

**Sunrise Coalition Comments on
Stormwater Issues at Proposed Bradley Ridge Subdivision**

Submitted to Chapel Hill Town Council
January 2008

Executive Summary

Applicant proposes to obliterate (pipe and fill) a small stream and associated wetlands on the eastern portion of the Bradley Ridge subdivision. Town Engineers classified the stream as “intermittent” in 2003 and thus brought it into the Town’s Resource Conservation District (RCD). At Applicant’s request, the stream was reclassified as less-than-intermittent in 2004 and thus excluded from the RCD and LUMO protections. The small stream and wetlands have important hydrologic functions that should be conserved. Excluding an intermittent stream from the RCD on the basis of a minor human-caused disconnection would set an important precedent for the Town as it implements LUMO.

Background

These comments are focused entirely on the eastern portion of the Bradley Ridge property that would drain into a stormwater retention pond known as Basin 1 in Applicants’ *Stormwater Impact Statement for Bradley Ridge Subdivision* prepared by Mitchell & Westerndorf, PA and dated July 3, 2007.

The hydrology of the Basin 1 drainage area is complex and has been the subject of considerable controversy. Town Engineers mapped a portion of this drainage area as an intermittent stream on March 7, 2003. The Engineers’ field notes include the following important statements: (1) “Perched groundwater provides hydrology.” (2) Wetland soils (hydric) persist in this area.”

In March 2004, HHOC requested a review of the feature that Town Engineers had classified as an intermittent stream in the Basin 1 drainage area. Town Engineers revisited the site on March 4, 2004 and made the following determination. “The eastern side of this property was visited 3/7/03. A low area there was previously determined to be an intermittent stream. However, although this “boggy area” may qualify as a “natural intermittent stream variant” by current LUMO guidance, it is not directly hydrologically connected to the perennial stream that crosses under I-40. This area does have some important hydrologic functions, and impacts to this seep should be avoided or minimized.”

Coalition Concerns

The Applicants’ Preliminary Plat and Stormwater Impact Statement do NOT indicate that measures will be taken to minimize impacts to the hydrologic functions of the small stream and associated wetlands in the Basin 1 drainage area. The approximate boundaries of this wet zone are delineated in Figure 1. As noted above, this wet zone includes a stream channel that was classified initially by Town Engineers as an intermittent stream and subsequently reclassified.

As currently proposed, the Bradley Ridge development will disrupt the hydrologic functions of the wet zone shown in Figure 1 and the associated drainage line that extends from the mapped wetland near the former Potted Plant to Basin 1. This area currently retains much of the stormwater, sediment and nutrients that pass through it. The area is effectively functioning now as a stormwater control. Seasonal perched water tables develop in this area with as much as 6” of standing water over extensive areas during wet periods. Seasonally wet soils with forest cover in the area are ideal for reducing stormwater quantity and improving quality.

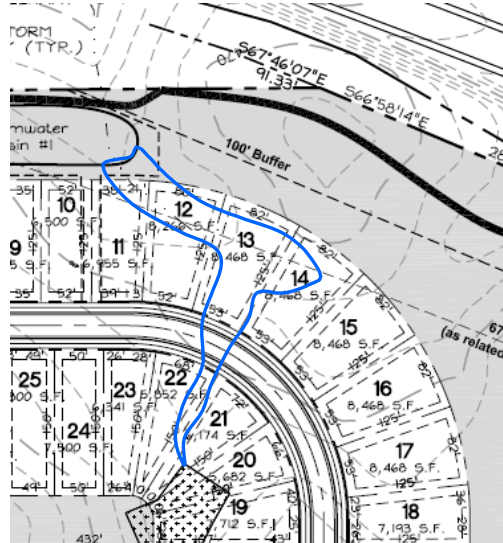
FIGURE 1

Seasonally saturated area: Intermittent Drainage

CH stormwater engineers cited the **significance of the area** and recommended that **disturbance be avoided or minimized**.

Request the determination be revisited to confirm adherence to LUMO –

- important precedent for Town
- Clearly state reasons for determination with reference to LUMO guidelines



12/16/2007

Sunrise Coalition re: Bradley
Ridge Concept Plan

Applicants' Proposal

The Applicant proposes to obliterate the small stream and wetlands by installing a pipe in or near the existing stream channel. Presumably the channel will be filled with dirt after the pipe is installed. The pipe will directly connect the entire drainage line with the proposed stormwater Basin 1.

Runoff from the two-year storm, as estimated by Mitchell & Westendorf, will increase from 4,603 cubic feet in the current pre-development conditions, to 11,723 cubic feet post-development. The increased stormwater runoff will be accompanied by increases in Total Suspended Solids (TSS) as well as nitrogen, phosphorus and other pollutants. We note that the pretreatment runoff volume may be overestimated as the estimation method (Rational Runoff approach) assumes that the runoff is delivered from its source without the reinfiltration that occurs naturally in existing stream channel and wetlands. If pretreatment runoff is overestimated, a greater reduction in runoff volume from the post-development condition may be required.

The primary purpose of Basin 1 is to reduce peak discharge and runoff volume in accordance with the Chapel Hill LUMO. Specifically, the LUMO states that the runoff leaving the site post-development should not exceed the two-year, 24 hour predevelopment event. Basin 1 will reduce peak discharge by temporarily storing runoff, then releasing it slowly. This will likely achieve substantial TSS reduction by providing a longer settling time but will likely not be effective in reducing nutrient concentrations in runoff. While TSS reduction (85%) is currently the only water quality improvement included in the LUMO, there is growing concern about the need for reductions in nitrogen and phosphorus loadings to the Jordan Lake water supply reservoir, which this area drains to. Conserving the natural ecological

functions of the small stream and wetlands in the Basin 1 drainage would be a cost-effective way to minimize future increases in nutrient loads.

Volume control using a bioretention facility such as Basin 1 is accomplished by infiltration, with the pond designed with a deep soil with high storage capacity, such as a loam, underlain by a sand drain and planted with vegetation that will promote evapotranspiration of the stored water. The stored water is first designed to be ponded at shallow depth (typically not exceeding 6" by EPA recommendations), then infiltrated to the soil, and then ultimately evaporated or drained through the sand bed or surrounding soil. However, in order to achieve the infiltration, EPA recommends that these facilities not be used where the groundwater table is within 6 feet of the surface, or in areas of soil exceeding 25% clay¹. The developer's soil boring report, as well as our own observations in the area shows that both of these conditions may pertain to this site.

Implications for LUMO Implementation

The small stream in question has important hydrologic and ecological functions. It was classified initially by Town Engineers as an intermittent stream and subsequently reclassified as less than intermittent at the request of the Applicant. The basis for reclassification is lack of a direct hydrologic connection of the intermittent stream to the perennial stream that drains the western portion of Applicant's property. The "disconnection" is minor (i.e., represents a small fraction of the total length of the stream), occurs very close to Interstate 40 near the point where the intermittent stream interests the perennial stream, and was apparently caused by human activity during I-40 construction or an earlier agricultural period.

Excluding an intermittent stream from the RCD on the basis of a minor human-caused disconnection would set an important precedent for the Town as it implements LUMO. The Sunrise Coalition requests that the Council review the classification of the small stream on Applicant's property with explicit consideration of precedent and the concept that a project such as Bradley Ridge that has been enabled by financial support provided by the Town of Chapel Hill should set a high standard with respect to environmental protection and LUMO compliance.

Recommendation

A standard stormwater control strategy is to use what is referred to as a "treatment train" in which several stormwater controls are placed in series to benefit from their combined treatment. This approach should be implemented at Bradley Ridge by incorporating into the stormwater management plan the existing ecological functions of the small stream, wetlands, and boggy soils in the drainage line to Basin 1. This could be accomplished by (a) prohibiting placement of homes in seasonally inundated areas, and (b) designing and maintaining a swale drain or constructed wetland in the wet zone in the Basin 1 drainage area.

Justification for Recommendation

The site conditions noted above (high groundwater table and high clay content of soil) will compromise the ability of Basin 1 to infiltrate stormwater, limiting the volume reduction that will be realized. The problem with Basin 1 is not its design, but rather its placement in a wet area with no other stormwater controls.

¹ US Environmental Protection Agency, Office of Water. 1999. *Storm Water Technology Fact Sheet – Bioretention*. EPA 832-F-99-012.

A reasonable solution is to make use of the existing stream channel and wetlands as a natural stormwater treatment, functioning either as a swale drain, or modified to increase its retention as a constructed wetland for which it is hydrologically suited. This solution is compatible with Chapel Hill LUMO Section 5.4.7. *Integrated Management Practices* which states: “Applicants shall utilize integrated management practices/best management practices to meet the standards established in subsection 5.4.6, using one (1) or more approved design options. Low impact design options are encouraged.”

The recommended solution has several advantages.

1. A natural stormwater treatment zone would help reduce nitrogen loads to Jordan Lake while also reducing TSS and stormwater volume.
2. During dry seasons, areas near the boundaries of the natural stormwater treatment zone would be suitable for recreational use and could be developed for that purpose to reduce or eliminate the 3.3 acre shortfall in required recreation area in the Applicants’ Preliminary Plat. Most current stormwater control guides view the potential dual purpose of stormwater control and neighborhood amenity as desirable².
3. The recommended approach would remove areas with high water tables from construction, thus reducing the potential for residents to have to deal with wet crawl spaces and unstable soil conditions.

² For example, see *Fundamentals of Urban Runoff Management: Technical and Institutional Issues 2nd Edition* by E. Shaver, R. Horner, J. Skupien, C. May, and G. Ridley. Published in 2007 by North American Lake Management Society (http://www.nalms.org/Resources/PDF/Fundamentals/Fundamentals_full_manual.pdf)

Summary of Sunrise Coalition Comments on Stormwater Issues at Proposed Bradley Ridge Subdivision

Chapel Hill Town Council
January 23, 2008

Scope of Comments

- Eastern portion of HHOC property that would drain into “Basin 1.”
- Basin 1 drainage area includes linear feature classified by Town Engineers as intermittent stream in 2003.
- At request of HHOC, intermittent stream reclassified in 2004. Town Engineers note that “boggy area” has “important hydrologic functions” and recommended that impacts be “avoided or minimized.”



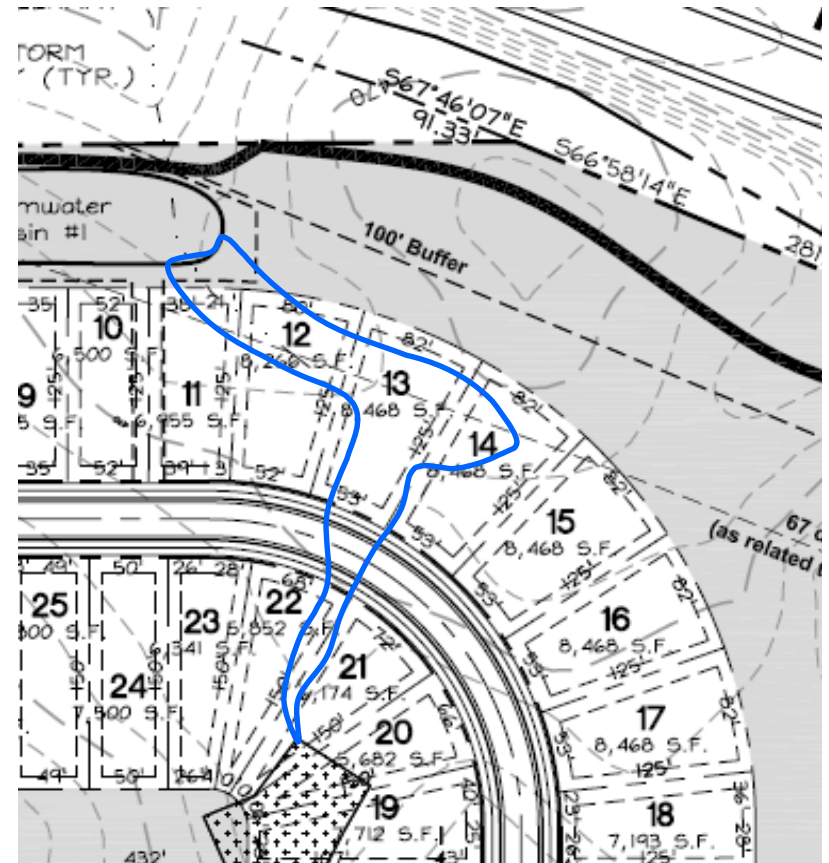


Seasonally saturated area: Intermittent Drainage

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Concerns

- No measures proposed by Applicant to minimize impacts to boggy wet area in Basin 1 drainage.
- This wet area currently functions as a natural stormwater treatment zone.
- Development and piping of the wet area will:
 - obliterate the stream channel and wetlands
 - eliminate and bypass the natural stormwater treatment in this area, directly connecting the entire drainage area to Basin 1.
- Basin 1 performance may be impaired by its placement on seasonally wet soils and high water tables, with high clay content.

Recommendation

- Conserve ecological functions of intermittent stream and associated wetlands.
- Prohibit structures in seasonally inundated areas.
- Incorporate natural stormwater treatment provided by stream and wetlands into stormwater management plan.

Advantages of Recommended Solution

- Natural stormwater treatment zone would help reduce nitrogen load to Jordan Lake.
- Parts of natural treatment zone could be developed for recreational use.
- Prohibiting construction in seasonally wet areas would protect future homeowners from problems associated with wet crawl spaces and unstable soil conditions.