

# Assessments of Public Water Supply Sources - RAYMOND

This report is a summary of NH Department of Environmental Services' assessments of the vulnerability of each source used by the public water system(s) located in this municipality. The sources listed here are grouped first by the type of public water system and then by the system itself. Each source was ranked according to a number of criteria; a vulnerability ranking is given for each criterion that applies to the source. *An explanation of each column in the report can be found on the last page.*

Source Number	Source Description	Source Type	Date Assessment Completed	Number of Vulnerability Rankings			Susceptibility Ranking Criteria										
				Highs	Mediums	Lows	Detects	Well/Intake	KCSs	PCSs	Highways/RRs	Pesticides	Septics	Urban Land Cover	Ag Land Cover	Animals	Lagoons

System Type  C=Community; P=Non-Transient, Non-Community; N=Transient

EPAID	<input type="text" value="1971010"/>	System Name:	<input type="text" value="RAYMOND WATER DEPT"/>																	
002	GPW	G	11/2/2001	1	2	9	L	L	L	M	M	L	L	L	H	L	L	L	L	
003	GPW	G	11/2/2001	1	2	9	L	L	L	M	M	L	L	L	H	L	L	L	L	
004	GPW	G	12/3/2004	1	2	9	L	L	L	M	M	L	L	L	H	L	L	L	L	

EPAID	<input type="text" value="1972010"/>	System Name:	<input type="text" value="PEU /LIBERTY TREE ACRES"/>																	
005	BRW	G	9/27/2001	2	0	10	L	L	L	L	L	L	H	L	H	L	L	L	L	
006	BRW	G	8/10/2001	2	0	10	L	L	L	L	L	L	H	L	H	L	L	L	L	

EPAID	<input type="text" value="1972020"/>	System Name:	<input type="text" value="RIVERVIEW MANOR CONDOMINIUMS"/>																	
002	BRW	G	3/13/2001	3	2	7	L	L	L	M	H	L	H	L	H	L	L	L	M	
003	BRW	G	3/13/2001	3	2	7	L	L	L	M	H	L	H	L	H	L	L	L	M	

EPAID	<input type="text" value="1972040"/>	System Name:	<input type="text" value="BRANCH RIVER APTS"/>																	
001	BRW	G	8/31/2000	4	3	5	H	L	L	M	H	L	M	H	H	L	L	L	M	
002	BRW	G	8/31/2000	3	3	6	H	L	L	M	L	L	M	H	H	L	L	L	M	

EPAID	<input type="text" value="1972050"/>	System Name:	<input type="text" value="PAWTUCKAWAY FARMS"/>																	
001	BRW	G	7/24/2000	0	1	11	L	L	L	L	L	L	L	L	M	L	L	L	L	
002	BRW	G	7/24/2000	0	1	11	L	L	L	L	L	L	L	L	M	L	L	L	L	

EPAID	<input type="text" value="1972060"/>	System Name:	<input type="text" value="WESTGATE ESTATES"/>
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Source Number	Source Description	Source Type	Date Assessment Completed	Number of Vulnerability Rankings			Susceptibility Ranking Criteria													
				Highs	Mediums	Lows	Detects	Well/intake	KCSs	PCSS	Highways/RRs	Pesticides	Septics	Urban Land Cover	Ag Land Cover	Animals	Lagoons	Dry discharges	Sanitary radius	Trophic status
001	BRW	G	8/25/2006	0	2	10	L	L	M	L	L	L	M	L	L	L	L	L		
002	BRW	G	8/25/2006	0	2	10	L	L	M	L	L	L	M	L	L	L	L			
003	BRW	G	8/25/2006	0	2	10	L	L	M	L	L	L	M	L	L	L	L			
004	BRW	G	8/25/2006	0	2	10	L	L	M	L	L	L	M	L	L	L	L			
<b>EPAID</b> <input type="text" value="1973020"/> <b>System Name:</b> <input type="text" value="LAMPREY RIVER COOPERATIVE"/>																				
001	BRW	G	6/21/2001	4	2	6	H	L	L	L	H	L	H	M	M	L	L		H	
<b>EPAID</b> <input type="text" value="1973030"/> <b>System Name:</b> <input type="text" value="PEU /GREEN HILLS ESTATES"/>																				
005	RAYMOND WATER DEPT	E	12/3/2001	0	0	0														
<b>EPAID</b> <input type="text" value="1973050"/> <b>System Name:</b> <input type="text" value="HILL TOP COOPERATIVE"/>																				
001	BRW	G	10/12/2000	1	1	10	L	L	L	L	L	L	H	L	M	L	L		L	
002	BRW	G	10/12/2000	1	2	9	L	L	L	L	L	L	H	L	M	L	L		M	
<b>EPAID</b> <input type="text" value="1973060"/> <b>System Name:</b> <input type="text" value="LEISURE VILLAGE"/>																				
002	BRW	G	8/7/2000	4	3	5	H	L	L	M	H	L	H	M	M	L	L		H	
003	BRW	G	8/7/2000	4	3	5	H	L	L	M	H	L	H	M	M	L	L		H	
004	BRW	G	8/7/2000	4	3	5	H	L	L	M	H	L	H	M	M	L	L		H	
<b>System Type</b> <input type="text" value="N"/> <b>C=Community; P=Non-Transient, Non-Community; N=Transient</b>																				
<b>EPAID</b> <input type="text" value="1977010"/> <b>System Name:</b> <input type="text" value="CAMP ONWAY"/>																				
001	BRW	G	7/26/2001	2	0	7	L	L	L	H	L	L	H			L	L			
<b>EPAID</b> <input type="text" value="1977030"/> <b>System Name:</b> <input type="text" value="PINE ACRES CAMPGROUND"/>																				
005	BRW	G	7/26/2001	2	0	7	L	L	L	H	H	L	L			L	L			
006	RAYMOND WATER DEPT	E	2/28/2002	0	0	0														
<b>EPAID</b> <input type="text" value="1977050"/> <b>System Name:</b> <input type="text" value="ONWAY LAKE FAMILY RESORT"/>																				
001	BRW	G	10/9/2000	1	0	8	L	L	L	H	L	L	L			L	L			
002	BRW	G	10/9/2000	2	0	7	L	L	H	H	L	L	L			L	L			

Source Number	Source Description	Source Type	Date Assessment Completed	Number of Vulnerability Rankings			Susceptibility Ranking Criteria												
				Higs	Mediums	Lows	Detects	Well/Intake	KCSs	PCSs	Highways/RRs	Pesticides	Septics	Urban Land Cover	Ag Land Cover	Animals	Lagoons	Dry discharges	Sanitary radius
EPAID 1978070	System Name: THE PINES SEAFOOD HOUSE																		
001	BRW	G	12/17/2002	2	0	7	L	L	L	H	H	L	L			L	L		
System Type <input type="text" value="P"/> C=Community; P=Non-Transient, Non-Community; N=Transient																			
EPAID 1975010	System Name: RAYMOND HIGH SCHOOL																		
001	BRW	G	9/1/2000	2	2	8	L	L	L	M	H	L	L	L	H	L	L		M

## Explanatory Notes

*Abbreviations used in the following notes:*

**HAC** = hydrologic area of concern for a surface water source. For small or undeveloped watersheds, the HAC includes the entire watershed. For all other surface sources, the HAC includes only a portion of the watershed close to the water system intake.

**WHPA** = wellhead protection area for a groundwater source. For community and non-transient systems, the WHPA is the area from which water is expected to flow to the well under extremely dry conditions. For transient systems, the WHPA is the area within 500 ft of the well.

**EPAID:** Each public water system is identified by a 7-digit federal ID number.

**Source number:** Each source is further identified by a 3-digit number.

**Source description:** An abbreviated description of the source from NHDES's database. (Some common abbreviations: BRW=bedrock well; GPW=gravel-pack well; GRW=gravel well; DUG=dug well; PTW=point well; SPR=spring; ART=artesian well; INF=infiltration well.)

**Source type:** G=groundwater (well or spring); S=surface water (lakes, reservoirs, ponds, rivers); E = water purchased from another system (*Purchased sources are not assessed per se, but the original sources used by the seller are assessed*).

**Date Assessment Completed:** The date NHDES completed the process of reviewing available data, collecting new data, and entered the assessment information into its database.

**Number of Vulnerability Rankings:** The number of High, Medium, and Low rankings for that source listed in the columns to the right. Each criterion is explained below. Some criteria do not apply to all types of sources or systems.

**Detects:** Confirmed detections of certain contaminants (after treatment) of suspected human origin, not including disinfection byproducts. L = none detected at or above trigger levels in the most recent round of sampling. There is no M ranking for this criterion. H = contaminants were detected at or above trigger levels.

**Well/Intake:** The integrity of the well (if a groundwater source) or the intake (if a surface water source). L = no unresolved deficiencies with the well or intake identified in the most recent sanitary survey. There is no M ranking for this criterion. H = there are unresolved deficiencies.

**KCSs:** Known contamination sources in the vicinity of the source. This includes any site known to DES where contaminants are known or very likely to have been released to the ground, and where remediation is not complete. L = none present in the WHPA (for groundwater sources) or in the HAC (for surface water sources). M (for community and non-transient systems) = one or more KCSs in the WHPA or HAC but not within 1,000 ft of the well or intake. *There is no M ranking for transient systems.* H = one or more KCSs within the WHPA or HAC within 1,000 ft of the well or intake.

**PCSs:** Potential contamination sources in the vicinity of the source. This includes any site known to DES where contaminants are known or very likely to be used in significant quantities, but where there are no known releases to the ground. L (for community and non-transient systems) = no PCSs within 1,000 ft of the well in the WHPA (for groundwater sources) or none present in the HAC (for surface water sources). L (for transient systems) = none present in the WHPA. M (for groundwater sources serving community and non-transient systems) = 10 or fewer PCSs within 1,000 ft of the well in the WHPA. M (for surface water sources) = one or more PCSs in the HAC but not within

1,000 ft of the intake. *There is no M ranking for transient systems.* H (for groundwater sources serving community and non-transient systems) = more than 10 PCSs within 1,000 ft of the well in the WHPA. H (for transient sources) = one or more PCSs in the WHPA. H (for surface water sources) = one or more within 1,000 ft of the intake in the HAC.

**Highways/RRs:** The presence of numbered state highways or active railroads in the vicinity of the source. L = none present in the WHPA or HAC. M (for community and non-transient groundwater sources) = one or more in the WHPA but not within 1,000 ft of the well. M (for surface sources) = one or more in the HAC but not within 300 ft of the source water. *There is no M ranking for transient systems.* H (for transient sources) = one or more in the WHPA. H (for community and non-transient groundwater sources) = one or more in the WHPA within 1,000 ft of the well. H (for surface sources) = one or more in the HAC within 300 ft of the source water.

**Pesticides:** Whether or not pesticides have been routinely applied in the vicinity of the source. This is based on the presence of land parcels owned by registered pesticide applicators. L = no application areas in WHPA or HAC. M (for community and non-transient sources) = application site(s) in WHPA or HAC but not within 500 ft of the well or within 300 ft of the intake. *There is no M ranking for transient systems.* H = application site(s) within 500 ft of the well or within 300 ft of the intake.

**Septics:** The presence or density of septic systems and sewer lines in the vicinity of the source. L (for community and non-transient groundwater sources) = no septic systems or sewer lines located within 500 ft of the well, and fewer than 30 septic systems in the remainder of the WHPA. L (for surface sources) = no septic systems within 500 ft of surface water. L (for transient sources) = no septic systems or sewer lines within 75 ft of the well. M (for community and non-transient groundwater sources) = fewer than 10 septic systems and no sewer line located within 500 ft of well, and fewer than 30 septic systems in remainder of the WHPA. M (for surface sources) = low density of septic systems (lots averaging 2 acres or more) within 500 ft of surface water in the HAC. *There is no M ranking for transient systems.* H (for community and non-transient groundwater sources) = 10 or more septic systems or any sewer line within 500 ft of the well and/or high density of septic systems (more than 30) in the WHPA. H (for surface sources) = densely developed shoreline (lots averaging less than 2 acres) within 500 ft of surface water in the HAC. H (for transient sources) = one or more septic systems or sewer lines within 75 ft of the well.

**Urban Land Cover:** The percentage of urban land cover in the vicinity of the source, based primarily on satellite images. *This criterion does not apply to sources serving transient systems.* L = less than 10% of the WHPA or HAC is urban, and less than 10% of the WHPA within 1,000 ft of the well is urban. M (for community and non-transient groundwater sources) = less than 10% of WHPA is urban but 10% or more of the WHPA within 1,000 ft of the well is urban. M (for surface sources) = between 10% and 20% of HAC is urban. H (for community and non-transient groundwater sources) = 10% or more of WHPA is urban. H (for surface sources) = 20% or more of HAC is urban.

**Ag Land Cover:** The percentage of agricultural land cover in the vicinity of the source (in the WHPA or within 300 ft of surface water in the HAC), based primarily on satellite images. *This criterion does not apply to sources serving transient systems.* L = no ag land. M = less than 10% ag land. H = 10% or more ag land.

**Animals:** The presence of concentrations of 10 or more animal units in the vicinity of the source. L = none in the WHPA or (for a surface source) within 300 ft of surface water in the watershed. M (for community and non-transient groundwater sources) = one or more such farms in the WHPA but not within 1,000 ft of the well. M (for a surface source) = none within 300 ft of surface water in the HAC, but one or more within 300 ft of surface water in the watershed. *There is no M ranking for transient systems.* H = one or more in the WHPA within 1,000 ft of the well or (for a surface source) within 300 ft of surface water in the HAC.

**Lagoons:** The presence of wastewater treatment lagoons or spray irrigation sites in the vicinity of the source. L = none in the WHPA or (for a surface source) in the entire watershed. M (for community and non-transient groundwater sources) = one or more in the WHPA but not within 1,000 ft of the well. M (for a surface source) = none within 300 ft of surface water in the HAC, but one or more in the watershed. *There is no M ranking for transient systems.* H = one or more in the WHPA within 1,000 ft of the well or (for a surface source) within 300 ft of surface water in the HAC.

**Dry Discharge:** The presence of dry-weather stormwater discharge sites in the vicinity of the source. *Only a handful of surface sources were evaluated for such discharges; no discharges were found.*

**Sanitary Radius:** The presence of development not associated with the well within the sanitary radius (within 75 to 400 ft of the well). *Applies only to groundwater sources serving community and non-transient systems.* Of particular concern are sewer lines, septic systems, or storage of regulated substances in this area. L = no inappropriate land uses or practices. No medium ranking. H = inappropriate land uses or practices were discovered during the most recent sanitary survey, and have not been corrected.

**Trophic status:** The projected trophic (nutrient) status of the source as predicted by a computer model using a future land development scenario for the watershed. *This criterion applies only to 24 lakes, ponds, and reservoirs included in the phosphorus loading study.* L = oligotrophic (relatively good clarity and water quality with low algae population). M = mesotrophic (intermediate clarity, quality, and algae population). H = eutrophic

**APPENDIX C**  
**Wellhead Summary Report**

**Well Name**  
**1. Branch River Apartments**  
Community System  
WHAP: 2600 ft

**Address**  
312 Route 27

**Site Photo**



**2. Hill Top Mobile Home Park**  
Community System  
WHPA: 2600ft

Englewood Drive/Harriman Hill Road



**3. Leisure Village**  
Community System  
WHPA: 4000/7000 ft

Old Route 101/Route 27



**4. Onway Lake Family Resort**  
Non-Community Transient System  
No WHPA

15 Sargent Drive






**5. Pawtuckaway Farms**  
Community System  
WHPA: 2600 ft

Stone Post Circle






## APPENDIX C Wellhead Summary Report



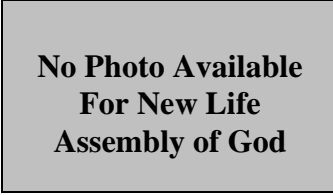

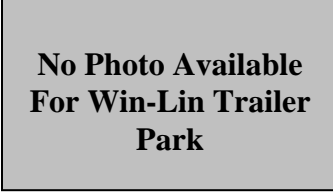

Well Name	Address	Site Photo
<p><b>6. PEU/Clearwater Estates</b> Community System WHPA: 4000ft</p>	263 Route 27	<p style="text-align: center;">No Photo Available for PEU/Clearwater Estates</p>
<p><b>7. PEU/ Green Hills Estates</b> Community System WHPA: 4000ft</p>	Route 107	
<p><b>8. PEU/ Liberty Tree Acres</b> Community System WHPA: 4000 ft</p>	Washington Street	<p style="text-align: center;">No Photo Available for PEU/Liberty Tree Acres</p>
<p><b>9. Raymond High School</b> Non-Transient/Non-Community System WHPA: 2600 ft</p>	45 Harriman Hill Road	
<p><b>10. Raymond Water Department</b> Community System WHPA: 2600 ft Based on Hydrologic Study</p>	Cider Ferry Road	



**APPENDIX C**  
**Wellhead Summary Report**

<b>Well Name</b>	<b>Address</b>	<b>Site Photo</b>
<b>11. Riverview Manor Condominiums</b> Community System WHPA: 4000/7000 ft	202 Route 27	
<b>12. The Pines Seafood House</b> Non-Community Transient System No WHPA	171 Route 27	
<b>13. Westgate Estates</b> Community System WHPA: 4000 ft	Sherry Lane	<p style="text-align: center;"><b>No Photo Available for Westgate Estates</b></p>
<b>14. Zions Camp</b> Non-Community Transient System No WHPA	30 Onway Lake Road	

**APPENDIX C**  
**Wellhead Summary Report**

<b>Well Name</b>	<b>Address</b>	<b>Site Photo</b>
<b>15. Tanglewood Trailer Park</b> Community System WHPA: 2600 ft	Harriman Hill Road	 <p style="text-align: center;"><b>No Photo Available for Tanglewood Trailer Park</b></p>
<b>16. Eaglebrook Church</b> Non-Community/Transient System No WHPA	90 Chester Road	
<b>17. New Life Assembly of God</b> Non-Community/Transient System No WHPA	84 Nottingham Road	 <p style="text-align: center;"><b>No Photo Available For New Life Assembly of God</b></p>
<b>18. Raymond Sportsman's Club</b> Non-Community/Transient System No WHPA	Branch Road/Hanson Road	
<b>19. Win-Lin Trailer Park</b> Community System No WHPA	Chester Road	 <p style="text-align: center;"><b>No Photo Available For Win-Lin Trailer Park</b></p>
<b>20. Pine Acres RV Park</b> Transient System	74 Freetown Road	

## **Appendix D: Amendments to Site Plan and Subdivision Regulations**

## **Groundwater Protection Proposed Amendments to Town of Raymond Site Plan and Subdivision Regulations**

The Raymond Planning Board has adopted both Subdivision and Site Plan Review Regulations under the provisions of RSA 674:35 and 674:43 and 44. These regulations empower the Planning Board to review and approve or disapprove subdivision and site plan applications for the subdivision of land and the construction of a structure or structures or other improvements on a tract of land for any non-residential uses, or for multi-family dwelling units whether or not such development includes the subdivision or resubdivision of the site.

In reviewing both the Planning Board's Subdivision and Site Plan Regulations, the SNHPC has found that there are no provisions in either regulations which provide for or further groundwater protection within the community and more importantly there are no submittal or plan requirements notifying the applicant, the public or the planning board about the need for groundwater protection within the community nor any reference to Raymond's existing Zone I – Groundwater Conservation Zoning District.

This problem can be adequately addressed through the following simple revisions as proposed herein. The overall goal of these revisions is to raise awareness about the need for resource protection among municipal officials, planning board members, property owners, developers and the public by focusing and taking necessary steps and actions which can promote groundwater and drinking water protection within the community.

In justifying the need for amending the Planning Board's subdivision and site plan regulations, it must be restated that the Town of Raymond relies entirely upon both public and private wells for drinking water and thus the town has an interest and duty to protect contributing groundwater to these water resources for the greater public good. In addition, it can not be assumed that Raymond's groundwater conservation district zoning regulations alone are going to be adequate to protect the town's groundwater. Most public officials, boards and commissions often assume that an applicant and his/her engineer have carefully considered and evaluated all environmental concerns during the zoning or site design process. However, this is not always the case and groundwater contamination is more common than most officials realize.

The first basic step that the Planning Board should take during the subdivision and site plan review process is to require the applicant or developer to provide information describing the environmental status of the site.<sup>1</sup> Have any releases occurred on the site? Is the site listed with NH DES or EPA as a hazardous

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<sup>1</sup> Todd H. Dresser, "Using the Site Plan Review Process to Promote Aquifer Protection", Cuoco & Cormier Engineering Associates, Inc., Nashua, NH

waste site? Have hazardous materials or storage tanks been maintained on the site?

These basic questions should be asked and adopted as standard requirements for all subdivision and site plan applications and they can be easily incorporated into either the subdivision/site plan application or submittal requirements of any municipality.

Information about existing contamination is not difficult to obtain. Both NH DES and EPA maintain lists of potential hazardous waste sites on their websites. It is not difficult for municipal officials or an applicant to review these records as part of the site plan review process to confirm that a site or an abutting parcel is not a listed hazardous waste site or generator of hazardous waste.

In addition, the Source Water Protection Plan prepared by SNHPC for the Town of Raymond can be used as a reference guide to help identify both known and potential contamination sources as well as the location of active community water systems and designated wellhead protection areas.

To implement these important and basic requirements, we strongly encourage the Raymond Planning Board to consider the following revisions to the Board's Subdivision and Site Plan Regulations. As you are aware, these revisions do not require a warrant article or town vote. All the Planning Board needs to do is to schedule and advertise a public hearing and adopt the revisions.

### **Site Plan/Subdivision Amendment**

Amend the following existing Sections and insert the following new Sections accordingly into the Site Plan Review and Subdivision Regulations to read as follows:

#### **Site Plan Review Regulations:**

### **ARTICLE V. GENERAL REQUIREMENTS**

#### **Section IX. GROUNDWATER PROTECTION**

The quality of groundwater as defined by RSA 485-C: 2 VIII. shall not be adversely affected by the proposed development. The applicant shall certify that the proposed development does not violate the rules and regulations of Chapter 485-C. Groundwater Protection Act with regard to groundwater and shall meet the following requirements. Proposed developments located within the Town of Raymond's existing Zone I - Groundwater Conservation District shall certify zoning compliance to the Planning Board as part of the site plan review and approval process.

1. Any application for site plan review which involves the proposed receiving, handling, storing or processing of any regulated substance (as defined by RSA 339-A:2) shall disclose this information as part of the application submission. Copies of all appropriate state permits as required by the NH DES for the proposed use shall be submitted to the Town of Raymond Health Officer and Raymond Fire Department as part of the site plan application.
2. Site plan applications which involve property contaminated by hazardous or toxic materials (as defined by RSA 339-A: 2) shall disclose such information as part of the application. If the Planning Board finds that a potential health risk or an environmental threat exists from a previous use or existing use of the site, then the Planning Board shall require that any environmental assessment that has been completed and submitted to NH DES shall be submitted to and reviewed by the Town Health Officer (or 3<sup>rd</sup> party consultant of Board's choice and applicant's expense) prior to any Planning Board action.
3. All Site Plans submitted to the Planning Board for review shall identify:
  - a) All existing aquifers as documented by the Town of Raymond's Aquifer Transmissivity Map (copy of this map is available from the Town Planning Department and as aquifer transmissivity GIS data available on NH GRANIT);
  - b) All designated wellhead protection areas for public water systems as documented in the Town of Raymond's 2009 Source Water Protection Plan prepared by the Southern New Hampshire Planning Commission and on NH DES websites and databases.
  - c) The location of all known and potential contamination sources as documented in the Town of Raymond's Source Water Protection Plan and on NH DES websites and databases.
  - d) A map of natural resources on and near the site, including an assessment of groundwater vulnerability.
  - e) A listing of the types and quantities of regulated and hazardous substances and pollutants which may be used on the site;
  - f) A map and/or diagram of facilities on the site related to groundwater protection, including secondary containment structure, loading/unloading areas, drinking water wells, septic systems, underground storage tanks and storm drain inlets, as applicable:
    - i. A listing of all state and federal regulatory requirements for the proposed use and a note on the plan which identifies the specific rules related to groundwater protection as applicable to regulated substances (Env-Wq.402), groundwater discharge (Env-Wq.402), and stormwater management (e.g. Env-Wq. 1500, AOT);

- ii. Identification and provision for adequate security of all groundwater protection BMPs proposed for the use;
- iii. Identification of any restrictions against discharges to groundwater, including direct and indirect discharges as required by state and federal permits and approvals;
- iv. Verification or approval that all general purposed floor drains be connected to an on-site holding tank; or a system authorized through a state subsurface disposal permit;
- v. Verification or approval that the design of all stormwater management and drainage facilities and structures shall not increase flooding or the potential for pollution of surface or groundwater, on-site and off-site; and
- vi. Submittal of an adequate Spill Prevention, Control and Countermeasure (SPCC) Plan approved by the Fire Chief and Emergency Management Director addressing the following elements:
  - Disclosure statements describing the types, quantities, and storage locations of all regulated substances that will be part of the proposed use or activity;
  - Owner and spill response manager's contact information;
  - Location of all surface waters and drainage patterns;
  - A narrative describing the spill prevention practices to be employed when normally using regulated substances;
  - Containment controls, both structural and non-structural;
  - Spill reporting procedures, including a list of municipal personnel or agencies that will be contacted to assist in containing the spill;
  - List of clean-up equipment with instructions available for use on-site and contact information for employees with adequate training to respond to a release and implement containment and clean up; and
  - Long term monitoring and management objectives.

## **Subdivision Regulations:**

### **Article 4. General Requirements**

#### **11. Groundwater Protection**

The quality of groundwater as defined by RSA 485-C: 2 VIII. shall not be adversely affected by the proposed development. The applicant shall certify that the proposed development does not violate the rules and regulations of Chapter 485-C. Groundwater Protection Act with regard to groundwater and shall meet the following requirements. Proposed developments located within the Town of Raymond's existing Zone I - Groundwater Conservation District shall certify

zoning compliance to the Planning Board as part of the site plan review and approval process.

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3. All Site Plans submitted to the Planning Board for review shall identify:
  - g) All existing aquifers as documented by the Town of Raymond's Aquifer Transmissivity Map (copy of this map is available from the Town Planning Department and as aquifer transmissivity GIS data available on NH GRANIT);
  - h) All designated wellhead protection areas for public water systems as documented in the Town of Raymond's 2009 Source Water Protection Plan prepared by the Southern New Hampshire Planning Commission and on NH DES websites and databases.
  - i) The location of all known and potential contamination sources as documented in the Town of Raymond's Source Water Protection Plan and on NH DES websites and databases.
  - j) A map of natural resources on and near the site, including an assessment of groundwater vulnerability.
  - k) A listing of the types and quantities of regulated and hazardous substances and pollutants which may be used on the site;
  - l) A map and/or diagram of facilities on the site related to groundwater protection, including secondary containment structure, loading/unloading areas, drinking water wells, septic systems, underground storage tanks and storm drain inlets, as applicable:
    - i. A listing of all state and federal regulatory requirements for the proposed use and a note on the plan which identifies the specific rules related to groundwater protection as applicable to regulated substances (Env-Wq.402), groundwater discharge



- ii. Identification and provision for adequate security of all groundwater protection BMPs proposed for the use;
- iii. Identification of any restrictions against discharges to groundwater, including direct and indirect discharges as required by state and federal permits and approvals;
- iv. Verification or approval that all general purposed floor drains be connected to an on-site holding tank; or a system authorized through a state subsurface disposal permit;
- v. Verification or approval that the design of all stormwater management and drainage facilities and structures shall not increase flooding or the potential for pollution of surface or groundwater, on-site and off-site; and
- vi. Submittal of an adequate Spill Prevention, Control and Countermeasure (SPCC) Plan approved by the Fire Chief and Emergency Management Director addressing the following elements:
  - Disclosure statements describing the types, quantities, and storage locations of all regulated substances that will be part of the proposed use or activity;
  - Owner and spill response manager's contact information;
  - Location of all surface waters and drainage patterns;
  - A narrative describing the spill prevention practices to be employed when normally using regulated substances;
  - Containment controls, both structural and non-structural;
  - Spill reporting procedures, including a list of municipal personnel or agencies that will be contacted to assist in containing the spill;
  - List of clean-up equipment with instructions available for use on-site and contact information for employees with adequate training to respond to a release and implement containment and clean up; and
  - Long term monitoring and management objectives.

## **Appendix E - Summary of Aquifer Electromagnetic Survey Results**

### **Overview of Electromagnetic Survey Results for Raymond, NH**

**by Shelley Frost Bobowski, Geosense, P.L.L.C.**

In September 2008, Geosense, P.L.L.C. made several transects to collect electromagnetic measurement and shallow soil borings across Raymond, NH, where the presence of an aquifer was in question.

A Geonics EM-31™ was used to measure earth conductivity at several stations whose locations were recorded with a Garmin 76CSX global positioning system. A minimum of two shallow soil borings were made on each transect, using a post hole digger to excavate soil to a depth of approximately three feet. Transect station locations were located on a surficial geological map of Raymond, and electromagnetic measurements were compared with surficial geology indicated. Results were tabulated and compared with descriptions of collected soil samples.

Comparison of indicated surficial geology with electromagnetic readings and soil sample characteristics indicate the following per transect:

- Transect 1: (northeast side of intersection of Route 27 and Route 152) Results support USGS interpretation of aquifer location.
- Transect 2: (southeast side of intersection of Route 27 and Route 152) Results support NHGS and USGS interpreted presence of aquifer.
- Transect 3: (north side of Onslow Lake Road) Results support NHGS interpretation.
- Transect 4: (west of Route 2, southern Raymond) In the southern part of the transect, results do not support both USGS and NHGS interpreted presence of aquifer (geophysics indicates an aquitard, and soils were a fine sandy silt to silty sand – aquitard/borderline aquifer). Results support USGS (aquifer) in northernmost two stations of transect.
- Transect 5: (west of Route 2, north of Transect 4, southern Raymond) . Electromagnetic readings generally support USGS interpretation.
- Transect 6: (Old Manchester & Old Batchelder Road) Results along road did not support the presence of an aquifer (both where USGS and NHGS indicate it is present), with the exception of one location, along the road near a house on the west side of the road. The general disagreement may be due to shallower(15 feet deep) bedrock in the area, since the EM-31 reads at an average depth of about 18 feet. However, soil characteristics in two borings indicated a sandy silt (aquitard).
- Station 92: High School bedrock well. An electromagnetic measurement was collected at a bedrock well located on a bedrock knob within an area mapped

by both USGS and NHGS as stratified drift deposit and aquifer, respectively. Readings at the well suggested a low-conductivity formation, and the value was similar to till.

- Transect 7: (behind Town or DOT Garage) Results support both USGS and NHGS interpreted presence of aquifer.

In summary, the collected data tended to support USGS interpretation more frequently, but in one large area north of Onway Lake indicated NHGS was the more accurate. Electromagnetic results suggested that in two locations neither USGS nor NHGS were correct. The cause is interpreted to be gradation of aquifer materials to aquitard-quality formation (finer grain sizes), and the presence of shallow bedrock.

John Munn  
Southern NH Planning Commission  
438 Dubuque Street  
Manchester, NH 03102

February 12, 2009

Subject: Electromagnetic Survey Results  
Aquifer Boundary Investigation  
Raymond, NH

Dear Mr. Munn,

Per our proposal dated August 8, 2008 to the Southern NH Planning Commission (SNHPC), in September 2008, Geosense, P.L.L.C. (Geosense) investigated aquifer boundary locations in several areas across Raymond, NH (Figure 1). Two surficial geological maps are available for the Raymond area, one prepared by the United States Geological Survey (USGS - *Geohydrology and water quality of stratified-drift aquifers in the Exeter, Lamprey, and Oyster River Basins, southeastern New Hampshire*, 1990) and the other by the New Hampshire Geological Survey (NHGS - *Surficial Geology Map*, 2008). The USGS map and NHGS map's locations of stratified drift and aquifer material largely coincide; however, there are some areas where fairly large discrepancies exist. Raymond's zoning is tied into the mapped extent of aquifer material, and so the location of the aquifer is necessary for proper governance.

With assistance donated by New England Envirostrategies, Inc. of Concord, NH, Geosense traversed six areas to measure electromagnetic, density, grain size distribution and other properties of soil.

A Geonics EM-31™ was used to measure earth conductivity at several stations along six transects (Attachments 1-4). Station locations were recorded with a Garmin 76CSX global positioning system. A minimum of two shallow soil borings were excavated per transect, using a post hole digger to a depth of approximately three feet. Transect and station locations were located on a surficial geological map of Raymond, and electromagnetic measurements were compared with surficial geology (Attachments 5-7). Results were tabulated and compared with descriptions of collected soil samples. Station locations, electromagnetic measurements, soil descriptions, and geologic interpretations by USGS, NHGS and Geosense are included on Table 1 and discussed in the following paragraphs.

## **FINDINGS**

Electromagnetic measurements fell within a rather narrow range (-4 to 36 milliSiemens per meter – mS/m). Comparison of mapped surficial geology with electromagnetic readings and soil sample characteristics indicate the following:

- Transect 1: (northwest side of intersection of Route 27 and Route 152). Results support the USGS interpretation of aquifer location. The USGS boundaries should be used northwest of the intersection.
- Transect 2: (southwest side of intersection of Route 27 and Route 152). Results support NHGS- and USGS-interpreted presence of aquifer. This transect was made to check the measurements of the geophysical instrument on soil considered by both organizations as aquifer material.
- Transect 3 (north side of Onslow Lake Road). Results support NHGS interpreted absence of stratified drift. The soils in the area varied from a silty fine sand to a sandy subangular to subrounded gravel, and appeared to be a reworked basal glacial till. The soil is likely more permeable than a typically very dense (and low-permeability) basal till; and may in areas serve as a lower-yielding aquifer. NHGS boundaries should be used in this area.
- Transect 4 (west of Route 2, southern Raymond, beyond the end of Ventura Drive). Electromagnetic measurements across most of the transect do not indicate the presence of stratified drift or aquifer material, interpreted by both the USGS and NHGS as present in the area. However, the lower electromagnetic reading is likely due to the existence of bedrock near the instrument's reading depth (18 feet). Shallow soil ranged in character from a sandy silt to a silty fine sand within the upper two feet of to a fine sand with traces of silt and coarse sand at a depth of approximately 3.5 feet. The shallow hole was excavated within 100 feet of a residential drinking water (WSB No. 200.0175). In this area both the USGS and NHGS indicate aquifer material. Electromagnetic measurements at the northernmost two stations of transect support the USGS interpretation of aquifer material. USGS boundaries should be used in this area.
- Transect 5 (west of Route 2, north of Transect 4, southern Raymond). Electromagnetic measurements generally support USGS interpretation of the presence of an aquifer, although the boundary appears to be further west, and so should be adjusted. The starting point of the aquifer is on the inlet road to a large gravel pit located north of Ventura Drive. The location along the road is on the neck of land next to a water body that is just east of the entrance gate to the pit. The pit itself appears to be at the former location of Little Rattlesnake Hill. The aquifer boundary lies between Station 65 (N43.00099, W71.18863) and Station 66 (N43.00143, W71.18957); and between Station 70 (N43.00193, W71.19022) and Station 71 (N43.00131, W71.18982).
- Transect 6 (Along Giles Road, between Old Manchester & Old Batchelder Road). Results along the road did not support the presence of an aquifer (where both the USGS and NHGS indicate it is present), with the exception of one location: near a house on the west side of Giles road and somewhat south of Old Batchelder Road. The general disagreement may be due to shallower bedrock in the area (15 feet deep), since the EM-31 reads at an average depth of 18 feet. However, soil characteristics in two borings along Giles Road indicated a sandy silt (aquitard) rather than sand and gravel.

Topography in the area suggests a rising bedrock surface adjacent to the length of the roughly northwest-southeast trending Giles Road. An entrance to an excavated sand and gravel pit is across from Old Manchester Road. The pit starts at least 50 feet west of Giles road and extends approximately 1,000 feet to the west, supporting the USGS interpretation of a stratified drift aquifer in the area. The USGS interpretation should be used.

- Transect 7 (behind Town or DOT Garage). Results support both USGS and NHGS interpreted presence of aquifer. Very high conductivities (20 to 36 mS/m) suggest a coarser soil, the presence of salt, or a combination of the two.
- Station 92 (High School bedrock well). An electromagnetic measurement was collected at a bedrock well located on a bedrock knob within an area mapped by both USGS as stratified drift deposit and by NHGS as aquifer, respectively. Readings at the well suggested a low-conductivity formation, and the measurement was similar in magnitude to readings taken over glacial till.

In summary, the collected data supported USGS interpretation in three locations, NHGS interpretation in one large area north of Onway Lake, and indicated shallow bedrock and possibly gradation of aquifer materials in two locations.

## **UNCERTAINTIES**

Several geologic occurrences blur 'the' location of the aquifer boundary:

1. indistinct and sometimes an interlayered or interfingering (gradational) contact between aquifer soil and surrounding, lower-permeability soil;
2. the presence of possibly higher-permeability soil that is not stratified drift north of Onway lake; and
3. varying thicknesses of aquifer deposits.

In a meeting between Geosense, Southern NH Regional Planning Commission and the NHGS, NHGS personnel suggested using the surface expression of aquifer soils to serve as the aquifer boundary. However, the surficial expression of an aquifer that is grading to a less permeable material can be difficult to define.

## **AQUIFER DEFINITION**

An aquifer is generally defined as a soil that has sufficient permeability and water to readily yield a sustainable water supply. Permeable soils that are present in thin layers and are hydraulically connected to larger deposits may not fit the definition of aquifer, due to the small saturated

thickness, but can serve as a conduit to transmit pollutants to the thicker, more saturated portions of a deposit.

Therefore, Geosense concurs with NHGS that to be protective, the Town should use the surface expression of a permeable deposit as the boundary of the aquifer. Furthermore, Geosense recommends incorporating a minimum hydraulic conductivity as part of the definition of Raymond's aquifer. A hydraulic conductivity of 0.005 centimeters per second (cm/s), typically associated with a silty fine sand, would be protective of the town's water supply. This value represents the permeable end of gradational values between permeable and semi-permeable soils.

## **FUTURE INVESTIGATIONS**

The limited scope of this project resulted in the investigation of aquifer boundaries in four key locations. Greater definition of boundary locations can be accomplished in a number of ways.

For properties that are to be developed in a manner that would violate Raymond's groundwater ordinances and regulations and are located where the presence of an aquifer is in question, or within a specified distance of an aquifer boundary, Geosense suggests that the town of Raymond require soil characterization and possibly hydraulic testing to determine soil characteristics. Such investigations could be tiered to reduce the burden on the developer, and range from test pitting with soil characterization to aquifer testing. Attention to qualifications of the inspector, depth of investigation and the aquifer testing program are critical to obtaining data upon which to make decisions regarding long-term protection of the aquifer. We would be pleased to provide more detailed recommendations for soil and aquifer testing to ensure dependable, usable data, and an appropriately-sized buffer based on statistical analysis of contaminated plume lengths across the United States.

Thank you for the opportunity to assist SNHPC and the Town of Raymond in this endeavor.

Sincerely,

Shelley F. Bobowski, P.E., P.G.  
Geosense, P.L.L.C.

c: Pierce Rigrod, NHDES  
David Wunsch, NHGS