Groundwater Monitoring Sampling Protocol
Vineyard Golf Club, Edgartown

Sampling Schedule:
The four sets of paired wells plus the single up-gradient well will be sampled on the following schedule:

Spring during the months of March or April
Fall during the months of September or October

Sampling may occur at any time during these months.

Well Sampling Order of Data Collection:
When arriving at the sampling wells, the process to prepare for and acquire a water sample will proceed as follows:

Inspection
Air pressure equalization
Water table depth measurement
Volume calculation
Purging and field parameter measurements
Extraction volume measurement
Water table rebound measurement
Sample acquisition
Sample handling
Quality Assurance
Post-sampling well security
Sample program uniformity

1. **Inspection:**
   Inspect wells to assure that they have not been tampered with, the locks are secure and the seal at the well pipe-ground contact is intact.
2. **Air Pressure Equalization:**
   Remove well caps and if tightly sealed (threaded) allow 10 minutes for deeper well to stabilize to ambient air pressure.
3. **Depth Measurement:**
   Measure depth to water with pre-cleaned, two-wire depth gauge by two consecutive readings that agree to the nearest 0.02 feet.
4. **Well Extraction Volume Calculation:**
   Based on the depth to water, calculate the volume of water contained within the well pipe. The formula to be used is: water column length (feet) X 0.163 gal/foot = gallons in one well volume.
5. **Well Purging and Field-parameter measurement:**
   Monitoring wells will be purged with a pre-cleaned bailer, dedicated bailers or pre-cleaned submersible pump. Purging shall proceed until five (5) well volumes are removed. At the approximate end of each well volume that is removed a measurement of pH, temperature and specific conductivity will be made and recorded. After at least three (3) well volumes are removed, purging may cease when three consecutive readings of all three parameters have stabilized to within

0.5 degree C, 0.1 pH unit and 5 micromhos. These readings will not be taken from the water to be used for lab analyses. Notes should be taken on the visible condition of the water extracted- cloudy, rusty, muddy, presence of an odor etc.

6. **Extraction volume measurement:**
The volume of water extracted shall be measured by filling and emptying a large container such as a five gallon plastic bucket or other suitable measuring device. After each pail is filled, the water should be disposed at least 10 feet from the pumping well and subsequent pails emptied in different locations to spread the discharge around. The total volume extracted should be entered in the field notes.

7. **Water table rebound measurement:**
After the well has been purged, the water table depth should be measured to determine that the well has filled and returned to at least 75% of the initial volume prior to initiating purging. This water table level should be entered in the field notes.

8. **Sample collection:**
Samples should be placed in appropriate, pre-labeled, lab-cleaned sample bottles. The labels should include the well identification number, time and date of sample collection. Samples to be analyzed for ammonium, Total Kjeldahl Nitrogen (TKN) and Total Phosphorus should be acidified to pH less than 2 units with analytical grade sulfuric acid. Care will be taken to assure that the inner portions of the cap and the bottle are not touched or exposed to other outside contamination while collecting the sample.

9. **Sample handling:**
Sample holding times should be limited to those required by the lab. Sample collection date and shipping should be coordinated with the lab to assure that these times are met. Samples for dissolved analyses should be filtered through a 0.45-micron cellulose acetate or other similar zero-nitrogen filter in the field. Approximately 20 milliliters of filtered sample should be discharged before filling the sample bottle to flush the filter. Samples should be packed in ice in a cooler immediately after collection. Samples should be shipped or delivered to the lab to arrive within 24 hours of collection. An appropriate Chain of Custody sheet should accompany the sample shipment.

10. **Quality Assurance:**
The lab to be utilized should be certified by the Commonwealth of Massachusetts. To assess the accuracy of the lab a blind duplicate sample should accompany each shipment of samples. This sample will be collected from one of the wells, handled as all the others are handled but labeled with a sample identification number consecutive with the well identification numbers i.e. if the well numbers are 1 through 8, the blind duplicate would be labeled as 9. The sample should not be labeled as 1-A or 1-D if taken at well 1. No two consecutive sampling rounds will have the duplicate taken from the same well.

11. **Post-sampling well security:**
The well cap will be locked following sample process completion.

12. **Sample program uniformity:**

The same procedures will be followed in the same sequence at each well.

Lab Analyses to be performed:
The samples shall be analyzed by approved EPA methodology for the following parameters: nitrate nitrogen, nitrite nitrogen, ammonium, Total Kjeldahl Nitrogen and orthophosphate.

Re-testing:
A re-test shall be performed to confirm a total nitrogen (nitrate + nitrite + TKN) result equal to or exceeding 2.0 milligrams per liter.

Equipment decontamination:
This procedure is not required for dedicated well sampling or purging equipment. The decontamination area should be set up away from the well bore of any monitoring well. It should consist of three clean buckets large enough for washing the equipment used. The first bucket will be half full with fresh tap water for rinsing the equipment to remove any loose debris such as mud, organic matter or rust. The second bucket will be half full with tap water and a low sudsing phosphorus and nitrogen free detergent such as Liquinox. The equipment should be scrubbed with a soft bristle brush in the wash water. The third bucket is to catch the rinsate from an isopropyl alcohol rinse followed by a high volume flush with distilled water.

Field Log Book:
A field logbook should be kept during the course of the study with the project name on the cover. Entries with water resistant ink or pencil should be made to record the following items:

- Date
- Well identification number
- Time the well is opened
- Personnel
- Equipment used for purging, sampling and field data collection
- Data recorded as described above:
  - Start and end time for purging
  - Purge method and total volume removed
  - Calibration of field equipment
  - All measurements as described in the protocol
- Sample data:
  - Well identification number
  - Time of sample collection
  - Sample identification number if different than well number
  - Sample appearance

Reporting:
Results will be forwarded to the Edgartown Conservation Commission Agent within 21 days of sampling. In addition to the analyses, a copy of the lab results signed by the appropriate authority at the lab; any record of quality control measures performed by the lab and a copy of the field logbook records will also be forwarded.