover or dominant plant species in the high marsh are salt meadow hay (spartina patens) and black grass (juncus gerardii), mixed with spiked grass (distichlis spicata), with patches of smooth cord grass (spartina alterniflora). The intertidal zone cover is spartina alterniflora. (Test. C. Elphick, 5/11/07, pp. 362, 363, test. S. Warren, 5/17/07, pp. 553, 554.)

15. A well-established band of tall, aggressively growing grass, phragmites australis (phragmites) borders the site along the upland edge of the salt marsh and the mosquito trenches where the ground is disturbed and is elevated above the twice daily tidal flushing. Phragmites thrive in low salinity waters, form dense monocultures and replace the natural mix of vegetation. The width of the existing phragmites border, which varies

[10] 33 USCS §1313(d); Section 303(d).

from a few to more than ten meters, indicates uneven runoff and ground water breakout in those elevated areas. (Exs. APP-18, 26, exs. INT-1B1, 69; test. S. Warren, 5/17/07, pp. 551-553, test. B. Howes, 5/22/07, pp. 1274, 1280-1282.)

16. The Clinton Harbor estuary, to the east of the site, is an open, shallow estuary of approximately 576 acres in size that is well flushed by the tides. The Harbor is currently identified on the state list of impaired waters. The estuary has historically supported substantial eelgrass beds (zostera marina). Currently, there are no signs of eelgrass indicating that the estuary has degraded over several decades, which is likely due to excess nitrogen loads to the waterway.[11] (Ex. APP-18; test. S. Warren, 5/17/07, pp. 567-569, test. 5/22/07, L. Dunbar, p. 1173, 1181, 1182, M. Welch, pp. 1476, 1477.)

4
Proposed Discharge/Discharge Volume

17. The proposed discharge of domestic wastewater would result primarily from toilets, urinals, and sinks. The applicant is required and intends to use customary conservation efforts such as low-flow fixtures for toilets and faucets to minimize the amount of wastewater to the extent possible. No additional water would be added to the system to dilute effluent concentrations in the discharge. Storm water discharges from the site would not be combined with the wastewater discharge. (Exs. APP-1, 3, 28; test. J. Whitcomb, 5/9/07, pp. 124, 134, 138.)

18. The maximum permitted discharge volume is 52,500 gallons per day (gpd). This design flow[12] is based on bedroom count and conservative assumptions about flow per bedroom, i.e., a total of 350 bedrooms, occupied by two people each generating 75 gpd or 150 gpd per bedroom. The average permitted daily flow is 35,000 gpd. The applicant anticipates the actual average daily flow for this development to be closer to 20,000 gpd based on reports from similar communities in Connecticut. (Ex. DEP-8A, exs. APP-14,

[11] Nitrogen favors the establishment of algae, phytoplankton and macroalgae that shade and smother eelgrass. (Test. S. Warren, 5/17/07, pp. 568, 569.)
[12] A conservative figure used to prevent hydraulic overload of the system. The design flow typically represents a safety factor of one and one-half times the expected flow through the treatment system. (Test. J. Whitcomb, 5/9/07, pp. 123, 124, test. W. Herzig, 5/24/07, p. 1631.)

19, 25; test. J. Whitcomb, 5/9/07, p. 125, test. S. Haydock, 5/17/07, pp. 516, 517, test. W. Herzig, 5/24/07, pp. 1626, 1631.)

5
Site Investigation/Site Conditions

19. The applicant consulted published soil surveys and conducted extensive subsurface investigations including ground water monitoring, pump tests, and over 140 test pits and soil borings to evaluate and understand the site geology and hydrology and determine the proper design of the proposed leach field. The applicant surveyed the boundaries and topography of the site, and determined the geologic characteristics of the upland and wetland soils, the depth and flow of ground water, the seasonal high water table, the tidal influences on ground water, and the salinity levels in ground water. (Exs. APP-2, 4, 6; test. S. Haydock, 5/17/07, p. 445-476.)

a
Geologic Characteristics

20. The site consists of a flat terrace of stratified glacial drift[13]. The upland soils are mapped as Hinkley gravelly sandy loam and described by the Soil Conservation Service as excessively drained soils formed on glacial fluvial deposits of stratified sand and gravel on outwash terraces.[14] The overburden consists of two continuous, well-sorted layers. The permeability of the soils, described as rapid in the surficial zone and very rapid in the subsoil, is estimated at twenty inches per hour or more than forty feet per day. The upper layer ranges in thickness from twenty-five to forty feet. The lower layer consists of fine sand and silt and varies in thickness from greater than fifty feet to near zero in the eastern portion of the site adjacent to the salt marsh. (Exs. APP-1, 4, 6, 7, 13, 15; test. S. Haydock, 5/17/07, pp. 445, 447, 448, 455-458, 465, test. R. Slayback, 5/21/07, p. 994, 995.)

21. The wetland soils on the east and southerly borders of the site are mapped as Westbrook mucky peat and described as nearly level, poorly drained organic soils in tidal

[13] A type of deposit typically formed by melting glacial waters. Soils tend to be coarse grain and well-sorted and are typically very permeable with high hydraulic conductivity. (Test. S. Haydock, 5/17/07, pp. 456, 457.)
[14] "Soil Survey of New Haven County", U.S. Department of Agriculture, Soil Conservation Service (1979.)

marshes. The soils are approximately ten to twenty feet deep from the surface to the interface with the stratified drift soils that extend under the salt marsh from the upland. The permeability of the Westbrook peat is described as moderate to rapid in the organic layer and moderate in the lower layer and estimated to range from six tenths of an inch to twenty inches per hour in the organic layer and six tenths of an inch to slightly more than one inch in the subsoil. (Exs. APP-6, 9, 13; test. S. Haydock, 5/17/07, pp. 476-480.)

b
Ground Water Flow

22. The ground water table exists in the upper soil layer approximately seven feet below surface during seasonally high water table conditions. Ground water depth is seven to eight feet in the area of the leach field and three to five feet at the lower elevations of the property near the salt marsh upland boundary. Ground water flows across the site in a fan-like pattern from the northwest near the entrance to the property and Route 1 to the south and southeast toward the wetlands. A small component flows from the southwest corner in a southwesterly direction to the unnamed ditch tributary to Bradley Creek. (Ex. APP-13; test. S. Haydock, 5/17/07, pp. 463, 464, 486, 487, test. R. Slayback, 5/21/07, p. 997.)

23. There are three likely pathways for ground water to move away from the upland. The applicant believes that most of the ground water flows through the stratified drift material beneath the marsh. Ground water may also discharge through breakout at the upland marsh boundary and flow out of the sand onto the surface of the marsh soils. Site observations by the applicant revealed little evidence of this possible pathway. The third pathway, from the stratified drift through the mucky peat and out into the marsh, is evidenced by freshwater observed in the mosquito trenches. The intervenors contend that most of the ground water discharges from the site "at the upland seepage face" and mainly through the "creekbottoms" closest to the upland border. (Exs. APP-3, 6, 10, 13, 24-26; test. S. Haydock, 5/17/07, p. 464, 486-489, 497-499, test. B. Howes, 5/22/07, pp. 1273-1277.)

c
Seasonal High Water Table

24. Ground water levels, which fluctuate in an area given the time of year, are typically lowest during July and August and highest during the spring. The highest ground water level, the seasonal high water table, occurs from the end of January through the end of May and is a significant factor in the evaluation of the effectiveness of the leach field to meet specific permit limits. The seasonal high water table in the area of the proposed leach field is approximately six to eight feet below ground surface. (Exs. APP-4-7; test. S. Haydock, 5/17/07, pp. 467-472.)

d
Tidal Influences on Ground Water

25. The applicant investigated the impact of tidal fluctuations on on-site water table elevations and ground water flow.[15] The applicant installed a monitoring device at the seaplane channel and additional monitoring devices in a set of wells along the southeast and southwestern boundaries to assess the influence of the tide. While the seaplane channel monitor showed a daily fluctuation in elevation of three to four feet and, in some cases, four to five feet, the monitoring devices installed in the on-site wells showed a daily fluctuation of only a few hundredths of a foot and at most two-tenths of a foot. (Test. S. Haydock, 5/17/07, pp. 472-475, test. R. Slayback, 5/21/07, p. 1002.)

26. The applicant's investigation also showed that salinity levels measured in the Hammonasset River ranged between nineteen to twenty-nine parts per thousand with the higher levels occurring toward Clinton Harbor and lower levels at the entrance of the seaplane channel at the northeast corner of the property. Salinity levels did not exceed one-tenth of one part per thousand in the on-site ground water monitoring wells. (Test. S. Haydock, 5/17/07, pp. 474, 475.)

27. The results of the applicant's investigation show that there is only a slight impact on the onsite water table elevations from tidal fluctuations. The lower salinity levels in the

[15] Twice daily tidal influences may have an effect on the water table and ground water flow across the site. As part of the leach field design process, the applicant evaluated the possible effect of the tide on the water table elevations. (Test. S. Haydock, 5/17/07, pp. 472, 473.)

ground water in the on-site monitoring wells is also consistent with the very small tidal impact on on-site ground water levels and further supports the conclusion of a weak hydraulic connection between the River and the site. These results are inconsistent with the intervenors' claim that there is a direct hydraulic connection between the aquifer and the tidal marsh area that impedes ground water flow. (Exs. INT-76, 82; test. S. Haydock, 5/17/07, pp. 472-476, test. R. Schreiber, 5/18/07, pp. 904-917.)

e
Hydraulic Conductivity[16]

28. The DEP requires the applicant to demonstrate that the soils have sufficient hydraulic capacity to transmit the flow from the leach field for an adequate distance without surfacing or breakout. There must be a minimum of twenty-one days of effluent travel time from the edge of the leach field to the nearest point of environmental concern, which is the unnamed tributary to Bradley Creek, approximately 350 feet from the leach field. The department also requires a minimum distance of two feet between the mounded seasonal high water table[17] to the bottom of the leach field. The field must have the capacity to convey a flow of one and one-half times the design flow or 78,750 gpd ("hydraulic reserve flow"). (Ex. DEP-8A; test. W. Herzig, 5/24/07, pp. 1633, 1634.)

29. Tests conducted at several locations on the site produced a range of values of the hydraulic conductivity of the soils. The geometric mean of the results of a pump test in the area of the proposed leach field indicated a horizontal hydraulic conductivity of 537 feet per day for the upper layer across the upland portion of the site. The geometric mean of the data from all of the on-site tests indicated a horizontal hydraulic conductivity value of 226 feet per day. This lower conductivity represents a more conservative value as it indicates that the discharge will travel at a slower rate through the unsaturated soils and create a higher water table mound. (Exs. APP-4-7, 13, 25; test. S. Haydock, 5/17/07, pp. 458, 461-468, 490, test. C. Maeder, 5/18/07, p. 717, test. R. Slayback, 5/21/07, p. 1011.)

[16] The ability of the soil to move the water discharged to the system away from the leach field. (Test. S. Haydock, 5/17/07, p. 458, 468.)

[17] The wastewater discharge will travel through the layer of unsaturated soils in the leach field until it reaches the water table, at which time a mound will form on the water table. The size of the mound will depend on the hydraulic conductivity of the soils in the leach field. (Test. S. Haydock, 5/17/07, p. 468.)

f
Ground Water Modeling

30. The applicant created a ground water model of the site using observed conditions and geological and hydrological data from the site investigations.[18] The model was used to simulate steady-state conditions to predict ground water flow and water table mounding based on the treated effluent load discharged to the leach field. Modeling simulations included four scenarios.[19] The results of the modeling indicate that the site has the hydraulic capacity to meet the design criteria required by the department. (Ex. APP-14; test. S. Haydock, 5/17/07, pp. 499-501, 518, test. C. Maeder, 5/18/07, pp. 702-727.)

31. The site boundaries, geological features, hydraulic conductivity values, precipitation recharge rate, and water table elevations were used to calibrate the ground water model. Site geological features were based on the field test results. The hydraulic conductivity values for layer one of the upland soils included 537 feet per day and 226 feet per day. A range of hydraulic conductivities of one-tenth of one foot to one foot per day was used for the peat layer/marsh deposits. The recharge rate was based on one-half of the highest rainfall anticipated at the site or thirty inches per year, and the water table elevation was based on the seasonal high water table for the site. (Exs. APP-1, 11-16; test. S. Haydock, 5/17/07, pp.498, 519, 520, test. C. Maeder, 5/18/07, pp. 703-709, 734, 735.)

32. The model was revised numerous times in response to staff concerns and questions raised by the intervenors. For example, the model site boundaries and soil characteristics were initially limited to the property boundaries and were extended to the center of the

[18] The applicant's ground water modeling software is based on a three-dimensional model developed by the United States Geological Survey called Modflow. Modflow is a widely accepted tool for simulating and predicting ground water flow. (Test. S. Haydock, 5/17/07, pp. 495-497.)

[19] Two scenarios use the design flow of 52,500 gpd with hydraulic conductivity values for the upper layer of 537 and 226 feet per day and two use the hydraulic reserve flow of 78,750 gpd also with hydraulic conductivity values of 537 and 226 feet per day. (Ex. APP-14; test. S. Haydock, S. Haydock, 5/17/07, pp. 499-501, 518, test. C. Maeder, 5/18/07, pp. 702-727.)

Hammonasset River and to Bradley Creek. The model was further revised to include the peat/marsh sediments and associated hydraulic conductivity values in response to concerns raised by the intervenors that the water table mound is underestimated due to the marsh deposits that block flow from the site. The applicant also retained the services of Leggette, Brashears & Graham (LBG) to independently review the modeling process. (Exs. APP-4, 6-8, 11-16; test. R. Slayback, 5/21//07, pp. 990-992, test. C. Fitting, 6/01/07, pp. 1708, 1709, 1711.)

33. The intervenors criticize the applicant's hydrogeologic investigations. The intervenors assertions include insufficient data collection, data gaps, and a lack of conservativeness in the modeling. The modeling results, according to the intervenors, predict water table mound heights and hydraulic travel times that are "too close a call" given the proposed discharge design flow. The basis for many of the intervenors' criticisms stems from a theory put forth by their expert regarding the existence of a lesser permeable layer or stratum[20] in the upper soil layer in the area of the leach field at a depth of ten to twelve feet that could impede the vertical flow of ground water and create a second water table.[21] (Test. R. Schreiber, 5/18/07, pp. 810, 831-843, 5/24/07, pp. 1511, 1512, 1563, 1568, 1571, 1572.)

34. The intervenors' expert based his claims that the site investigation was inadequate and modeling inputs were not sufficiently conservative on this notion of an impediment

[20] The intervenors' expert, Robert Schreiber, noted that this lesser permeable layer could be "a combination of lots of little … laminated layers" all adding up to vertical resistance or one thick layer. (Test. R. Schreiber, 5/24/07, p. 1561.)

[21] Schreiber based his conclusions on pump test results that indicated that the volume of ground water draw down from the test was greater in deeper wells and less in more shallow wells in the area of the pump well. Schreiber analogized these results to a situation in Falmouth, Massachusetts where it was determined that fine soils, undetected by field investigations, created an impediment to vertical ground water flow. Mr. Schreiber emphatically noted that while the Falmouth and Griswold sites are geologically different, his point was that there could be a vertical hydraulic problem in the area of the leach field that had not been detected by the applicant's site investigation. He concluded that the pump test results were not adequately explained or simulated in the applicant's model, a hydraulic loading test should have been conducted and continuous soil borings should have been collected and analyzed to confirm the presence of the lesser permeable layer. (Test. R. Schreiber, 5/24/07, pp. 1514, 1532, 1533, 1536, 1537, 1546, 1561, 1581, 1582.)

to discharge flow in the upper soil layer. Other experts retained by the Town of Madison, the applicant, and DEP staff disagree and consider the applicants' site investigation to be extensive and well within professional standards for the purpose it was conducted. These experts explained that the pump test, intended to stress the upper soil layer in the area of the leach field, produced expected results that represented the differences in hydraulic conductivity between the upper and lower soil layers and did not support Mr. Schreiber's theory of the presence of a lesser permeable layer within the upper stratum. (Exs. APP-2, 7, 13, 16; test. C. Maeder, 5/18/07, pp. 948-950, test. R. Slayback, 5/21/07, pp. 997, 1009, 1081, test. 6/1/07, C. Fitting, pp. 1721-1725, S. Haydock, pp. 1806-1810.)

35. The soil characteristics do not indicate the presence of a lesser permeable layer that would impede vertical flow. The upper layer in the area of the leach field is thirty feet deep and is very transmissive. The coarser soils in that layer are well-connected allowing for high hydraulic conductivity. Although there may be localized occurrences of fine-grained soils, the presence of a laterally extensive fine-grained layer that could impede vertical flow is inconsistent with field data and typically is not found in stratified glacial drift. (Test. C. Maeder, 5/18/07, p. 958, test. R. Slayback, 5/21/07, pp. 995-998, 1004, test. 6/1/07, C. Fitting, pp. 1712, 1721-1724, 1731-1734, S. Haydock, pp. 1810, 1811.)

36. The intervenors also criticized the applicant's steady-state modeling conditions, including the thirty-inch per year precipitation recharge rate[22], the two-to-one ratio of the horizontal to vertical hydraulic capacity[23], the 300,000 - 500,000 gpd natural ground water levels[24], and the use of the seasonal high water table. The intervenors also claim that the applicant ignored the effect of the discharge on ground water flow such that flow

[22] Rainfall in the area is generally forty-four to forty-five inches per year, which would result in a recharge rate of twenty-two inches per year. The applicant conducted its modeling using a conservative thirty inches per year to simulate conditions where the seasonal water table would be at its highest elevation. (Test. S. Haydock, 5/17/07, 672, test. B. Howes, 5/22/07, p. 1276.)

[23] The ratio is an indicator of the soil's resistance to vertical flow as greater than the resistance to horizontal flow. Mr. Schreiber testified that the ratio should have been greater than two to one, possibly even as high as 100 to 1. (Test. R. Schreiber, 5/18/07, pp. 884, 885.)

[24] The applicant estimated that the daily background or ambient discharge from the site ranged from 300,000 to 500,000 gpd. Intervenors' expert estimates varied among witnesses. Mr. Schreiber claimed that the volume could be as low as 50,000 gpd. Professor Howes testified to a range between 110,000 to 150,000 gpd. (Ex. APP-25; test. S. Warren, 5/17/07, p. 605, test. R. Schreiber, 5/18/08, pp. 929, 930, test. B. Howes, 522/07, pp. 1276-1278.)

could travel in the direction of Young's Village if the water table mound was as high as their expert predicted it could be. (Ex. INT-77; test. R. Schreiber, 5/18/07, pp. 829, 830, 865-867, 927, 937, test. C. Fitting, 6/1/07, p. 1719.)

37. Many of the intervenors' conclusions regarding these values were directed to issues unrelated to the purpose for the modeling.[25] Modeling inputs such as the hydraulic reserve flow, the design flow, the seasonal high water table, and the recharge rate would not likely occur at the site or might occur on a transient but not a continuous basis. These variables were intended to represent "worst-case" site conditions in the area of the leach field to predict its ability to effectively convey the discharge and meet the requisite water table mound heights and travel times. (Exs. APP-4-6, 13; test. R. Slayback, 5/21/07, p. 1015-1017, test. C. Fitting, 6/01/07, pp. 1751, 1752.)

38. Sensitivity analyses evaluating the impact of the ratio of the horizontal to vertical hydraulic capacity on the effectiveness of the leach field showed no significant impact. LBG, using accepted analytical methods, confirmed that the requisite water table mounding and travel time could be met with a hydraulic conductivity value as low as 150 feet per day.[26] The water table mound created by the discharge may cause flow to initially travel from the leach field to the north or northwest toward Young's Village. However, before reaching the border of the Village, the flow will join the normal pattern of ground water away from the leach field to the south, southeast and southwest. (Ex. APP-13; test. C. Maeder, 5/18/07, p. 732, test. R. Slayback, 5/21/07, pp. 1012, 1021, test. C. Fitting, 6/01/07, pp. 1720, 1757.)

---

[25] For example, the intervenors' expert criticized the model because the steady-state conditions and the precipitation recharge rate overestimated the natural underflow, which distorts the incremental effect of the discharge on the freshwater load to the marsh. This issue is unrelated to the effectiveness of the leach field to meet department standards. (Test. 5/18/07, C. Maeder, p. 947, R. Schreiber, p. 927)

[26] LBG notes that there is "no reason to suspect such low hydraulic conductivities occur in the vicinity of the proposed leaching field." (Ex. APP-13.)

6
Draft Permit/Operating Design Requirements

39. The draft permit requires the applicant to meet specific terms and conditions, monitor water use, monitor the operation of the sewage treatment and disposal system, analyze the quality of the effluent, and analyze the quality of the ground water downgradient from the leach field. The proposed permit term is ten years, after which an application for renewal must be submitted and the system reexamined. (Test. W. Herzig, 5/24/07, p. 1636.)

40. The draft permit requires the applicant to employ a wastewater treatment facility operator who is certified by the DEP as a Class III operator. The permit sets out a compliance schedule that requires written verification that the system is operating in accordance with DEP-approved plans and specifications and is achieving compliance with all permit terms and conditions. This verification must be submitted with the concurrence of General Electric, the facility operator and the design engineer. (Ex. DEP-8A; test. W. Herzig, 5/21/07, pp. 1107, 1108.)

41. The applicant must submit the results of a detailed permit compliance audit to the Commissioner every two years. This audit must be conducted by a qualified professional engineer licensed in Connecticut and must evaluate compliance with all permit terms and conditions for the preceding two-year period and include detailed descriptions of all remedial actions taken or proposed to address any violation or deficiency discovered. (Ex. DEP-8A; test. W. Herzig, 5/21/07, p. 1107.)

42. The permitted discharge limits include average monthly limits of biochemical oxygen demand (BOD) and total suspended solids (TSS) at 20 mg/l. Total nitrogen is limited to an average of 1.75 pounds/day, based on a twelve-month rolling average, with a maximum concentration of 10 milligrams per liter (mg/l). The sampling point for determining compliance with these limits is the final effluent pump station prior to discharge to the leaching field. Raw influent that flows into the Zenon system must also be monitored for BOD, TSS, total nitrogen, pH, temperature, alkalinity and turbidity. (Ex. DEP-8A; test. W. Herzig, 5/24/07, pp. 1631, 1638-1640.)

43. The draft permit requires the applicant to assure that ground water affected by the discharge conforms to the Connecticut Water Quality Standards. Ground water will be monitored quarterly at sites identified on DEP approved as-built plans. Ground water will be monitored for depth, various nitrogen compounds, pH, total phosphorus and fecal coliform. Monitoring wells will be installed in each segment of the leach field to verify water table mounding and that the load is proper. (Ex. DEP-8A; test. J. Whitcomb, 5/9/07, pp. 214-217, 229, 230, test. S. Haydock, 5/17/07, pp. 525, 526.)

44. The draft permit requires monthly inspections of the pumps, blowers, Zenon components, distribution chambers and chemical feed systems. The trash trap and pump chambers must be pumped annually; the depth of sludge accumulated in the tank must be measured during pumping. The applicant is also required to conduct quarterly inspections of the trash trap baffles and surface condition of the leach field, including the depth of ponding in the leach field and quarterly tests of the emergency generator. Water meter readings of water usage must be taken weekly. A waste hauler will remove sludge waste generated by the system. (Ex. DEP-8A, ex. APP-1.)

45. The applicant must record the results of chemical analyses on Discharge Monitoring Reports and report the results to the department. Reports must include detailed explanations of any violations of the permit limits and any corrective actions taken and a schedule for completing any outstanding corrective actions. The applicant must also maintain a record of the total flow for each day of discharge. (Ex. DEP-8A.)

46. Best management practices (BMPs)[27] are also required to control the plume that will result from this proposed, non-point source discharge[28]. These BMPs include: a specific

[27] Activities that reduce pollution and are determined by the Commissioner to be acceptable based on, but not limited to, technical, economic and institutional feasibility. Section 4 of the Water Quality Standards provides, among other things, for the use of appropriate BMPs to control non-point source discharges to high quality surface waters. In this case, where the lower Hammonasset River is considered impaired, this requirement must be satisfied as part of the program to improve the integrity of the waterbody. (Test. W. Herzig, 5/31/07, pp. 1629, 1630.)

[28] Any unconfined and diffuse source of pollution, such as storm water or snow-melt runoff, atmospheric deposition or ground water not conveyed to a surface water discharge point within a discrete conveyance. (Test. W. Herzig, 5/31/07, p. 1629.)

permit condition prohibiting the discharge of oils, greases, industrial or commercial wastes, toxic chemicals or wastes from water treatment systems or other substances that can adversely affect the operation of the treatment system and pollute ground water; using the Zenon system to reduce BOD, TSS and nitrogen; pressure dosing to the leach field such that the bottom area of the leach field will receive a relatively low application of treated sewage; and locating the leach field as far from the wetland boundaries as feasible to allow for additional polishing and renovation of the treatment plant effluent. (Test. W. Herzig, 5/24/07, pp. 1630, 1631.)

47. The applicant will comply with the terms and conditions of the draft permit. The applicant will develop a spill prevention and control plan as required for other permits for this project. An integrated pest management plan is proposed to maintain public greenspaces with organic fertilizers applied by licensed professionals to guard against over fertilization and minimize additional impacts due to runoff. (Exs. APP-2, 4; test. J. Whitcomb, 5/9/07, pp, 167, 213, 314, 221-237, test. S. Haydock, 5/17/07, pp. 524, 525-527.)

48. The applicant's proposed storm water management system is decentralized to promote infiltration in small areas across the site to mitigate the increase in runoff resulting from the development. Roof drainage is collected and discharged to the ground near the individual buildings. Driveways will be constructed of porous pavers to allow infiltration and subsurface infiltration galleries will be located away from the tidal wetlands. Grassy swales will collect overflow, leak stone berms will disperse flow, and the 100-foot vegetated buffer will provide for storm water infiltration before it gets to the tidal boundary. (Test. J. Whitcomb, 5/9/07, p. 167, test. S. Haydock, 5/17/07, pp. 522, 523, test. M. Welch, 5/22/07, pp 1479-1481.)

7
The Advanced Treatment System

a
Overview of Proposed System

49. The proposed system consists of a sanitary collection system, trash traps, flow equalization tanks, Zenon components, discharge tanks and the leach field. The entire system would be enclosed with all components underground. The system would be closed and tanks covered and sealed for odor and air control. Air pumped into the Zenon components would be piped to an aboveground control building and filtered through activated carbon before discharge. A back up generator would support the system. The applicant has not proposed and the system would not include a bypass component. (Test. 5/9/07, D. Boucher, pp. 80, 81, J. Whitcomb, pp. 140, 152, 156, 157.)

50. The sanitary collection system includes sewer lines connected from each home and the community building to a collection piping system. Wastewater would be collected through the system and travel by gravity feed to a wet well at a pump station located in the center of the site, the low point of the collection system. The pump station is designed to include an auxiliary storage tank so that collection system can hold one day's flow without having to discharge in the event power is lost to the pump station. Wastewater would be pumped from the pump station to the settling tank/trash traps that are supplied with grinder pumps. The trash trap is intended to remove trash and non-biodegradable solids, such as hair, lint, grit, and plastics that may damage the Zenon components. After pretreatment in the settling tank, the influent would travel to the flow equalization tanks (FET). (Exs. APP-2, 28; test.J. Whitcomb, 5/9/07, pp. 133-135, 174.)

51. Prior to reaching the FET, the flow would be chemically treated to ensure proper alkaline and pH levels. The FET is designed to hold the anticipated design flow for a period of eight to twenty-four hours. The purpose for the FET is to equalize the high variability of influent to ensure the consistent homogeneous wastewater characteristics necessary for optimum pretreatment. After the volume of wastewater reaches a certain level in the FET, water would be pumped at a continuous slow rate to the Zenon components. (Ex. APP-28; test. J. Whitcomb, 5/9/07, pp. 141, 170, 171, 178, 179.)

52. The flow would travel from the FET through the Zenon components where the wastewater would be treated to reduce nitrogen, bacteria, viruses and phosphorus. Wastewater would travel from the Zenon system to the clearwell storage tank prior to discharge to the leach fields. The leach field, required to renovate any remaining bacteria, viruses and phosphates, would be constructed in four segments with each segment designed to treat one-fourth of the effluent. Following treatment, the effluent would pass through the leach field and travel with the ground water off the site. (Test. J. Whitcomb, 5/9/07, pp. 197-214.)

b
The Zenon System

53. The proposed Zenon system is a pre-engineered modular treatment system that consists of a dual-train bioreactor divided into four components or zones. The components include pre-anoxic tanks, aerobic tanks, post anoxic tanks, and ultra filtration membranes. Other system components include chemical feed systems, pumps and a control panel. The dual-train system allows for maintenance without disruption to wastewater treatment. (Ex. APP-28; test. 5/9/07, M. Sherman, p. 51, D. Boucher, pp. 76-86, J. Whitcomb, pp. 140-151.)

54. The Zenon system includes a membrane bioreactor (MBR), which is an activated sludge process that filters solids from the wastewater. Membrane bioreactors were first developed for small commercial and industrial applications in the early 1970s. The Zenon MBR technology that is proposed for this system has been used in a variety of applications for fourteen years. MBR systems have increased in size with capacity from small systems of 10,000 - 20,000 gpd to large systems of 40,000,000 gpd. (Test. M. Sherman, 5/9/07, pp. 41-46.)

55. Effluent is pumped from the FET at predetermined volumes and intervals to the pre-anoxic tanks, where denitrification occurs by oxygen deprivation, causing nitrogen to convert to nitrogen gas. The effluent is then pumped to the aeration tank where sodium hydroxide is added to maintain optimum pH levels. The aerobic process converts other

forms of nitrogen, particularly ammonia, into different nitrogen compounds that bond with oxygen. The effluent then passes to the post-anoxic zone where additional oxygen deprivation causes more nitrogen to convert to nitrogen gas. The post-anoxic tanks are equipped with chemical dosing pumps to add carbon to the effluent to promote additional denitrification. (Ex. APP-28; test. J. Whitcomb, 5/9/07, pp. 140-151.)

56. The effluent then flows from the post-anoxic zone to the membrane bioreactors where bacteria, suspended solids, and viruses are filtered from the wastewater by low-pressure vacuum pumps that pull the effluent over hollow fibers with microscopic ports (0.04 microns). The effluent is cycled and recycled through the Zenon system ten times. At the point of discharge from the Zenon system, treated wastewater is capable of meeting the draft permit requirements for nitrogen, BOD and TSS. (Test. J. Whitcomb, 5/9/07, pp. 140-145, 153, 154, 208.)

c
The Leach Field

57. The proposed leach field would be located under a common green as far from the marsh upland interface as possible at elevation 10.85 feet above sea level. The natural materials present at that location make up the base of the leach field and would be covered by six inches of clean broken stone. Plastic galleries, half-round pieces of interlocking plastic, would be installed to support the low-pressure distribution pipe system, which consists of a series of interconnected pipes with small holes. The low-pressure distribution piping would be secured to the top of the galleries and covered by eighteen inches of soil and topsoil. The depth of the constructed portion of the leach field must be three feet at a minimum and is planned to be approximately four to four and one-half feet. (Test. J. Whitcomb, 5/9/07, pp. 136, 137, 202-204, 5/11/07, p. 290.)

58. The leach field would be constructed in four distinct segments. Once a sufficient volume of treated effluent has accumulated in the clearwell storage tank it would be conveyed by force main to the low-pressure distribution system. The force main would run along the perimeter of the leach field and feed each segment from two sides to equalize the discharge to that segment. A valve system would convey equal volumes of

treated effluent to each of the four segments. (Test. J. Whitcomb, 5/9/07, pp. 136, 137, 198, 204, 205.)

59. The applicant is required to construct a leaching system that has the capacity to handle the 78,750 gpd hydraulic reserve, and to establish the proposed dosing rate to the leach field to meet DEP requirements. The leach field must be designed to be of sufficient hydraulic size to transmit treated effluent based on a maximum dosing rate of 1.2 gallons per square foot per day of leach field bottom area. The proposed size of the leach field, 44,132 square feet, provides for a distribution rate of 1.19 gallons per square foot per day. (Test. J. Whitcomb, 5/9/07, p. 137, test. W. Herzig, 5/24/07, p. 1632.)

60. The leach field must be adequately designed to satisfy the DEP requirements for pollutant renovation for bacteria, viruses and phosphorus by providing a sufficient separation distance of at least two feet between the bottom of the leach field and the water table mound created by the discharge. The leach field depth of 10.85 feet will provide a minimum separation distance of slightly more than two feet for the 78,750 hydraulic reserve flow and three feet for the design flow. (Test. W. Herzig, 5/24/07, p. 1633.)

d
System Operation and Maintenance

61. The Class III operator would ensure compliance with the inspection and monitoring requirements set forth in the draft permit. In addition, the Class III operator would ensure quality control through visual inspections, tests for effluent nitrogen, phosphorus and pH levels, and evaluation of recycle and effluent flow rates. The operator must make adjustments to chemical feed, recycle rates and dissolved oxygen levels where necessary and must check the system components. (Ex. DEP-8A; test. 5/9/07, D. Boucher, pp. 73-76, J. Whitcomb, pp. 228-232.)

62. The Zenon system is designed to function without the need for an operator on-site twenty-four hours per day. Necessary inspections and reporting require the operator to be present approximately two to three hours per day. The system operates using a

programmable logic controller (PLC). The PLC activates alarms connected to system components to notify the system operator if a situation warrants operator attention and simultaneously activates a stand-by pump or other duplicate component if necessary. The PLC allows for remote program monitoring and modifications. (Ex. APP-28; test. D. Boucher, 5/9/07, pp. 76-78.)

63. The department revised the permit requirements for Zenon systems following a review of previously permitted Zenon systems in Connecticut.[29] Applicants are now required to engage a licensed operator to review the proposed design to insure that the plant is operator friendly. The system design engineer must provide as-built drawings and, with the technology provider, certify that the plant was constructed in compliance with the approved design plans. The system Operation and Maintenance Manual must be approved by the Commissioner and verified by the licensed operator to be adequate. Biennial compliance audits are also required. (Ex. DEP-8A; test. J. Whitcomb, 5/9/07, p. 233, test. W. Herzig, 5/21/07, pp. 1106, 1107.)

64. The proposed system design also incorporates certain features that are not utilized on the previously permitted systems, including additional nitrification-denitrification components, which allow for treatment of higher hydraulic loads. The proposed system also provides expanded control over flow rates, return rates, and discharge rates through improved programmable logic controls, which allow for better maintenance of the optimum treatment environment. (Test. J. Whitcomb, 5/9/07, pp. 149, 150, 154, 165, 166.)

8
Water Quality

65. Permits to discharge to Class GA ground waters are authorized provided the discharge: is treated domestic sewage or from a septage treatment system or other wastes

[29] Staff evaluated twelve previously permitted Zenon systems operating at Connecticut facilities. Six systems were found to be out of compliance with permitted discharge limits. Corrective actions to bring the systems into compliance included improved operation and maintenance procedures, design improvements, and treatment and removal of a toxic substance from the waste stream. Ground water from all reporting facilities was found to be in compliance with permit limits prior to discharge to a point of

of natural origin; is easily biodegradable; and poses no threat of pollution to the ground water. The DEP therefore required the applicant to demonstrate that the ground water impacted by the treated wastewater is protected and maintained at allowable levels established by the Connecticut Water Quality Standards. (Ex. DEP-8A; test. W. Herzig, 5/24/07, pp. 1627, 1628.)

66. The proposed system is designed to treat the wastewater generated at the site to at least drinking water standards at the point of environmental concern for the pollutants that are likely to be present. The most conservative point of environmental concern is the unnamed ditch tributary to Bradley Creek and the salt marsh. The four major contaminants that are regulated for this type of discharge are: bacteria, viruses, phosphorus and nitrogen. (Ex. DEP-8A; test. W. Herzig, 5/24/07, pp. 1633, 1634.)

67. The Zenon system treats the effluent for bacteria and viruses. The department requires the applicant to demonstrate that at least two feet of unsaturated soils separate the bottom of the leach field and the mounded water table created by the discharge. This unsaturated area provides for renovation, in part, for any bacteria and viruses remaining in the effluent. To further renovate bacteria, the department requires a minimum twenty-one day time of travel in the ground water before the flow reaches a point of environmental concern. (Ex. DEP-8A; test. W. Herzig, 5/24/07, pp. 1633, 1634.

68. The applicant's modeling results indicate that if the bottom of the leach field is set at elevation 10.85 feet, a minimum separation distance of 2.07 feet can be achieved for the hydraulic reserve discharge (78,750 gpd) and three feet for the design flow (52,500 gpd). The modeling also shows that the requisite travel time was attained in less than 100 feet; the most conservative analysis showing that the flow will travel fifty-one days before reaching the nearest point of environmental concern. Ground water does not typically flow in the direction of Young's Village. However, even if the discharge were to flow in a westerly direction toward the Village as the intervenors' expert claims, the twenty-one day requirement is easily met before the discharge reaches the property boundary. (Exs.

---

environmental concern. (Ex. DEP-8D; test. D. Boucher, 5/9/07, pp. 95, 96, test. 5/21/07, W. Herzig, pp. 1106, 1123, R. Lorentson, pp. 1140, 1143-1145.)

APP-7, 11-16, 31, 34; test. J. Whitcomb, 5/9/07, pp. 210, 211, test. S. Haydock, 5/17/07, p. 498-500, 518, test. C. Maeder, 5/18/07, pp. 727, 728, 748, 749 test. R. Slayback, 5/21/07, p. 1011, test. W. Herzig, 5/24/07, pp. 1633, 1634, test. 6/1/07, S. Haydock, pp. 1796-1798, C. Fitting, pp. 1715, 1716, 1730, 1731.)

69. Nitrogen must be treated to meet the permit discharge criterion of an average of 1.75 pounds per day, a concentration of ten mg/l per day at a flow of 20,000 gpd. At the design flow of 52,500 gpd, the nitrogen concentration would have to be less, approximately four mg/l per day. The proposed Zenon system is designed to meet these limits. Infiltration of precipitation into the pervious soils of the uplands provides some dilution of the remaining nitrogen. Wetland soils, high in organic content, contain denitrifying bacteria that promote further renovation of nitrogen as it passes through the natural soils between the leach field and the marsh. The applicant has also demonstrated that the soils have the minimum capacity to adequately renovate at least six months of phosphorus production within five feet of the leach field. (Ex. APP-25; test. J. Whitcomb, 5/11/07, pp. 343, 344, 346, test. L. Dunbar, 5/22/07, p. 1174, test. W. Herzig, 5/24/07, pp. 1634, 1639, 1640.)

70. The Town of Madison Water Pollution Control Authority will work with the applicant to ensure the effective management of the system. The DEP will not approve the applicant's system plans and specifications unless the MWPCA and the applicant enter into an agreement. After the final permit is issued, the applicant is required to submit discharge-monitoring reports to the DEP, the MWPCA and the local health department. (Ex. DEP-8A, exs. APP-32, 47, 48, 54; test. W. Herzig, 5/31/07, pp. 1636, 1640-1643.)

9

DEP Permit Review: Compliance with Coastal Management Act

71. The proposed project and permit must be consistent with the goals and policies of the Connecticut Coastal Management Act (Act) because the site is located within a coastal boundary. The most significant coastal management issues raised by the proposed project include the freshwater impacts to the on-site and adjacent tidal wetlands and

nitrogen loading to the Hammonasset River and Clinton Harbor. (Ex. DEP-8A; test. M. Welch, 5/22/07, p. 1473.)

a
Freshwater Impacts

72. Increasing freshwater discharges from upland runoff and the treated wastewater to the root zone of the tidal wetlands plants can flush salt out of wetland peat, which allows for the spread of phragmites. Currently, the band of phragmites on the perimeter of the site and in the mosquito trenches does not appear to be expanding, indicating that the balance of freshwater and saltwater is in equilibrium in the area. Depending on the amount of freshwater introduced to the root zone from the discharge, the site-specific hydrogeology and the extent of phragmites in the area, the adverse impact to the tidal wetlands could range from minimal to substantial. However, the extent of the possible spread of phragmites is limited by areas of high levels of salinity. (Test. S. Warren, 5/17/07, pp. 551, 552, 560, 561, 581, test. 5/22/07, B. Howes, p. 1281, M. Welch, pp. 1473-1475.)

73. The incremental increase in freshwater resulting from the project is based on the natural flow presently occurring on the site. The applicant and the intervenors' experts have provided estimates of the ambient flow of freshwater from the site that range from 50,000 gpd to 500,000 gpd.[30] The experts' corresponding incremental increases from the design flow (52, 500 gpd) to the ambient freshwater flow range from ten to one hundred percent. (Ex. APP-25; test. S. Warren, 5/17/07, p. 571, test. R. Schreiber, 5/18/07, p. 928, 929, test. B. Howes, 5/22/07, pp. 1276, 1277, test. R. Slayback, 5/21/07, p.1019.)

74. There are no numeric criteria provided in the Act for freshwater discharges to tidal wetlands. To avoid or minimize impacts from such freshwater discharges, the DEP routinely recommends BMPs for water management adjacent to tidal wetlands such as the use of diffuse, subsurface discharges. Given the geology of the site, a portion of the

[30] The applicant has estimated an ambient flow range of 300,000 to 500,000 gpd. Intervenors' expert Schreiber claims that with a precipitation recharge rate of nine or ten inches per year, ambient flow could be as low as 50,000 gpd. Intervenors' expert Howes determined a range of 110,000 to 150,000 gpd. LBG estimated a rate of no lower than 175,000 gpd but considered 300,000 an appropriate rate given the twice-

freshwater discharge is expected to enter the root zone. Any portion of the discharge that does enter the root zone will be dispersed over the marsh-upland edge or will breakout within the tidal wetland. A notable portion of the discharge will flow under the mucky peat, resulting in a diffuse, non-point discharge throughout the estuary consistent with DEP-endorsed BMPs. (Ex. DEP-8C; test. M. Welch, 5/22/07, p. 1475.)

75. The purpose of the required 100-foot buffer between the upland development and the tidal wetlands is to protect the wetlands from adverse impact, to provide for storm water infiltration before it reaches the wetlands, and to provide an area for public access. The buffer area will be planted with grassy, herbaceous plant material to absorb storm water runoff and provide nutrient uptake. Storm water will be managed through a decentralized system that promotes infiltration in small areas across the site. There are no point discharges for storm water. (Ex. APP-1, test. S. Haydock, 5/17/07, pp. 522-524, test. M. Welch, 5/22/07, pp. 1478-1481.)

76. The coastal management policy most relevant to the freshwater discharge is the prevention of despoliation and destruction of tidal wetlands to maintain vital natural functions, encourage rehabilitation and restoration of degraded tidal wetlands, and encourage the creation of wetlands where feasible. General Statutes §22a-92(B)(2)(E). Given the storm water management plan, and including the buffer zone and the diffuse discharge, any change in freshwater/saltwater balance resulting from the discharge cannot reasonably be characterized as despoliation or destruction of tidal wetland resources. (Test. M. Welch, 5/22/07, pp. 1474-1476.)

b
Nitrogen Loading to the Surface Water

77. The Hammonasset River, Clinton Harbor, and Long Island Sound are identified on the state list of impaired water bodies. Excess nitrogen is one of the potential sources that may contribute to impairment. To assess the impact of the additional nitrogen load on the salt marsh and the Clinton Harbor estuary, estimates of the existing nitrogen load

---

daily tidal flushing of the marsh. (Ex. APP-25; test. S. Warren, 5/17/07, p. 571, test. R. Schreiber, 5/18/07, p. 928, 929, test. B. Howes, 5/22/07, pp. 1276, 1277, test. R. Slayback, 5/21/07, p.1019.)

flowing from the river to the estuary were determined to be between .5 mg/l and 1 mg/l. There are no definitive studies of the existing nitrogen load in the estuary. Staff estimated the existing load to be between 150 and 350 pounds per day. (Ex. APP-50; test. S. Warren, 5/17/07, p. 615, test. 5/22/07, L. Dunbar, pp. 1172, 1173, 1211, 1212, B. Howes, pp. 1369, 1370.)

78. Staff reduced the maximum average permitted nitrogen load of 1.75 pounds per day (290.34 kg/yr) by one-half in consideration of the attenuation that is expected to occur as the discharge passes through the wetland soils. Staff determined that the proportional increase in the nitrogen load over the conservatively estimated existing load of 150 pounds per day would be approximately one-half of one percent.[31] Intervenors' expert Howes dismissed the possibility of nitrogen attenuation before the discharge reaches the creek bottoms and concluded that the proportional increase in nitrogen would be one percent from the discharge, which would increase to at least two percent when rainfall and runoff are included.[32] (Ex. APP-50; test. 5/22/07, L. Dunbar, pp. 1173 - 1175, B. Howes, pp. 1309-1312, 1337.)

79. There is a reasonable expectation that the water quality standards can be met, even with the additional nitrogen load from the proposed discharge. Other activities in the watershed will have an impact on the incremental increase in nitrogen to the extent that the total nitrogen load will be reduced. For example, remedial activities prompted by

[31] Staff determined that the increase in nitrogen load was "so small as to be considered insignificant" with regard to that consistency determination. (Test. L. Dunbar, 5/22/07, pp. 1173-1175.)

[32] The intervenors considered the proposed increase in impervious areas post-development as a basis for including the increase in runoff in the total nitrogen discharge to the surface water. Testimony from the intervenors' witness, Professor Brian Howes, was inconsistent. For example, in his initial report to the intervenors, Professor Howes based his estimate of the incremental increase in nitrogen load to the estuary on the permitted design flow (52, 500 gpd) and a load rate of 10 mg/l and concluded that the load from the discharge alone would be 728 kg/year. Adding the increased nitrogen from runoff resulting from the development, which could be over 1000 kg/year, Howes established a combined increase in load of between two and more than twenty percent due to seasonal variations. During his testimony, Professor Howes stated he based his increased load estimates on the average daily permitted flow rate of 35,000 gpd with a load rate of 10 mg/l. After learning that the maximum average nitrogen load that would be permitted would be 1.75 pounds per day, Professor Howes concluded that the full 1.75 pounds of unattentuated nitrogen would reach the surface water representing a one percent incremental increase in load to the estaury. Combined with other sources of nitrogen load, he concluded that the incremental increase would be two percent. Professor Howes determined that the current total nitrogen load in the River is 1 mg/l, which he revised after learning that staff had established a load of .5 mg/l. (Ex. INT-68; test. B. Howes, pp.1284-1287, 1301, 1342, 1401, 1402.)

orders issued by the department to the town of Clinton and a nearby commercial property would result in a decrease in nitrogen load of approximately fifteen pounds per day or a seventeen to one offset rate. These reductions are expected to occur over the next few years.[33] (Test. L. Dunbar, 5/22/07, pp. 1176, 1177, 1218, 1219.)

80. An integral component of the Connecticut Water Quality Standards is the Connecticut Anti-degradation Implementation Policy. The Policy is intended to establish procedures to implement the Surface Water Quality Standards and applies to the proposed discharge. A major factor in determining whether a discharge is consistent with the Policy is a determination of the relative magnitude of any increase in nitrogen to the surface water body. The relative magnitude of the increase due to the proposed discharge is one-half to one percent with an anticipated reduction in the existing nitrogen load of ten percent. (Ex. DEP-11; test. L. Dunbar, 5/22/07, p. 1177.)

81. The nitrogen discharge is not expected to impact marsh vegetation significantly. Point source discharges with high concentrations of nitrogen, such as those from a sewage treatment plant discharging millions of gallons per day, have contributed to dense populations of macro algae ulva lactuca or sea lettuce.[34] Ulva is not expected to be an outgrowth of this discharge. (Test. S. Warren, 5/17/07, p. 558, test. 5/22/07, L. Dunbar, pp. 1182, 1185, 1186, 1201-1204, B. Howes, pp. 1309, 1360, 1361.)

10
Unreasonable Pollution Allegation: Potential Environmental Impacts

82. In their allegations that the proposed discharge is reasonably likely to cause unreasonable harm to the natural resources of the state, the intervenors claims[35] include:

[33] Comprehensive implementation of stormwater BMPs by watershed municipalities pursuant to a general permit are also expected to decrease current nitrogen loads over time. (Ex. INT-6; test. L. Dunbar, 5/22/07, pp. 1176, 1177.)

[34] Sea lettuce is a one-cell-layer thick plant anchored to the bottom and suspends into the water column in very large sheets. The plant can strip nutrients and oxygen from the water column and create conditions that are inhospitable to other species. (Test. L. Dunbar, 5/22/07, pp. 1185, 1186.)

[35] The intervenors and members of the public have also raised concerns about the potential for adverse impacts from the disposal of prescription medications through the waste stream. Prescription drugs and personal care products (PPCP) contain pollutants that represent emerging issues for the environment as little is known about the transport or effects of such pollutants in the ground water. The department does not specifically regulate the discharge of PPCP but has published guidance that encourages disposal of such

the discharge will contribute excessive levels of nitrogen to an impaired water body; the salt marsh habitat will be altered by the introduction of the freshwater discharge into the marsh system; and the discharge is likely to unreasonably impair the habitat of state listed species of special concern, in violation of the Endangered Species Act. General Statutes §§26-303 through 26-316.

a
Nitrogen Loading to Estuary

83. The intervenors claim adding nitrogen to the impaired surface waters in the area of the site constitutes unreasonable pollution. Clinton Harbor is hydraulically connected to Long Island Sound. A total maximum daily load for nitrogen (TMDL)[36] has been established for Long Island Sound pursuant to the federal Clean Water Act. The TMDL establishes the maximum nitrogen load to be discharged to western Long Island Sound from point and non-point sources. As the area is listed as impaired, significant reductions in nitrogen loading are mandated by the specific TMDL. A TMDL has not yet been established for Clinton Harbor, however, the Hammonasset River and its tributaries were considered as part of the waters that are contributing to Long Island Sound. (Test. L. Dunbar, 5/22/07, pp. 1178, 1179, 1188.)

84. The TMDL for Long Island Sound sets a nitrogen waste load allocation from point sources of twenty pounds per day and allows for trading among dischargers to accommodate local growth. The same concept is incorporated into the TMDL for non-point sources. Point and non-point sources discharging less than twenty pounds per day are considered too small for an accurate individual allocation; loads were aggregated in the TMDL to accommodate local increases that may result from new sources. The target for achieving consistency with the TMDL is the year 2014. Presently, reductions in nitrogen load to the area are occurring at a rate faster than expected. (Test. L. Dunbar, 5/22/07, pp. 1179, 1180, 1190.)

---

items through solid waste systems rather than through subsurface or municipal sewage disposal systems. (Exs. APP-10, 90; test. W. Herzig, 5/24/07, pp. 1663-1670.)

[36] An assessment of the maximum amount of any pollutant that can be assimilated by a water body and still maintain compliance with the Water Quality Standards. A TMDL consists of a waste load allocation for point source discharges, a load allocation for non-point sources and a margin of safety to account for any uncertainties. A TMDL is often expressed as an equation, the waste load allocation plus the load allocation plus the margin of safety. (Test. L. Dunbar, 5/22/07, pp. 1183-1184, 1188-1189.)

85. The TMDL was never considered to represent a moratorium on any new nitrogen source provided the goal can be achieved through BMPs and measures to reduce nitrogen from current sources. Given the enforcement activities that are expected to reduce nitrogen in the area by approximately fifteen pounds per day over the next several years, the proposed attenuated nitrogen load of eight-tenths of a pound per day from the proposed discharge would not be considered an impediment to achieving consistency with the TMDL. (Test. L. Dunbar, 5/22/07, pp. 1180, 1181, 1196, 1218, 1219.)

86. The intervenors also claim that significant increases in nitrogen load to the estuary are a coastal management concern due to its potential to adversely impact the reestablishment of aquatic vegetation, specifically eelgrass. It is not clear to what extent nitrogen adversely impacts eelgrass compared to other nutrients. Historically, eelgrass had been present in the estuary perhaps as recent as the late 1990s, but was diminishing. Currently, there are no significant colonies of eelgrass in the estuary or the Hammonasset River. (Test. S. Warren, 5/17/07, pp. 567, 568, test. 5/22/07, L. Dunbar, pp. 1181, 1213, 1216, B. Howes, pp. 1318, 1322, 1326, M. Welch, pp. 1476, 1477.)

87. Staff determined that the increase in nitrogen load resulting from the proposed discharge would be more than offset and inconsequential to the reestablishment of eelgrass beds in the Hammonasset River or in Clinton Harbor. Intervenors' expert claims that if the total nitrogen load were close to the threshold necessary to support eelgrass, any incremental increase in nitrogen would further diminish eelgrass habitat in the area ("threshold theory"). Staff does not consider the impacts of a discharge on vegetation not present in the area in a determination that a project is consistent with coastal management policies. Therefore, if eelgrass is currently not present, there is no requirement to consider the impact to it from the discharge. (Ex. INT-6; test. 5/22/07, L. Dunbar, p. 1183, B. Howes, pp. 1318, 1322, 1326, 1405, M. Welch, pp. 1482, 1483, 1488.)

b
Freshwater Impacts/Phragmites Expansion

88. The intervenors claim that any increase in freshwater to the marsh can alter and reduce the salt marsh and result in the expansion of the phragmites on the site at the expense of other saltwater tidal vegetation. Various estimates of the incremental increase in freshwater flow from runoff and the proposed discharge have been posited. No one can predict by exactly how much the phragmites will expand as a result of the additional freshwater. By a "best guess", the intervenors' expert proposes the phragmites will increase proportionately to the increase in freshwater to establish a new equilibrium. (Ex. APP-18, ex. INT-69; test. S. Warren, 5/17/07, p. 556, test. 5/22/07, B. Howes, p. 1282, M. Welch, p. 1474, 1475.)

89. The relationship of the volume of additional freshwater along the upland-marsh border to the expansion of phragmites is unknown. It is possible that, without phragmities control, there will be some incremental increase in phragmities. However, the applicant is required and intends to develop and implement a phragmites control program. The local zoning permit contains a condition that the applicant must develop such a program that "goes beyond the upland edge and sets forth an ongoing plan to control phragmites in the tidal wetland and along the tidal creek edges." (Exs. APP-4, 18, 60; test. S. Warren, 5/22/07, pp. 1466, 1467.)

90. A phragmites control program would require the application of herbicides in late summer and early fall, followed by mowing the standing dead stalks in the winter. Phragmites cannot be eradicated and management of the vegetation requires an on-going effort. A phragmites management program would support black grass and may allow for the re-establishment of lower salinity, brackish upper border vegetation. This would be an ecological enhancement of the marsh system as such vegetation is relatively uncommon in the Clinton Harbor system. The Coastal Management Act does not differentiate between a freshwater or brackish tidal wetland and a saline tidal wetland; each are considered valuable tidal wetlands. (Ex. INT-68, test. S. Warren, 5/17/07, pp. 563-565, 5/22/07, pp. 1466-1470, test. M. Welch, 5/22/07, pp. 1486, 1487.)

c
Endangered Species

91. The intervenors also claim that any alteration of the high marsh will eliminate the habitat of the salt marsh sharp-tail sparrow and the seaside sparrow, species of special concern.[37] These birds are known to feed in salt marshes along Long Island Sound. The salt marsh sharp-tail sparrow is likely to nest in low grasses, such as spartina patens and juncus gerardi (black grass), in high marsh areas adjacent to the upland. The seaside sparrow is likely to nest in the lower marsh areas. The birds are known to exist in salt marshes of this size and characteristics. (Test. C. Elphick, 5/11/07, pp. 359-370, 392, 393, 419, 420.)

92. The habitat of the two sparrows is threatened when it is fragmented or reduced. Marshes or marsh areas that are dominated by phragmites do not support the birds in large numbers.[38] Given that phragmites are present in the area, any change in conditions that favor a significant expansion of the phragmites could impact the number of birds that are able to nest in the marsh. At this site, such a change in conditions would mean a flow of freshwater to the marsh-upland border of a sufficient volume to support the expansion of phragmites to the extent that the sparrow habitat would be adversely affected and no ongoing phragmites control program, which will provide black grass (juncus gerardii) habitat for the sparrow. (Test. C. Elphick, 5/11/07, pp. 400- 404, 423-425, test. S. Warren, 5/17/07, pp. 563, 564, 522/07, p. 1469.)

[37]Any native species documented to have a naturally restricted range or habitat in the state. General Statutes §26-304(9).

[38] A study to determine whether salt marsh restoration, specifically a phragmites control program, will effectively provide or preserve habitat for these species has recently been initiated. (Test. C. Elphick, 5/11/07, pp. 360, 361.)

B
CONCLUSIONS OF LAW

1
THE APPLICATION AND DRAFT PERMIT COMPLY WITH THE PROVISIONS OF GENERAL STATUTES §22a-430 AND ITS IMPLEMENTING REGULATIONS

The applicant is required to obtain a permit for the discharge of domestic wastewater into the waters of the state. The Commissioner, in consideration of the applicant's permit application, must determine whether the discharge would cause pollution of the waters of the state or whether the applicant's proposed system to treat the discharge will protect the waters of the state from pollution. If the Commissioner determines that the proposed treatment system will protect the waters of the state, the applicant will then be required to submit plans and specifications for the proposed treatment system for the Commissioner's approval. After installation of the proposed system, in full compliance with the approved plans and specifications, the Commissioner will issue the permit for the proposed discharge. General Statutes §22a-430(a) and (b).

a
REGS., CONN. STATE AGENCIES §22A-430-3

Section 22a-430-3 provides certain general conditions for water discharge permits. Section 22a-430-3(b) provides that a permit must incorporate all applicable regulatory provisions, either expressly or by reference, including that section and §22a-430-4. §22a-430-3(b)(1)(C). The attached draft permit reflects compliance with this requirement. Section 22a-430-3(e) provides that once the permit is issued, the applicant is under a duty to comply with its terms and conditions. The applicant has indicated its intent and ability to comply with all terms of the draft permit.

Section §22a-430-3(f) provides that the applicant must properly operate and maintain the facility and treatment system. Proper operation includes compliance with permit limits, adequate funding, adequate operator staffing and adequate controls including quality assurance procedures. The draft permit requires the employment of a

Class III certified operator, who would be responsible for ensuring that the wastewater treatment system operates within the limits of the permit. The applicant would also be required to comply with the schedule that, at a minimum, sets forth the inspection and maintenance required by the permit. The draft permit provides that the Commissioner must approve the applicant's Operation and Maintenance Manual. In addition, the regulations authorize the DEP to enter the property to conduct its own inspection or to review records. §22a-430-3(c).

The draft permit also reflects compliance with §22a-430-3(j) in that the applicant will be required to conduct ongoing monitoring and testing, including ground water testing, and reporting according to a prescribed schedule to assure compliance with the permit limits. The applicant will maintain a record of the total flow for each day of discharge. The permit provides that any violation of the limits specified must be included in the discharge monitoring report along with any corrective action taken or scheduled.

In addition to the foregoing, the record shows that the applicant intends to install low-flow fixtures to minimize the amount of wastewater discharged as required by §22a-430-3(o). A spill prevention and control plan must be developed to establish procedures to prevent or minimize and control unplanned releases as provided in §22a-430-3(p). The system is designed to evaluate and maintain proper wastewater strength and flow rates to prevent noncompliance with permit limits as provided in §22a-430-3(r). Therefore, the record shows ample evidence that the applicant's proposed wastewater treatment system and the terms and conditions of the draft permit are consistent with the applicable provisions of §22a-430-3 of the implementing regulations.

b
REGS., CONN. STATE AGENCIES §22a-430-4

Section 22a-430-4 sets forth the procedures and criteria for issuing water discharge permits, including the required application information and preliminary review procedures. §§22a-430-4(a) through (d). Section 22a-430-4(e)(1) provides that in arriving at a determination on an application, the Commissioner must find that the requirements enumerated in that section are met. The evidence in the record supports a

conclusion that the proposed treatment system and the permit terms and conditions satisfy the following relevant provisions of §22a-430-4(e)(1):

> *The effluent limitations and conditions listed in subsection (l) of this section, including any case-by-case determinations made under subsection (m) of this section. §22a-430-4(e)(1)(A).*

The draft permit sets out the applicable limitations and/or conditions. The regulated pollutants for this discharge include bacteria, viruses, phosphorus and nitrogen. The proposed treatment system is designed to treat all regulated pollutants to acceptable levels. The draft permit requires continuous and periodic inspection, monitoring, maintenance and the sampling/recording of the effluent quality of the wastewater before it is discharged. The draft permit imposes various reporting requirements to ensure compliance with the effluent limitations stated in the permit. The permit also sets out conditions restricting the substances that may be discharged to the system.

> *The sludge disposal requirements listed in subsection (g) of section 22a-430-3 of the Regulations of Connecticut State Agencies. §22a-430-4(e)(1)(D).*

Subsection (g) requires that the applicant "dispose of screenings, sludges, chemicals and oils and any solid or liquid wastes resulting from the wastewater treatment processes at locations approved by the commissioner for disposal of such materials, or by means of a waste hauler licensed under the provisions of the Connecticut General Statutes." The applicant will have sludge wastes generated by the wastewater treatment system hauled by a licensed carrier.

> *The bypass provisions of subsection (k) of section 22a-430-3 of the Regulations of Connecticut State Agencies. §22a-430-4(e)(1)(E).*

Subsection (k) prohibits any bypass of the collection or treatment system unless the bypass is approved by the Commissioner for essential maintenance, or is unavoidable and there are no feasible alternatives to bypassing the system. The applicant has indicated that there will be no request for approval for a bypass of the collection or treatment system.

The resource conservation requirements of subsection (o) of section 22a-430-3 of the Regulations of Connecticut State Agencies. §22-430-4(e)(1)(F).

The resource conservation provisions require the applicant to maintain practices and facilities that would produce the minimum amount of wastewater to the maximum extent practicable and prohibit the addition of water to dilute effluent concentrations in the discharge. The applicant intends to use low-flow fixtures to minimize the discharge flow. No additional water will be added to the proposed system to dilute effluent concentrations in the discharge.

The spill prevention and control requirements of subsection (p) of section 22a-430-3 of the Regulations of Connecticut State Agencies. §22a-430-4(e)(1)(G).

Subsection (p) requires a spill plan to prevent, minimize and control leaks or other unplanned releases of all toxic and hazardous substances. The applicant will prepare a spill prevention and control plan.

The instrumentation and related requirements of subsection (q) of section 22a-430-3 of the Regulations of Connecticut State Agencies.

Subsection (q) requires instrumentation to record and/or control the functions of the system, the characteristics of the discharge, and the measurement and recording of the daily volume of water discharged. This provision does not apply to this application because the proposed system would discharge domestic and not process wastewater. However, the record reflects that the proposed system will be monitored, controlled, and inspected as required in the draft permit and will include alarm mechanisms, operation and maintenance requirements and associated instrumentation.

The equalization requirements of subsection (r) of section 22a-430-3 of the Regulations of Connecticut State Agencies. §22a-430-4(e)(1)(I).

Subsection (r) provides that treatment facilities must be designed to "prevent upsets, malfunctions or instances of noncompliance resulting from variations in wastewater strength or flow rate, and shall include…equalization facilities separate from

the treatment facilities." The proposed system includes a flow equalization tank (FET) to provide consistent flow through the Zenon components to ensure optimum treatment. The draft permit provides requirements for testing the wastewater at the point of the FET. The system is designed to meet the requirements of subsection (r); the likelihood of an upset, malfunction or instance of noncompliance due to variations in wastewater strength or flow rate is unlikely.

2
THE PROPOSED TREATMENT SYSTEM WOULD PROTECT THE WATERS OF THE STATE FROM POLLUTION

a
Ground Water Quality

In order to issue a permit for any discharge of water, substance or material into the waters of the state, the Commissioner must determine that a "proposed system to treat such discharge will protect the waters of the state from pollution." §22a-430(b). Given that the ground water classification for the property on which this proposed system would be built and operated is "GA impaired", the DEP required the applicant to demonstrate that the discharge would be consistent with the standards set forth in its Water Quality Standards for ground water classified as GA.[39] Therefore, the applicant is required to show that the wastewater will be treated to a level such that the discharge at any point of environmental concern is of drinking water quality.

The Zenon system is an established technology. The membrane bioreactor process has been used successfully since the early 1970s. The treatment system, prior to discharge to the leach field, will remove most bacteria and viruses. The Zenon components will treat nitrogen to meet the required standard at the point that the treated wastewater leaves the treatment system and before the discharge would reach the property line or point of environmental concern. The proposed wastewater treatment system will satisfactorily treat the relevant pollutants as required to comply with the applicable standards.

The permit requires monitoring and reporting to the DEP and provides for an inspection, operation and maintenance schedule, including a biennial audit to be conducted by a licensed professional engineer to evaluate compliance with permit terms and conditions. The effluent will be monitored at various points throughout the system and ground water will be monitored at DEP approved sites, including within the area of the leach field.

While routine operator attention, including monitoring and maintenance, will be provided in compliance with the draft permit, constant care is not required. Storage capacity is incorporated throughout the system to accommodate any interruption in the collection or treatment processes. In addition, the proposed system is alarmed at key points of operation and would include redundant components to insure continuous operation.

The maximum volume of wastewater discharge to be permitted would be 52,500 gallons per day, a peak flow that is not anticipated to occur on a daily basis or even frequently. The size and design of the leach field and the analysis of the site to accept the discharge was based on this maximum rate. The intervenors have attempted to call into question the capacity of the leach field and site soils to effectively renovate any remaining bacteria and viruses. However, the applicant's extensive site investigation and conservative modeling and analyses demonstrate that the requisite effluent travel time of at least twenty-one days will be achieved to eliminate any remaining bacteria and viruses from the discharge before reaching a point of environmental concern.

The required separation distance between the bottom of the leach field and the water table mound will be attained with the base of the leach field at elevation 10.85 feet. In addition, the record shows that the upland soils are capable of providing more than adequate capacity to remove a six-month production of phosphorus. The design of the proposed system is such that effluent traveling from the leach field will meet drinking

[39] The department presumes that ground water in an area classified as GA will, at a minimum, be suitable for drinking or other domestic uses without treatment. (Connecticut Water Quality Standards, Ground Water Quality Standards, April 12, 1996.)

water quality standards at the points of environmental concern for the pollutants of concern (bacteria, viruses, phosphorus and nitrogen).

b
Surface Water Quality

The applicant must incorporate appropriate BMPs for the control of the proposed discharge consistent with Connecticut Water Quality Standards. Surface Water Quality Standards, Section Four, December 17, 2002.[40] The specific BMPs required and incorporated to control the proposed discharge include: the draft permit prohibition on the discharge of chemicals or substances that would adversely affect the operation of the treatment system or pollute ground water; use of a denitrifying advanced treatment system; pressure dosed discharges to the leach field; and installation of the leach field as far from the tidal wetland boundary as practicable.

The department considered the potential impact of the nitrogen load from the discharge on surface water quality, specifically the impacts on the Hammonasset River and Long Island Sound. The department also considered the intervenors' claim that nitrogen from the discharge and from runoff would result in unreasonable impairment of the River. The department properly considered the potential impacts from nitrogen in the context of whether the proposed discharge would be consistent with the policies and objectives of state and federal water quality programs.

The permitted nitrogen load from the proposed discharge is limited to an average of 1.75 pounds per day. Some nitrogen renovation will occur before the discharge reaches the surface waters. Although there is no clear evidence of the amount of nitrogen that will be discharged from runoff, the stormwater system and the buffer zone will mitigate the impact of any increase in runoff that may result from the development. The resulting increase in nitrogen load to the surface waters will be relatively small compared to the current load conservatively estimated to be 150 pounds per day.

[40] Section 4 provides, among other things, that the Commissioner must require the use of BMPs for the control of point and non-point source discharges, dredging activity, and the discharge of dredged or fill materials, to high quality surface water. The BPMs for this project are required as part of the program to improve the water quality of the Hammonasset River.

The Hammonasset River and Clinton Harbor contribute to the nitrogen load to Long Island Sound, for which a TMDL has been established. The TMDL program is not intended to impose a complete ban on new discharges and, in fact, anticipates new discharges. Presently, reductions in nitrogen in the discharge area are occurring at a rate faster than expected. The rather small increase in nitrogen load from the discharge will be more than offset by legally required reductions from identified dischargers over the next several years.

The required BMPs are consistent with the Connecticut Water Quality Standards for surface waters. Also, the discharge is consistent with the state's Anti-degradation Implementation Policy as it will not result in a significant change in water quality. The discharge will not interfere with the attainment of surface water quality standards for the River and will not impede the objective of achieving consistency with the TMDL for Long Island Sound. Therefore, the discharge from the proposed treatment system will not adversely impact the surface waters of the state.

3

THE PROPOSED DISCHARGE IS CONSISTENT WITH THE GOALS AND POLICIES OF THE CONNECTICUT COASTAL MANAGEMENT ACT

Any regulated activity within the coastal area is subject to a determination of consistency with the Connecticut Coastal Management Act. General Statutes §22a-98. The site is located within the coastal area, therefore the proposed discharge must be consistent with the goals and policies of the Act. The applicant submitted for review and received approval of a coastal site plan by the Town of Madison Planning and Zoning Commission acting in consultation with the DEP. The department also reviewed the application to determine whether the discharge was consistent with the applicable policies and standards of the Act. The coastal management issues raised by the proposed discharge include the impacts of freshwater on the on-site and adjacent tidal wetlands and the potential impacts of additional nitrogen loading to the Hammonasset River and to Clinton Harbor on water quality and aquatic vegetation.

a
Freshwater Impacts

The coastal management policy most relevant to the freshwater impact of the proposed discharge is to "preserve tidal wetlands and to prevent the despoliation and destruction thereof in order to maintain their vital natural functions; to encourage the rehabilitation and restoration of degraded tidal wetlands and where feasible and environmentally acceptable to encourage the creation of wetlands …. §22a-92(b)(2)(E).[41] To demonstrate that the proposed discharge is consistent with this policy, the applicant must incorporate all reasonable measures to mitigate any adverse impacts on coastal resources. §22a-98.

The freshwater impacts to the on-site and adjacent tidal wetlands depend on the amount of the discharge that is directed to the root zone of tidal wetland plants. There is considerable difference of opinion in the record regarding what portion of the discharge would enter the root zone of the tidal wetland plants or would flow under the tidal wetland peat and discharge over a much broader area. It is clear, however, that it is not possible to determine the precise amount of flow that will enter the root zone and result in an expansion of the invasive species of phragmites.

A review of the relevant provisions of the Act reflects that there are no specific criteria regarding freshwater discharges in the coastal area. Best Management Practices endorsed by the department have customarily been used to mitigate adverse impacts of freshwater discharges. The BMPs recommended and incorporated into this project include a diffuse subsurface discharge, location of the discharge as far from the tidal wetlands boundary as practicable, and incorporation of nitrogen removal technology.

There is evidence in the record that the current balance of saltwater and freshwater appears to be in equilibrium with no indication that the present band of phragmities is expanding. There is also evidence that some increase in freshwater discharge to the wetlands may foster expansion of the phragmites. However, in addition

to the BMPs incorporated into this project, the applicant is required to develop a control program to prevent expansion of phragmities on the site. The record shows that this control program, which must be ongoing, can effectively prevent phragmities expansion and allow for the development of other valuable, brackish wetland vegetation.

There is sufficient evidence in the record that the proposed discharge and the resulting increase in freshwater will not adversely impact tidal wetlands. The anticipated impacts from any change in the balance of freshwater and saltwater cannot be characterized as despoliation or destruction of tidal wetland resources. §22a-92(b)(2)(E). In addition, the applicant has demonstrated that all reasonable measures have been incorporated to mitigate the adverse impacts of additional freshwater on tidal wetlands. §22a-98. Therefore, the freshwater discharge is consistent with the applicable policies of the Act.

b
Nitrogen Load

The Act also does not set forth any numeric standards for nitrogen discharges. However, the additional nitrogen load from the discharge to the Hammonasset River and to Clinton Harbor is a coastal management issue to the extent that it could adversely impact water quality and submerged aquatic vegetation. As previously discussed, the incremental increase in nitrogen load to the surface waters would be a relatively small increase when compared to the conservative estimate of 150 pounds per day of existing nitrogen and will therefore not adversely impact water quality.

It is undisputed that the additional nitrogen is not likely to have a significant impact on marsh vegetation. The anticipated increase in nitrogen load is also not expected to foster the growth of such nuisance vegetation as sea lettuce, which can adversely impact other productive plants. Although nitrogen can adversely impact eelgrass, a valuable but declining aquatic resource, there are currently no indications that eelgrass is present in the Hamonnasset River or in Clinton Harbor.

---

[41] The Act also considers the public policy considerations of §22a-28 pertaining to tidal wetlands, which provides that it is the "public policy of this state to preserve the wetlands and to prevent the despoliation and destruction thereof."

There is no basis for a conclusion that the additional nitrogen resulting from the proposed discharge will adversely impact tidal wetlands in the area. Even if the "threshold theory" put forth by the intervenors' expert has merit, the intervenors have provided no evidence of what the threshold level of nitrogen must be to preserve or restore eelgrass. There is also no evidence that present nitrogen levels in the surface waters are just over that threshold such that even a relatively small increase in nitrogen may prohibit restoration of eelgrass. The record demonstrates that the additional discharge of nitrogen will not adversely impact subaquatic vegetation and is therefore consistent with the applicable goals and policies of the Act.

4

THE PROPOSED DISCHARGE WILL NOT UNREASONABLY IMPAIR HABITAT OF SPECIES OF SPECIAL CONCERN

In their claim of unreasonable impairment under the Connecticut Environmental Protection Act (CEPA), the intervenors allege that the discharge will likely convert the high salt marsh to a freshwater marsh, thereby eliminating the habitat of "at least one species of special concern", the salt marsh sharp-tailed sparrow.[42] The intervenors have made the point that impairment of this habitat would require a chain of events that includes a significant incremental increase in freshwater to the high marsh, an upset of the balance of freshwater to saltwater sufficient to foster significant expansion of phragmites, which would, in turn, cause destruction of the high marsh breeding habitat of the sharp-tailed sparrow.

As previously mentioned, there is no evidence of the actual amount of freshwater that will discharge to the high marsh. The potential incremental expansion of phragmites proposed by the intervenors is, by a "best guess", a one-to-one increase. There is

[42] In their prehearing list of legal issues, the intervenors also claimed that impairment of the habitat of species of special concern would be inconsistent with the provisions of the Endangered Species Act. General Statutes §§26-303 through 26-316. During the hearing, the intervenors presented testimony of the presence of two species of special concern, the salt marsh sharp-tail sparrow and the sea sparrow, which is known to nest in the lower marsh areas. From the absence of any references in their post-hearing submission to the impacts of the discharge on low marsh habitat, the sea sparrow or the Endangered Species Act, it appears that the intervenors have abandoned these claims.

however, no evidence of what increase is sufficiently significant to eliminate the high marsh habitat of the sharp-tailed sparrow. Finally, there is no persuasive evidence that the applicant's phragmites control program will fail to protect or provide appropriate habitat for the species. There is therefore no basis to conclude that the discharge will cause the unreasonable impairment of the sharp-tailed sparrow habitat.

5

BURDEN OF PROOF

a
The Applicant

It is well settled that the applicant bears "the burden of going forward with evidence and the burden of persuasion" that its proposed treatment system will protect the waters of the state from pollution. §22a-430, Regs., Conn. State Agencies, §§22a-3a-6(f); 22a-430-1 through 22a-430-8; see also *Town of Newtown v. Keeney,* 234 Conn. 312, 322 (1995) (applicant bears the burden of proof throughout proceedings on its application). The record demonstrates that the applicant has met its burden of proof by providing substantial, persuasive evidence that the proposed system to treat the discharge will protect the waters of the state from pollution.

b
The Intervenors

The intervenors allege that the proposed wastewater treatment system and discharge violates the Connecticut Environmental Protection Act (CEPA)[43] in that it is "reasonably likely to have the effect of unreasonably polluting, impairing or destroying the public trust in the air, water or other natural resources of the state." General Statutes §22a-19(a). Specifically, the intervenors maintain that the proposed treatment system would not protect the waters of the state from pollution and that the discharge would result in impairment of the surface waters and the salt marsh.

[43] General Statutes §§22a-14 through 22a-30.

Under CEPA, the intervenors have the burden of establishing a prima facie case that, if the proposed conduct is authorized, unreasonable pollution and impairment will likely result. *Manchester Envtl. Coalition v. Stockton,* 184 Conn. 51, 57-58 (1981). Where the legislature has created a statutory and regulatory scheme that specifically governs the proposed conduct, the question of whether it is unreasonable "must be evaluated through the lens of [that] entire statutory scheme …." *City of Waterbury v. Town of Washington,* 260 Conn. 506, 549-551 (2002). Therefore, to demonstrate that the proposed treatment system will cause unreasonable pollution, the intervenors must show that it does not comply with the provisions of §22a-430 and its implementing regulations. Id. at 557.

As previously discussed, the preponderance of the evidence supports a conclusion that the discharge complies with the requirements of the relevant statutory and regulatory scheme. The intervenors' efforts to cast doubt on the capacity of the site to adequately transport and renovate the discharge after treatment are not sufficient to prove otherwise. The intervenors have failed to meet their burden of proving that the proposed discharge is inconsistent with the requirements of §22a-430 and its implementing regulations and have therefore failed to establish a prima facie case of unreasonableness on this issue.

The intervenors also claim that the discharge of freshwater and nitrogen will cause unreasonable impairment of the Hammonasset River and the tidal marsh. It can be argued that there is no statutory scheme directed specifically to such impacts, the violation of which would define unreasonable pollution. In that circumstance, the intervenors must meet their burden of proof by establishing a prima facie case of unreasonable pollution or impairment.

CEPA does not define the terms unreasonable pollution or impairment. However, I am guided by the court's discussion in *Waterbury* that lead to its conclusion that "the word 'unreasonable' must have some meaning other than anything more than de minimis." Id. at 555-557. It is reasonable to infer that the court, referencing the quantity and quality of evidence that it considered necessary to rebut a prima facie case, envisioned evidence of the degree of impairment and certainly of more than a mere

possibility of impairment. In the instant case, the intervenors have not provided evidence that goes beyond establishing the possibility of impairment.

In addition, the discharge is consistent with the Connecticut Coastal Management Act, the Connecticut Surface Water Quality Standards, and the state's ability to attain the goals and objectives of the water quality standards for the Hammonasset River and Long Island Sound. Even if such factors are not considered through the lens of a specifically relevant statutory scheme, they cannot be ignored in considering whether the discharge would cause unreasonable pollution.

The intervenors have not presented sufficient evidence to establish a prima facie case that the proposed discharge is reasonably likely to unreasonably pollute or impair the River or the tidal marsh. Having failed to do so, it is unnecessary for me to consider whether there are feasible or prudent alternatives to the proposed treatment system.[44] §22a-19(b). Moreover, even if the intervenors had established a prima facie case, there is substantial, persuasive evidence in the record that the discharge will not unreasonably pollute, impair or destroy the public trust in the water and natural resources of the state.

C

CONCLUSION

The application complies with the applicable statutory and regulatory standards. General Statutes §22a-430; Regs., Conn. State Agencies §§22a-430-1 through 22a-430-8. The terms and conditions of the draft permit are consistent with the provisions of §22a-430 and its implementing regulations. The proposed treatment system will treat the wastewater to a level to prevent pollution of ground water and maintain a high water quality, as required by the Connecticut Water Quality Standards. The proposed treatment system will protect the waters of the state from pollution.

[44] Section 22a-19 requires the consideration of alternatives only when it is determined that the proposed discharge will cause unreasonable pollution. *Paige v. Town Planning & Zoning Commisison of the Town of Fairfield,* 235 Conn. 448 (1995).

The applicant's extensive site investigation and predictive modeling more than adequately demonstrate that the discharge will be treated to at least drinking water quality standards. The discharge and requisite best management practices are consistent with Connecticut Surface Water Quality Standards and with the Connecticut Coastal Management Act. The intervenors have provided considerable evidence in their efforts to establish a case of unreasonable pollution and impairment due to the proposed discharge. The record reflects that the intervenors' claims were fully considered throughout the local proceedings, the department's application review process, and during this proceeding. However, the preponderance of the evidence leads to the undeniable conclusion that the discharge from the proposed treatment system is not reasonably likely to cause unreasonable pollution and that the impacts of the discharge will not result in unreasonable pollution to or impairment of the tidal wetlands or the Hammonasset River.

III

RECOMMENDATION

Having found that the applicant's proposed treatment system will protect the waters of the state from pollution, the applicant should be authorized to submit construction plans and specifications to construct the proposed wastewater treatment system as provided in §22a-430. Once the applicant has demonstrated that the system has been constructed in compliance with the approved plans and specifications, the revised draft permit should be finalized and issued to the applicant.

/s/ Jean F. Dellamarggio
Jean F. Dellamarggio, Hearing Officer

P A R T Y L I S T

Proposed Final Decision in the matter of LeylandAlliance, LLC (Madison Landing)
Application #200401781

PARTY	*REPRESENTED BY*
The Applicant	
LeylandAlliance, LLC. Howard Kaufman 16 Sterling Lake Road Tuxedo, NY 10987	Thomas P. Cody, Esq. Robinson & Cole, LLP 280 Trumbull Street Hartford, CT 06103-3597
Department of Environmental Protection	
Bureau of Materials Management & Compliance Assurance ***79 Elm Street*** Hartford, Ct 06106	Oswald Inglese, Director Warren Herzig
Intervenors	
Carol Leavitt Altieri William B. McCullough	Keith R. Ainsworth, Esq. Evans, Feldman & Boyer, LLC P.O. Box 1694 New Haven, CT 06507-1694
Petitioner	
Stop Griswold Over-Development	Keith R. Ainsworth, Esq. Evans, Feldman & Boyer, LLC P.O. Box 1694 New Haven, CT 06507-1694
Interested Person	
John Bowers, Director of Health Town of Madison Town Hall, 8 Campus Drive Madison, CT 06443	

ATTACHMENT A

DRAFT COPY
UIC PERMIT

issued to

LeylandAlliance, LLC
16 Sterling Lake Road
Tuxedo, New York 10987
Attn: Mr. Howard Kaufman,
Vice President & General Counsel

Location Address: Madison Landing
Griswold Airport Property
1362 Boston Post Road
Madison, CT 06443

Facility ID: 076-047 **Permit ID:** UI0000411 **Permit Expires:**

Watershed: South Central Shoreline **Basin Code:** 5000

SECTION 1: GENERAL PROVISIONS

(A) This permit is issued in accordance with section 1421 of the Federal Safe Drinking Water Act 42 USC et. seq. and section 22a-430 of Chapter 446k, Connecticut General Statutes ("CGS"), and Regulations of Connecticut State Agencies ("RCSA") adopted thereunder, as amended.

(B) LeylandAlliance, LLC, ("Permittee"), shall comply with all conditions of this permit including the following sections of the RCSA which have been adopted pursuant to section 22a-430 of the CGS and are hereby incorporated into this permit. Your attention is especially drawn to the notification requirements of subsection (i)(2), (i)(3), (j)(1), (j)(6), (j)(8), (j)(9)(C), (j)(11)(C), (D), (E), and (F), (k)(3) and (4) and (l)(2) of section 22a-430-3.

Section 22a-430-3 General Conditions

(a) Definitions
(b) General
(c) Inspection and Entry
(d) Effect of a Permit
(e) Duty
(f) Proper Operation and Maintenance
(g) Sludge Disposal
(h) Duty to Mitigate
(i) Facility Modifications; Notification
(j) Monitoring, Records and Reporting Requirements
(k) Bypass
(l) Conditions Applicable to POTWs
(m) Effluent Limitation Violations (Upsets)
(n) Enforcement
(o) Resource Conservation
(p) Spill Prevention and Control
(q) Instrumentation, Alarms, Flow Recorders
(r) Equalization

Section 22a-430-4 Procedures and Criteria

(a) Duty to Apply
(b) Duty to Reapply
(c) Application Requirements
(d) Preliminary Review
(e) Tentative Determination
(f) Draft Permits, Fact Sheets
(g) Public Notice, Notice of Hearing
(h) Public Comments
(i) Final Determination
(j) Public Hearings
(k) Submission of Plans and Specifications. Approval.
(l) Establishing Effluent Limitations and Conditions
(m) Case by Case Determinations
(n) Permit issuance or renewal
(o) Permit Transfer
(p) Permit revocation, denial or modification
(q) Variances
(r) Secondary Treatment Requirements
(s) Treatment Requirements for Metals and Cyanide
(t) Discharges to POTWs - Prohibitions

(C) Violations of any of the terms, conditions, or limitations contained in this permit may subject the Permittee to enforcement action, including but not limited to, seeking penalties, injunctions and/or forfeitures pursuant to applicable sections of the CGS and RCSA.

(D) Any false statement in any information submitted pursuant to this permit may be punishable as a criminal offense under section 22a-438 or 22a-131a of the CGS or in accordance with section 22a-6, under section 53a-157 of the CGS.

(E) No provision of this permit and no action or inaction by the Commissioner of Environmental Protection ("the Commissioner") shall be construed to constitute an assurance by the Commissioner that the actions taken by the Permittee pursuant to this permit will result in compliance or prevent or abate pollution.

(F) The authorization to discharge under this permit may not be transferred without prior written approval of the Commissioner. To request such approval, the Permittee and proposed transferee shall register such proposed transfer with the Commissioner, at least 30 days prior to the transferee becoming legally responsible for creating or maintaining any discharge which is the subject of the permit transfer. Failure, by the transferee, to obtain the Commissioner's approval prior to commencing such discharge may subject the transferee to enforcement action for discharging without a permit pursuant to applicable sections of the CGS and RCSA.

(G) Nothing in this permit shall relieve the Permittee of other obligations under applicable federal, state and local law.

(H) An annual fee shall be paid for each year this permit is in effect as set forth in section 22a-430-7 of the RCSA.

(I) This permitted discharge is consistent with the applicable goals and policies of the Connecticut Coastal Management Act (section 22a-92 of the CGS).

SECTION 2: DEFINITIONS

(A) The definitions of the terms used in this permit shall be the same as the definitions contained in section 22a-423 of the CGS and section 22a-430-3(a) and 22a-430-6 of the RCSA.

(B) In addition to the above the following definitions shall apply to this permit:

"Bi-Weekly" in the context of a sampling frequency, shall mean sampling is required twice per month.

"Quarterly", in the context of a sampling frequency, shall mean sampling is required in the months of February, May, August, and November.

"3 times per year", in the context of a maintenance frequency, shall mean the maintenance must be performed at least 3 times during the period of May to November.

"Twelve Month Rolling Average" in context of this permit is defined as the average of the current months bi-weekly samples in pounds per day (the current month average) averaged with the average from the previous eleven months.

SECTION 3: COMMISSIONER'S DECISION

(A) The Commissioner has made a final determination and found that the system installed for the treatment of the discharge, will protect the waters of the state from pollution. The Commissioner's decision is based on **Application No. 200401781** for permit issuance received on June 9, 2004 and the administrative record established in the processing of that application.

(B) The Commissioner hereby authorizes the Permittee to discharge 52,500 gallons per day of domestic sewage in accordance with the provisions of this permit, the above referenced application, and all approvals issued by the Commissioner or the Commissioner's authorized agent for the discharges and/or activities authorized by, or associated with, this permit.

(C) The Commissioner reserves the right to make appropriate revisions to the permit in order to establish any appropriate effluent limitations, schedules of compliance, or other provisions which may be authorized under the Federal Safe Drinking Water Act or the Connecticut General Statutes or regulations adopted thereunder, as amended. The permit as modified or renewed under this paragraph may also contain any other requirements of the Federal Safe Drinking Water Act or Connecticut General Statutes or regulations adopted thereunder which are then applicable.

SECTION 4: EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

(A) The use of sewage system additives, as defined in section 22a-460(g) of the CGS, are prohibited unless such additive is registered with the Commissioner in accordance with section 22a-462-3 of the RCSA. The Commissioner in no way certifies the safety or effectiveness of any registered additive. **The Permittee shall include in the public offering statement, condominium instruments, rules and regulations adopted pursuant thereto, and any management agreement for the facility the requirement that no sewage system additive shall be used in the subject treatment system unless such additives is registered with the Commissioner, in accordance with section 22a-462-3 of the RCSA.**

(B) Oils, greases, industrial or commercial wastes, toxic chemicals, wastes from water treatment systems, or other substances, that will adversely affect the operation of the subsurface sewage treatment and disposal system, or, which may pollute ground water, shall not be discharged to the subsurface sewage treatment and disposal system. **The Permittee shall include in the public offering statement, condominium instruments, and rules and regulations adopted pursuant thereto, and any management agreement for community sewerage**

system the requirement that no petroleum based oils and greases, industrial or commercial wastes, toxic chemicals, wastes from water treatment systems or other liquids that will adversely affect the operation of the subsurface sewage treatment and disposal system or which may pollute ground water shall be discharged to the subsurface sewage treatment and disposal system.

(C) The Permittee shall assure that groundwater affected by the subject discharge shall conform to the Connecticut Water Quality Standards.

(D) Any limits imposed on the discharges listed in this permit take effect on the issuance date of this permit, hence any sample taken after this date which, upon analysis, shows an exceedance of permit limits will be considered non-compliance.

(E) The monitoring requirements of this permit begin on the date of issuance of this permit if the issuance date is on or before the 12th day of a month. For permits issued on or after the 13th day of a month, monitoring requirements begin the 1st day of the following month.

(F) The discharge shall not exceed and shall otherwise conform to specific terms and conditions listed below. The discharge is restricted by, and shall be monitored in accordance with, the table(s) below.

TABLE A

Discharge Serial No. 301-2	Monitoring Location: E
Wastewater Description: Domestic sewage effluent from Zenon System	
Monitoring Location Description: Final effluent pump station	
Average Daily Flow: 35,000 gallons per day	Maximum Daily Flow: 52,500 gallons per day

PARAMETER	FLOW / TIME BASED MONITORING				INSTANTANEOUS MONITORING	
	Average Monthly Limit	Maximum Daily Limit	Sample Frequency	Sample Type	Maximum Concentration	Sample Frequency
Biochemical Oxygen Demand	20 mg/l			Grab		Bi-weekly
Total Suspended Solids	20 mg/l			Grab		Bi-weekly
Total Nitrogen	1.75 lbs/day*			Grab	10 mg/l	Bi-weekly

* Based on a Twelve-Month Rolling Average.

TABLE B

Discharge Serial No. 301-2		Monitoring Location: G
Wastewater Description: Domestic sewage influent to Zenon system		
Monitoring Location Description: EQ Sump (raw influent)		
Average Daily Flow: 35,000 gallons per day		Maximum Daily Flow: 52,500 gallons per day
PARAMETER	**INSTANTANEOUS MONITORING**	
	Sample Type	**Sample Frequency**
Biochemical Oxygen Demand	Grab	Bi-weekly
Total Suspended Solids	Grab	Bi-weekly
Total Kjeldahl Nitrogen	Grab	Bi-weekly

TABLE C		
Discharge Serial No. 301-2		Monitoring Location: P
Wastewater Description: Domestic sewage influent to Zenon System		
Monitoring Location Description: Zenon Process Tank		
Average Daily Flow: 35,000 gallons per day		Maximum Daily Flow: 52,500 gallons per day
PARAMETER	**INSTANTANEOUS MONITORING**	
	Sample Type	**Sample Frequency**
pH	Grab	Bi-weekly
Temperature	Grab	Bi-weekly
Alkalinity	Grab	Bi-weekly
Turbidity	Grab	Bi-weekly

(1) The pH of the discharge shall not be less than 6.0 nor greater than 9.0 Standard Units at any time and shall be monitored on a weekly basis. The Permittee shall **report pH values, specifically maximum and minimum, for each day of sample collection.** The pH range for each month is defined as the highest and lowest single pH reading during all operating days of the month including periods when sampling is not performed.

(2) The Permittee shall maintain at the facility a record of the total flow for each day of discharge.

(3) All samples shall be comprised of only those wastewaters described in this schedule, therefore, samples shall be taken prior to combination with wastewaters of any other type and after all approved treatment units, if applicable. All samples taken shall be representative of the discharge during standard operating conditions.

(4) In cases where limits and sample type are specified but sampling is not required, the limits specified shall apply, to all samples, which may be collected and analyzed by, the Department of Environmental Protection personnel, the Permittee, or other parties.

(5) The Permittee shall employ a wastewater treatment facility operator who will be responsible for the operation of the wastewater treatment facility. Such wastewater treatment facility operator shall be certified as a facility class III operator pursuant to Section 22a-416(d) of the Connecticut General

Statutes and regulations adopted thereunder.

(6) The Permittee shall perform the monitoring and sampling of the treatment system in accordance with the requirements of this permit and shall perform ground water monitoring in accordance with the monitoring plan approved in writing by the Commissioner. The requirement that the monitoring plan be performed shall be included in the Public Offering Statement, Condominium Bylaws, and the rules and regulations adopted thereto.

(7) The treatment facilities shall be monitored, inspected and maintained in accordance with the following schedule:

TABLE D

INSPECTION, MONITORING, or MAINTENANCE	DISCHARGE SERIAL NO.	MINIMUM FREQUENCY
Mechanical inspection of pump station	301-2	Monthly
Mechanical inspection of blowers	301-2	Monthly
Mechanical inspection of *ethanol* feed system	301-2	Monthly
Mechanical inspection of trash trap baffles	301-2	Quarterly
Mechanical inspection of pump stations	301-2	Monthly
Visual inspection of Zenon system	301-2	Monthly
Visual inspection of distribution chambers	301-2	Monthly
Visual inspection of surface condition of leaching fields	301-2	Quarterly
Depth of sludge in septic tank	301-2	During pump-out
Water meter readings of water usage	301-2	Weekly
Test run of emergency generator	301-2	Quarterly
Pump out trash trap	301-2	Annually
Pump out pump chambers	301-2	Annually
Pump out holding tank	301-2	As needed
Depth of ponding in leachfield	301-2	Quarterly

NOTE:
The Madison Sanitarian shall be notified at least one week prior to pumping of trash trap. Verification of all pump outs shall be attached to the monitoring report and a copy of the report shall be sent to the Madison Director of Health.

(8) The monitoring and sampling required within this permit is a minimum for reporting purposes only. More frequent monitoring and sampling of the treatment system may be required to operate the facility to obtain acceptable results for the parameters being monitored as required by the Operation and Maintenance Manual approved by the Commissioner.

TABLE E (GROUNDWATER MONITORING)	
DISCHARGE SERIAL NO. 301	**MONITORING LOCATION:**

		(W-downgradient; V-upgradient)	
GROUND WATER MONITORING WELL NO:. (as named on AS BUILT)		**DESCRIPTION**: (i.e downgradient monitoring wells)	
PARAMETER	UNITS	**MINIMUM FREQUENCY OF SAMPLING**	**SAMPLE TYPE**
Coliform, Fecal	col/100ml	Quarterly	Grab
Groundwater Depth	Ft, in	Quarterly	Instantaneous
Nitrogen, Ammonia	mg/l	Quarterly	Grab
Nitrogen, Nitrate	mg/l	Quarterly	Grab
Nitrogen, Nitrite	mg/l	Quarterly	Grab
Nitrogen, Total Kjeldahl	mg/l	Quarterly	Grab
Nitrogen, Total	mg/l	Quarterly	Grab
pH	S.U.	Quarterly	Instantaneous
Phosphorus, Total	mg/l	Quarterly	Grab

SECTION 5: SAMPLE COLLECTION, HANDLING and ANALYTICAL TECHNIQUES AND REPORTING REQUIREMENTS

(A) Chemical analyses to determine compliance with effluent limits and conditions established in this permit shall employ methods approved by the Environmental Protection Agency pursuant to 40 CFR 136 unless an alternative method has been approved in writing in accordance with 40 CFR 136.4.

(B) The results of chemical analysis and treatment facilities monitoring required by Section 4 shall be entered on the Discharge Monitoring Report (DMR), provided by this office, and reported to the Bureau of Materials Management and Compliance Assurance, at the following address, by the end of the month following the month in which the samples are taken. The report shall also include a detailed explanation of any violations of the limitations specified and corrective actions performed, and a schedule for the completion of any corrective actions remaining.

Bureau of Materials Management and Compliance Assurance (Attn: DMR Processing)
Connecticut Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

(C) If any sample analysis indicates that an effluent limitation specified in Section 4 of this permit has been exceeded, a second sample of the effluent shall be collected and analyzed for the parameter(s) in question and the results reported to the Commissioner within 30 days of the exceedance.

(D) Copies of all DMRs shall be submitted concurrently to the local Water Pollution Control Authority (hereinafter "WPCA").

(E) Copies of all DMRs shall be submitted concurrently to the local Health Department.

SECTION 6: COMPLIANCE SCHEDULE

(A) On or before three (3) months after issuance of this permit the permittee shall verify in writing to the Commissioner that the alternative treatment technology is operating in accordance with the approved plans and

specifications and is achieving compliance with all permit limits and conditions. The Permittee shall obtain written concurrence from the design engineer, the technology provider and the wastewater treatment facility operator who will be responsible for the operation of the wastewater treatment facility.

(B) On or before seven (7) days after issuance of this permit, the Permittee shall record on the land records of the Town of Madison a document indicating the location of the zone of influence created by the subject discharge, as reflected in the application for this permit. The Applicant shall obtain the Commissioner's written approval of such document before recording it. On or before one (1) month after issuance of this permit, the Permittee shall submit written verification to the Commissioner that the approved document indicating the location of the zone of influence created by the subject discharge as reflected in the application for this permit has been recorded on the land records in the Town of Madison.

(C) On or before seven (7) days after issuance of this permit, the Permittee shall record a copy thereof on the land records in the Town of Madison. On or before one (1) month after issuance of this permit, the Permittee shall submit written verification to the Commissioner that this permit has been recorded in the land records in the Town of Madison.

(D) Every two years, on or before the anniversary date of the issuance of this permit, the Permittee shall submit the results of a detailed permit compliance audit to the Commissioner. Such audits shall be performed within sixty (60) days prior to the anniversary date. The compliance audits shall be performed by a qualified professional engineer licensed to practice in Connecticut with the appropriate education, experience and training which is relevant to the work required.

Each audit shall evaluate compliance with all permit terms and conditions for the preceding two-year period. The evaluation shall review all pertinent records and documents as necessary, including Discharge Monitoring Reports (DMRs); laboratory reports; operations and maintenance plans and performance logs/records; equipment specifications and maintenance schedules; engineering drawings; and spare parts inventory.

Each audit report shall include a description of all records and documents used in the evaluation, a summary of compliance with permit terms and conditions, and detailed descriptions of all remedial actions taken or proposed to address each violation or deficiency discovery.

(E) A copy of each audit shall be submitted concurrently to the local WPCA and to the local Health Department.

This permit is hereby issued on

Gina McCarthy
Commissioner

GM/WH/vd

cc: Madison Health Department
Madison Water Pollution Control Authority