ROCKINGHAM COUNTY CONSERVATION DISTRICT
110 North Road, Brentwood, NH 03833-6614
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www.rockinghamccd.org

September 30, 2015

Mr. Andrew Corrow, Chair
Durham Planning Board
Durham Town Hall
8 Newmarket Road
Durham, NH 03824

Re: Application for Conditional Use Permit for Water Quality Permeable Reactive Barrier
4 Griffith Drive, Durham, NH

Dear Mr. Corrow and Members of the Planning Board,

Thank you for considering this application for a Conditional Use Permit for installation of a Permeable Reactive Barrier (PRB) to test the effectiveness of this passive water quality treatment tool at a residential property at 4 Griffith Drive in Durham. In addition to this letter the planning board application includes:

- A Conditional Use Permit Application
- A letter of intent detailing the proposed project.
- A letter of authorization from the landowner.
- A letter requesting CUP application fee waiver.
- A list of abutters
- A copy of the current deed
- A two-sheet plan set showing the location of the PRB and all required site features on the Conditional Use Permit Application Checklist.
- A locus map for the project
- A schematic diagram showing the PRB concept in cross section.
- A letter from Sally Soule, New Hampshire DES Watershed Assistance Bureau stating that this project does not require a permit or waiver from the NHDES Subsurface Bureau, and the signed Memorandum of Understanding between Rockingham County Conservation District and the Landowner for the project.
- A letter detailing the requirements set forth in Durham Section 175-23 C.

Background and Project Introduction

Great Bay has been identified in New Hampshire as an impaired water body for excess total nitrogen levels. Many sources have been identified, including nitrogen from septic systems. In the past, active on-site septic system technologies to remove nitrogen from effluent have been expensive and subject to mechanical failure. However, a new passive water quality treatment system called a Permeable Reactive Barrier (PRB) is being tested. This technology is designed

to passively control nitrogen in conjunction with an existing or new septic system to prevent nitrogen migration to sensitive watershed areas without any mechanical equipment. A schematic diagram showing how a PRB system works follows this summary.

The Rockingham and Strafford County Conservation Districts received funding through the New Hampshire Department of Environmental Services Watershed Assistance Grant to test and demonstrate this new technology at two sites - 4 Griffith Drive in Durham and at Windsor Meadows Condominium Association in Brentwood. The owners of both sites have provided their written permission for these projects.

Small wells were installed by hand around each site's septic system, and have been sampled four times prior to planned construction of the PRB system. These samples will help us to understand the amount of nitrogen leaving the septic system leach fields before the installation of the PRB. Based on the sampling results, site-specific designs for the Permeable Reactive Barriers have been developed.

PRB Installation and Operation

The PRB will be installed by excavating a trench approximately 5 feet deep and 1.5 feet wide along the downgradient side of the existing leach field. The trench will then be filled with Nitrex media and wood chips. As groundwater passes through the barrier filter material, dissolved inorganic nitrogen in the groundwater will be converted to nitrogen gas, which will then be slowly released from the soil. The surface the area above the trench will be mounded approximately 0.5' above ground surface and re-seeded. A shallow 1 -inch diameter monitoring well will be placed in the trench for long-term water quality monitoring to supplement the five wells already installed. No other plumbing or equipment is associated with this passive water quality treatment system. The life expectancy of the treatment trench is approximately 15 years.

This trench is designed to reduce the discharge of inorganic nitrogen (primarily nitrate and nitrite) to the nearby wetland and Chesley Brook, a tributary of the Oyster River. Elevated nitrate and nitrite can impair water quality for drinking water consumption and can degrade surface water and aquatic habitats especially in estuary settings such as the tidal portion of the Oyster River and Great Bay.

Project Management

Danna Truslow, PG is the project manager and hydrologist for this project. Leonard Lord, CWS, District Manager of the Rockingham County Conservation District is co-project manager. Vicky Stafford, District Manager of Strafford County Conservation District is a project coordinator. Mark Kelly, P.E. of Haley and Aldrich, Inc. is the consulting engineer on the project and Lombardo Associates, Inc. is the PRB engineer for the project. Mr. Kelly and Conservation District Staff will oversee the installation.

This project was partially conceived by David Cedarholm while Durham town engineer and is designed as an Oyster River Watershed restoration activity. April Talon, Town Engineer, and the Town of Durham Public Works department is providing guidance, equipment, and labor to complete the work at the Durham site. The site will then serve as a demonstration project for this technology. The wells will be sampled after installation in 2015 and 2016, ending in December 2016. All of this work will all be done at no cost to the homeowner.

The Wetland Conservation Overlay District conditional use standards are included below.

1. There is no alternative location on the parcel that is outside of the WCO District that is feasible for the proposed use;

The location of the PRB has been designed to intercept and treat groundwater moving from the septic system leach field downgradient to the wetland and Chesley Brook. It is also located to be out of the wetland and away from the septic field. A slit fence and other erosion control measures will be installed during construction to prevent impacts to the wetland and brook.

2. The amount of soil disturbance will be the minimum necessary for the construction and operation of the facilities as determined by the Planning Board;

The trench is designed to be 1.5 feet wide, approximately 5 feet deep and about 60 feet long. We will set aside topsoil and re-use that for cap on the trench and it will then be re-seeded to prevent erosion. Soils taken from the excavation will be transported off-site to the Durham DPW. We will protect the ground used for staging and movement of vehicles with plywood or mats to prevent disturbance outside the trench area. If the project is approved in the November 18th meeting, Durham DPW will plan to install the trench in late November or early December when the ground will be frozen or partially frozen which will further prevent damage to the soils and construction area.

3. The location, design, construction, and maintenance of the facilities will minimize any detrimental impact on the wetland, and mitigation activities will be undertaken to counterbalance any adverse impacts; and

As explained above, the layout and erosion control and soil disturbance measures are designed to prevent impacts to the wetland. The water quality will be improved by reducing overall nutrient loads in particular, nitrate, which can cause eutrophication of estuarine waters such as the Oyster River and Great Bay to which Chesley Brook Drains. The trench area will be re-seeded and should need little or no maintenance. Groundwater monitoring in the existing monitoring wells will be continued after installation to determine the

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effectiveness of the PRB. This information will be shared with the town through reports and outreach after the trench is installed.

4. Restoration activities will leave the site, as nearly as possible, in its existing condition and grade at the time of application for the Conditional Use Permit.

As described in the previous sections the site will be restored after construction to its original condition. The area above the trench will be slightly mounded but other than that will look as it did before construction.

I hope the information provided is helpful for your decision regarding this project.

In addition to the conditions listed above some additional information regarding the project setting requested in the Conditional Use Permit checklist follows.

- The 100-year flood zone does not fall within the property or project areas. This is based on review of the FEMA DFIRM Map 33017C0377D.
- Currently, approximately 8% of the lot is made up of impervious surfaces including the building and driveway. This project will not add to impervious surfaces on the property.
- April Talon, Durham Town Engineer, is sending a letter to abutters inform them of the project.

Feel free to call me at 603-498-2916 if you have any questions or would like additional information.

Sincerely,

Danna B. Truslow, PG
Hydrologist, Project Manager