3. REVIEW OF EXISTING CONDITIONS

A brief review of existing, readily available information on water quality concerns, pollution sources, and existing management practices is the first step in evaluating potential pollution risks. This overview has several objectives:

- To insure that the assessments build on existing information;
- To identify data gaps, particularly for monitoring purposes;
- To highlight the most valuable or vulnerable water resources;
- To provide a basis for refining water supply system management plans, wellhead protection plans and town water resource protection goals and priorities; and
- To provide a baseline for reviewing progress in water resource protection efforts and for establishing new watershed management strategies.

This summary is drawn from information sources such as water supply system management plans, municipal plans and ordinances, water quality monitoring data. Input from state and municipal officials, water suppliers, and other participants during the assessment process are also included here. This summary is not intended to be a comprehensive synthesis, and it may not include all available data. Key findings of this water quality status review are summarized below.

3.1 Town Water Quality Goals and Protection Strategies

Protecting the island's water resources is a primary goal of the town's comprehensive community plan. The Jamestown Brook Watershed, which encompasses the two drinking water reservoirs and the town's wellhead protection area, has been established as a Watershed Conservation District and is protected by both the RR-200 Zoning District (1985) and the Open Space I District (1999). Through combined federal, state and local initiatives, approximately 73 percent of the land in the watershed is now permanently protected. The town continues to use a wide range of creative methods to protect land in the Jamestown Brook Watershed. These initiatives include purchase of development rights by the State Farmland Commission and The Nature Conservancy, financial contributions from the State's Departments of Transportation and Environmental Management for outright land purchase, and the donation of conservation easements to the Conanicut Island Land Trust by private developers as part of subdivisions (2001 Jamestown Comprehensive Community Plan). In 2001 the town adopted a wastewater management ordinance mandating regular septic system inspections with pumpout as needed, followed by adoption of a High Groundwater Table zoning overlay in February 2003. This innovative ordinance establishes performance standards for wastewater treatment, wetland buffer protection, and

Rhode Island's Drinking Water

Public Water Suppliers have at least 15 service connections, or serve at least 25 people per day for at least 60 days of the year. Rhode Island has about 477 public water suppliers serving more than 1,055,000 people. These fall into four categories:

Types of water supplies

17 *Large community water suppliers* pump at least 50 million gallons per year.

About 70 *Small community water suppliers* serve residential customers such as clusters of homes, trailer parks and nursing homes, but pump less than 50 million gallons per year.

74 *Non-transient non-community suppliers* serve at least 25 of the same people for at least 60 days a year, such as schools or businesses.

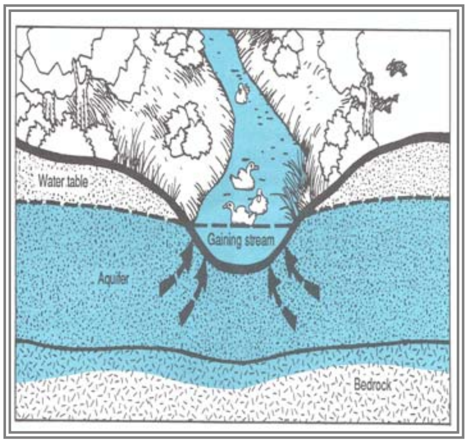
330 *Transient non-community suppliers* serve at least 25 different people at least 60 days of the year. These include for example, hotels, campgrounds and restaurants

Surface or Groundwater

74% of Rhode Islander's drink water from surface water supplies – the Scituate Reservoir alone provides water for 60% of the state's population.

The 22 largest water companies use surface water.
The other 455 water systems use groundwater.

26% of Rhode Islanders rely on groundwater for water supply, about 100,000 of these have private wells.



Groundwater and Surface Water: One Resource
Within a watershed or wellhead area groundwater and surface waters are connected as one resource. Groundwater generally flows towards and discharges to wetlands and surface waters, but wells can also draw from nearby surface waters. Because surface and ground waters are connected, pollution inputs to one can easily affect the other.

stormwater control through limits on impervious cover and standards for infiltrating runoff with new development in densely developed high water table areas.

3.2 Jamestown's Groundwater

All fresh water on Conanicut Island comes from precipitation. Rainwater seeps into the ground, replenishing streams, reservoirs and groundwater. Groundwater held in bedrock fractures is the primary source of drinking water. But the Island's bedrock aquifer has limited yield and over pumping can draw salt water into wells. The amount of freshwater available and its quality is directly related to land use activities in the watershed or recharge area, including the quality of effluent discharged from septic systems and the amount of recharge available to dilute infiltrating pollutants and maintain a balance with surface waters. Because surface waters and groundwater are closely connected, changes in water flow and pollutant inputs affect both resources.

Getting water from a rock

The Island core is fractured bedrock, overlain by a thin layer of soil and sediments up to 30 feet thick. A compacted "hardpan" layer 2-4 feet deep extends throughout much of the Island, restricting downward water flow. This dense layer, combined with fine soils that transmit water slowly and shallow bedrock in some areas creates seasonal high water table throughhout much of the island. Infiltrating rainwater tends to flow along the hardpan layer and emerge in wetlands and other surface waters. Water infiltrating deeper fills cracks in the underlying bedrock where it is stored and moves more slowly toward surface waters and coastal shoreline. Water held in these cracks forms a "bedrock aquifer".

Jamestown's Groundwater Lens

Freshwater in the Island's fractured bedrock aquifer forms a lens shaped body of water that "floats" on saltwater because its density is less than the surrounding saltwater. Within this freshwater lens bedrock fractures are filled with fresh water. Below the lens and at the shoreline edges, bedrock fractures and sediments are filled with salt water. The lens is thickest, about 500 feet, near the middle of the island and thins to only a few tens of feet near the perimeter. Over pumping wells can draw saltwater into the freshwater lens, especially at the perimeter of the Island where the freshwater layer is thinnest.

Predicting groundwater yield

The amount of water available from bedrock wells depends on the number and width of fracture openings and is difficult to predict. The limited amount of water held in small fractures results in relatively low yields and high drawdown. For example, a pumping rate of only five gallons per minute is typical of residential wells in bedrock. A well pumping at this rate would "drawdown" or lower the water table in the vicinity of the pumping well approximately 70 feet, and 100 feet or more in wells with lower yields. The amount of groundwater available is based on the number and size of bedrock fractures. Because this is difficult to predict, it is almost impossible to forecast how much water a new well will yield. However, deeper bedrock wells generally have a larger reservoir, potentially intersecting more water-filled fractures with greater depth. Since each well creates it's own draw down effect, wells clustered together on small lots are more likely to have overlapping draw down areas, resulting in lower water table collectively. Over pumping wells can draw saltwater into the freshwater lens, especially at the perimeter of the Island where the freshwater layer is thinnest. When building on an undeveloped lot it is wise to first drill a well and conduct a pump test to determine if the yield is adequate for household needs. *(Adapted from Veeger et.al., 199).*

3.3 Current Water Quality Conditions

Drinking Water Supply Quality

The quality of public drinking water in Jamestown is generally very good, and is currently meeting state and federal safe drinking water standards. However, based on the RI Department of Environmental Management's 303(d) List of Impaired Waters (RIDEM, 2002) the Jamestown Brook, which connects Carr Pond and Watson Pond reservoirs, has impaired water quality due to pathogens and biodiversity impacts. According to RIDEM (C.Carey, personal communication) these water quality problems are likely due to very low flow conditions. A Total Maximum Daily Loading (TMDL) study to identify the cause of impairment is planned for the future. The Jamestown Brook is also currently being monitored for elevated levels of cooper and lead.

Water flowing between Carr Pond and Watson Pond also passes through a large wetland complex. This percolating process causes the water in Watson Pond to have high quantities of organic matter, iron, and minerals. Though naturally occurring, these substances can cause discoloration and unpleasant tastes and odors (Jamestown, 2000). High organic matter also interferes with chlorination, generating undesirable by-products known as trihalomethanes.

Jamestown Shores Groundwater

In 1996, the hydrogeology group at the University of Rhode Island, in cooperation with the Jamestown Groundwater Quality Study Committee, conducted a one-year study on groundwater quality in the northern section of the island. The purpose of the study was to describe the hydrogeology and water resources of northern Conanicut

Monitoring Requirements for Public Drinking Water Supplies

Rhode Island Department of Health Testing

Parameter	Testing Requirement
Asbestos	Once every ninth year.
Nitrates	Quarterly for 1 year; reduce to annually.
Nitrites	One sample.
Pesticides/Synthetic Organic Compounds (SOCs)	Quarterly every 3 years; reduced to twice every third year.
Selected Inorganics	Annually.
Unregulated Organics	Quarterly every 3 years.
Volatile Organic Compounds (VOCs)	Quarterly for 1 year; then annually; then reduced to every 3 years.

Island; to assess the chemical quality of freshwater resources; to identify potential sources of groundwater contamination; and to provide a series of recommendations for protecting water quality (Veeger et.al., 1997). The study sample included 123 private drinking water wells.

The study identified the Jamestown Shores area as most negatively affected by development. Septic system effluent, fertilizer runoff, and saltwater intrusion were identified as sources of localized groundwater contamination. Results showed that 15 percent of wells were contaminated with fecal coliform. Eleven percent of these wells had nitrate-nitrogen concentrations higher than the 5 mg/l "action" level indicating significant input from fertilizers or septic systems and need for corrective action. Two of these wells exceeded the maximum limit of 10 mg/l. In comparison, the naturally occurring level of the nitrate form of nitrogen is generally less than 0.5 mg/l . The U.S. Geological Survey considers levels greater than 1 mg/l a sign of impact from fertilizers or wastewater. In the Veeger study, more than half of the tested wells had nitrogen concentrations higher than 1 mg/l. These researchers found that wells on lots smalller than 1 acre were more susceptible to bacterial contamination. Contaminated wells also had higher nitrogen concentrations, averaging 3.2 mg/l. The high density of septic systems in the Jamestown Shores area was considered the most likely cause of groundwater degradation. Of the 123 sampled wells, 25 percent yielded excess concentrations of chloride. Saltwater intrusion, as well as septic leachate and de-icing salts were identified as possible sources. Shoreline areas closest to the edge of the Island's thin freshwater lens were identified as most at risk from groundwater intrusion with development.

Properly treated wastewater effluent can help replenish groundwater supplies and minimize salt water intrusion. Consequently, town officials have determined that improving septic system performance and controlling improper system siting on unsuitable land is environmentally preferable to sewers. The limited amount of public drinking water supply, and the need to reserve public water and sewer capacity for the village center, and high cost of sewer extension are other determining factors in the town's decision not to extend public water to this neighborhood. According to the recent hydrogeologic study, the island's large lot zoning (2 – 5 acres/dwelling unit) in most areas provides sufficient protection of limited drinking water supplies in terms of sustainable water use and limited pollutant inputs (Veeger et.al., 1997).

The recently adopted onsite wastewater management program and zoning performance standards for high ground water table ordinance were specifically designed to improve the performance of onsite wastewater treatment systems and to control runoff and localized flooding problems in Jamestown Shores and other areas with substandard lots.

3.4 Town-Identified Water Resource Issues

The following summarizes issues identified in reviewing plans, reports, and monitoring studies. It also incorporates comments and concerns expressed by town staff and volunteers participating in the assessment.

Water *Quality* Concerns

- Localized groundwater contamination in the Jamestown Shores area due to the close proximity of wells to leach fields posed by high-density development on substandard lots of record.
- Transportation spills and polluted storm water runoff from Route 138 in the Watson Pond basin and the municipal wellhead protection area.
- High runoff and localized flooding in densely developed areas such as the Jamestown Shores area, especially with continued development.
- Extensive agricultural use in the Watson Pond sub-watershed could be a concern if not managed properly.
- Difficult soils in most areas have restrictive drainage contributing to septic system failure and high runoff.
- Effects of future development on island water quality, especially on substandard lots of record served by individual wells.
- Advanced wastewater treatment technologies open the door to development of highly marginal lots once considered unbuildable.

Water *Quantity* Concerns

- Public water supply reservoirs are relatively small, with limited capacity. The Island's bedrock aquifers have limited supply capability and yield is variable.
- Strong growth pressures, with new home construction, home expansion and conversion of seasonal cottages to year round use, place demands on the Island's limited water resources.
- Safe yields for all sources of public water have already been exceeded. Severe drought in 1993 forced the JWD to rely on the National Guard to supply water to their customers from late summer through fall.
- On the north end of the island, wastewater from septic systems provides essential recharge to groundwater for private well use.
- The town wells, which draw groundwater near the town reservoir, may possibly affect the wells in the Jamestown Shores area (2000 Jamestown Comprehensive Community Plan).
- Increased pumping from the JWD wells could have detrimental effects on wetlands in the Jamestown Brook Watershed.

- Jamestown Brook is listed as impaired for aquatic habitat and pathogens largely due to low flow, rather than pollutant inputs.
- Private wells located in shoreline areas in the Jamestown Shores area at risk from salt water intrusion. (Veeger et.al.1997). There are already many instances of wells running dry in this area during drought periods, threatening loss of real estate value (Comprehensive Plan, 2001.)
- "The current condition of the town's sewer lines allows for vast amounts of groundwater to infiltrate into the sewer pipes and into the treatment facility" (Jamestown Comprehensive Plan, Final draft 2001). Groundwater infiltrating into leaking sewer pipes adds an additional 200,000 to 1.3 million gallons of water per day to the treatment plant, depending on the season. This depletes groundwater recharge and reduces the amount of wastewater that can be treated at the sewage treatment plant. If leaky pipes are replaced and all gutter drains and sump pumps are removed from the system, the sewer treatment facility could process waste from approximately 3,750 homes – 1000 more than the 2,750 homes that currently receive sewer service. Groundwater recharge lost to the sewer system reduces groundwater flow to streams which can impair stream habitat. Loss of fresh groundwater flow to the shoreline may also increase susceptibility to salt water intrusion. Although this groundwater loss occurs in the sewered where public water is available, the effect of reduced recharge on groundwater supply capacity and susceptibility to salt water intrusion beyond the district are unknown.

4. LAND USE AND WASTEWATER NEEDS INVENTORY

The land use database is the foundation of the assessment. Land use, natural site characteristics and septic system inventories all provide insight on pollution risks in general, and site suitability for onsite wastewater treatment in particular. Because land use is the basis for many factors used to evaluate pollution risk, such as percent impervious cover and nutrient loading estimates, accurate land use input data helps match actual conditions to generate more realistic assessment results.

This chapter outlines sources of data and methods in creating a land use database for all study areas. It also summarizes results of a parcel level analysis of land use and onsite wastewater treatment needs in the Jamestown Shores area. Included are the following:

- Brief overview of data sources and results of land use /septic system inventory.
- Methods and assumptions for developing future land use projections using a simple build out analysis based on RIGIS land use maps and town zoning.
- Overview of current land use and future projections for the Island; specific results for each study are included in the appendix.
- Parcel analysis of land use, natural characteristics and onsite wastewater treatment systems in the Jamestown Shores area, including assessment of future wastewater needs and constraints.

Drinking water supply areas were considered at low risk for onsite wastewater treatment due to light development currently, large lot zoning, and extent of protected land. Consequently, the wastewater needs analysis focused on Jamestown Shores, a known problem area with high water table and poor conditions for wastewater treatment.

This section presents only a brief overview of current land use and buildout projections. Each study area was analyzed separately with full results of current land use, future projections, and site features provided in the appendix. Complete documentation on development of the GIS database is also included in the appendix.

4.1. Current and Future Land Use

Database Development

The land use data for this analysis was derived from the 1995 RIGIS coverage, using twenty-one land use categories consolidated from 32 mapped categories based on similar use, intensity, and pollution risk. Land use maps were updated with major changes and corrections identified by assessment mapping volunteers based on their knowledge of the area and windshield surveys.

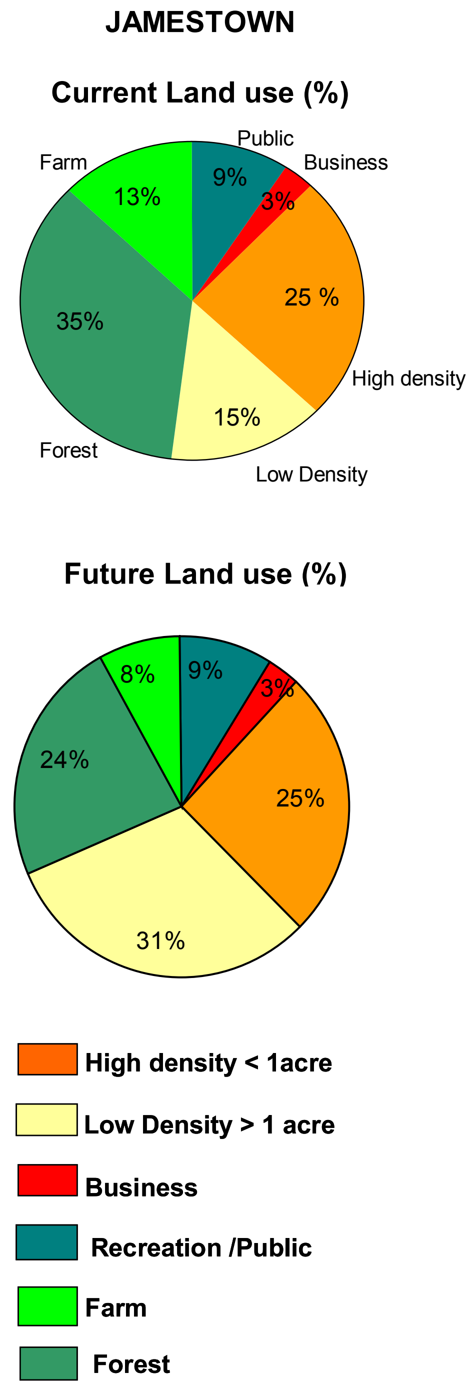


Figure 6. Distribution of Current and Future Land use, Jamestown, RI.

The number of dwelling units was estimated from the RIGIS residential land use categories. Population was based on 2.41 persons per dwelling unit (Jamestown, 2001). The town sewer service district, a linear RIGIS coverage, was updated using sewer line information provided by the planning department. Without parcel level data on the number of homes actually connected to the sewer line, we assumed homes within 500 feet are reasonably likely to take advantage of public sewers. Buffering the updated sewer lines created an approximate sewer service area. Within the sewer service area we assumed all development is connected to the sewer line, which may or may not be the case. Based on the land area outside the sewer district, we estimated the number of houses with septic systems per acre in each RIGIS residential land use category. Assuming one septic system per sewered dwelling, we estimated the number of septic systems for the Island overall and for each of the other study areas separately. To refine this estimate, we used a recent inventory of developed parcels by town plat maps and zoning districts developed by the Planning Department to adjust the number of septic systems town-wide (Jamestown, 2001).
In the Jamestown Shores and Carr Pond areas, where digital parcel records were available, the number of existing septic systems and potentially developable lots was calculated directly from this GIS database.

Build-out Methods and Assumptions

To estimate future development potential we conducted a build out analysis for each study area individually. Although the town had recently projected future growth for the Island based on plat boundaries and zoning districts, our purpose was to evaluate the type of land use change and associated pollution risks in each study area. Using the town zoning map as the future land use scenario, we assumed all privately owned and unprotected land would be eventually developed based on the underlying zoning district. We did not estimate a time frame for this growth. In calculating the potential change in future land use acreages we made the following assumptions:

The change in future land use acreage for all study areas except Jamestown Shores (where the parcel-based analysis was used) assumes the following:

- All permanently protected open space will not be built upon.
- New development density will adhere to current zoning.
- Most privately held open space (Scout Camps, golf courses, rod & gun clubs) will not be developed further.
- Areas with severe slope (>15%), wetlands, bedrock on surface, and very high water table soils (>1.5’) will not be built upon.
- Wetlands and 150’ buffer thereto will not be disturbed.
- Surface waters and their tributaries will retain undisturbed buffers of 200 feet.
- Occupancy is 2.41 persons/dwelling unit average.

For a more exact estimate of the number of septic systems anticipated with future growth, we adjusted our housing counts in unsewered areas using town estimates of buildable lots for each plat by zoning district.

Wastewater Needs Assessment

In each study area, suitability for onsite wastewater treatment was evaluated using RIGIS soils and land use data. This analysis identifies septic system locations – focusing on densely developed area, and high risk areas for septic system failure. Consistent with RIDEM regulations, we define failure as surface ponding of wastewater and also discharge of improperly treated effluent to groundwater. Even without obvious sign of malfunction, "treatment failure" can occur when the groundwater table rises too close to the bottom of the leach-field, allowing untreated wastewater to enter groundwater. Similarly, sub-standard septic systems in shoreline areas can allow untreated waste to enter surface waters either by direct overland flow or sub-surface flow in groundwater.

The purpose of this analysis is to identify areas where septic system treatment capacity is limited, where wastewater effluent is more like-ly to affect local water resources and wells, and to evaluate potential future conditions and impacts. This includes the following analyses:

Current Onsite Wastewater Treatment Conditions

The number of septic systems located within in each study area was estimated using the land use database.

Cumulative effects of septic systems to water supplies were evaluated using nutrient loading estimates in relation to other potential sources such as fertilizers and runoff. Results are presented in Chapter 5.

Localized risks to water supplies and private wells from septic sys-tems were mapped and/or land areas calculated for each study area considering the following features:

- Dense unsewered residential development.
- Non residential unsewered development with potential for high-flow and high-strength wastewater. These areas are very limited as commercial uses are located within the sewer district.
- Unsewered development within shoreline zones (land within 200 feet of surface waters, including ponds and perennial streams).

Soil constraints for onsite treatment. Soil types for the study area were organized into functional groups based on ability of soil to allow water infiltration (using four soil "hydrogroups") and water table depth. Soil types were mapped and land use categories as-sociated with each soil group were calculated.

- To identify areas of highest risk, locations of unsewered development on high water table and within 200’ of surface waters were mapped to highlight areas of overlap through “hotspot” mapping.

Future Wastewater Treatment Needs and Impacts

Using results of the build-out analysis, the number of septic systems anticipated with future development was calculated.

The type, density and location of future development in unsewered areas was mapped.

Site suitability for future development was evaluated by map analysis and by re-calculating soil /land use data in potentially developable areas. Results for the Island and water supply areas are presented in Chapter 5.

Jamestown Shores Parcel Analysis

In the Jamestown Shores and Carr Pond areas, where digital parcel records were available, the number of existing septic systems and potentially developable lots was calculated directly from this GIS database.

The Jamestown Shores parcel inventory describes lots according to their development status, size, mapped location in high water table soils and wetland buffers. Onsite wastewater treatment capability is evaluated based on the age of house construction, septic system repair status, and site suitability.

Site suitability was based on soil permeability, two levels of mapped water table depths (0-3.5 feet and 0-1.5 feet from the ground surface) and lot location within shoreline zones to surface waters. Age of construction was determined by Town parcel data. Septic system repair permits were obtained from RIDEM records, matched to town records using parcel ownership, and mapped by parcel location or address matching.

Note: This is a preliminary assessment using RIGIS map data and town parcel records. Septic system inspections now required under the town’s Wastewater Management Program will provide a much more accurate inventory of the status of septic systems throughout the Island.

General Findings – Island and Drinking Water Supplies

Full development under current zoning is expected to result in conversion of forest, pasture and other agricultural land primarily to low-density residential development. Figure 6 above shows the potential change in land use distribution from current to future conditions. Forest and farmland may decline from almost half of the land cover to about one third. The acreage of low-density development on 4.5-acre lots is likely to double from 15 to 30 percent. No change in high density development is predicted because this town-wide projection is based on zoning, without considering grandfathered lots of record that are smaller than the current zoning.

Based on the town build-out analysis the number of septic systems townwide is estimated to be 1,532 under current land use, potentially increasing by 1,120 in residential zones to a total of 2,651 at full buildout. This represents an increase from 0.25 to 0.43 septic systems per acre. A more recent estimate by the town for wastewater management planning estimates as many as 1,750 septic systems may exist currently (possibly homes or businesses located within the sewer district but not connected to the sewer line) indicating our estimates of nutrient loading and related impacts may be slightly conservative.

In the drinking water supply areas the current density is estimated to be very low, ranging from only 0.03 units/acre in the Watson Pond watershed to 0.33 in both the Carr Pond and town wellhead protection areas. Because of low-density zoning in these areas, only very slight increases are expected with future development.

More detailed land use information can be found in the appendix to this report, including a detailed land use breakdown of each study area, assumptions used in conducting the buildout analysis using RIGIS land use data and methods for adjusting the buildout using the parcel database in the Jamestown Shores area.

4.2 Jamestown Shores Parcel / Septic System Analysis

Parcel Analysis Method

In the Jamestown Shores and Carr Pond areas, where the parcel database was available, we calculated the number of built parcels and itemized the number of unprotected vacant parcels without prejudging their suitability for development. This was done in part, because of the inherent inaccuracy of the soils database at the parcel level. Soil maps are reliable for general land use planning, but not at the scale of individual lots, especially at the 5,000 and 10,000-square-foot lots. Also, the methods used to identify lots with development constraints generate useful estimates for planning purposes, but are not fully accurate at the parcel level. For example, lots were identified using standard GIS selection criteria such as those having their centers in high water table less than 18 inches, and visually inspected for accuracy. In all cases, field inspection is necessary to verify soil characteristics, wetland boundaries, and determine general suitability for development.

General Findings – Jamestown Shores

In contrast to the water supply study areas and the town as a whole, Jamestown Shores, with 823 developed lots, is very densely developed at 1.08 systems/acre. Approximately 390 parcels are vacant and unprotected. If developed, the result would be a total of 1,217 future septic systems – an increase of 48 percent and a future density of 1.63 systems/acre. As shown in Table 1, many of these vacant lots are located on very wet sites (water table less than 18") that are likely to be wetland and considered unbuildable. Even when excluding wetlands from future development calculations, the town-wide build out conducted by the Planning Department projected that 33 percent of all new growth townwide could occur in the Jamestown Shores area (Jamestown, 2001).

Septic System Age

Based on town records, approximately 38 percent of the dwellings in Jamestown Shores were built prior to 1970, when RIDEM standards for onsite wastewater treatment systems were adopted. Jamestown Shores parcels, with dwellings constructed before and after 1971, are shown in Figure 7. Lots built after 1970, presumable with septic systems meeting state minimum standards, are shown in gray. The vacant unprotected parcels, shown in green, comprise 32 percent of all lots. Building on all vacant lots would result in a 48 percent increase in the number of houses.

The number of systems that pre-date adoption of DEM minimum stand-ards for septic system siting and design is a concern because these are more likely to be substandard or otherwise in need of repair. Even if a system is not showing obvious signs of failure with backups or effluent surfacing in the drainfield, the system can still be failing if it is not treat-ing waste properly. Leaking tanks, broken pipes and partially clogged drainfields all increase the risk that improperly treated effluent will reach the groundwater where bacteria can move much more readily to nearby wells.

Septic System Repair Status

To further assess septic system conditions we analyzed RI DEM repair records (1986-1999) for Jamestown shores and the larger area including Plat 4. As shown in Figure 8, approximately 11 percent of homes built before 1970, and 5 percent of those built after 1970, have a record of a DEM permit for system repair or system upgrading with building expansion, known as alteration permit. When excluding recorded septic sys-tem repairs and alterations, we estimated that 32 percent of the developed parcels in Jamestown Shores are more than 30 years old and likely to be substandard. Inspections required under the town wastewater management program will determine the actual number. This is a public health concern because substandard systems present the greatest threat for movement of disease-causing bacteria and viruses in groundwater. Shallow water tables and small lots with private wells contribute to the risk of contamination.

Parcels on High Water Table soils

Parcels located on high water table soils were mapped using the RIGIS digital soils database derived from the RI Soil Survey (Rector, 1991). Under DEM minimum standards for new septic systems a minimum of two feet is required from the ground surface to the water table. Soils were mapped using water table breakdowns established in the soils database, at 0 to 18 inches from the ground surface and 0 to 3.5 feet below the surface.

The results are shown in Figure 9, with parcels on high water table 0 to 3.5 feet from the ground surface mapped for Jamestown Shores and the surrounding area. Other parcels on dryer land are not shown. In James-town Shores 34 percent of developed lots were found to have high water table less than 3.5 feet. Of the vacant parcels in the Shores area, almost 62 percent are mapped as high water table less than 3.5 feet, and about half of these have a water table less than 18 inches and are probably wetland. Of the 1,484 parcels in the larger mapped area, 50 percent are mapped as high water table 0 to 3.5 feet and 22 percent of these are developed.

It is important to note that high water table lots were selected as those parcels having their center in high water table soils using standard ArcView GIS mapping selection criteria. This analysis provides approximate data for planning purposes and is not intended to determine development suitability of individual parcels. Field investigation is necessary to determine wetland boundaries and depth to water table. Additional information about Jamestown soils are included in Chapter 5 of this report.

Figure 7. Parcel analysis for pre-1970 structures in Jamestown Shores
Parcels built before 1970, shown in pink, pre-date adoption of RIDEM minimum standards for septic systems. Other lots developed after 1970 are shown in grey. Vacant unprotected parcels which wetlands, as shown in green, comprise 32% of all lots.

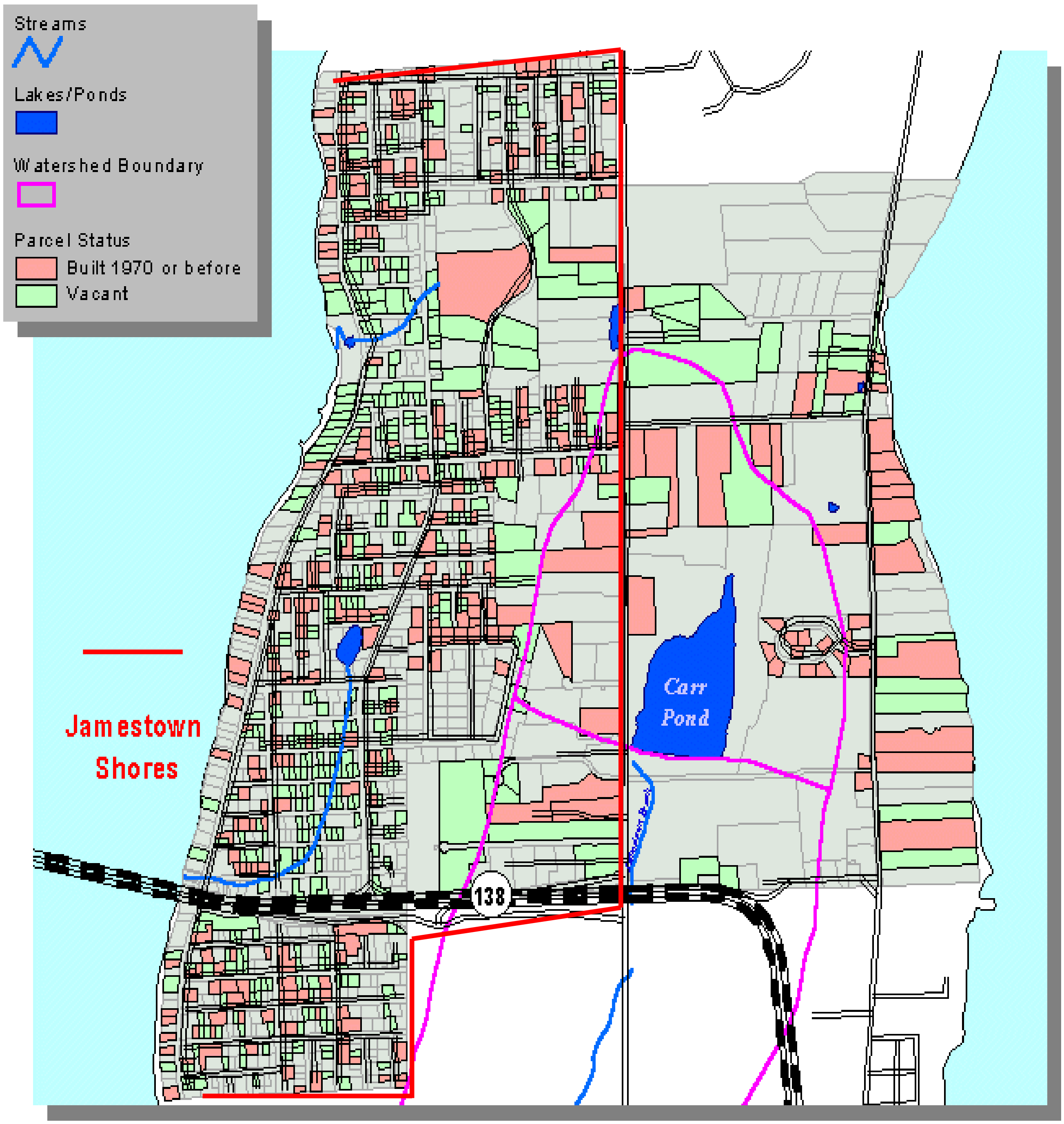


Figure 8. Jamestown Shores parcels with RIDEM repair or alternation permits 1986-1999.
Based on RIDEM permit records, 32% of homes in the Jamestown Shores area were built more than 30 years ago, before adoption of minimum septic system standards, and have no record of repair. These are more likely to be substandard and in need of repair.

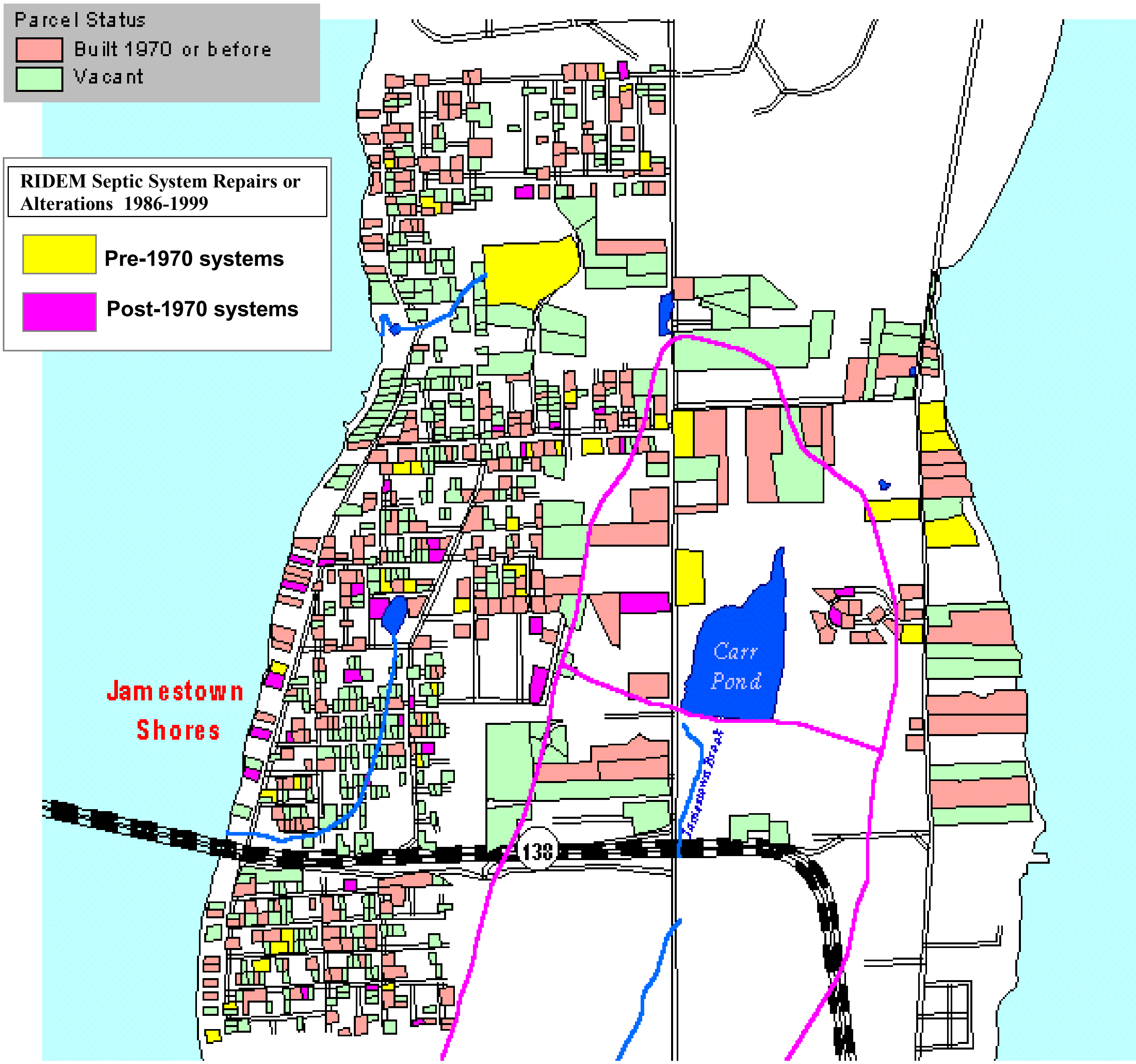
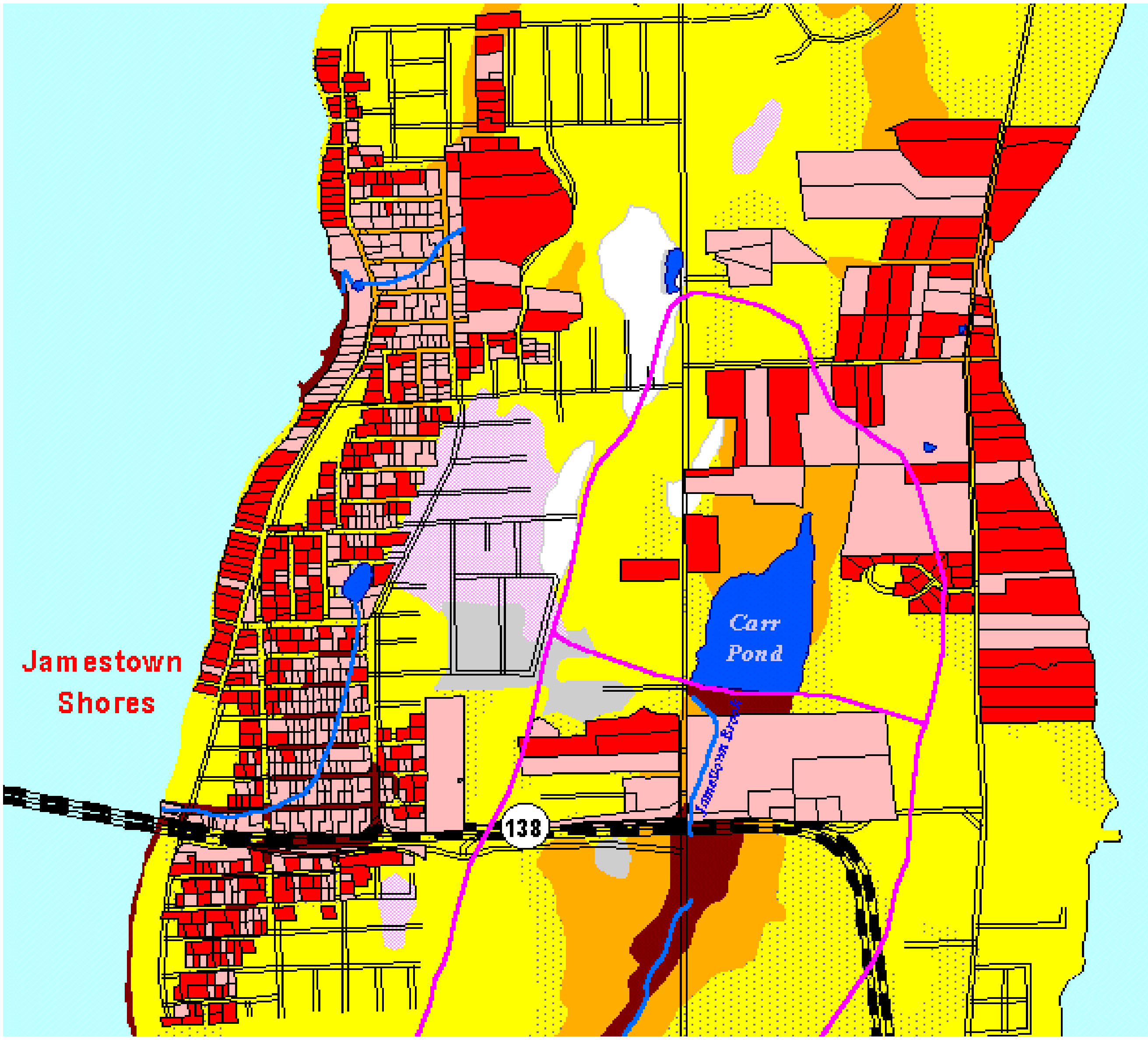


Figure 9. Parcels on high water table soil



Parcels on Wet Soils
- Yes, Not Occupied
- Yes, Occupied

Soil Hydrologic Group and Water Table Depth
- A- Excessively Permeable
- B- Well Drained
- B- SHWT 1.5'-3.5'
- C- SHWT > 6'
- C- SHWT 1.5'-3.5'
- C- SHWT 0-1.5'
- D- SHWT 0-1.5'
- Variable or No Data

Parcels on high water table soils 0 - 3.5 feet, Jamestown Shores

Note: Only parcels on high water table soils and in densely developed areas are shown. In other areas soil hydrologic soil groups and water table depths are shown. Although excessively permeable soils are shown here, these soil types were later corrected to slowly permeable with seasonal high water table, based on current soil mapping methods.

Table 1. Jamestown Shores Parcel Analysis

JAMESTOWN SHORES PARCEL ANALYSIS					
Developed Residential Parcels	**Built Pre-1970 only**	**Built Post-1970 only**	**Total Built**	**Vacant / Unprotected**	**Potential Future with Full Build out**
< 5000 Sq.ft.	3	0	3	2	5
5000 to 9,999	104	163	267	275	542
10,000 to 19,999	112	207	319	63	382
20,000 to 39,999	64	117	181	32	213
> 1 Acre	11	42	53	22	75
Total	**294**	**529**	**823**	**394**	**1,217**
Parcel Characteristics					
Septic System Repairs	31	29	60		
Substandard Lot Size	280	157	437		
In a buffer to surface waters (200') or to Wetlands (150')	25	66	91	158	249
On Seasonal High Water Table Soil 0 - 3.5 feet	117	164	281	244	525
less than 1.5 ft.				113	
1.5 – 3.5 ft.				132	
Grandfathered lots (smaller than current zoning)				359	

Updated January 2003

Jamestown Shores Parcel Analysis Summary

- There are currently 823 developed parcels with septic system in the Jamestown Shores area west of Carr Pond (Plats 3, 5, 14, 15 & 16).

- 32 percent of existing homes pre-date RIDEM 1970 septic system standards and have no record of repair. These are likely to be sub-standard system and in need of repair.

- Of the pre-1970 systems without repair permits, 40 percent are on high water table 0 - 3.5 feet and are likely to be in groundwater for at least a portion of the year.

- There are approximately 394 vacant, unprotected residential parcels. Of these 91 percent are smaller than one acre and at least 70 percent are smaller than 10,000 sq.ft. In comparison, 33 percent of the developed lots are less than 10,000 sq.ft.

- About 40 percent of vacant lots are estimated to be at least partially within a shoreline buffer to wetlands (150') or surface waters (200'), compared to only 11 percent of developed lots.

- Almost 62 percent of vacant parcels are located in areas mapped as high water table 0–3.5 feet, compared to 34 percent of developed parcels on these wet soils.

- Of the vacant lots on high water table, 46 percent are mapped as very high water tables 18 inches or less. In the past, these hydric soils have been considered unsuitable for development. Building on all 394 vacant parcels would result in a 48 percent increase in developed lots, almost doubling the total number of homes with septic systems and wells from 823 to 1,215. Restricting development to marginal sites with a water table no less than 1.5 feet would potentially result in a 25 percent increase in new septic systems and wells, bringing the total up to just over 1,000 homes.

- If construction is allowed on water tables less than 1.5 feet, new development in Jamestown Shores would represent 33 percent of all new development expected town-wide (based on town parcel data for Jamestown Shores in comparison with town-wide future growth projections). This is concern since this area is already identified as having contaminated wells, very low well yields, salt water intrusion and localized flooding.