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May 31, 2013

Ms. Amanda Loomis
Framingham Planning Board
Memorial Building
150 Concord Street
Framingham, Massachusetts 01702

Re: Ford's Hill Estates – Second Stormwater and Wastewater Management Plan Review

Dear Ms. Loomis:

The Horsley Witten Group, Inc. (HW) is pleased to submit this second plan peer review to the Town of Framingham (the Town) Planning Board (the Board) for the proposed stormwater management and wastewater management designs for the Ford's Hill Estates subdivision project. Other aspects of the proposed project (e.g. water supply, traffic, wetlands, fire protection, etc.) are not included as part of this review.

Previously, HW submitted an initial review of the proposed wastewater and stormwater designs in a letter dated May 16, 2013. In response, the Applicant submitted revised plans, calculations, and associated materials on May 23, 2013. This second review letter addresses the adequacy of the Applicant's responses to our initial review comments. For clarity, the initial review comments are repeated here, with a statement regarding the adequacy of the Applicant's response following in italics.

General Soil Testing Comments

Some aspects of the soil testing affect both the wastewater and stormwater design components of the project and are, therefore, discussed first to provide background for subsequent wastewater and stormwater comments.

a. The Applicant estimated seasonal high groundwater (SHGW) at key locations across the property based upon the observation of Redoximorphic Features (mottles) in test pits. Mottles were observed in the majority of the testing locations. SHGW estimates based on soil mottling are highly variable across the site, sometimes in relatively close geographic proximity. For example, test pits DTH 110 and DHT 111 in the vicinity of the proposed infiltration basin, are located within approximately 50 feet of each other, yet have SHGW estimates that vary by five feet. SHGW estimation based upon test pit mottling can sometimes be inconclusive. There is a range of soil colorization that can develop in response to different durations and extents of soil saturation. In low-permeability till materials, such as those that characterize much of the site, variegated soil colorization can develop above the true SHGW as rain water slowly infiltrates. More definitive soil mottling is generally indicative of true SHGW, or sometimes perched groundwater.

   The Applicant has addressed this comment. The Applicant has provided an additional test pit in the location of the infiltration basin bottom.

b. Title 5 outlines several different allowable methods for determining the estimated SHGW. Methods include the observation of mottles, on-site observation of actual depths to groundwater, or by correlation with a nearby USGS Index Well using the "Frimpter" method. The Frimpter method is approved by the Department of Environmental Protection (DEP) and is often useful when site observations occurred at a time when groundwater is not within the annual high range, or when observations of soil mottling are inconclusive. We note that there are a number of observation wells located on site from which groundwater elevations could be measured and Frimpter SHGW adjustment made. This additional source of SHGW information could help better refine SHGW estimates in locations where the mottling information is inconclusive and/or inconsistent.

The Applicant has addressed this comment. The Applicant has provided Frimpter SHGW calculations that corroborate the observed SHGW estimate from the new test pit dug in the location of the proposed infiltration basin.

2. Wastewater Design Comments:

a. Section 15.212 of Title 5 (Depth to Groundwater) states that *"The minimum vertical separation distance of the bottom of the stone underlying the soil absorption system above the high ground-water elevation shall be four feet in soils with a recorded percolation rate of more than two minutes per inch or five feet in soils with a recorded percolation rate of two minutes or less per inch."* There are several deep observation test holes in which SHGW is estimated to be less than four feet below grade, requiring the leaching area to be mounded above the existing grade. We defer to the Board of Health to determine if such mounded systems are permissible, and for compliance with this section of the regulations.

Comment is informational only. The Applicant has not yet completed final septic system designs. The BOH will review and comment on the proposed septic system designs when they are submitted.

b. Proposed elevations of the septic components and associated grading are not shown on the plans. In order to meet the required separation to the estimated SHGW, some leaching areas will likely be "mounded systems" that require fill over the existing grade, as discussed above. With the information currently provided, we are unable to determine if the grading requirements will be met per Section 15.255 (breakout elevation and 3:1 side slopes), especially for the mounded systems. The grading required to construct mounded systems may also potentially impact the stormwater system design by requiring more land clearing than currently estimated, or by altering the drainage areas.

Comment is informational only. The Applicant has not yet completed final septic system designs. The BOH will review and comment on the proposed septic system designs when they are submitted.

c. Septic tanks, pump chambers and reserve leaching areas are not shown on the plans. Therefore, we are unable to confirm that all required setbacks are being met.

Comment is informational only. The Applicant has not yet completed final septic system designs. The BOH will review and comment on the proposed septic system designs when

they are submitted.

d. Title 5 requires (Sections 15.102 and 15.104) that a minimum of two deep observation hole tests be performed in the primary leaching area and two in the reserve area along with percolation tests in both the primary and the reserve leaching areas. Most of the proposed lots (i.e, lots 3, 4, 5, 6, 7, and 8) do not appear to meet this requirement. Reserve areas are not explicitly called out on the plans. If separate reserve areas are envisioned, then none of the lots currently meet the requirement for two test pits in each reserve area.

   The Applicant has clarified that the reserve trenches will be located between the primary trenches in the same footprint area. Septic system designs have not yet progressed to the point that those footprint areas have been quantitatively sized. There are at least two test pits in each conceptual leaching area footprint, or in very close proximity, which is adequate at the conceptual level. When final septic system designs are completed, the BOH will review and determine if the current test pit distribution adequately meets their requirements.

e. There was no percolation test log submitted for PT-C on Lot 8. The corresponding deep observation hole log shows a layer of sandy loam from 54" to 90" below grade, which would be considered the most restrictive layer in which the percolation test should be performed. A log for PT-C, conducted within the most restrictive layer, should submitted, or a new percolation test should be conducted to illustrate compliance with this requirement.

   The Applicant has addressed this comment by shifting the proposed leaching area footprint away from the missing percolation test log and to another area with two adequate test pits and percolation tests.

f. The Impact Statement contains conflicting references to the number of bedrooms. On page 4, 4 bedrooms per home is referenced and on pages 6 and 10, it claims that the homes will be either 4 or 5 bedrooms, with an average of 4.5. It appears that the majority of the lots (with the exception of Lots 2 and 3) have the required area to support a 5 bedroom system (per 310 CMR 15.214). We recommend that the narrative be revised for consistency.

   Comment is informational only. The Applicant has clarified that there will be an average of 4.5 bedrooms. Meaning some lots will have four bedrooms and others five. All but two of the lots have sufficient land area to support 5 bedrooms.

g. Because each home will be served by a separate Title 5 septic system and private well, the area is considered a Nitrogen Sensitive Area as designated by Title 5 (310 CMR 15). Title 5-approved septic systems for individual residential lots are presumed by DEP to be compliant from a nitrogen loading standpoint so long as they meet the so-called “440 rule”, with no more than 440 gallons per day (gpd) of Title 5 septic flow per 40,000 square feet of lot size. The proposed lots are all of adequate size to meet this requirement for four bedrooms, and all but two of the lots are of adequate size to support five bedrooms.

   Comment is informational only.

h. The information currently submitted for Planning Board review is significantly less detailed than what will be required the by Board of Health (BOH) before it can approve septic system designs.

Comment is informational only. The Applicant has not yet completed final septic system designs. The BOH will review and comment on the proposed septic system designs when they are submitted.

3. Stormwater Design Comments:

a) MASWMS encourages applicants to use low impact development (LID) techniques as much as possible. While the current plans do include some appropriate LID practices, we encourage the Applicant to explore incorporating more LID techniques in the design. Potential options to consider include, adding meanders to the rectilinear wet water quality swale, pervious covers for sidewalks and driveways, adding roof rechargers, and providing stormwater treatment inside the cul-de-sac.

The Applicant has addressed this comment. The Applicant has proposed recharge chambers to infiltrate roof runoff. Additionally the Applicant has submitted two alternative plans showing a 50 foot right-of-way and a no cistern options. Both of these options require less grading and impervious area and, therefore, present a lower environmental impact than the current design.

b) The Applicant's sheet entitled "Proposed Drainage Areas" does not show land cover (woods, pavement, roof, grass, etc.) nor does it depict all of the proposed features or clearing limits. It is difficult at this time to confirm that land use within drainage areas is correctly modeled.

The Applicant has addressed this comment.

c) The Applicant's sheet entitled "Proposed Drainage Areas" shows P2, P3, and P5 drainage areas as flowing off site, unmanaged. These drainage areas contain impervious areas including portions of the gravel fire road, the fire cistern, the entrance of the cul-de-sac, and some house lots and associated foundation drains. Therefore, stormwater runoff is not in compliance with MASWMS Standards 1 and 4 for these drainage areas. MASWMS Volume 1, Standard 1 requires no new untreated stormwater discharges. MASWMS Volume 1, Standard 4 requires stormwater management systems to provide 80% total suspended solids (TSS) treatment prior to discharge. MASWMS Volume 3 provides *de minimus* calculation guidance for the purposes of Standard 4. We ask the Applicant to show that the stormwater management system meets Standards 1 and 4, or to provide a *de minimus* calculation, if applicable.

The Applicant has addressed this comment by adding a swale to treat runoff from the formerly untreated portion of the gravel fire road and convey it to the overall stormwater management system, and by providing calculations to demonstrate that the other areas meet the de minimus criteria.

d) The proposed infiltration basin design is based upon soils information from test pits DTH 110 and 111, which are approximately 60 – 80 feet away from the location of the proposed infiltration practice bottom. Therefore, we ask the Applicant to provide an additional test pit in the central area of the basin bottom. Additional soil information is needed because

SHGW levels vary considerably between test pits DTH-110 and DTH-111. See comments 2e and 2f.

The Applicant has addressed this comment. The Applicant has provided an additional test pit in the location of the infiltration basin bottom.

e) MASWMS Volume 2 requires a two foot separation between infiltration basins and SHGW. As discussed in Section 1 of this letter, test pit DTH 110 and DTH-111 show widely variant SHGW estimates in close spatial proximity; 312.5 feet and 317.5 feet, respectively. The bottom of the infiltration basin is proposed at 318 feet. Depending on where SHGW actually is beneath the infiltration basin bottom (within the range estimated between DTH-110 and DTH-111), the proposed infiltration could be compliant with the SHGW separation requirement, require a groundwater mounding assessment to determine compliance, or not be compliant under any circumstances. We ask the Applicant to provide additional subsurface soil information beneath the location of the basin bottom to ensure it meets the required two foot separation. See comments 2d and 2f.

The Applicant has addressed this comment by completing an additional test pit in the location of the infiltration basin bottom, and providing a corroborating Frimpter SHGW calculation.

f) MASWMS Volume 3 requires a mounding analysis for exfiltration systems which exhibit less than four feet of separation between the bottom and SHGW, and are used to attenuate the 10-year storm or greater for purposes of meeting the MASWMS peak discharge requirement. It is unclear from the material submitted how the proposed infiltration basin contributes to the HydroCad modeled evaluation of peak discharges. As stated previously in comments 2c and 2d, we recommend additional soil testing to confirm SHGW elevation and recommend that a mounding analysis be conducted if separation is less than four feet. In addition to the requirements of MASWMS Standard 2 regarding peak discharge, we are also concerned that groundwater mounding effects may compromise the calculated ability of the infiltration basin to meet MASWMS Standard 3 for groundwater recharge.

While not included in the actual application package to the Board, we are aware of a groundwater mounding analysis submitted by the Applicant as part of a May 13, 2013 letter written in response to comments submitted by the BOH. No discussion of methods or results of the mounding analysis were included with that letter, but the submitted mounding analysis showed a 4.1-foot groundwater mound resulting from an undefined storm event that inundates the infiltration basin to a height of approximately 1.5 feet above the basin bottom. If accurate, those results raise questions about the infiltration basin's ability to infiltrate stormwater and meet MASWMS groundwater recharge requirements. Unsaturated conditions beneath the basin are required for infiltration and recharge to occur.

Using the same input parameters as shown in the Applicant's analysis, we duplicated the same 4.1 foot groundwater mound shown by the Applicant. We recommend that, if further evaluation indicates an accurate separation from SHGW of four feet or less, a groundwater mounding analysis be submitted. That analysis should be conducted based on in-situ testing of aquifer input parameters and fully described as to methods and results. The ability of the basin to dewater within the required 72-hour time frame, provide adequate groundwater recharge, and provide sufficient peak discharge attenuation should be discussed when considering the affects of groundwater mounding.

The Applicant has addressed this comment by completing an additional test pit in the location of the infiltration basin bottom, and providing a corroborating Frimpter SHGW calculation. The vertical separation between the bottom of the proposed infiltration basin and SHGW is greater than four feet and, therefore, a groundwater mounding analysis is not required.

g) MASWMS Volume 2 suggests that infiltration basins be designed with the inlet and outlet at distal ends to create a longer flow path and ensure even spreading of runoff. Currently the proposed infiltration basins inlet and outlet are at an approximately 90-degree angle and are 40 feet apart. We recommend the Applicant try to position the inlet and outlet of the infiltration basin as far apart as possible.

The Applicant has addressed this comment.

h) The infiltration basin shows exfiltration through the entire wetted area including sideslopes. Exfiltration does not occur in significant amounts through sideslopes. The Applicant should only use the surface area of the basin bottom to account for exfiltration.

The Applicant has addressed this comment.

i) MASWMS Volume 2 requires infiltration basins to be located 50 feet from any slope greater than 15%. The proposed infiltration basin has a proposed fill berm with slopes of 30%, ending at contour 316. Where proposed contour 316 meets existing contour 314 a slope of about 50% is created. We advise the Applicant to address this, as the concern for breakout failure is high and the proposed infiltration basin is less than 100 feet to a wetland resource. Groundwater mounding, as discussed in comment 2f, may also contribute to this breakout concern and should be evaluated.

The Applicant has addressed this comment by providing a construction detail for the proposed berm that shows it to be appropriately designed with an impermeable core compacted and keyed into the native soils beneath.

j) Test pits DTH-112 and DTH-113 in the area of the proposed wet water quality swale show mottles at elevations of 313.5 feet and 312.33 feet respectively. The proposed wet water quality swale has a bottom elevation of 309 feet. Wet water quality swales are intended to have a permanent pool, but that pool is generally designed to be approximately one foot or less. The Applicant's proposed wet water quality swale has a permanent pool depth of

approximately 4 feet(based upon the SHGW estimates from test pits DTH-112 and DTH-113); limiting the types of vegetation that can be grown in the swale, the storage capacity of the swale, and the retention time for water flowing through the swale . This would mean that the treatment capacity of the swale would be diminished. Further implications of the permanent pool depth are discussed below in comments 2k and 2l.

The Applicant has addressed this comment by adding a notation to the plans that shows a low flow outlet at elevation 309.5 feet, for a permanent pool depth of six inches.

k) The Applicant did not model the starting elevation of the permanent pool of the wet water quality swale at the appropriate groundwater elevation of approximately 313 feet (based upon the SHGW estimates from test pits DTH-112 and DTH-113). We ask the Applicant to revise their HydroCad model to correctly show the permanent pool in the wet water quality swale. See comments 2j and 2l.

The Applicant has addressed this comment.

l) MASWMS Volume 2 states that wet water quality swales should be designed to convey the 10 year storm event with at least 1 foot of freeboard above the 10 year storm event elevation. Wet water quality swales must also convey the 2 year storm event without erosion. Currently, the amount of freeboard available in the wet water quality swale is unknown because the HydroCad model does not incorporate the permanent pool. We ask the Applicant to revise their calculations, model, and design as necessary to reflect the correct SHGW, incorporate a permanent pool of appropriate depth, and meet the MASWMS Volume 2 design criteria. We also recommend that the Applicant choose the vegetation of the wet water quality swale appropriately, so that it may grow in the permanent pool, because the vegetation is important in providing some of the treatment for this practice. See comments 2j and 2k.

The Applicant has addressed this comment.

m) MASWMS Volume 2 recommends a pea gravel diaphragm as adequate pretreatment for lateral flows to a wet water quality swale. As some runoff from roofs and driveways will flow directly overland to the wet water quality swale, we recommend the Applicant add a pea gravel diaphragm.

The Applicant has addressed this comment.

n) The Applicant proposes to use the wet water quality swale during the construction period as a temporary sedimentation basin. Because SHGW creates a permanent pool in the basin (see comments 2j, 2k, and 2l), storage capacity in the swale may be limited and discharges from the swale could be frequent during the construction period. Discharge from the swale to the wetland resource areas during construction should not contain any sediment. We recommend that the Applicant provide specific notes to the plans and to the Stormwater Pollution Prevention Plan regarding monitoring of discharge from the temporary

sedimentation basin during construction to prevent sediment transport to wetland resource areas.

The Applicant has not completely addressed this comment. We recommend that a note be added to the plans, and that additional detail be added to the Stormwater Pollution Prevention Plan to require monitoring of the swale and its outlet during construction to prevent sediment transport to the downgradient wetlands.

o) The slope on the uphill side of the wet water quality swale appears to be approximately 10%. We recommended that the Applicant ensure vehicles can move along the wet water quality swale to provide maintenance.

The Applicant has addressed this comment.

p) We recommend adding elevations (including the permanent pool) to the details of the cross sections of the infiltration basin, wet water quality swale, and to the outlet control device for the wet water quality swale to aid in construction.

The Applicant has addressed this comment.

q) MASWMS Volume 2 recommends that an observation point be installed in infiltration basins.

The Applicant has addressed this comment.

r) The Applicant does not provide mosquito prevention plans in the O&M plan. The wet water quality swale is designed to have a four-foot deep permanent pool which would create mosquito breeding habitat. We recommend that the Applicant address this concern.

The Applicant has addressed this comment.

We appreciate the opportunity to provide review comments on the proposed stormwater and wastewater management systems for the subject site. Please feel free to contact me with any questions or comments.

Sincerely,

HORSLEY WITTEN GROUP, INC.

Neal Price
Senior Project Manager