

Brem - 113 - 11.17.2014

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NOV 17 2014

	Issue	Test	Explanation/Comments
1	<p><u>Impacts from Project's Wells on Abutters' Wells</u></p> <p>The Project will tap into an aquifer that already serves a neighborhood of single-family homes. The existing homes in the neighborhood are on large lots, spreading the demand on the aquifer. The Project will introduce 19 new homes in a small geographic area, tapping into the same aquifer. This may have the effect of reducing the available well water for the entire neighborhood, including the Project.</p>	<p>The Applicant has agreed to perform pump tests of its wells, and to monitor water levels in wells of abutters within 500 feet of the Project's wells. GHC has proposed a \$15,000 deposit by the Applicant into escrow to cover the costs for an abutter who must dig a new, deeper well if the Project's wells cause abutters' wells to fail. <i>GHC</i>, 11/14/14, p. 2.</p>	<p>Since the Project is proposed in phases, and nine wells are proposed, if individual wells are tested one at a time when they are brought on-line, it will not be possible to get a complete picture of possible impacts to abutters' wells. See, Letter from Town Counsel Tom Harrington to DEP, 11/14/14, p. 5. For this reason, among others, the Project's wells should be classified as a "public water system" under DEP regulations. <i>Harrington</i>, 11/14/14, generally. If the wells are not treated as one system by DEP, then all of the Project's wells should be installed first and pumped-tested simultaneously. A comprehensive "Well Monitoring Plan and Protocol" was developed for the Coventry Woods 40B decision (Section K), and there is no reason to depart from this precedent:</p>
2	<p><u>Nitrogen Loading Impacts on Wells</u></p> <p>The Project Site is a "nitrogen sensitive area" under Title 5 regulations. 310 CMR 15.214(2). Under DEP's governing "Nitrogen Loading Guidance," large systems such as what are proposed must meet a 10mg/l standard for concentrations of nitrogen in the groundwater at property boundaries. See, <i>DEP Guidance</i>, p. 6. On-site and abutting wells are at greater risk of elevated nitrogen concentrations due to presence of fractured bedrock.</p>	<p>DEP's Nitrogen Loading Guidance requires applicants to undertake a "mass balance analysis," which is a predictive model that measures nitrogen loading based on soil conditions and groundwater flow direction.</p> <p>The Applicant has agreed to do this model, but not in the correct way. Instead of measuring the dilution rate from each septic system and calculating the concentration from each system at specific downgradient points on a map, the Applicant is proposing to aggregate all of the wastewater flow from the project and dividing the total amount of recharge on the property. <i>Horsley</i>, 10/2/14, p.1. GHC concurred in its 10/19/14 letter (Para. 1, 6).</p>	<p>Title 5 puts a cap on septic system design flow for "nitrogen sensitive areas" of 440 gallons per day, per acre. This Project will significantly exceed that standard, but the Applicant has proposed to utilize enhanced nitrogen removing systems that purportedly will provide an equivalent amount of nitrogen concentration to the 440 gpd standard, and which purportedly will be approved by DEP. In addition to the 440 gpd standard, this Project must also meet the 10mg/l standard for nitrogen at property boundaries. Aggregating the flow and compiling average concentrations at property boundaries is not sufficient. DEP's Guidance states that "[w]hen siting Title 5 systems and private wells in the same area, the location, depth and construction of private wells and the hydraulic interactions between septic system discharges and private wells should be taken into account." GHC observed that "to determine nitrate concentrations downgradient of leach fields, it is necessary to include a calculation of the nitrate plumes that will develop downgradient of the proposed leach fields." <i>GHC</i> 10/19/14, p. 2.</p>

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3	<p><u>Pathogen Impacts on Wells</u></p> <p>On-site and abutting wells are at greater risk to pathogens (virus/bacteria) due to presence of fractured bedrock. The Applicant agreed to undertake a pathogen impact analysis.</p>	<p>A pathogen transport model is widely used and accepted in the hydrology community. Pathogens do not "dilute" in the way nitrogen does, but they become inactive over time. A "time of travel" estimate must be established for the model, estimating the duration of pathogens leaving the septic systems. The Applicant and GHC agreed that a 2-year time of travel would be appropriate here.</p>	<p>To calculate whether pathogens will be in the groundwater in the location of on-site and abutters' wells, the direction and rate of groundwater flow must be determined first. Since groundwater on and abutting the site moves through bedrock fractures, the orientation and location of these fractures need to be identified. This is typically done through a "trace fracture" or dye analysis. <i>Horsley</i>, 10/3/14, p. 1. DEP's <i>Private Well Guidelines</i> state that, in siting wells near septic systems, "[i]t should be kept in mind that contaminants can be transported great distances through fractured bedrock and groundwater flow in the overburden may not be in the same direction as in the bedrock." <i>DEP PWG</i>, p. 16.</p> <p>GHC recommended that "groundwater flow rate and direction will need to be determined for the transport and plume analyses. It should be done for the surficial and bedrock aquifers..." <i>GHC</i>, 10/19/14, p. 3.</p>
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