Outlook

#2025-0287 / Wake Robin LLC & Ms. Serena Granbery (ARADEV LLC) / 104 & 106 Sharon Road & 53 Wells Hill Road / Special Permit for Hotel, Redevelopment of the Wake Robin Inn (Section 213.5) / Map 47/ Lot 2 & 2-1 /

From Terri Carlson <tcarlson@crameranderson.com>
on behalf of
Perley H. Grimes <pgrimes@cramer-anderson.com>

Date Mon 9/8/2025 6:31 PM

To Land Use <landuse@salisburyct.us>; Michael Klemens <fenbois@aol.com>

Cc candres@barclaydamon.com <candres@barclaydamon.com>; Joshua E. Mackey <jmackey@mbwlawyers.com>

1 attachment (828 KB)

REMA Response.pdf;

Please place the attached response in the record of the above matter. Thank you

Perley H. Grimes, Jr., Esq.
Cramer & Anderson LLP
46 West St., P.O. Box 278
Litchfield, CT 06759
Ph: 860-567-8718
Fx: 860-567-4531
Email: pgrimes@cramer-anderson.com

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September 4, 2025

VIA E-MAIL

Dr. Michael Klemens, Chairman – P&Z Commission
Planning and Zoning Commission Members
Ms. Conroy
Town of Salisbury
PO Box 548, 27 Main Street
Salisbury, CT 06068

RE: RESPONSES TO SLR'S LETTERS
Wake Robin Inn Redevelopment
104 & 106 Sharon Road & 53 Wells Hill Road, Salisbury, CT
REMA Job No.: 24-2744-SLS4

Dear Chairman Klemens:

REMA ECOLOGICAL SERVICES, LLC (REMA), is submitting responses to some of the SLR's comments in response to our August 22nd, 2025 letter/report.

Before we get into our responses to SLR, it is important to put forth a discussion on credentials. Review of a large complex project such as this one, must draw on experts with multiple fields of expertise. Engineering expertise is of course paramount for sizing and design of stormwater management systems, but implementation of water quality protection (see Section 100.3 (g) of Town regulations) also requires a solid grasp of pollution attenuation processes by plants, soils and their biota; of factors influencing pollutant settling and adsorption rates; and of the challenges posed by soluble pollutants. Experienced and credentialed wetland/soil scientists, such as those at REMA, are qualified to review stormwater plans from this perspective. The town planning and zoning commission will benefit from their input, as a supplement to input from the town engineering department.

In response to SLR's September 3rd, 2025 letter, which focused on statements we made during the last public hearing, especially regarding stormwater quality, we offer the following:

R1. Duly noted.

R2. The observation was just simply that compared to the previous design, which was withdrawn, the peak rates of discharge **have** increased. The impervious surfaces have increased, but the volumetric capacity of the two primary basins have not increased.

R3. The claimed TSS, TP, and TN pollutant removal efficiencies by SLR do not comport with reality. Across the peer-reviewed literature and large monitoring datasets, infiltration basins do not consistently achieve 100% attenuation of TSS, TP, TN, or metals (especially the dissolved/soluble fractions). At best, they provide substantial—but not total—load reductions, and performance varies by storm size, design, maintenance, and influent chemistry.

The literature shows that:

- When a basin captures and infiltrates an entire event, the *surface discharge load* for that event can approach zero—but this is not 100% pollutant "removal" in the fate-and-transport sense (pollutants move to the subsurface, and large storms bypass). EPA notes that measured pollutant "removal" for infiltration is typically inferred from volume reduction, and nitrogen removal is often low without specialized denitrifying design.

- **Nitrogen** (especially nitrate) is the hardest to control with simple infiltration; conventional, freely draining bio/infiltration often exports NO_3^- unless a submerged/anoxic zone with carbon is added. This has been demonstrated repeatedly in controlled and field studies.

- **Phosphorus:** particulate P is filtered well, but dissolved P removal is inconsistent and can be negative unless media are amended (e.g., with aluminum-based water-treatment residuals) specifically to sorb phosphate.

- **Metals:** total metals are usually attenuated with filtration/sorption, but dissolved Cu/Zn removal is variable and sometimes poor without tailored media; results range from high removals to negligible or even slight leaching depending on media and chemistry.

Published standards and crediting reflect this reality:

- State manuals (e.g., MA and NJ) cap creditable performance well below 100% (e.g., 40–60% TSS for extended detention; ~80% TSS for infiltration/bioretention with proper pretreatment), and do not credit 100% removal for any basin-type BMP. These caps exist because 100% removal is not supported by field evidence.

The reasons 96% to 100% attenuation as claimed by SLR is grossly unrealistic are:

1. Bypass & extreme events: No basin treats every storm; large events exceed storage and bypass treatment.
2. Soluble species: Settling doesn't remove dissolved fractions; filtration media have finite capacity and chemistry-dependent behavior.
3. Nitrogen pathways: Without engineered anoxic zones and a carbon source, denitrification is limited, so nitrate persists.
4. Measurement reality: For infiltration, "removal" often means no surface effluent, not destruction; pollutants may enter groundwater unless transformed or strongly sorbed.

The Key references (open-access or official) for the above statements are:

- International Stormwater BMP Database – Performance Summaries (detention basin results; nutrients/metals). (The Water Research Foundation, Squarespace)
- EPA Fact Sheet – Infiltration Basins: pollutant removal primarily via volume reduction; nitrogen often low. (The Water Research Foundation)
- Nitrate in bioretention/infiltration: conventional designs do not attenuate nitrate; adding an internal water storage/anoxic zone with carbon improves NO_3^- removal. (PubMed, ScienceDirect)
- Dissolved metals behavior: variable; some studies show good removal with specific media, others show low/negative dissolved Cu removal—underscoring that 100% is not credible. (PubMed, kuscholarworks.ku.edu)
- State crediting caps (illustrative): Massachusetts and New Jersey manuals cap TSS credits (~40–60% for extended detention; ~80% for infiltration/bioretention), far from 100%. (Mass.gov, anjec.org)

Even with excellent design, which in our professional opinion has not been demonstrated with this application (see below), maintenance, and media amendments, 100% attenuation of TSS, TP, TN, and metals—including their soluble forms—is **not** supported by the scientific

literature for infiltration basins. If near-total load reduction is required for a given outfall, it typically demands a treatment train (robust pretreatment + filtration/adsorptive media + denitrifying step + sufficient storage for small storms), with the understanding that extreme events and soluble species prevent guaranteeing 100%.

We continue to stand by our professional opinion that without robust herbaceous vegetation in the bottoms of the basins, as well as a proper soil amendment with organic matter, many of the pollutant attenuation processes that are performed by vegetation and soils (topsoil in particular), the efficiency of the proposed infiltration basins to provide a high level of water quality control will not be achieved. We note that the national databases that we reviewed presume that infiltration basins are vegetated. The planting "scheme" provided by SLR is grossly inadequate.

We should also point out that in calculating their unrealistic percentages of stormwater pollutant removals they used "BMP Performance Curves for Soil Infiltration Rate: Infiltration Trench" from a report prepared by Tetratech for the US EPA (Region 1), entitled "Stormwater Best Management Practices (BMP) Performance Analysis," dated March 2010. We note that they should at least have used the tables and graphs for "infiltration basins" included in that report.

R4. In our opinion, not providing specific information on the presence of bedrock in the basins' construction specifications, renders the plans incomplete.

R5. This statement by REMA was based on a legitimate question by a commissioner. SLR could have just let this stand, but have attempted to respond, and the reasoning is unclear. Therefore, REMA provides the basis for our simple answer to a question.

Atmospheric deposition is a major, and often dominant, source of nitrogen to southern New England watersheds, but the *fraction* it supplies is highly variable by place, scale, and storm. Studies and modeling syntheses put its contribution to total watershed N loading in southern New England commonly in the ~30–60% range (and higher in some watersheds), while direct (wet + dry) deposition to surface waters can account for ~1–40% of N inputs depending on system size and watershed area. For stormwater runoff specifically, atmospheric inputs (wet + dry deposition to surfaces between storms, and rainwater itself) often supply a substantial portion of the N exported in small-to-moderate storms — again with large spatial and seasonal variability (examples and references below).

Key points in this discussion, based on the scientific literature, are as follows (selected):

- Regional modeling (SPARROW / USGS) for New England finds that atmospheric deposition is roughly half of the total nitrogen load across the modeled area — i.e., on the order of ~50% overall — with the fraction larger in some rural/suburban watersheds and smaller where wastewater or agricultural sources dominate.

- A focused study applying a watershed-loading model to 74 southern New England estuaries, which are very sensitive to nitrogen inputs, found a very wide range in total N inputs across embayments; atmospheric deposition is one of the major source categories and explains much of the lower-end loads in small embayments with small watersheds. Reported relative contributions vary estuary-to-estuary (factor of thousands among embayments), so local estimates are needed.

- Total minimum daily loads (TMDL) and watershed syntheses for Long Island Sound / southern New England have estimated that ~30–40% (or more) of nonpoint/regulatory stormwater N loads originate from atmospheric deposition (direct + indirect). For example, the Long Island Sound TMDL synthesis estimated ~40.8% of the nonpoint/regulated stormwater N load came from atmospheric deposition in their baseline. This reflects deposition that accumulates on impervious surfaces between storms and is then washed off during runoff events, plus rainwater N delivered during storms.

- Mechanistic/field work shows that in urban/residential catchments a large fraction of the dissolved N in early or small storms can be supplied directly from atmospheric wet deposition or from recently deposited dry material that is readily washed off. Isotopic tracer studies and event-sampling studies support this finding (relative contribution depends on antecedent dry period, land cover, and storm size).

Much of the N in urban stormwater is dissolved organic nitrogen (DON) and dissolved inorganic N (DIN — ammonium and nitrate). Several stormwater studies report DON as the dominant fraction of TN in runoff from residential/urban land uses, and a substantial portion of those dissolved forms is derived from atmospheric inputs and wash-off. This matters because dissolved forms are more bioavailable and more likely to drive eutrophication of waterbodies.

Following are a few representative references that support the above statements:

1. **Moore, R.B., et al. (2004)** — *Estimation of Total Nitrogen and Phosphorus in New England using SPARROW* (USGS SIR 2004-5012). Reports that atmospheric deposition is a very large contributor regionally (order of ~50% of modeled N load across New England, with higher fractions in some areas). U.S. Geological SurveyNEIWPCC
2. **Howarth, R.W. et al. (WHOI report / reviews)** — *Estimating Atmospheric Nitrogen Deposition in the Northeastern U.S.* and related synthesis chapters. Reviews show atmospheric deposition commonly supplies tens of percent of coastal nitrogen (and note direct deposition to surface waters can be 1–40% depending on system). WHOI Sea Grant+1
3. **Nixon, S.W., and Howarth, R.W. (cited in regional syntheses)** — classic syntheses on nitrogen inputs to coastal systems showing broad ranges for direct deposition contributions and emphasizing system-specific behavior. WHOI Sea Grant
4. **Howes, B., et al. (2009/2010) — "Nitrogen inputs to seventy-four southern New England estuaries"** (Watershed loading model application). Demonstrates large variability among embayments and shows atmospheric deposition is an important source across many small embayments. ScienceDirectResearchGate
5. **NOAA / recent decadal analyses (2022–2023)** — *Decadal trajectories of land–sea couplings: nitrogen loads and...* (NOAA repository). Examines trajectories of atmospheric N deposition and its role in long-term N loading trends to New England estuaries; useful for understanding recent declines/increases and management implications. NOAA Institutional Repository
6. **NADP / USGS methodological reviews** — provide the observational basis for wet deposition (NADP/NTN) and discuss limitations for measuring dry deposition; useful background for quantifying total atmospheric inputs. U.S. Geological SurveyNADP
7. **Stormwater / event studies & reviews** — e.g., reviews of urban runoff sources and field studies that quantify wash-off and direct atmospheric contributions to stormwater contaminants (metals, PAHs, N fractions). These show dry deposition to impervious surfaces and direct wet deposition during storms are important inputs to runoff mass in many urban catchments. ScienceDirectPMC

While we are on the subject of stormwater runoff attenuation, we should note again, having mentioned this same concern during our presentations reviewing the application that was withdrawn a few months ago, that there is one post-development watershed *that does not have anywhere near the pollutant attention necessary to ensure that a major downgradient resource, namely Lake Wononskopomuc will not be impacted.* Based on the plans and the drainage study proposed sub-watershed WS-20 is 2.58 acres in size, with 0.39 acres of

impervious surfaces. These include the entrance/exit driveways to Sharon Road and a portion of driveway to the northern parking lot.

The entrance/exit driveways will be the ones that will be receiving the bulk of vehicular traffic, and therefore these surfaces will generate a higher proportion of pollutants associated with vehicle movements (i.e., more axle miles) compared to the other impervious surfaces on the subject site. These surface represent the "hot spots" for pollution generation. There are some minimal roadside swales and "yard drains" that pick up the runoff from these surfaces, and one catch basin which ties into the outlet pipe from the site's western infiltration/detention basin.

The only other BMP is a hydrodynamic separator through which stormwater will flow before it is conveyed to the Sharon Road system, but this CDS unit also receives stormwater from the aforementioned basin. This is *minimal* treatment of stormwater, focused more on TSS attenuation (off-line hydrodynamic separators are much more effective than on-line ones as this one). There is no capturing of the water quality volume (WQV), and nothing that will effectively attenuate TP and TN, especially the soluble forms. This minimally treated water is conveyed to the lake, and will contribute to its degradation.

In response to SLR's August 26th, 2025 letter, which responded to our letter dated August 22nd, 2025, we offer the following under several headings:

NDDB Compliance

With regard to REMA's comments pertaining to compliance with state-mandated screening and mitigation for state-listed species that have been documented in the state vicinity, SLR conceded that no final, official sign-off letter has been received from the CTDEEP NDDB department. SLR did report informal concurrence by the state botanist with the plant survey and proposed mitigation for *Carex oligocarpa.* However, rare plant populations are a moving target, often changing significantly from one year to the next. CTDEEP is likely to require repeat surveys and revised mitigation plans before issuing the final NDDB signoff.

SLR comments did not the address the endangered Long-eared bat, *Myosotis septentrioalis*. The was no response to REMA's concerns or mention any regulatory responses (by CT DEEP or federal wildlife biologists) with regard to this bat species. Based on REMA's experience,

final, official NDDB approval requires that threats be satisfactorily addressed for all the potential listed species in the initial determination letter. Note that Mr. Logan, of REMA has credentials and experience as a wildlife biologist, as well as Soil Science and Wetland Science.

On p. 6 of the REMA letter dated August 22, 2025, he wrote the following:

Another federally and State listed species recorded from the vicinity of the site by CT DEEP is the Northern long-eared bat (Myotis septentrionalis), which has seen severe declines in the past few years due to white nose syndrome (WNS). During summer it roosts in cavities of both live and dead trees under loose bark, like those found in the old growth forest, on mature sugar maples, shagbark hickory, and also on dead trees, only rarely in structures. It over winters in caves, which do occur nearby in the marble district. The tree study categorized trees by condition, to prepare for extensive culling of dead or ailing trees. However, not only this rare bat, but many other wildlife species and overwintering insects depend on the cavities that develop in dead trees or branches.

On p. 5 he wrote that:

"... of the 800 trees tallied, 146 have a dbh (diameter at breast height) of 18 inches or more; fifteen have a dbh of thirty inches or more. Review of aerial photos record shows 4.1 acres of forest in the northerly portion, and a contiguous 5.1-acre block of old-growth forest in the southerly portion of the site, that has remained intact at least since 1934, per the archival aerial for that year.

The commission should understand that even before mortality due to white nose syndrome, this particular rare bat species was limited to the very small fraction of Connecticut that has suitable caves for hibernation, found only in soluble bedrock (e.g. marble or limestone). Only Salisbury and a few other western towns can support this species (other bat species with less precarious status hibernate elsewhere, e.g. in barns, warehouses, attics, and hollow trees). Also, the large number of very old, large trees of species like sugar maple and shagbark hickory with loose bark, suitable for summer roosting.

Concerns Related to Rare Species and Habitats

REMA responds to SLR's contention that issues raised in REMA's prior reports are outside the purview of this commission, e.g. concerns about loss of rare species, large trees, and old

growth forest habitats, by quoting several sections of the Salisbury Zoning Regulations (5-20-2024).

Section 100 (Purposes) includes the following:

100.2 (b): Conserving and protecting natural resources such as ridgelines, farmland, wetlands, watercourses, and other sensitive natural resources and areas.

Section 100.2 (j): ***Implementation of the Plan of Conservation & Development***
Section 100.3: Implementation

In order to accomplish the above stated purposes, these Zoning Regulations shall regulate the following:

Section 100.3 (e), "Regulate….."the area of yards, open spaces, and buffer strips."

Section 100.3 (f), "Regulate height, size, location of signs, parking, landscaping, *lighting, and other uses of land"*

Section 100.3 (g). "Development shall be regulated to minimize erosion and sedimentation, pollution of surface and groundwater, and adverse impact on wetlands….***and other sensitive and significant features of the environment"***

Such other sensitive and significant features clearly includes scarce habitat for populations of rare plants or animals at risk of disappearing from the town and state, e.g. the old growth forest with suitable roosting habitat.

Health and Tree-Related Concerns

The second listed purpose of the Salisbury Zoning Regulations is stated as follows:

100.2 (a) Promote and protect the *Public healt*h, convenience, safety, and ***general welfare*** of the community.

SLR did not respond to REMA 's concern that although the site's trees were inventoried, the application lacks information on numbers and sizes of trees to be eliminated in different parts of the project. There was no response to REMA's well-referenced discussion of the scientifically-documented excellent capacity of forests to benefit human health through

filtration of fine particulate air pollutants, and through cooling (See references 1, 2, and 3). This has become relevant even in rural Salisbury due to increasingly frequent air pollution from distant wildfires. Local cooling by trees includes both shading and evaporative cooling during transpiration. Trees also generate oxygen and remove carbon dioxide from the air. The quantitative extent of these three ecosystem services is a direct function of foliage volume and density; therefore large, mature trees have the greatest value to public health and community welfare.

Please let us know if you have any questions on the above.

Respectfully submitted,

Rema Ecological Services, LLC

Sigrun N. Gadwa, MS, PWS
Ecologist, Professional Wetland Scientist
Registered Soil Scientist

George T. Logan, MS, PWS, CSE
Professional Wetland Scientist
Registered Soil Scientist
Certified Senior Ecologist