FROM: Chris Bason, Executive Director, Delaware Center for the Inland Bays

TO: Lisa Vest, Public Hearing Officer, DNREC

RE: Mountaire Farms of Delaware Inc. Construction & Spray Irrigation Permit Application

DATE: June 19, 2020

Dear Lisa,

Thank you for your opportunity to comment on the Mountaire permit applications. The Center for the Inland Bays is a private non-profit organization dedicated to protecting and restoring Delaware's Inland Bays estuary including the Indian River and Swan Creek, which are affected by these applications. The Center is responsible for facilitating the implementation of the Inland Bays Comprehensive Conservation and Management Plan to which the Department is signatory. Central to this Plan is the achievement of the 1998 Total Maximum Daily Loads of nutrients for the Inland Bays and the enforcement of the waters of Exceptional Recreational and Ecological Significance provisions of the State Water Quality Standards which require the least environmentally damaging disposal alternatives for wastewater.

The following is my evaluation and requests regarding the proposed permits and their contribution to the nutrient loading of the Indian River and Swan Creek. These comments have been reviewed by multiple members of the Inland Bays Scientific and Technical Advisory Committee of the Center's Board of Directors and members of the Center Board's ad hoc Mountaire Pollution Committee which was formed to address the 2017 failure of the wastewater treatment plant. My education has focused on the ecology and management of aquatic ecosystems and I have 22 years of experience in the field. I continue to publish my research in peer reviewed journals and publications of the Center for the Inland Bays. My Bachelor's of Agricultural Science came from the University of Delaware and my Master's Degree in Biology was earned from East Carolina University where I studied the effects of beaver ponds on water quality. In 2005, I dedicated my career to understanding the science and management of the Inland Bays as the Center's Science Coordinator and in 2012 assumed the Directorship of the Center. I have been responsible for and have overseen the production of multiple State of the Bays and State of the Creek reports utilizing over 30 indicators of environmental quality and I have been responsible for the most recent update of the Comprehensive Conservation and Management Plan for the Inland Bays. In addition, I have

overseen numerous direct research and synthesis efforts in the Inland Bays watershed and have been responsible for dozens of water quality restoration projects. In 2018, I authored a report of the Findings and Recommendations of the Center's Mountaire Committee regarding the failure of the facilities wastewater treatment plant.

The Center is grateful for the work that Mountaire and DNREC have completed together to resolve the issues with Mountaire's wastewater treatment and disposal facility and to reduce the associated impacts to the Inland Bays. Mountaire is an important stakeholder in the Inland Bays Watershed and fills an important community role through its production of poultry products and as a large employer. However, the Center finds this permit application incomplete and inconsistent with the Inland Bays Comprehensive Conservation and Management Plan (CCMP) as well as Title 7 Chapter 60 of Delaware code pertaining to DNREC's Regulations Governing the Design, Installation and Operation of On-Site Wastewater Treatment and Disposal Systems (OSWTDS). Therefore, the Center respectfully requests that the applications be revised to include all required elements and that these elements contribute to significant revisions of the draft permits so as to provide the highest possible protection for the quality of the receiving waters. Please see below the details to support these findings.

Condition and Status of Receiving Waters

Delaware's Inland Bays and their tidal tributaries including Swan Creek and the Indian River are designated under Title 7 of Delaware Code Section 7401 pertaining to the State's Water Quality Standards as Waters of Exceptional Ecological and Recreational Significance. ERES waters are accorded a level of protection and monitoring in excess of that provided most other waters of the State. They are recognized as special natural assets that must be protected and restored, to the maximum extent practicable, to their natural condition.

To this end, the Water Quality Standards require DNREC to, through adoption of a pollution control strategy for each ERES stream basin, take appropriate action to cause the systematic control, reduction, or removal of existing pollution sources, and the diversion of new pollution sources, away from ERES waters. The 1998 Total Maximum Daily Load regulations for nutrients entering the Inland Bays and the 2008 Inland Bays Bays Pollution Control Strategy were promulgated by DNREC to do this.

Despite over two decades of regulatory and voluntary efforts to restore the water quality of the Indian River and Swan Creek, these waterways remain highly-polluted and do not meet their designated uses. DNREC has monitored water quality of the Indian River near the Mountaire facility (station #306181) since at least 2000. The average total nitrogen concentration here is over twice the healthy limit for the River, phosphorus concentrations are 40% higher than the healthy limit, and floating algae (measured as chlorophyll) is more than 5 times greater than the healthy limit. There are no downward trends in pollutant concentrations. The most recent nonpoint source nutrient loading data for the Indian River Bay (from 2006 to 2014), as reported in the 2016 State of the Inland Bays Report, show the average total nitrogen load at 4,643 pounds, more than 6 times the TMDL limit. There are no apparent downward trends. The

River exhibits dramatic diel cycling hypoxia in the summertime driven by dense algae blooms fueled by the nutrient pollution. Continuous dissolved oxygen monitoring conducted by the Center in the summer of 2018 showed the river regularly approached zero dissolved oxygen. This pollution has a disproportionately high impact on juvenile fish and crabs due to their relatively high abundance in the lower salinity waters of this part of the estuary.

DNREC monitoring data for Swan Creek at MD Camp Road show nitrate nitrogen concentrations averaging approximately at 4 mg/L from 1998 to 2010, well above the 3 mg/L total nitrogen TMDL concentration target DNREC uses for freshwater streams. More recent data from the location at Mount Joy Road (station #308341), whose watershed is mostly upgradient of the spray irrigation fields, has demonstrated total nitrogen concentrations exceeding the target value of 3 mg/L nitrogen since January of 2019. The 2006 to 2014 average total nitrogen loads calculated by DNREC using data from this station are 408 pounds per day. This is over six times the non-point source TMDL for Swan Creek which is 65.5 pounds of total nitrogen per day.

The poor water quality of these receiving waters occurs concurrently with serious pollution episodes documented in the Department's 2017 Notice of Violation and the 2019 Proposed Consent Decree and Conciliatory Agreement. These include the 2017 failure of the Mountaire wastewater facility, subsequent operation of the facility at a greatly reduced treatment capacity for over 2 years, and leakage of contaminated groundwater from a temporary storage lagoon discharging into Swan Creek. The addition of pollution from these documented episodes has no doubt impacted the ecology of these most important waters of the State.

Surface Water Assessment Report

A detailed surface water assessment report must be prepared to demonstrate how the discharge of pollutants will meet water quality standards and needed TMDL reductions for the watersheds.

A large wastewater treatment and disposal system is regulated by DNREC under its OSWTDS regulations and thus it is incumbent upon the permit applicant and DNREC to comply with those regulations. Despite the condition of the receiving waters, the permit does not include a surface water assessment report as required by Section 6.2.4 of the regulations:

"A Surface Water Assessment Report (SWAR) must be submitted to demonstrate that nutrient performance standards for wastewater are being met at the post treatment location of a large on-site system or through natural attenuation processes prior to reaching the closest receiving surface water body in order to comply with surface water quality standards. Work performed in connection with the SWAR requires geologic interpretation. These assessments must be completed by, or under the supervision of, a Delaware-licensed professional geologist (PG). The SWAR and related documents must bear the seal and signature of the PG overseeing the project. The SWAR must be submitted to the Department for review and approval."

Furthermore Section 6.5 Large System Permitting states:

"In order to obtain a permit to construct and operate an on-site wastewater treatment and disposal systems with daily flow rates of ≥ 2,500 gallons, a permit application must be submitted to the Department for review and approval. A permit application will not be reviewed by the Department until the SIR, HSR and SWAR have been reviewed and approved by the Department."

Nitrogen Loading and Level of Treatment

The proposed level of treatment for nitrogen does not meet ERES provisions of the State's Water Quality Standards and will not allow TMDLs nor surface water quality standards for upper Indian River or Swan Creek to be met. A treatment level of 5 mg/L total nitrogen in effluent should be required along with increased storage and offset projects including but not limited to water quality buffers on the site.

According to the calculations provided in the April 2020 Final Design Summary and Vegetative Management Plan Update, the average amount of nitrogen applied to the fields that enters the groundwater under normal disposal conditions is 32,782 pounds per year, or 90 pounds per day (see table below). This groundwater then rapidly flows through aquifers over the order of days to years to discharge to Swan Creek and Indian River. Under higher effluent application rates used to compensate for periods where disposal is limited, the nitrogen entering groundwater is considerably more than twice that of normal disposal conditions: 74,987 pounds per year or 205 pounds per day (see table below).

The TMDL for nonpoint sources of nitrogen to Swan Creek is 65.5 pounds per day. Because the permit application does not include the required SWAR, we here make an assumption about the distribution of groundwater flow from the site. Assuming that half of the infiltrating groundwater and nitrogen from the disposal site flow to the Indian River and half flow to Swan Creek, a minimum of 44.5 pounds of nitrogen will discharge to Swan Creek. Again, this is a minimum estimate and does account for additional loading with higher disposal rates. This amounts to 68% of the TMDL to the creek from 447 acres of spray field which constitutes just 3.3% of the 13,657 acre total Swan Creek watershed. Permitting this would require that the remaining 13,210 acres of the Swan Creek watershed contribute only 21 pounds of nitrogen. The portion of the Swan Creek watershed upstream of the DNREC monitoring station #308341 at Mount Joy Road contributed 408 pounds of total nitrogen per day on average for the years 2006 to 2014.

The same calculations can be applied regarding the TMDL for the upper Indian River. The TMDL for non-point source nitrogen for the Upper Indian River is 425 pounds per day; less that of Swan Creek, which flows to the River, is 359.5 pounds per day. Assuming that half of the infiltrating groundwater and nitrogen from the disposal site flow to the River, a minimum of 44.5 pounds of nitrogen will discharge to the River. This makes up 12.4% of the TMDL from 447 acres of spray fields which constitutes just less than 1% of the 69,468 acres of the upper Indian River Watershed less the Swan Creek Watershed. Given the disproportionately large

contribution to the River's TMDL from the facility and the success to date in reducing non-point source loads from the larger watershed, permitting this discharge will not allow achievement of the TMDL for the upper Indian River in the conceivable future.

Table. Pounds per month of Total Nitrogen in Percolate ultimately discharging to surface waters under normal disposal conditions (from Attachment H of the April Final Design Summary and Vegetative Management Plan Update).

Month	Corn	Soybean	Average
Jan	6055	5771	5913
Feb	5506	3796	4651
Mar	6055	0	3028
Apr	3120	0	1560
Sep	3078	0	1539
Oct	4888	6050	5469
Nov	3837	5870	4856
Dec	5475	6056	5766
TOTAL	38014	27543	32782

Table. Pounds per month of Total Nitrogen in Percolate ultimately discharging to surface waters under high-flow alternate disposal conditions to compensate for periods of limited disposal (from Attachment I of the April Final Design Summary and Vegetative Management Plan Update).

Month	Corn	Soybean	Average
Jan	9114	8847	8981
Feb	8268	6574	7421
Mar	9114	10	4562
Apr	12317	0	6159
May	9784	9731	9758
June	6777	4381	5580
July	6701	1089	3895

Aug	0	0	0
Sep	6062	807	3435
Oct	7952	9132	8542
Nov	6799	8850	7825
Dec	8533	9132	8833
TOTAL	91421	58553	74987

Title 7 of Delaware Code Section 7401, The State Water Quality Standards, requires that discharges to ERES waters must be the least environmentally damaging practicable alternative. Furthermore, all point and human induced nonpoint sources subject to control through use of best management practices or otherwise, shall be required to remove nutrients to the extent necessary to prevent excessive growth of photosynthetic organisms. For existing sources of pollution, that would include the Mountaire facility, ERES provisions of the standards state DNREC shall not issue or reissue a permit for an existing source unless the applicant demonstrates a utilization of all economically feasible and reasonably available waste minimization practices and technologies, and the lack of feasible alternative production processes and disposal options.

To meet the ERES provisions of the Standards and best approach required TMDL reductions, the permit must require the facility to treat to enhanced nutrient removal (ENR) levels. ENR treatment technology can achieve nitrogen levels as low as three milligrams per liter nitrogen and regularly to 5 mg per liter nitrogen. This technology can be considered the best available technology in a general sense and it has been deployed at dozens of wastewater treatment plants in the Chesapeake Bay watershed of Maryland. According to comments of subject matter expert Dane Bauer that were provided as part of the public hearing submission from Baird Mandalas and Brockstedt on behalf of Cuppels et al., four active discharge permits for poultry facilities in Virginia have wasteload allocations based on 6 mg/L total nitrogen. The City of Rehoboth Beach Wastewater Treatment Plant was able to achieve an average nitrogen concentration of 6.2 mg/L over the last three years referenced in its 2017 discharge permit. Furthermore, at the July 27, 2018 meeting of the Inland Bays Scientific & Technical Advisory Committee, University of Delaware Professor Emeritus Bill Ritter delivered a presentation entitled Wastewater Treatment Options For The Food Processing Industry during which he confirmed that 3 mg/L total nitrogen effluent quality was achievable[1].

[1] https://www.inlandbays.org/wp-content/uploads/Ritter_Wastewater-Treatment-Options-for-Food-Processing-Industry_STAC-07272018.pdf

Treating to 5 mg/L nitrogen would reduce the nitrogen loading by half of what is currently proposed. The reduction in loads will be realized from September through April when nutrient application exceeds plant uptake, volatilization, and denitrification.

However, even this level of treatment will continue to result in disproportionately high contributions of nutrients from the facility to the surface waters relative to their TMDLs, particularly for Swan Creek. Therefore the Department should also require 1) additional storage to reduce the amount of application from September through April when nutrient losses from the fields occur and 2) an environmental offset resulting in additional and verifiable best management practices for nutrients within the receiving watersheds.

These offsets should include establishing 100 foot buffers of species native to the area on surface water features of the disposal area, stream restoration projects, and enhancement of ditches to improve water quality. The offsets should be additional to any measures required to mitigate previous and ongoing violations of the existing permit. The nutrient reductions generated through these projects can be used to reduce the overall nutrient loading from the operation to achieve the TMDL reductions needed from the facility.

Phosphorus Levels and Level of Treatment

Required information regarding existing soil phosphorus levels and effluent phosphorus concentration was not provided thus the application appears to be out of compliance with the regulations. This information is necessary to determine the administrative and engineering controls needed to meet surface water quality standards. Detailed information indicating the dates and locations of samples with areas prone to phosphorus mobility included must be provided for review and addressed in the permit.

The OSWTDS regulations (6.2.2) require a soils investigation report including soil chemical testing to determine retention capacity of wastewater constituents in the soil. Phosphorus is of concern in this regard because of its potential to be a limiting constituent by accumulating in soils to levels that would risk loss to surface waters. However, data and results of soil testing was not provided in the permit application. Neither were any phosphorus concentrations in the effluent nor reasoning for the lack of a permit limit on phosphorus.

In a May 2015 Memorandum from Jack Hayes of DNREC regarding the soils portion of a Compliance Monitoring Review of Mountaire's permit, phosphorus was found to be "four times the optimal level for crop uptake," and "no additional phosphorus needed to be added anytime soon." Given the mismanagement and ultimate failure of the wastewater system, and given the continued operation of the system at reduced overall treatment capacity, a current and detailed report of soil phosphorus levels across the site specifically including areas prone to high phosphorus mobility due to runoff or saturated soils must be provided as a condition of permit approval and site operation.

The nutrient management plan within the Final Design Summary does state that "the current Phosphorus Site Index calculations for Mountaire result in ratings ranging from low to medium.

A medium PSI rating requires that strategies be employed to reduce the amounts of phosphorus applied to a given site. It is recommended that Mountaire strive to achieve a wastewater phosphorus concentration that results in a reduction of phosphorus application that matches crop removal based on a three year cycle." However, more detailed information needs to be provided to determine the timing of the sampling that led to the calculations and the distribution of samples across the site.

Page 5 of the Design Engineer Report and Vegetative Management Plan Update for Spray Irrigation of Treated Wastewater does state that total P effluent should be maintained at concentrations of 3 mg/l or less TP for effluent flows of 2.6 mgd. However, no permit limit is required.

Storage

The system design and permit do not meet the minimum required amount of storage per DNREC regulations or best management practices for wastewater and must be revised to provide at least 45 days of storage.

According to information provided in the EPA's Process Design Manual for the Land Treatment of Municipal Wastewater Effluents (2006), a base level of 40 days of wastewater storage are recommended for Delaware due to cold weather, excessive precipitation, crop management, and system reliability. Furthermore, Delaware's own regulations for wastewater treatment and disposal (6.3.2.3.12) require 45 days of storage for municipal systems. The permit application proposes 44 million gallons of storage capacity. At an average daily flow treatment capacity of 2.6 million gallons, that appears to provide only 17 days of storage. Given the regulations, the history of ponding and runoff at the site, and the increasing intensity of precipitation events associated with climate change, the permit should be revised to provide at least 45 days of storage.

Furthermore, the proposed location for the construction of the new storage lagoon is partially within the 100 year floodplain. This should be moved out of the floodplain to reduce the risk of a flood that could compromise the lagoon or result in a spill.

Buffers

The information regarding buffers is incomplete and the buffers required by the permit are inadequate and must be increased as indicated on a detailed site plan indicating each wetland and water feature to be buffered with its type (e.g. intermittent, perennial).

The draft permit requires that *"A buffer zone of 50 feet shall be maintained between the wetted edge of the spray field and the edge of any wetlands or any perennial lake or stream provided that the buffer zone is maintained in perennial vegetation, otherwise a buffer zone of 100 feet shall be maintained."*

According to the regulations (6.3.2.3.10.1.5), *"a 100 foot buffer is required between the wetted edge of spray fields and the edge of any perennial lake or stream or ephemeral drain"*, and these buffers must be vegetated. Clearly the intent of the buffer regulation is to maintain perennial vegetation in the buffer. Simply meeting the regulation's vegetation requirement does not justify a 50% reduction in the width requirement. A 50 foot buffer does not comply with the ERES designation of the receiving surface waters and could lead to direct runoff of improperly applied wastes into surface waters.

Furthermore, the Shellfish Waters Guidelines of the regulations state that as a matter of policy the isolation distance between a watercourse included in shellfish growing waters and an on-site wastewater treatment and disposal system is to be maximized whenever possible and must be at least 100 feet. The Indian River and Swan Creek and are considered growing waters and so should their direct surface water connections in this regard.

It is unclear from the language in the draft permit if buffers on intermittent streams are required. Does the adjective "perennial" apply to just lakes or to both lakes and streams? This should be clarified in accordance with the regulations (6.3.2.3.10.1.6) to require A 50 foot buffer is required between spray fields and the edge of any channelized, intermittent watercourse.

ERES provisions of the State Water Quality Standards state that DNREC shall not issue or reissue a permit for an existing source unless the applicant demonstrates a utilization of all economically feasible and reasonably available waste minimization practices and technologies, of which adequate buffers required by regulation certainly are one.

The application materials did not appear to include a General layout of wastewater disposal area, including buffer areas as required under 6.5.1.5.3.8 of the regulation. Neither could plans be found indicating the location of all wetland and water features in the disposal area nor the status of flowing water features (ephemeral, intermittent, and perennial). An examination of aerial photography of the entire disposal area shows numerous wetlands and channelized surface water conveyances in various locations throughout. Detailed plans indicating each wetland and water feature to be buffered and its type along with adequate buffer widths must be provided.

<u>Temporary Sludge Storage Lagoon</u>

The permit should reinforce the 2019 Conciliatory Agreement between DNREC and Mountaire by including as an item of construction the closure of the temporary sludge storage lagoon adjacent to Swan Creek.

The permit should also include any ongoing requirements for monitoring groundwater quality associated with the leakage of the lagoon. The status of the lagoon as closed should be marked on the site plans.

Study of Groundwater Mounding

No numerical model mounding analysis was included to demonstrate that the required vertical isolation distance between the mounded water table and the disposal surface can be maintained and is required to be included in the application (Section 6.2.3.6.).

The omission of a numerical model mounding analysis of the impacts of wastewater application on the depth to water table does not meet the OSWTD regulation (Section 6.2.3.6.). The following further justify this requirement as a condition of a permit: 1) the relatively shallow depth to groundwater on the site, 2) surface water runoff from the site described in DNREC's ongoing lawsuit involving Mountaire, and 3) ponding and runoff on the site seen from the photos contained within the Baird, Mandalas, and Brockstedt comments included with the permit application materials.

Denitrification values

Denitrification estimates (15%) used to calculate the amount of nitrogen in the percolate appear high, potentially underestimating nitrogen loss to groundwater and surfacewaters; the estimates should be reassessed with required supporting information included.

The OSWTD Regulations require the source of all data and assumptions made for design to be referenced in the DER (6.3.2.3.13). This information should be provided with justification on the selection of the chosen rate.

No known peer-reviewed research or site-specific study on Delmarva has reported a 15% denitrification rate in similar soils. In fact, numerous publications over 40 years document the common occurrence of serious nitrate contamination of groundwater in eastern Sussex County from agriculture and wastewater disposal practices on well-drained soils with low organic matter content. Several of these studies focused on the land at and around the Mountaire facility. The permit application compounds the error by claiming a denitrification rate of at 15% for the entire year, an incorrect assumption given that denitrification rates are lower during seasonally cold weather. The soils of the site are by and large well drained with low organic matter (~1%). Meisinger and Randall (1991)[2] estimate an 8% denitrification rate for such soils. The 15% denitrification rate underestimates pollution to ground and surface waters from operation of the spray irrigation disposal system. Without justification, this rate should be lowered to 8%.

Supplemental Nitrogen Fertilizer Application

Nitrogen balance calculations (Attachment H) under normal disposal conditions (2.6 mgd monthly average) do not include additions of supplemental fertilizers. However, the nutrient management plan provided states that "Supplemental fertilization is performed to account for nutrient needs not supplied via effluent applications." Further, DNREC's Compliance Review

[2] Meisinger and Randall. 1991. Estimating Nitrogen Budgets for Soil-Crop Systems *in* Managing Nitrogen for Groundwater Quality and Farm Profitability.

Report for the facility dated 11/12/15 indicates that supplemental fertilization occurred over the period of 2009 - 2013 at an average rate of 60 to 100 lbs of nitrogen per acre per year. This was during a period of permitted effluent concentrations higher than the proposed permit level. Given this, it seems likely that supplemental fertilization will be undertaken (with permission) and thus should be added at some average level to the nitrogen balance calculations. Given that significant portions of nitrogen in fertilizers applied to sandy soils typical of the site are not taken up by crops or are otherwise lost to denitrification or volatilization, they will enter the groundwater percolate and should be accounted for in percolate nitrogen concentrations and mass.