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September 11, 2007

Ms. Mary Trudeau
Town of Belmont
Conservation Commission
19 Moore Street
Belmont, MA 02478-2501

Re: The Residences
Acorn Park Drive
Belmont, Massachusetts

Dear Ms. Trudeau:

At your request we have reviewed the proposed residential project, "The Residences" located at Acorn Park Drive in Belmont, MA. Specifically, we have reviewed the Notice of Intent (June 12, 2007), the accompanying site plans (June 4, 2007), a Drainage Report (June 4, 2007), the DEP Superseding Order of Conditions (September 30, 2004), a comment letter prepared by Rizzo (June 26, 2006), and a series of other comment letters from Epsilon and Wetlands and Wildlife, Inc.

Horsley Witten Group is an interdisciplinary environmental consulting firm with a staff of approximately 40 engineers, hydrologists, ecologists and planners. Our firm prepared the Smart Growth Toolkit for the Commonwealth of Massachusetts and is currently in the process of updating it. We believe that every development project in Massachusetts can and should integrate "low impact development" and other smart growth techniques into their design.

The proposed project includes 299 residential units and the associated parking and driveway network on a 15-acre parcel that is surrounded by wetlands that drain to the Little River and Alewife River system. According to the USDA soil survey, the soils on the parcel are comprised largely of "udorthents", or fill. Soil test pits suggest shallow groundwater conditions exist throughout the site.

My comments are as follows:

General Comments:

1. The project does not incorporate "low-impact design" (LID) features in accordance with the Massachusetts Smart Growth Toolkit. This Toolkit has been designed as guidance to developers and local governments to encourage sustainable projects.

2. Impervious surfaces will cover a large portion of the upland area of the parcel dramatically affecting the site's hydrology and microclimate conditions.

3. The proposed stormwater management system does not comply with the Massachusetts Stormwater Management Policy. The proposed components are not integrated into a "treatment train" approach and are likely to fail under post-development conditions.

4. The project designers have relied upon inconclusive site data and analyses upon which they have attempted to develop engineering solutions. Specifically, the high groundwater calculations and percolation test data that is provided cannot be relied upon to design stormwater features.

5. The proposed project as currently designed will result in increased flooding, hydrologic changes to the surrounding wetlands and water quality impacts.

Specific Comments:

1. Groundwater Levels: Test pits and water level readings were performed at several locations throughout the site. Redox (water staining of soils) observations in the test pit logs were discarded with a note, "mottling inconclusive". Instead the USGS Frimpter method was applied to estimate high seasonal groundwater levels. This method is intended for glacial deposits of till or sand and gravel and may not be as accurate in areas of fill (which is present throughout the majority of this site). The primary soil type mapped by the USDA and presented by the Applicant is "Udorthents, Wet Substratum". They are described as "gently sloped areas that were previously tidal marsh, flood plains, bays, harbors, and swamps that have been filled. Fill consists of various types of soil material, rubbish and refuse" (see "Drainage Report" prepared by Tetra Tech Rizzo, Appendix D). This is supported in some of the soil test pit logs where "unsuitable materials" were found: TP-1 (impervious surfaces), TP-2 (disturbed soil and fill material), TP-4 (impervious layers), TP-5 (fill materials and impervious layer), TP-6 (disturbed soils and impervious layers) and TP-8 (impervious layers).

Another analysis of groundwater conditions on the site is provided by McPhail Associates, Inc. during 2000 – 2001. During this period groundwater levels were measured at five locations throughout the site. Specifically, a water table elevation of 7.6 feet was recorded at OW B-4 on April 2, 2001 and an elevation of 5.9 feet was recorded at OW B-5 on April 2, 2001. These measurements suggest that higher groundwater levels may occur and that additional water level monitoring would be helpful in establishing a clearer and more accurate understanding of high groundwater conditions on the site. If the proposed infiltration systems are inundated by high groundwater they will hydraulically fail causing surface flooding on the site.

2. Groundwater Mounding: The proposed drainage system will direct the stormwater runoff from several of the buildings and associated parking areas to three infiltration systems. This will concentrate the stormwater at these three specific locations and will cause the groundwater levels

to rise. This is called groundwater mounding. Mounding will occur under both steady-state conditions (resulting from average annual precipitation and runoff) and more significantly under the larger "design" storms such as the 10 and 100-year events.

According to the drainage report the estimated high groundwater levels under existing conditions will come to exactly 2.0 feet (the minimum requirement in the Massachusetts Stormwater Policy) underneath Infiltration Basins 1 and 3. Any additional groundwater mounding caused by proposed infiltration facilities this groundwater mounding could result in non-compliance with the Policy, and during larger events cause these systems to hydraulically fail. We recommend that the Conservation Commission require the Applicant to provide groundwater mounding analysis to evaluate this impact. It is our experience that groundwater mounding could raise groundwater levels several feet in the immediate vicinity of such infiltration basins.

3. Total Suspended Solids Removal: We do not believe that the project meets the minimum 80% total suspended solids (TSS) requirement in the Massachusetts Stormwater Policy. First, a 70% removal credit is taken for the use of "grassed bio-filter strips". These facilities are not "swales" as defined by the Stormwater Policy, do not meet the dimensional criteria of swales and therefore cannot be credited with this removal rate. Secondly, the underground detention basins (pipes) are assumed to remove 70% TSS. These systems are designed to attenuate peak flows and not as water quality treatment areas. Any sediments that are trapped in the system will be resuspended and transported through the system during subsequent storm events.

The Stormwater Policy guidance clearly pertains to open surface extended detention basins when providing a TSS removal credit (p. 3.A-1). According to the Policy, the effectiveness of properly designed extended detention basins is based, in part, upon "establishing wetland vegetation in a shallow marsh component or on an aquatic bench in the lower stage of the detention basin will enhance removal of soluble nutrients, increase sediment trapping, prevent sediment re-suspension, and provide wildlife and waterfowl habitat." Clearly the subsurface detention structure as proposed will not provide these functions.

4. Thermal/Water Quality Impacts: The runoff from pavement surfaces and rooftops can be very hot during the summer months. The proposed drainage system will direct stormwater into the groundwater and to surface discharges, both immediately upgradient of the adjacent wetlands and Little River. Little River is directly tributary to the Alewife River that has been designated as a Class B river with regard to the Surface Water Quality Regulations (314 CMR 4.00). Among other standards, the Regulations limit discharges such that "a rise in temperature due to a discharge shall not exceed 5 degrees F (2.8 degrees C)". Given the high amount of impervious cover, thermal impacts to wetlands and the associated aquatic ecosystems can be significant and should be assessed.

5. Compensatory Flood Storage Area: The applicant has proposed a compensatory flood storage area in the southern portion of the site area as mitigation for filling portion of the floodplain. This area is also identified on the Site Plan as the discharge location for stormwater

discharges from the proposed development (see FES1 associated with Underground Basin 2). The Applicant should explain how this facility can accommodate both of these events occurring simultaneously.

A second issue associated with the proposed compensatory flood storage area is groundwater. The bottom of this basin is shown at elevation 5. An observation well, OW-4 is located in the area of this basin and has shown groundwater elevations as high as 5.9 feet. During high groundwater periods, it appears as though the effective storage volume will be reduced. This should be accounted for in the computations.

6. Additional Stormwater Policy Comments:

a) The "Maximum soil infiltration rates should generally not exceed 0.5 inches per hour to ensure adequate pollutant removal" (pg 3.E-7). This is in agreement with Standards and Specification for Infiltration Practices, which is reference by the Policy on page 3.E-5. The Applicant is using percolation rates in the range of 1 to 2 minutes per inch (the equivalent of 30 – 60 inches/hour), which do not conform to this requirement.

b) Infiltration is not allowed in fill material (page 3.E-8). It is unclear how much of the site is actually fill material. Further test pits are required in the areas of the proposed infiltration areas, if this stormwater management method is pursued further.

c) The Stormwater Policy requires "a minimum of two soil borings should be taken for each infiltration trench" and "infiltration trenches over 100 feet in length should include at least one additional boring location" (pg 3.E-7). This requirement is not met.

d) The Applicant does not meet the minimum upslope setback for an infiltration system to water of the Commonwealth of 100-feet (pg 3.E-8).

Please contact me at your convenience with any questions that you might have regarding these comments.

Sincerely,

HORSLEY WITTEN GROUP, INC.

Scott W. Horsley
President