

ATTACHMENT A:
REBUTTAL TO MEMORANDUM BY
DWIGHT H. MERRIAM, ESQ.

In the following we deal carefully and respectfully with the “critique” of our testimony authored by Attorney Dwight H. Merriam of Robinson & Cole (R&C), hereafter referred to as the “Merriam Memorandum.”¹ At the outset we must emphatically state that at a personal level we (i.e., Sigrun Gadwa and George Logan) have never, in 31 years of collective professional experience, come across such an undignified diatribe based on misinformation and twisting of facts. We are both perplexed and saddened, given the fact that we have held Attorney Merriam in high regard. Moreover, this time-consuming effort on his part has, in our opinion, failed to produce the sought after effect by the applicant, which was to bring into question our testimony, and to shift the focus away from the facts, via a thinly disguised *ad hominem* attack.

As will become abundantly clear in the following pages, Rema Ecological Services, LLC, and by association George T. Logan and Sigrun N. Gadwa, have been entirely consistent in their positions regarding potential impacts to natural resources, including wildlife populations, wetlands and watercourses. These positions are reinforced by the scientific literature and our extensive professional experience.

We would respectfully suggest that since Attorney Merriam neither holds degrees and certifications, nor has experience in natural resources sciences, that his “critique” is unfounded and should be disregarded.

Our response is summarized as follows:

First, the landscape setting of a particular project and the size of the habitat parcel to be developed are of utmost importance to the value of the wildlife community it supports and to the ecological significance of a given level of fragmentation impacts or wetland setbacks of a given width. None of the five (5) REMA development projects cited in the Merriam Memorandum have a level of ecological integrity that even approaches that of The Preserve. Three (3) are traversed or bordered by a major interstate highway. REMA had provided this information, which is pointedly omitted in the Merriam Memorandum. Comparing a wildlife impacts assessment for The Preserve with one for the Willowbrook Golf Course in densely residential South Windsor is truly an “apples to oranges” comparison.

¹ The memorandum is dated 12/21/04 from Dwight H. Merriam, FAICP, CRE, to Robert A. Landino, P.E., regarding a “Critique of George T. Logan Testimony.”

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Second, a major emphasis of the Merriam Memorandum revolves around our past positions regarding vernal pools, yet only one of the five referenced projects (i.e., Waterford) has a viable, although only moderately productive, vernal pool in an area to be developed. The Milford project, which was not a golf course project, has a potential (former) vernal pool that is non-viable because it is dewatered each summer to irrigate a major greenhouse operation. The Merriam Memorandum omits this key fact from the text excerpts on the vernal pool setbacks for the Milford project. The site plan for the Middlebury golf course by design places the only two productive vernal pools deep within a contiguous +/- 84-acre portion of the site where no development is proposed.

Third, it is in the design phase where River Sound Development, LLC differs greatly from REMA, which follows an ecological constraints analysis approach based on site-specific wildlife, vegetation, and habitat data to minimize losses to ecological integrity and to biodiversity. Projects for which REMA has provided consulting services may indeed follow a similar "standard of development" in some areas, such as design of a wetland bridge for a golf cart path or for "flyover" zones where wetland vegetation is maintained at a low height. In Section 3.4, the Merriam Memorandum excerpts descriptions of a key design procedure still used by REMA: site-specific buffer width determination, taking into account soils, slope, resource sensitivity, and special conditions such as "listed" species or sensitive wildlife resources. The summaries of ranges of buffer widths provided for several REMA projects cannot be evaluated outside their site-specific context, or compared to the setbacks in The Preserve design.

Fourth, all the report excerpts cited in the Merriam Memorandum were taken from submissions or testimony before Inland Wetlands and Watercourses Agencies (IWWAs), not before Planning and/or Planning and Zoning Agencies. Ecological Assessment reports produced by REMA for the five referenced projects were submitted either prior to the AvalonBay v. Wilton Conservation Commission decision by the Connecticut Supreme court or after the amendment to the Wetlands Act which became law in June 2004, allowing IWWAs to consider impacts to wetland wildlife, with certain limitations. Discussions of potential impacts on upland wildlife species, including birds, due to upland forest fragmentation or habitat alteration were typically included, as ancillary information, because wetlands impacts were the primary focus (and the jurisdiction) of the IWWAs. Therefore, for each of the five REMA development proposals cited in the Merriam Memorandum upland wildlife considerations could not be the driving force for those site designs. By contrast, the Old Saybrook Planning Commission can consider the entire site and all of its natural features (i.e. wetlands and uplands) as well as its ecological integrity in deciding whether The Preserve proposal is sufficiently protective of existing resources.

SPECIFIC TESTIMONY EXCERPTS AND RESPONSES

Following is our “point-by-point” response to the Merriam Memorandum, which appears in *italics*. Please note that subsections to the Merriam Memorandum (e.g. 1.2) were inserted by REMA to ease in cross-referencing. Where relevant, our response also notes how the REMA excerpts or the responses to the specific criticisms actually apply to our testimony regarding The Preserve.

At your request, we have reviewed the testimony of George T. Logan and Rema Ecological Services, LLC (collectively or individually, "Logan"), expert witness for the Connecticut Fund for the Environment, in connection with projects raising issues similar to those raised by the application of River Sound Development LLC with respect to The Preserve.

Based on this brief review, it is clear that Logan has consistently taken the position in his other work that golf course development and other development close to vernal pools could be accomplished in the public's interest with no unacceptable adverse impacts. Many of the standards of development Logan has advocated elsewhere are in fact either commensurate with, or less protective than, those proposed by River Sound Development LLC for The Preserve. Given the contradictions between his prior testimony and the testimony he has given on behalf of the Connecticut Fund for the Environment regarding The Preserve, we respectfully submit that his testimony before the Old Saybrook Planning Commission is completely suspect, lacks any objective scientific credibility and should be completely disregarded by the Commission.

Below, we have prepared an abbreviated list of projects for which Logan has testified on the record and included a brief description of the project and relevant excerpts of his testimony.

1) *Project:* *Willowbrook Golf Course, South Windsor*

Project Description: *The project involved an 18-hole golf course located on 85 acres of land east of Brookfield Street in South Windsor. Approximately 19,046 square feet of wetlands would be impacted, 7.9 acres of upland review area will be disturbed for the construction of tees, greens and fairways, and approximately 1.3 acres of additional upland review area will be disturbed for selective clearing in order to allow air circulation.*

Summary of Position: *Logan served as Environmental Planner for the applicant, which was seeking Planning Commission approval for the construction of Willowbrook Golf Course. Logan emphasized the net results of the impacts across the entire project, including enhancements to be made to areas to be preserved and the various deleterious impacts, and*

concluded that the development had "a high probability of bringing a net benefit to the environment."

Key Errors and Omissions: The total direct wetland impact is **1,946** square feet, not 19,046 square feet as quoted. This site is totally incomparable with The Preserve site. It is primarily old tobacco fields converted to row crops, and lies within a densely, residentially developed landscape setting, incompatible with viable populations of area-sensitive forest birds or other forest fragmentation-sensitive wildlife (see Figure 1, attached). Existing wooded pockets supported low diversity forest bird communities. There was negligible viable vernal pool habitat. Infestation by invasive plant species was severe. Proposed riparian buffers to the Podunk River, which is already moderately to severely impaired, averaged several hundred feet. At this site, enhancement of fairway edges with plantings, control of invasive plants, and creation of wetlands of a higher functional value (and more than twice the size) than those impacted, would indeed result in a meaningful increase in net wildlife habitat value for suburban species. Therefore, for this specific REMA development proposal, a "*high probability of bringing a net benefit to the environment*" is a true statement. However, as proposed this cannot be said of The Preserve.

Relevant testimony: 1.1 The bringing in of inputs (e.g. water, fertilizer, chemicals) to ensure that the appearance of the course is aesthetically appealing and marketable "is all done in a way that absolutely minimizes these chemicals leaving and either being incorporated into the groundwater" or downstream. Sensible management will always minimize the use of such inputs since turf management personnel charge based on how much they put in. "These people put just the right amount in because it's coming out of their pocket."

[With respect to the use of fertilizer and other inputs,] "Golf courses have progressed... to a point where... these chemicals that are used to preserve... the intensive areas such as the greens do not leave the green. They're put on at the right time of day, the right time of year and they don't... put them in right before a storm comes."

Response and Testimony Relevant to The Preserve: Proper application techniques, product selection, and adequate wetland and riparian buffers based on the type and sensitivity of these resources are all key factors affecting the risk of degrading *downgradient water resources*. Minimal 25-foot wide buffers are widespread in the Preserve plans. Risks are typically higher for private homeowners or residential landscaping companies than for more sophisticated and cost-conscious golf course groundskeepers. An entirely separate issue, however, is the in-situ effect on wildlife, especially on migrating amphibians and birds, on fairways and their margins. This is not a matter regulated by IWWAs – but may be considered by a Planning Commission.

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1.2 *"I remember reading something from a professor at UMass who said that under proper management none of these chemicals or fertilizers actually leave the topsoil or the substrate."* (emphasis added)

Response: Whether a product applied to a lawn or a fairway will remain within the substrate, adsorbed to soil particles, until it breaks down, depends on properties of the chemical such as its solubility in water and its affinity for soil particles, as well as the speed with which it breaks down. Proper management includes proper product selection. Since 2001, when consulting for this proposal, REMA has added significantly to its knowledge base in this area, which likely makes us uniquely qualified in Connecticut, since as natural resource specialists we can best analyze potential ecological impacts from pesticides and their breakdown products. REMA has recently begun requesting that clients proposing a formal landscaping program provide them with lists of proposed materials, to screen for mobile toxic products that might reach sensitive resources. We have done this for the product list proposed for The Preserve. Results may be found in Section 4.0 of our January 5th, 2005 report.

1.3 *With respect to long term impacts on wetlands, the net effect would be negligible. Taking one particular wetland area as an example (Wetland "N"), Logan stated "It's going to change, no doubt about that. But it's not going to be changed into something that is not functional as a wetland. It'll be something different, maybe more of an open pool, which may be something that" the identified wildlife, including [inaudible] frogs and peepers "like better." "Overall, [there will be] some shifts here and there but these overall systems are not going to change by function.*

Response: Wetland alterations must be considered in the context of the *initial* level of function of the wetland. The portion of the "N" wetland mentioned as an example, was a very small shallow depression area (non-vernal pool) ringed by a few trees, next to an existing forest edge, which would have been converted to a shallow marsh that would have been very productive for certain amphibian species. Unfortunately, here as well as in numerous other instances, the Merriam Memorandum is quoting out of context.

2) *Project:* Residential Community and Golf Course, Middlebury

Project Description: *The project involved a combined residential development and 9-hole golf course, which would involve the disturbance of approximately 0.11 acres (0.15% of the total wetlands on site) and selectively cut and manage 0.39 acres of wetlands and golf course flyovers and utility crossings.*

Key Errors and Omissions: (A). The reviewer failed to note that proposed alternatives before the Middlebury IWWA would significantly reduce the total direct impacts to wetlands and watercourses.

(B). Due to its landscape setting and size, this site lacks the outstanding ecological integrity of The Preserve, and habitat fragmentation impacts from this proposed golf course are not comparable. At 312-acres, it is one third the size of The Preserve. It is bisected by Interstate 84, and is bounded to the north by busy State Highway 188 and a residential district (see Figure 2, attached).

(C). The project plan includes a set-aside of open space to the south of Interstate-84 which preserves the most valuable natural resources, based on extensive field data collection. These roughly 84 contiguous and on-site acres abut privately owned, but secure, off-site forested open space, creating a habitat block of nearly 200 forested acres. The southern open space includes *the only productive* vernal pools, the largest, most valuable riparian wetland, and three of the four state-listed species found on the site. This design was based on an Ecological Constraints Analysis (ECA), which included more than 270 hours of field data collection. The entire 750-foot terrestrial envelopes of the southern vernal pools are to be preserved. The southern forested block is large enough to continue to provide core area for some of the area-sensitive forest songbirds that do use the site (e.g. scarlet tanager, wood thrush).

Testimony Relevant to The Preserve: The Middlebury proposal referenced in the Merriam Memorandum was the same project that we cited during our November 17th, 2004 oral testimony as an example of the type of natural resource inventory and analysis that we saw lacking in The Preserve Proposal. Below we attach the Foreword to our October 26th, 2004 report entitled "*Environmental Assessment: Existing Conditions*" submitted in support of an application before the Middlebury IWWA. Also, attached to this present document, is an example of a similar *Ecological Constraints Analysis Plan* that was used to guide resource-sensitive development in the Essex portion of The Preserve property formerly known as Essex-West. This is in stark contrast to the inventories and analyses produced for The Preserve that, while in part thorough (e.g. herpetological surveys by Klemens), are not properly synthesized to indicate those portions of the site are either sensitive to development and/or contain resources of high ecological integrity and value.

"1.0 FOREWORD

This *Environmental Assessment: Existing Conditions* is the culmination of three seasons of baseline inventories at the subject site (i.e. 2002, 2003, and 2004). Prior to the applicant's involvement the property owner, Route 188 Investors, LLC, had commissioned Rema Ecological Services, LLC (REMA), to conduct an *Ecological Constrains Analysis* ("the ECA") of the site in order to assist in the resource-sensitive siting of a golf community. The ECA and a conceptual development plan were presented before the Conservation Commission on March 25th, 2003.

The primary goal of the ECA was to guide in the design of a development plan for the subject site that was to be sensitive to the site's ecological resources, including regulated wetlands and watercourses. The primary planning principles of the ECA were to:

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1. *Avoid* the most ecologically sensitive and/or valuable resources on the site.
2. *Avoid* and/or *minimize* impacts upon resources of intermediate sensitivity and/or value.
3. *Concentrate* development activities within those areas of the site that have the least ecological value and/or sensitivity; and
4. *Include mitigative strategies* in the design that will further protect ecological resources on the site and/or enhance ecological value in the areas were they are proposed.

As can be seen in the submitted plans, and discussed in part in the following narrative, the applicant, GDC Development CT, LLC has succeeded in designing a residential community and golf course that follows each and every of the above planning principles. REMA was consulted in the early stages of the plan development, and the ECA was used as a guide. REMA is satisfied the submitted plans not only follow the ECA planning principles, but have also surpassed them.

A testament to the sound implementation of the ECA is the very limited development within the southern parcel (+/- 86 acres south of I-84), which will remain undeveloped. This parcel was found to have the highest biodiversity of the entire site, as well as sensitive and/or valuable resources, such as productive vernal pools, and an oligotrophic bog-like shrub swamp, the marsh-swamp system of Long Meadow pond, two (three) Connecticut-listed Species of Special Concern, as well as archaeological/historic resources.”

Summary of Position: Prepared on behalf of the applicant, Logan's report "Environmental Assessment (Proposed Conditions)," dated November 18, 2004, repeatedly emphasized that the project's impacts had been minimized to a reasonable extent by the applicant.

Response: The design process for minimization of impacts was emphasized by REMA (see above Foreword), including the constraints analysis based on thorough biological data collection – keyed to specific site locations, an approach which is sorely lacking in the design of The Preserve – which includes a +/- 300-350 acre area without site specific bird, mammal, or plant data.

Relevant Testimony: 2.1 The proposal "has to a considerable extent avoided activities within the town's 50-foot upland review area (URA), to minimize indirect impacts on wetland functions. The total URA disturbed by cutting or filling is roughly 2.6 acres, and the URA disturbed by clearing is 1.2 acres, for a total of 3.8 acres, or 8.6% of the total URAs.

Response: The Merriam Memorandum failed to note that alternative layouts and designs were proposed before the IWWA which would further and significantly reduce impacts within the URAs and increase setbacks and buffers. Although the town of Middlebury has a 50-foot upland review area, wetland and riparian setbacks and buffers for this plan are substantially greater especially where slopes are steep or adjacent to wetlands identified as sensitive (apart from vernal pools). The buffer to the east of Long Meadow Brook averages over 250 feet. A

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large portion of the URA disturbed by vegetation cutting or grading is temporary disturbance associated with utility or roadway crossings. Unfortunately, an inadequate setback such as 50 feet, does, to some extent, hamstring design engineers and environmental planners. The Town of Middlebury has now increased its setback regulations.

2.2 Groundwater discharge into wetlands on site will increase and the quality of such discharge will depend on the golf course management practices, but with an experienced professional in charge of the golf course's Integrated Pest Management program, "it is unlikely that any significant impacts upon wetlands and watercourses will occur."

Response: See the response and clarification of comments on turf chemical application at Willowbrook Golf Course, Sections 1.1 and 1.2. Note again that this REMA report excerpt addresses impacts on wetlands and watercourses, which can, potentially, be minimized by correct application of low mobility products – but not in-situ or upland impacts on wildlife and soil biota, not clearly under the jurisdiction of IWWAs. Also note that REMA did insist on appropriate separation distances from sensitive wetlands and watercourses and did not rely solely on the existence of an appropriate IMP and Turf Management program.

Testimony Relevant to The Preserve: At least two factors not only make the Middlebury Golf Course proposal dissimilar to that of The Preserve, but also make it a better design, given the sensitivity of the resources there. First, the Middlebury Golf Course is a much shorter course than that proposed at The Preserve, which would limit the use of turf maintenance chemicals. Second, the layout of the Middlebury Golf Course puts the fairways parallel to the long axis of the site's most significant wetlands, which allows for more than sufficient buffer zones. In contrast, at The Preserve many fairways cross significant wetland corridors (nine holes), which limits the width of buffer to a minimum, or they are tucked right up against wetlands with no buffer and/or actual clearing of wetlands. It would behoove the applicant to consider the example set forth by the design of the Middlebury Golf Course.

2.3 The wetland plant communities on-site will not be degraded as a result of nutrient increases resulting from lawn runoff because the affected wetland plant communities are mesotrophic or eutrophic.

Response and Testimony Relevant to The Preserve: It is not possible to generalize comments and designs related to wetland setbacks from one site, and apply them to another site. A given fairway setback (e.g. 60 feet) that would not result in significant nutrient impacts on one wetland could indeed significantly impact another wetland with different soils and trophic status. Note that the applicant has failed to identify the trophic status and corresponding nutrient sensitivity of the wetlands at The Preserve, although the botanical information provided on Pequot Swamp Pond (habitat Unit 6) indicates strongly that this wetland is in fact oligotrophic, that is, a nutrient-limited environment. Golf Holes No. 10 and

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No. 18, in their entirety, and portions of Holes No. 11, No. 15, and No. 17, as well some housing and the golf course maintenance facility, are proposed within the very limited watershed of Pequot Swamp Pond. It is generally accepted that no development should be proposed within the limited watersheds of oligotrophic systems, particularly those that would generate excess nutrients, such as roadways and golf course fairways, even under ideal conditions. Moreover, forest vernal pools also typically have a naturally low nutrient status.

2.4 "With any development project, ecological integrity is a function that is unavoidably diminished to some extent. However, functional losses have been reduced by site design adjacent to the large forested wetlands with populations of disturbance-sensitive wildlife, especially forest songbirds..."

Response: The Merriam Memorandum uses ellipses (...) to indicate that part of a quotation has been left out. Ellipses are useful when one seeks to include only the most relevant words of a quotation; however, any omission must not distort the quotation's original meaning. The Merriam Memorandum fails in this regard. The following text on the design features in the Middlebury course to protect ecological integrity was not included in the memorandum:

"One example is the 200 to 300 foot setback between Wetland D (the upper Long Meadow Brook corridor) and the Phase 1 housing cluster. An approximately 400-foot wide connecting corridor has been left between the C1 and C4 wetlands systems, encompassing the lower portion of the C2 and C3 stream corridor. The C2 stream corridor, rated moderate to high for several functions and values, also averages about 400 feet in width, including the water quality basins, which are to be planted with native shrubs and groundcovers. Wetland C4 is up to 700 feet across, so wide that the interior will remain secluded enough even for disturbance-intolerant forest, neotropical migrants such as veery and wood thrush. The large block of forested land, south of the highway, will continue to support the full assemblage of forest songbirds found on the site, and will act as a source of birds that will continue to use at least the interior portions of the larger swamps north of the highway. The size of the Long Meadow Brook corridor is also ample for continued use by the forest birds documented at Survey Point 2 ... (emphasis added)

2.5 Where there is a close proximity between the golf course and several areas with disturbance-sensitive species, impacts are minimized because 1) "indirect disturbance from a golf hole is considerably less than that from an entry road to a housing cluster," 2) "the golf course is quiet at night, and will not be used for many months (late fall through early spring)," and 3) cart paths are routed on the opposite side of the fairway. (emphasis added)

Response and Testimony Relevant to The Preserve: By omitting REMA's discussion of site layout features (see above in response to 2.4), the Merriam Memorandum implies that the fairway comments (2.5) are the primary strategy in protecting ecological integrity. The

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Merriam Memorandum also restates and skews these comments to imply that the proposed Middlebury Golf Community fairways were located very close to sensitive resources. It adds the phrase "close proximity between the golf course and several areas with disturbance sensitive species" (underlined), and deletes "...increasing distances to wetland boundaries to over 200 feet..." It also deletes (without using ellipses properly) the REMA list of types of indirect impacts "(light, noise, movement, etc.)". These indirect impacts become increasingly important at a site like The Preserve, which has a much higher proportion of disturbance-sensitive wildlife, within a very large (for Connecticut) undeveloped habitat block.

3) *Project:* *Waterford Golf Club, Waterford*

Project Description: *The development included an 18-hole public golf course, a clubhouse, associated roadways and parking areas and other infrastructure improvements. The application sought approval to discharge treated stormwater, disturb approximately 2,900 sf of wetlands for fairway construction, convert approximately 2.37 acres of partially degraded wet meadow and shallow marsh wetlands to open water and emergent wetland communities for construction of an irrigation pond, convert 1.54 acres of forested wetlands to scrub shrub and emergent wetlands by cutting the canopy for fairway construction, pipe approximately 450 linear feet of intermittent watercourse for fairway construction, "slightly alter" 0.16 acres of wetland understory vegetation for the placement of approximately 515 linear feet of wood bridges, temporarily disturb certain small wetlands areas and conduct activities within regulated activity areas. A little less than half of the site was proposed to remain undisturbed and 1.1 % was proposed to become impervious.*

Key Errors and Omissions: The site is 194 acres, less than **one fifth** the size of The Preserve, with an elongated, rectangular shape, and it is bisected by a major electric powerline. As shown in the accompanying figure (Figure 3 and 3a, attached), it is bordered by industrial development to the north and east, and the south end is a former earth mining site. Extensive contiguous forest lies to the west of this site, which is within a somewhat fragmented habitat block that is less than half the size of the habitat block within which The Preserve lies. The Waterford habitat block is surrounded by busy highways (i.e., Interstates 95 and 395, CT Route 85), and an industrial area, in contrast to The Preserve habitat block, which is surrounded by less intensive uses, such as low-density residential development. Once again, it is important to emphasize that the sheer size and the landscape setting of The Preserve dramatically increases its ecological integrity.

Summary of Position: *On behalf of the applicant, Logan prepared several reports, including "Environmental Assessment: Part I Existing Conditions," dated December 14, 2000, "Environmental Assessment: Part II Proposed*

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Conditions," dated March 22, 2001, "Invasive Plant Management Program," dated May 24, 2001, and "Amended Discussion on Direct Impacts to Wetlands C Through F," dated May 10, 2001. Several additional reports were also submitted. The overall position of these reports were that the ecological resources on site have been degraded in many respects and that the wildlife has become accustomed, and is now well suited, to these conditions. The limited impact of the planned construction, together with the mitigation and enhancement strategies to be used by the developer, will not significantly harm and in some respects will benefit the wildlife on site. (emphasis added)

Response: The underlined text above does not accurately convey the overall position of the REMA report. Aside from the long-past forest disturbance characteristic of most of New England, plant and wildlife communities described in the Waterford report are diverse natural assemblages, nearly free of invasive plant species. Wildlife impacts were **not** the focus of the excerpted Waterford Golf Club reports, which were part of an application to the Conservation Commission (a.k.a. Inland Wetlands and Watercourses Agency; IWWA), with jurisdiction only over wetlands and watercourses. The key message to the commission in the first 28 pages of the report was that adverse impacts to **wetlands** would not be significant. (This is unlike the current application for The Preserve, which is before the Planning Commission with broader ecological concerns.)

Response and Testimony Relevant to The Preserve: At the back of the Proposed Conditions Report, REMA did in fact discuss in detail – and admit – impacts to forest interior and area-sensitive avians, but as ancillary, background information to the IWWA. Although it was never permitted or built, impacts would have been significantly less than at The Preserve, due to the moderate size (194 acres) and elongated shape of the site, and to the contiguity of proposed western open space with extensive off-site forested areas further to the west. The Waterford site was not rich in sensitive vernal pools wildlife or declining turtles. REMA stands by its position that the Waterford Golf Course proposal would not have significantly impacted the “edge” wildlife species along the powerline or at the southern sand and gravel pit area, or the flexible species such as blue jay, chickadee, gray squirrel, and white tailed deer, that are numerically dominant in both large forests and suburban areas. Along this line, REMA points out that at The Preserve, development along the eastern utility corridor or near the existing residential neighborhoods south of the site would have less impact on wildlife than development near Pequot Swamp Pond or in the east-central wetlands complex.

Relevant Testimony: 3.1 Logan asserted that the alteration of roughly 1.54 acres of forested wetlands to scrub shrub and meadow wetlands will "enhance wetland function... by diversifying both flora and fauna. For example, certain wildlife species attracted to or preferring shrub thickets and forest edge situations will proliferate here," and noted further, "the diversity and abundance of wildlife in [the shrub areas along a

powerline right-of-way] was much higher than that of undisturbed forested areas, including wetlands"

Response and Testimony Relevant to The Preserve: The proposed flyover zones at the Waterford Golf Course were in direct proximity to the powerline and the southern former sand and gravel mining area, where non-forested habitat could enhance existing well-developed communities of shrubland and meadow species. The understory also happened to be rich in species that also thrive in a shrubland cover type. This is in stark contrast to The Preserve golf course flyovers and wetland vegetation alterations which would all be disturbing mature forested wetlands.

3.2 *The railings of the bridges to be installed "will serve as perches" for birds and the bridges will be "an excellent way to view wetland vegetation and wildlife, especially birds."*

Response: A minor positive aspect of a development such as bridge railings needs to be considered in the context of the overall impacts on wetland resources. The memorandum does not mention other more significant measures to minimize impacts at wetlands crossings in the REMA report – of which *avoidance* is the most important.

3.3 *Identified the following key variables for assessing the adequacy of proposed buffer zones: 1) "the presence of "Special Conditions" requiring the imposition of recommended minimum buffer zone widths"; 2) "the baseline value of the regulated wetland or watercourse"; 3) "the intensity and type of the proposed development"; 4) "the dominant vegetative cover type and density within the potential buffer area"; 5) "the average buffer width; the average slope within the potential buffer areas"; 6) "the water quality renovation capability of the potential buffer zone's soils"; and "whether water quality [best management practices] are included in the site plans." (emphasis added)*

Response: Of this list of six key variables, still used by REMA in planning appropriate buffer widths, the first, "the Presence of Special Conditions", is paramount at The Preserve, where the existence of a very large block of forested and wetland habitat raises special issues of fragmentation threats to biodiversity and genetic diversity, which are simply not relevant for the vast majority of applications on moderate sized tracts.

3.4 *"Golf courses are not generally considered intensive land uses, apart from potential leaching of excess nutrients, which on a well-designed and managed golf course [sic], such as the proposed would be." (emphasis added)*

Response and Testimony Relevant to The Preserve: Golf courses fall in the middle of the scale of developed landuse intensity, with gas stations and heavy industry ranked as most intensive and low density residential as least intensive. Habitat loss and habitat fragmentation are also important impacts that need to be considered separately from landuse intensity. As stated above, nutrient impacts, especially for mobile nitrates, are a risk from golf courses, especially when the receiving wetlands are oligotrophic, like Pequot Swamp Pond [unlike Long Meadow Brook (Middlebury) and the Podunk River (South Windsor) of the previously cited REMA projects]. The Waterford plan included a complex set of best management practices specifically geared to trap nutrients, while at the same time taking advantage of sufficiently wide buffer zones, unlike those proposed at The Preserve. Of 18 golf holes, only one (i.e. Hole No. 14) does not impact wetlands through canopy cuts and clearing or has buffer zones to wetlands that are at least 50 feet in width. The following table shows the high intensity of direct and indirect impacts to wetlands and watercourses from the proposed 18 golf holes alone:

Golf Hole	Canopy Cut?	Linear Feet of Buffer \leq 50	Remarks
1	Yes	650	Impacts 2 wetlands areas
2	Yes	1,200	Impacts 2 wetland areas
3	Yes	700	Impacts 1 wetland area
4	Yes	1,650	Impacts 2 wetland areas
5	Yes	1,000	Impacts 1 large wetland area
6	Yes	1,050	Impacts 4 wetland areas
7	Yes	850	Impacts 1 wetland area
8	Yes	2,150	Impacts 2 large wetland areas
9	Yes	750	Impacts 2 wetland areas
10	Yes	650	Upgradient of Pequot Swamp Pond
11	Yes	500	Flyover through Pequot Swamp Pond
12	Yes	450	Impacts 1 wetland area
13	Yes	1,450	Impacts 4 wetland areas
14	No	-	No impacts
15	Yes	1,250	Impacts 2 wetland areas
16	Yes	850	Impacts 3 wetland areas
17	Yes	250	
18	Yes	400	Upgradient of Pequot Swamp Pond
Driving Range	Yes	450	Impacts 1 wetland area
TOTAL		16,250	

3.5 *Evaluating a satisfactory average buffer width, Logan notes: 1) "With a few exceptions, the widths of the remaining undisturbed vegetation range from 25 feet to over 150 feet"; 2) "Of the approximately 15,900 linear feet of wetland boundary on the site (fn), only about 900 linear feet will have buffers that are less than 20 to 25 feet" representing*

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5.6% of the total wetland boundary on site; and 3) "another way of looking at the functional buffer to wetlands in the post-development phase is to calculate the total area in acres of undisturbed land within 100 feet of wetland boundaries and compare it with the total area in acres of undisturbed land remaining after construction."

Response: The Waterford statistics on buffer widths cannot be evaluated without the information in the list of variables for determining buffer width (e.g., slope, soil type, etc.). Additional considerations include the functions and values of each of the wetlands, as well as its documented sensitivity to the proposed landuse. The location of any watercourse or waterbody embedded within a wetland is also important. For example, a setback of 25 feet may be enough for a narrow, intermittent stream, bordered by 125 feet of transitional wooded swamp – which functions as a buffer - but *not* wide enough for a perennial brook in a steep-sided ravine.

3.6 "Although the reverberation and noise of blasting and construction activities could temporarily affect some wildlife, vegetation will likely not be affected, based on our observations of vigorous, healthy woodland immediately adjacent to four active rock quarries in Central Connecticut."

Response: Some species of wildlife (not vegetation) have been documented to be sensitive to noise impacts.

3.7 "A rule of thumb [regarding the deleterious effects of wind throw] ... is that a woodland opening of 100 to 200 times the height of the vegetation in question is needed before a new wind regime is developed. In other words, a large opening is needed to really change the wind regime, as it would be measured at ground level."

Response and Testimony Relevant to The Preserve: This is correct. It is the biological, not the physical impacts of created edges that are of concern at The Preserve. These include the following: 1) amphibian mortality of juvenile amphibians while crossing fairways (desiccation and predation), 2) increased nest predation and parasitism along forest edges, 3) increased colonization by invasive plant species along edges, and 4) reduced genetic exchange as fairways impede seed dispersal, and movement of amphibians, reptiles, and invertebrates, including pollinator insects. (Genetic diversity is not an issue for small or moderate sized tracts.)

3.8 "... the field observations of bird density and species richness at the Site suggest that there will not be significant adverse impacts from the proposed project on wildlife populations using the Site or the adjacent region because such wildlife is already accustomed, to a great

extent, to human activity and the types of disturbances proposed by the project. Moreover, much of the site will remain in its current ecological condition with added mitigation plantings along the edges, and the newly added ponds with wetland margins, all contributing to the maintenance of wildlife diversity at the Site. The overall wildlife assemblage using the

Site after development may even be more diverse than [sic] it is now, due to the diversification of habitat features proposed."

"The net affect [sic] of [canopy openings on the Site] will not be a significant adverse impact on wildlife due to the direct loss of wooded acreage, exacerbation of existing habitat fragmentation or edge-effects, because the Site will still provide many of the existing, plus some new wildlife habitat resources. The increased vegetative diversity associated with "edge-effects" will diversify the food and cover resources at the Site, and thereby provide some ancillary benefit to species now limited on the Site.

Response and Testimony Relevant to The Preserve: These excerpts, quoted above, discuss the benefits to wildlife species that are already adapted to forest edges and human disturbance, to the proposed extensive edge plantings, and also to the created pond habitat that had been proposed at the Waterford Golf Course. This subset of wildlife is already important at the Waterford site along the powerline and the southern graveled area and would be expected to expand in response to the proposal. This is indeed a wildlife benefit of a golf course; the applicant has also testified that The Preserve development would benefit these types of species. However, this would be at the expense of the area-sensitive forest birds and also the less common disturbance-sensitive edge species.

3.9 *"To a large degree avoidance of the unwanted effects of habitat fragmentation at the Site depends primarily upon two overriding factors: (1) the preservation and enhancement of contiguous woodland with particular regard to those native species currently inhabiting the Site, and (2) the management of said woodland immediately following project completion to discourage and avert the establishment of unwanted plant species."* (emphasis added)

Response and Testimony Relevant to The Preserve: Aggressive, sustained management of woodland invasive species and minimization of unnecessary edge creation are indeed important tools for minimizing impacts on remaining forest at a site, if the applicant will pay for it or wetland commissions will stipulate it. The Preserve, as proposed, has not avoided the unwanted effects of habitat fragmentation through the preservation of sufficient "core" forested area for the area-sensitive and fragmentation-sensitive wildlife species documented on-site.

3.10 *"In our region "area-sensitive" birds are more frequently encountered in large, maturing forest tracts. Most of these avian species are neotropical migrants; that is, they are birds that overwinter in South and Central America and breed in the United States. Population declines have been reported for the majority of these species and habitat fragmentation and breeding-ground habitat alteration have been among the major reasons cited (Robbins et al. 1989, Askins et al. 1990, Terbough 1990). However, an emerging body of literature points out that in many cases wintering ground habitat loss, not breeding-ground factors, perhaps provides the better explanation for the observed declines (Rappole and McDonald 1994).*

"Although abundance will undoubtedly drop for [species of area-sensitive breeding birds], it is not likely that species richness for forest interior birds will significantly change since several large patches of contiguous woodland will be preserved and will remain interconnected through the provision of land that will remain undeveloped within the balance of the Project Site."

"The proposed project has the potential to contribute to the region's trend of forest fragmentation through the opening of corridors and clearings for golf course development. This will result in increased amounts of edge effect habitat, along with the loss of treed acreage. The habitat changes would be reflected in shifts in species composition towards a more cosmopolitan or "suburban" character (i.e. fewer "interior species," and more open canopy wildlife activity). However, the net effect of these activities will not be a significant adverse impact on habitat value due to direct losses of wooded acreage, exacerbation of existing habitat fragmentation or edge-effects, because the site will still provide most of the existing resources for wildlife, including increased densities of some. Wildlife enhancement measures that are available to offset impacts from tree removal; include provision of maintained meadow (upland rough and wetland meadow) and carefully managed native plantings along the created forest edges throughout the project area."

" The proposed clearing of patches in the woodlands (i.e., golf fairways, greens and tees) represents additional "fragmentation," but it is not likely to significantly accelerate the process in the region because the woodlands will still provide useful and substantial habitat, likely supporting all of the species observed or expected in the area."

Response: Avian losses due to habitat fragmentation were acknowledged and discussed in the Waterford reports. REMA pointed out that *both* summer breeding ground factors and factors related to overwintering conditions contribute to avian population declines, to variable

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degrees. Reductions in population sizes of area-sensitive songbirds were anticipated at the Waterford site, though not species losses.

Due to its narrow shape and landscape setting, the site has less “core” area, in which area-sensitive forest birds are not already impacted to some degree by edge effects. Quoting from p. 66 of the REMA Existing Conditions Report:

“Temple (1986), Temple and Cary (1988), Bednarz (1993), and Hoover (1992), just to mention a few, found that area-sensitive birds *preferred* densely wooded tracts with “core areas” located 100 meters (i.e. 330 feet) to 200 meters (i.e. 660 feet) or more from the forest edge. Using the more conservative 100-meter threshold, the contiguous wooded tract associated with the study area was found to contain approximately 150 acres of potential “core area.” ”

Note that woodlands to be left undisturbed to the west and southwest of the subject site adjoin large areas of offsite forest, so that large habitat blocks remain in the site vicinity. The carefully managed, ambitious plantings program was proposed to reduce net, overall adverse impacts on wildlife.

3.11 “the inventory of species for the Project Site suggests that there are no species which depend on this Site to the exclusion of any other lands in the vicinity, defacto evidence that the region's wildlife have adjusted to the overall “patchiness” that has occurred over the years.”

Response: For example, the very uncommon and area-sensitive hooded warbler was not recorded on the site, unlike The Preserve site.

3.12 “The width of the corridors to be cleared for golf fairways could not possibly affect the wind shear dynamics of the forest canopy, because the woodland canopy to tree height ratio would be significantly less than the 100 to 200:1 ratio cited by Jones (1983).”

Response: This is a correct statement that applies in general to golf course fairways, including those proposed at The Preserve.

3.13 “There will not be a significant change in soil moisture since most of the Site, particularly those portions that are being developed, have well drained sandy/rocky soils. In addition, every effort is being made to recharge the groundwater back into the ground by using infiltrative devices at the edge of fairways, wherever possible.”

Response: The Preserve application lacks mention of such infiltrative devices at this stage of the application review.

3.14 *"Separation distances between the edge of the vernal pool and the edge of the proposed clearing is not less than 60 feet and is as much as 250 feet. Approximately 4.1 acres of upland forest, plus 0.38 acres of forested wetland, will be left undisturbed around the site's 0.34-acre vernal pool. In our opinion, the terrestrial habitat provided around this moderately diverse and low-moderately productive vernal pool, is sufficient for the maintenance of the present populations."*

Response and Testimony Relevant to The Preserve: The Preserve application includes significantly more productive vernal pools with smaller terrestrial habitat envelope (e.g., Nos. 5, 9, 19, 22, and 23). REMA has specific data in field notes (not in the report) documenting the moderate productivity of this pool at the Waterford site, making it a Tier 2 vernal pool.

3.15 *"It is well understood that when a predominantly forested upland property is developed, impacts to forest dwelling wildlife are unavoidable. However, every effort should be made to minimize this kind of impact to the extent possible. To limit impacts to forest dwelling and forest interior species the development planner seeks to minimize intrusion into mature forest. Given the type of development for which the property is zoned, the plans have succeeded, in our opinion, in minimizing conversion of forested habitat and excessive fragmentation, thereby ensuring that many forest species, including "disturbance-sensitive" species, will continue using the site and adjacent areas." (emphasis added)*

Response and Testimony Relevant to The Preserve: Sizes, shapes, and connectivity of forested habitat blocks affect the level of impact to wildlife. The proposed layout for The Preserve does not meet this objective (see underline). In our opinion, the proposed layout excessively fragments the forested habitat, with a commensurate detrimental impact to area-sensitive and fragmentation-sensitive wildlife.

3.16 *"Many of the site's wetlands, including the site's perennial watercourse (Stony Brook), will have a higher potential of being used for educational and recreational experiences, whether organized or impromptu, by the local and regional population, since they will be more readily accessible."*

Response and Testimony Relevant to The Preserve: Access for recreation can indeed be provided in the context of a development, but it can also be achieved by other means. Under existing conditions, The Preserve site offers a "wilderness" recreational experience and outstanding scientific opportunities due to its very large size, with opportunities to see and study wildlife, vegetative communities, and rare and uncommon plants that are rarely encountered. The proposed project would diminish these values. For example, the fairway

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and housing cluster in close proximity to the east side of Pequot Swamp Pond would greatly diminish the recreational potential of this site, because this exceptional resource and its adjacent forest have uncommon plants and birds, and unusual scenery.

4) *Project* *AvalonBay I, 284-unit Residential Development, Milford*

Project Description: The project involved the construction of a 284-unit multi-family apartment community on a site comprising approximately 42.1 acres. The applicant sought approval to discharge treated storm drainage to wetland areas and watercourses and to conduct activities with the designated 100-foot and 150-foot upland review areas. Inhabitants on the site included mole salamanders, wood frogs and the eastern box turtle.

Key Errors and Omissions: Because the seasonally flooded swamp on the site is used each summer to irrigate a large greenhouse operation, its hydrology does not sustain reproduction of vernal pool species. This small site's ecological integrity is compromised by Rte. 15 to the north, the greenhouse operation to the south, and a condominium complex to the west, although there is undeveloped habitat to the southeast that is owned by the City of Milford and currently is open space (see Figure 4, attached).

Summary of Position: On behalf of the applicant, Logan prepared, among other testimony, an "Environmental Assessment," dated July 17, 2001, (EA) and an Eastern Box Turtle Conservation and Management Plan, dated November 1, 2001. (Box Turtle CMP). Logan argued that the project would not result in any direct impacts to wetlands and watercourses and that potential indirect impacts had been minimized such that the potential impacts to regulated resources and their function would be "minimal or negligible."

Response and Testimony Relevant to The Preserve: The REMA position was based on a thorough inventory of the natural resources, including habitat used by eastern box turtle, and a sensitive project design that took these natural resources into account, with development concentrated in an area heavily infested by invasive plants. REMA's detailed turtle conservation plan for the Milford site, excerpted below, included a 13-acre open space set-aside adjoining extensive off-site open space, and habitat enhancement and creation by removal of dense invasive shrubs, as well as fencing to prevent roadkill, preconstruction searches, and an education program for residents. We found no such programs or mitigative measures included in the Application materials for The Preserve, although the westernmost turtle sighting is near a residential cluster along roads B and C, and the south-central cluster is near Ingham Hill Road. Spotted turtles and certain snakes are also highly vulnerable to

roadkill (Klemens stated that a gravid spotted turtle was found dead on Route 151), a potential impact that has not been addressed.

Relevant Testimony: “Approximately 0.82 acres of preferred turtle foraging habitat was delineated on the site (see Table 1). Of this total, 0.42 acres will be lost to residential development in Habitat Units A, B, E, F, G, and H (see attached plan sheet.)”

With respect to box turtle habitat, "...1.31 acres of preferred foraging habitat will be created, while an additional 0.23 acres of poor habitat will be enhanced. In total, 1.94 acres of mostly optimal foraging habitat will be provided post-development, compared with 0.82 acres of marginal to optimal habitat delineated under existing conditions. This will provide a net gain of 1.12 acres of habitat, as well as significant improvement in overall habitat quality".

"The following plan is designed to be consistent with the box turtle's acknowledged ecological requirements and behavior patterns. It includes several components:

- 1) Minimize losses during construction, by phasing of construction, searches, and exclusion practices.*
- 2) Conserve overall box turtle habitat, occupying a substantial area in the eastern portion of the site.*
- 3) Create additional box turtle foraging habitat south of Habitat Unit C and in detention basins #32 and #22.*
- 4) Enhance and manage meadow/scrub turtle foraging areas to maintain them as optimal foraging habitat, particularly Habitat Units C, Band D (Wetland 5).*
- 5) Build fencing or other barriers to minimize traffic injury or harm by humans or pets.*
- 6) Provide educational materials aimed to raise awareness and reduce incidental harm by humans."*

“GOAL: Minimize losses of box turtles during construction

STRATEGY: Search for and remove turtles from preferred habitat areas before the grading and grubbing phases of construction.”

“GOAL: Set aside sufficient land to sustain a population of box turtles, based on the information on present home ranges

and estimated population density provided and issued in the EA.

STRATEGY: Designate an approximately 13-acre conservation area on the east side of the site, which is directly and functionally linked to existing box turtle habitats on adjacent properties.

“GOAL: Create additional and replacement box turtle habitat for foraging, nesting, and hibernating.

STRATEGY: Create several open canopy habitat areas by removing trees and shrubs in areas with moist soils. Plant and/or seed herbaceous species preferred for foraging, and some native shrub species, that will provide quality habitat for box turtles and for other wildlife species of early successional habitats. Select a site with existing low forest quality, and use detention basin slopes where tree removal would take place to construct them.”

“GOAL: Provide friable, well-drained sandy soil in several areas for nesting, because soils on the eastern slope in the proposed conservation area are mostly moderately well-drained.

STRATEGY: Create additional box turtle nesting habitat by placing loose, sandy soil (fn), at least 12 to 15 inches deep, along clearing edges in upslope drier areas, as shown on the attached plan sheet.”

“GOAL: Maintain and/or increase the size of existing foraging habitat areas, post-construction.

STRATEGY: As part of overall property maintenance, the property owner shall conduct selective brush removal every three years to keep clearings as optimal box turtle foraging habitat...”

“GOAL: Prevent losses of turtles, particularly adults.

STRATEGY: Build a barrier to keep turtles out of the traveled area and inform staff and residents through appropriate educational materials to prevent inadvertent harm.”

"Also interspersed in the following pages are analyses on general environmental issues, such as the potential effects upon purely upland wildlife populations, which are not and should not be considered regulated activities because they are not directly related to impacts upon wetlands and watercourses."

"We can conclude that none of the wetland-dependent or wetland associated species observed or expected on the site or its immediate environs will be adversely and significantly affected by the proposed development activities. The primary reasons for this conclusion are that these species are either at least moderately tolerant of existing nearby human activities or have territories and home ranges that do not overlap significantly into the proposed development envelope. Also, more importantly, none of these species' critical wetland habitat is being altered by the proposal."

*"One important aspect of environmental planning, which specifically relates to wildlife habitat impacts, should be brought forth here. Randall Arendt, the highly regarded Connecticut land use planner and lecturer, has repeatedly emphasized that by concentrating living units into smaller footprints [sic] on the landscape, preferably near transportation corridors, one can reduce the overall consumption and vehicle use. Refer to his landmark book *Conversation Design*, published in 1996 by Island Press. Simply put, many of the 284 units in the proposed Avalon at Milford, may take the place of single-family homes that would occupy a much larger total acreage of habitat, in the existing Connecticut rural and forested landscape. This reduces urban sprawl, which limits the taking of undeveloped land. Another positive environmental effect from planning practices that reduce urban sprawl, such as those employed here, is the commensurate reduction of the number of vehicle miles traveled per person inhabiting a dense living facility next to a major transportation corridor, which would be the case with this proposal, when compared to a person living in a rural-suburban environment."*

Response and Testimony Relevant to The Preserve: The clustered village concept has the environmental benefits described above, but in practice, in The Preserve, the environmental benefits would not be realized due to the large area occupied by golf fairways, and the locations of the village clusters in relation to sensitive natural resources, such as within the watershed to Pequot Swamp Pond.

"Populations of disturbance-sensitive or forest-interior species are already limited to the southern and southeastern portion of the site. These populations will retreat somewhat further to the southeast, continuing to use the lower portions of the eastern hillside. Impacts will

be greatest on the few species in this group (ovenbird, towhee, and to a lesser extent red-eyed vireo) that are present on the site in significant numbers. At a population level, impacts will be less on other forest interior species, because their densities are already low, as discussed in a previous section."

Response and Testimony Relevant to The Preserve: Note that the 13 acres of open space were placed contiguous to extensive off-site open space to minimize habitat fragmentation. Edge effect was already severe in the northern and eastern portions of this site. Due to its landscape setting, the diversity and density of the community of area-sensitive forest songbirds at the Milford site does not compare with that in The Preserve. The Milford site was not being extensively or at all being used by "indicator" species of large unfragmented forest, such as the scarlet tanager, worm-eating warbler, and wood thrush, as is the case at The Preserve. Ovenbird and red-eyed vireo are unequivocally upland forest wildlife species, not regulated by the Milford Inland Wetlands Agency. REMA acknowledged that they would be impacted.

"There will be a reduction in the size and a change to the overall shape of the woodlands on the property. However, the remaining wooded habitat patches are interconnected and will not be reduced in size below a threshold that will extirpate the birdlife now using them. The conversion and reduction of the on-site upland forest does, not equate to the elimination of existing forest species from the site and its immediate surroundings. Although abundance will most likely drop from some of these, it is not likely that species richness will significantly change since some fairly large patches of contiguous upland and wetland forest will remain both on-site and off-site."

"The site woodlands do not fit the broad tenet of "larger is "better" because the site is already a remnant patch that has developed a biota influenced by the original fragmentation, and a series of land use practices stemming from at least the 1800s. Since much of the birdlife using the site have already become adjusted, out of necessity over the past 100 years, to traveling across open areas, the need for them to pass over landscaped residential areas is not a significant adverse impact."

"Finally, the size and shape of woodland habitat patches is of little concern for bird conservation because of birds' ability to fly between patches. Birds do require patches of wooded habitat for roosting and breeding, but connectivity is not a significant concern as long as the patch size is large enough to provide the vegetative diversity and food resources to which they are adjusted on a particular site, which will be the case with this site post-development."

Response: To reiterate, for non-area-sensitive avians (not vulnerable to nest parasitism and predation near forest edges), that predominate at this site, patch size and shape is *not* of concern, for the reasons stated above. For area-sensitive avians, it is not so much connectivity as patch size and “blockiness” that is important. Because a higher degree of genetic diversity can be maintained in a larger population, block size is critical, regardless of dispersal ability.

"Comparison of various vernal pool habitats is important to protect against falling into the "one-size-fits-all" approach to environmental planning and conservation."

"All vernal pool and "vernal pool habitats" are not created equal, that is, they do not all provide the same level of function. Therefore, it would be helpful if vernal pools and vernal pool habitats could be ranked along a qualitative scale from "low" functioning ones to "high" functioning ones."

"Following are some basic guidelines for the protection of vernal pools that have been published in the region (Semlitch 2000, Donahue 1996 (fn))..."

- 1. Provide a minimum 100-foot wide buffer around a vernal pool to function as a staging area*
- 2. Provide overland linkage to suitable terrestrial upland habitat. Since most "vernal pool" species spend a considerable amount of time within upland habitat, linkage with such preferred habitat is critical for the long-term viability of these species...*
- 3. Provide a water budget balance pre- to post development. To the extent possible, the same amount of water should be available to a vernal pool post-development...*
- 4. Avoid piping stormwater runoff directly to vernal pools."*

"The following questions are key in assessing the intensity of any potential impacts and the efficacy of any proposed mitigation:

- 1. What is the population size?*
- 2. Is the population viable?*
- 3. Is there enough habitat to support a viable population, post-development?*
- 4. Is this population likely to be part of a larger metapopulation that might enhance the long-term prospects for the site to support a local population?*
- 5. Are there sufficient dispersal routes, connecting viable habitat, available to maintain metapopulation structure?*
- 6. Is there any habitat that is critical to the maintenance of the box turtle population that would be taken?"*

Response and Testimony Relevant to The Preserve: REMA followed this procedure in assessing the hydrologically impaired vernal pool at Milford, despite the negligible value of the pool for vernal pool amphibians, and a minimum 150 foot setback was recommended. The Klemens herpetological study at The Preserve has differentiated pools by productivity and diversity, but the site design protects terrestrial habitat around some of the highly valuable pools, but not others (e.g. Pools 23 and 19). Impacts of golf course fairways on connectivity in this metapopulation have not been adequately considered. In the eastern portion of the site an entire "population" of vernal pools is not conserved. This will have adverse effects upon obligate amphibians within the eastern portion of The Preserve.

"It is understood that when forested upland property is developed, impacts to forest-dwelling wildlife are unavoidable. However, reasonable efforts have been made to minimize the impact to the extent possible. To limit impacts to forest dwelling and forest interior species the development planner has to minimize intrusion into mature forest, within the context of the primary objective, which is to protect regulated resources (i.e. wetlands and watercourses). The net result will be that the diversity of wildlife species at the site will be largely unaffected, while the site's most valuable wildlife habitats, the western swamp and adjacent forest, and the eastern slope wetlands, will continue to provide habitat for numerous wildlife species." (emphasis added)

The diminution in the numbers of certain avian and other upland wildlife species, attributable to developing portions of the overall property, will be partially mitigated through the creation of additional "edge" habitat. Edge habitats or ecotones are transition areas between adjacent ecological communities. They are the places where two or more habitats meet, such as forestland, shrubland and meadow. Habitat edges, such as the ones that will be created by the proposal, are unique in that they combine some of the characteristics of two or more habitats; in this case forest and open field (i.e. maintained lawns, ornamental plantings, "edge" habitat plantings, low-maintenance upland meadows."

Response: Both the Milford and the Willowbrook (South Windsor) sites are set within a developed landscape setting, where a higher proportion of wildlife can respond to edge enhancement mitigation, than would at a large forested site such as The Preserve. Note, again, that the REMA reports were submitted to the Milford IWWA (see underline). Their jurisdiction is different than that of the Old Saybrook Planning Commission reviewing The Preserve proposal.

"After project completion, fewer recreational vehicle users (e.g. ATVs), but more walkers/hikers will be able to enjoy the wetlands' beauty."

Highway noise will continue after project completion, and there will be some additional noise from the residences, such as vehicle noise, and children's play. Setbacks are wide enough, however, and the proposed plantings screenings dense enough that buildings will not be visible from wetland viewing areas during the growing season, and only partly visible in winter. Noise will also be attenuated."

Response and Testimony Relevant to The Preserve: Note that the proposed setbacks to Pequot Swamp Pond, with high educational and aesthetic value, are well under 100 feet in most areas, in sharp contrast to the Milford buffer width to the western swamp, which does not function as highly and is not sensitive to development nearby.

5) *Project* *AvalonBay II. 100-unit Residential Development, Wilton*

Project Description: The project, involving the construction of a 100-unit apartment home community would be located on site measuring 10.64 acres. New construction, including multi-family buildings, a clubhouse, driveways and parking areas, lawns, a pool and stormwater facilities would occupy 7.4 acres (4.1 acres of impervious surface) and 3.3 acres would be left in their natural state.

Summary of Position: On behalf of the applicant, Logan prepared an "Environmental Assessment," dated February 12, 2003, a Supplemental Report Addressing Vernal Pool Habitat Issues, dated February 9, 2000, as well as supporting correspondence. Logan's position is that the development avoids direct impacts to the site's wetlands and through buffer zones and stormwater management facilities will minimize indirect impacts.

Key Errors and Omissions: This site, mostly a landscaped estate, is also in a densely developed landscape setting, bordered to the west by Route 7, and lacking an on-site vernal pool (see Figure 5). Therefore, it does not resemble The Preserve in any way. Proposed setbacks to the very low functional value wetland resource on the site averaged over 100 feet. This intermittently flowing ditched and dewatered forested swamp was thoroughly inventoried, but contained only a few pollution tolerant invertebrates, and no fish or amphibians. The proposed stormwater management system was truly outstanding, with percent TSS removal of over 95%, based on P8 water quality modeling.

Relevant Testimony: "I would respectfully suggest that a protective zone should be commensurate with the quality of the habitat in question and that the wider zones should be contemplated only for the "best-of-the-best" of vernal pool habitats."

Response and Testimony Relevant to The Preserve: The issue in this case was whether it was appropriate to deny the wetlands application for the project in order to protect a few pockets of degraded wooded habitat within the landscaped estate, which happened to be within 750 feet of the marginally productive off-site pond, in order to provide terrestrial habitat for a few spotted salamanders. REMA stands by its statement that this was not a significant wetlands impact – an entirely different situation from the rich complex of vernal pool habitats at The Preserve.

"There is minimal potential for water quality impacts on aquatic habitat in either Wetland 1 or the off-site pond in Wetland 2 via sheetflow runoff or polluted groundwater seepage because: 1) the wetlands are protected by a 50-foot wide or greater naturally vegetated, regulated setback; 2) the slopes adjacent to wetland are very gradual; and 3) the watersheds to the on-site wetland areas are very small, with most of the developed area draining elsewhere. An integrated pest management (IPM) program will be implemented, as at other AvalonBay communities, but the key element is providing little landscaped area within areas that slope towards the ditch in Wetland 1 or the offsite pond, where chemicals may be applied. A study by Hefting (1998) is just one example from a body of research documenting the effectiveness of forested wetland setbacks at attenuating nutrient (nitrite) pollution."

Response and Testimony Relevant to The Preserve: By contrast The Preserve site plans include numerous areas where setbacks to wetlands are less than fifty feet, and largely lacking in trees.

6) Project Athletic Field Construction, Greenwich

Project Description: The development included the construction of a private athletic field measuring almost an acre in close proximity to a wooded swamp and an outlet stream flowing into the East Branch of the Byram River.

Summary of Position: Logan prepared a report in opposition to the construction of an athletic field on private property. Logan's report emphasized the harms caused by the construction, including increased water flow into adjacent properties, degradation of water quality as a result of the run-off of fertilizers, fungicides, herbicides and insecticides, noise from users and mowers and disturbance of and interference with sensitive species in adjacent forested land.

Key Error and Omission: This was a retroactive permit application for a field already built within the regulated wetland setback, without a wetlands permit, which had caused extensive erosion onto neighboring properties, and impacts upon aquatic habitats².

Relevant Testimony: "REMA has been involved in the permitting of numerous athletic fields in association with new school facilities throughout Connecticut. These fields are invariably designed to respect wide buffers from regulated resources, are fitted with BMPs 'such as water quality swales and bio-retention basins, and have a site-specific Integrated Pest Management (IPM) plan that regulates future maintenance."

Response: For example, a 300-foot forested hillside was left between the athletic fields at the Beacon Falls Regional High School (Region #16) and Carrington Pond, a Town-owned recreational area, which prevented degradation of the lake, despite several blowouts and erosion problems during school construction. Also, unlike the field at this site, other athletic fields permitted with the help of REMA were replete with BMPs, such as biofiltration swales and bioretention areas, which would capture runoff directly from the fields, and then direct flows into more formal stormwater management BMPs such as extended detention basins.

"At a minimum, we would propose the following, if some kind of a limited use recreational/athletic field would be permitted:

- 1. Respect a minimum 150-foot wide buffer to the wetland and watercourse at the site, and restore this buffer to a deciduous forest. Exclude slopes greater than 15% from the buffer calculation.*

Response: Following the Calhoun and Klemens (2002) methodology, a 150-foot setback would leave more than 75% of a terrestrial forested habitat envelope for the potential vernal pool at this site. Aside from amphibian terrestrial habitat, the 150-foot setback was also recommended in order to provide a noise buffer to the wetland, and as complementary upland habitat for avians, bats, insects, and mammals.

- 2. Treat all runoff or collected underdrain drainage through a series [sic] water quality swales and bio-retention areas (i.e. infiltration/biofiltration basins). These BMPs should be able to store 1.5 inches of runoff or exfiltrate associated with such a field and provide a hydraulic residence time of 24 to 30 hours. The outlet to such a "treatment train" should be a level spreader with biofiltration/infiltration capabilities.*

² It should be noted that Dr. Michael W. Klemens and Rema Ecological Services, LLC are both part of a consulting team that is currently reviewing this "after-the-fact" application.

Response: REMA typically recommends 24 to 30 hour, rather than 12 to 24 hour hydraulic residence time, which is appropriate in some cases, for settling of very fine TSS, with adsorbed pollutants. The 1.5 inch capacity is appropriate for an athletic field with underdrains. Stormwater management designs, like buffer widths, need to be evaluated in a **site-specific** context.

3. *Provide a detailed Integrated Pest Management (IPM) plan for the future maintenance of the field.”*

Response and Testimony Relevant to The Preserve: An IPM plan including products with high aquatic toxicity would certainly not be acceptable in view of the direct hydrologic connection between the underdrain and the brook, flowing into the Byram River and its tributary stream. However, all IPM plans are not alike and should be tailored to the specific site using detailed and site-specific data. IPM plans are only one tool the land use manager can use to protect natural resources from degradation, and should not be a substitute for proper site design that allows for protection mechanisms that are naturally available to be utilized, such as the provision of wetland and riparian buffers.