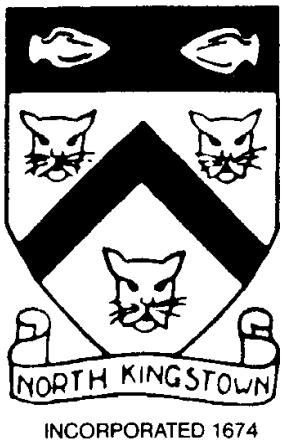
TOWN OF NORTH KINGSTOWN

ONSITE WASTEWATER MANAGEMENT PLAN



November 2000

Chapter 1 – Executive Summary

The North Kingstown Wastewater Management Plan addresses present and future wastewater management needs for the Town. The study was prepared in accordance with guidelines established by the Rhode Island Department of Environmental Management Division of Water Resources, necessary to qualify for funding under the State's Revolving Fund (SRF), Community Septic System Loan Program (CSSLP).

North Kingstown is a small coastal community located approximately 20 miles south of Providence. The Town encompasses a land area of approximately 44 square miles. Today, 23,861[1] people reside in the community and population is projected to increase to 29,000 by the year 2015, or the end of this 20-year planning period.

Approximately 96 percent of the present population relies on cesspools and septic systems for treatment and disposal of wastewater. This heavy reliance on individual sewage disposal systems (ISDS) has led to problems associated with failure. There are many areas of the Town, which have inherent environmental conditions such as high groundwater table, poor soil types and restricted lot sizes that require careful siting and diligent maintenance of ISDS. Failed ISDS systems are believed to be a contributor of bacteriological and nutrient contamination in Wickford Harbor and other surface water bodies.

The portion of the population serviced by conventional sewage collection and treatment facilities is located in the immediate vicinity of the Quonset Point/Davisville (QPD) Industrial Park on former Navy land. Quonset Point/Davisville is a former navy base developed in the 1940's, which contains its own independent utilities including a wastewater collection and treatment system. In its current state, the treatment facility has a capacity of 1.78 million gallons per day and uses rotating biological contactors followed by sedimentation to achieve secondary treatment levels.

Groundwork for this report was established by the Town's Sewer Study Committee. The Committee was formed in the fall of 1990 to study North Kingstown's wastewater needs. After a comprehensive evaluation of the issues, problems, causes of problems and solutions, the Committee developed a detailed report in October 1993, which recommended a direction for wastewater management activities and included the preparation of a wastewater facilities plan. A request for proposals for the preparation of a wastewater facilities plan was issued and Pare Engineering Corporation was selected to prepare the plan. A draft plan dated August 1995 was forwarded to the RIDEM for comments.

The draft wastewater facilities plan built on the work of the Sewer Study Committee, which included the identification of certain problem areas and a recommendation that central collection through a tie in to the Quonset Davisville Wastewater Treatment Facility be investigated. The Town initially pursued this option and began negotiations with the RI Economic Development Commission as well discussions with a financial institution and bond counsel. In addition, a public worksession was held to discuss the proposal and solicit input.

[1] - 1990 US Census Data

During this same time period the University of Rhode Island, through its onsite wastewater training program, was working to promote alternative onsite treatment options. Some of these technologies appear to be appropriate for use on sites with limitations such as small lot size, high water table, etc.

Based on the financial analysis of the sewering proposal and apparent acceptance and availability of onsite treatment alternatives, the Town Council of North Kingstown decided that the Town would continue with the use of onsite treatment systems through a program of maintenance, management and replacement of failed systems.

To this end, the Town of North Kingstown has recently adopted a wastewater management district ordinance as a starting point to ensure proper system performance. The ordinance requires that property owners have subsurface disposal systems periodically inspected and pumped out as needed. This approach will provide benefit by raising the awareness of the public toward ISDS system function, the typical causes of ISDS failure and proper maintenance.

Chapter 2 – Introduction

2.1 Purpose and Scope

The purpose for developing a Wastewater Management Plan for the Town of North Kingstown is to provide the town with a COMPREHENSIVE planning document that will provide direction to ensure the proper management of wastewater throughout the planning period. The methodology for the development of this document was tailored for compliance with Rhode Island comprehensive Planning and Land Use Act and with the financing provision of the U.S. Clean Water Act relating to the State Revolving Fund program. The Rhode Island Department of Environmental Management, Office of Water Resources, who will act as the primary reviewing authority, has prepared specific guidelines governing the preparation of wastewater management plans.

The methodology employed in the wastewater management plan development process consisted of utilizing the previous effort by the North Kingstown Sewer Study Committee and the subsequent efforts of Pare Engineering Corporation, quantifying existing wastewater disposal problems within the Town.

The Sewer Study Committee, through the preparation of the *Sewer Study Report* dated October 1993, identified the historically broad use of Individual Sewage Disposal Systems (ISDS) within the Town. The report indicated a desire, where possible, to continue with the use of such systems as long as proper management practices could be implemented and integrated into the wastewater management plan. This would ensure that ISDS met, and could continue to meet, efficiency standards to safeguard the environment. Part of the mechanism to warrant the continued use of ISDS included the development of wastewater management districts in the Town. Wastewater management districts provide a means to properly manage the use of ISDS as well as the development of standards for repair, design and construction of ISDS systems.

The final aspect of the plan development, which was paramount to all aspects of the project, was public participation. Aside from regulatory requirements for public comment, it was understood that the basis of a successful project was rooted in addressing the needs of the community. Public work sessions and working groups were held and supplemented with formal public meetings and hearings as required so that the final plan will take into full consideration the views and desires of the community.

2.2 Historical Perspective

The Town of North Kingstown, population 23,861 is located approximately 20 miles south of Providence. In many respects, it is a typical southern New England coastal community consisting of a mix of residential, commercial, and limited industrial districts. It also has many areas that experience an increase of population during the summer months due to the influx of summer recreational users of Town facilities. One peculiarity of the Town is the existence of an expansive major industrial complex within its borders, known as the Quonset Point/Davisville Industrial Park, which contains several major industrial facilities. This facility is owned and operated by the Rhode Island Economic Development Corporation. Though this industrial complex includes its own self-contained utilities (i.e. sewer and water), in many respects, the future growth of the Town and the industrial park are closely linked.

In recent years, the Town's administrative staff has recognized the need to insure the proper management of wastewater generated throughout the Town. Historically, the Town has relied upon individual sewage disposal systems (ISDS). Only limited portions of Town are serviced with conventional sewer systems that are inter-connected with the Wastewater Treatment Facility at Quonset Point/Davisville. The heavy reliance on ISDS has, in several instances, led to problems of failed systems on lots with site constraints such as lot size, soil conditions, or the proximity of wetlands and water bodies. Faulty construction will also lead to premature system failure. Failed ISDS systems also are thought to be a contributor of bacteriological and nutrient contamination in Wickford Harbor and other surface water bodies.

In 1990, in an effort to address these concerns, the North Kingstown Town Council established a working group, known as the North Kingstown Sewer Study Committee. This group was given the task of quantifying the wastewater disposal problems within the Town, evaluating existing and future wastewater disposal needs, and of presenting various alternatives as a first step in bringing the Town's wastewater concerns under control. In October 1993, the Sewer Study Committee completed a comprehensive report, detailing the specific items relating to wastewater management that would need to be addressed as part of a comprehensive wastewater management planning effort. (Appendix A)

The Town initially took the next step, that being the development of a comprehensive wastewater facilities plan in accordance with the guidelines and regulations for such documents as promulgated by Rhode Island Department of Environmental Management (RIDEM), Division of Water Resources. A draft Wastewater Facilities Plan prepared by Pare Engineering Corporation was submitted to the RIDEM in August 1995.

2.3 Key Issues and Objectives

The identified need to be addressed by the North Kingstown Wastewater Management Plan can be summarized in a few key issues and objectives: 1) The current overall state of on-site sewage disposal needs improvement; 2) Individual Sewage Disposal Systems have been the primary method for wastewater disposal and will continue to be extensively utilized. To ensure that ISDS technology remains a viable technology for the 20-year planning horizon, proper management practices must be employed; 3) There are several areas within the Town where conventional ISDS technology may be found to be unsuitable due to physical constraints on these properties. In these areas, alternative means of wastewater management will be necessary. The use of innovative and alternative (I/A) technologies is highly desired, where practical, to overcome site constraints and to address the wastewater management needs of the community without the need for large-scale conventional sewering.

Chapter 3 – Planning Area

3.1 Study Area Description

The study area for this wastewater management plan is defined as the entire Town of North Kingstown, located in Washington County, Rhode Island. The Town is bordered on the east by Narragansett Bay, on the south by the Towns of South Kingstown and Narragansett, to the west by the Town of Exeter, and on the north by the City of Warwick and the Town of East Greenwich.

The Town is divided into seven general planning districts. Figure 3.1 illustrates the general location of the entire planning area and delineates the seven planning districts. The Belleville-Lafayette district is located in the south center of the Town and contains approximately 4,000 acres of land and water. The northern portion of the district consists of rolling hills with some steep slopes along Belleville Pond. Southern areas contain steeper topography with some flat areas west of Silver Spring Lake. The streams, ponds, wetlands and groundwater supplies of the Annaquatucket and Pettaquamscutt aquifers are of ecological and recreational significance. Much of the land within the district has constraints on development such as high water table, steep slopes, a wellhead protection area and a large groundwater recharge area.

The majority of dwelling units within Belleville/Lafayette are single-family residences with approximately 84 percent of the dwellings situated on lots of less than one acre in area.

The Coastal Villages Planning District includes the area extending along the coast of Narragansett Bay from the border of the Town of Narragansett to the Quonset Point/Davisville Industrial Park. This district, which extends 1 to 2 miles inland, contains approximately 4550 acres. The villages of Wickford, Hamilton, and Saunderstown are included in this district. The southern half of the district is relatively flat upland area with steep slopes along the coast leading down to the Bay. Northern areas consist of coastal outwash plains composed of flat to gently sloping land. Approximately 520 acres (11 percent) of the total land area is covered by wetland.

In 1990, the coastal villages contained 2,877 dwelling units comprising 33.5 percent of the Town's housing stock. Wickford and Post Road represent the primary commercial centers for the coastal villages as well as the entire Town. A number of smaller commercial centers are located in Saunderstown and Hamilton. Very little industry is found in this planning district.

The Pettaquamscutt Planning District is located in the south-central portion of the Town, and generally surrounds the Pettaquamscutt River. The district encompasses approximately 3,500 acres of which wetland comprises 740 acres (21 percent). The topography of the area is diverse with flat to hilly upland areas along Tower Hill and Allentown Roads, sloping steeply down to the Pettaquamscutt River Valley. Pettaquamscutt has little commercial or industrial development and consists almost entirely of undeveloped woodland or low to very low-density residential development.

The Pettaquamscutt District sits over the Pettaquamscutt Groundwater Reservoir and a large groundwater recharge area. This fact, coupled with the environmentally sensitive Narrow River watershed, indicate that the most appropriate land use for this area remain open space or low density residential.

The Quidnessett Planning District is located in the northern portion of the Town. The district is bordered to the north by the Potowomut River, to the east by Narragansett Bay, to the west by East Greenwich and to the south by Quonset Point/Davisville. Quidnessett contains approximately 4,930 acres of land. The northern section of Post Road, the Town's primary commercial center is found in this district. Much of the residential development is situated on lots of less than 10,000 square feet. The most densely developed areas can be found in the Kingstown Heights, Quidnessett Heights, and Mount View neighborhoods. Since 1985, new residential subdivisions have been constructed such that only a few large parcels remain.

The Scrabbletown Planning District is located in the northwest portion of North Kingstown and encompasses 4,007 acres of land. Northern sections generally consist of steep slopes, whereas southern sections are predominantly flat. Scrabbletown has a variety of land uses including industrial, commercial, and residential. Approximately 10 acres of industrial land are along Old Baptist road adjacent to the AMTRAK railroad corridor. Commercial properties are located along Quaker Lane. Most of the residential development is low density with 40 percent of the dwelling units situated on lots in excess of one acre. A high percentage of the Scrabbletown District is wetland and over 50 percent of the land area is situated over a groundwater recharge or aquifer area.

The Slocum Planning District is located in the southwest portion of the Town and encompasses 4,250 acres of largely undeveloped land. Residential development consists of single family houses that are widely scattered. The district is located over the Chipuxet groundwater aquifer and recharge area. Slocum contains a small light industrial district situated north of the active AMTRAK railroad, which includes several sand and gravel operations and other miscellaneous entities.

The final planning district is defined as Quonset Point/Davisville, which incorporates the former military complex and the West Davisville container facilities. The district is presently serviced by a secondary wastewater treatment facility and sewage collection system. The majority of the land area is located in the 3,095 acre Quonset Point/Davisville Industrial Park. The industrial park includes a 745 acre airport, a 150 acre golf course owned and operated by the Town of North Kingstown, 970 acres of recently vacated U.S. Naval facilities, and 867 acres of industrial land. Residential development is limited to former navy housing complexes that have been converted into apartments.

3.2 Existing Population

The existing population in North Kingstown (1990 Census) is 23,861. Estimated population figures for each planning district in 1990 are shown in Table 3-1.

TABLE 3-1
EXISTING POPULATION BY PLANNING DISTRICT (1990)

AREA	POPULATION
Belleville/Lafayette	3,579
Coastal Villages	7,874
Pettaquamscutt	358
Quidnessett	9,783
Scrabbletown	955
Slocum	358
Quonset Point/Davisville	954
Total	23,861

3.3 Land Usage

In the growth of any community, the gradual change in land use from rural or agricultural to residential, commercial or industrial activities produce a demand for adequate municipal services, particularly in the area of wastewater management.

Information concerning land use was obtained through a review of Assessor's plats, the Town's Comprehensive Plan and from on-site inspections. The Town of North Kingstown encompasses a total area of 28,061 acres. Approximately 6,008 acres or 21.4 percent of the total land area is currently utilized for residential purposes. Other significant land uses include 1,978 acres of agricultural land and 1,639 acres of parks and recreational facilities. There are also 24 sites within the Town; totaling 2,200 acres that are currently zoned industrial. Of these, 850 acres are currently utilized for industrial purposes. 283 acres are utilized for non-industrial purposes and 1,065 acres are vacant. The majority of the industrially zoned land is located within the Quonset Point/Davisville Industrial Park. Current land use information is presented in Table 3-2.

Commercial development for the most part is situated linearly along Post Road and Tower Hill Road. The most intensive area of commercial development is generally located between Frenchtown Road and West Main Street, with Quonset Point/Davisville approximately at the mid-point of this stretch. Existing commercial uses include retail outlets, office space, restaurants, automotive centers and small hotels/motels. Most of the commercial properties are constrained by shallow lots. Commercial development also can be found along Quaker Lane and at the center of many villages including Wickford, Saunderstown and Lafayette.

3.4 Geology

Geologic formations and groundwater levels are important design considerations for individual sewage disposal system. High groundwater elevations can result in contamination of groundwater sources from inadequately treated or filtered effluent. Shallow depths to bedrock or other impervious materials can result in rapid movement of untreated wastewater along their surface potentially causing groundwater and water supply well contamination. Both of these conditions will lead to premature failure of an ISDS. In addition, geologic and hydrogeologic conditions encountered in the construction of ISDS have a direct bearing on their cost.

TABLE 3-2
EXISTING LAND USE

Type	Acres
Commercial	624
Industrial	850
Institutional/Public	1,203
Parks/Recreation	1,639
Uncommitted land	15,369
Agricultural	1,978
Residential	6,008
Extractive land	390
Total	28,061

Geologic data was obtained from the Groundwater Map of the Wickford Quadrangle (1959). Glacial outwash deposits underlie more than 50 percent of the planning area. These consist of medium to course sand and gravel interbedded with fine sand, silt and clay. The deposits form a relatively thick mantle over the bedrock. Outwash deposits are found primarily in the Quidnessett, Lafayette and Quonset Point Davisville Planning districts.

Till, consisting of a thin layer of unstratified and unconsolidated boulders, gravel, sand, silt and clay over bedrock, is found primarily in the Slocum and Saunderstown areas and also the region west of Post Road from Victory Highway to Davisville Road. The village of Wickford is primarily underlain by a mixture of till and outwash deposits.

Rock outcrops can be found in the vicinity of the following locations, which are underlain by outwash deposits.

- Newcomb Road and Post Road
- South of Bissell Cove
- Annaquatucket Road and Feather Bed Lane

3.5 Environmental and Geophysical Conditions

Physical characteristics important to a study of this nature include geography, topography, geology, soil conditions, groundwater and surface water conditions. Knowledge of environmental characteristics makes it possible to develop forecasts of future land use and population growth.

3.5.1 Soil Conditions

Data published by the United States Department of Agriculture, Soil Conservation Service was reviewed to determine the types of soil present in the planning area and their appropriate uses and suitability for development. Soil characteristics can limit the extent and intensity of buildings, roads, subsurface wastewater disposal systems, and other improvements. The soil in which a subsurface wastewater disposal system is located, has a major affect on its ability to function. The most important soil characteristic in this regard is permeability.

Soils with extremely low permeability do not allow sufficient volumes of wastewater to infiltrate into the subsurface, causing ponding in the vicinity of the system or system back-ups. Conversely, soils with excessive permeability generally do not provide adequate treatment of effluent and allow pollutants such as nutrients and bacteria to pass directly to groundwater.

For purposes of this study, soil classifications have been placed into broad categories based on features such as permeability, slope, depth to bedrock, and water table. Figure 3-2 illustrates soil conditions in the planning area as they relate to development constraints. The characteristics of the most frequent soil series found in the Town are discussed below:

Bridgehampton, a silty loam, is found in nearly level plains to sloping hillsides in regular and irregular areas ranging from 5 to 100 acres. Various types of Bridgehampton soils are found on over 3,350 acres of land in the planning area. The surface and subsoil layers can be expected to reach a combined depth of 40 inches or more. Available water capacity is high and runoff is slow. Bridgehampton is suited for community development, but careful

attention must be paid to septic system design to prevent pollution of groundwater. Slopes that are excavated are for the most part unstable; most of this soil type is found in the Town's central/south central segment.

Canton and Charlton series soils can be found on more than 2,000 acres in level, sloping and steeply sloping disposition. These soils are sandy loams with a surface layer of approximately three inches and a substratum to 60 inches, and are usually in parcels ranging from 5 to 200 acres. Available water capacity is moderate and runoff is slow. While the soils are suitable for community development, slopes can be problematic and attention to septic design is important because of the tendency for effluent to seep to the surface. Most of this soil type is found in the central and southeasterly portions of Town.

Carlisle Muck generally is found on level areas ranging in size from 5 to 100 acres. This soil type is found on over 1,450 acres in the planning area. Water capacity is high and runoff is very slow. The water table is near or at the surface for most of the year and subject to ponding. The soil is poorly suited for community development and cannot accommodate septic systems.

Hinckley series soils are excessively drained soil and most often found in level areas of irregular shape, in parcels of 5 to 75 acres, with some occurrence in rolling hills. Approximately 1,750 acres are covered by this soil group. Topsoil is approximately six inches in depth with about a 12-inch subsoil and 60 inches of substratum. The soil is suitable for community development, but improper septic system design and installation will result in rapid pollution of groundwater. Excavated slopes are typically unstable. Most of this soil type is found in the northwest and central part of the Town.

Merrimac Sandy Loam is the soil type that occurs in a higher percentage than any other type found in North Kingstown and covers an area greater than 5,300 total acres. Irregular shaped plains, terraces and rolling hills, ranging in size from 2 to 400 acres, are typical. This soil type is somewhat excessively drained and suited to community development. However, improper septic system design and installation will result in rapid pollution of groundwater. Excavated slopes are usually unstable. There is typically eight inches of topsoil, 17 inches of subsoil and a 60-inch substratum. This soil type is most commonly found in the north and central easterly portions of the Town.

Quonset Gravelly Sand Loam is an excessively drained soil found on flat plains and hilly areas to 15 percent grade in parcels ranging from 5 to 75 acres. This soil type is found on more than 2,700 acres of land in North Kingstown. Its potential problems regarding septic systems and erosion are consistent with the other predominant North Kingstown soil types. The largest areas of Quonset Soils also coincide with the locations of significant deposits of stratified drift that overlay the Town's four groundwater aquifers. Such soils are often targeted for earth removal and gravel extraction activities.

3.5.2 Soil Hydrology

Soil types have been categorized by the U.S. Soil Conservation service into four hydrologic groups, which allows estimates to be made of infiltration/percolation rate after the soils have been wetted. Most of the major soils groups previously identified in the planning area are classified as Group A or Group B.

Group A soils have a high infiltration rate when thoroughly wet. These consist mainly of deep well drained sands or gravel. Group A have a high rate of water transmission.

Group B soils have a moderate percolation rate when thoroughly wet and consist of moderately deep or deep, moderately well drained soils that have a moderately fine to moderately coarse texture. These soils have a moderate rate of water transmission.

Lower lying areas of the Town and those associated with wetlands and floodplains typically have soil types that are classified as Group C or Group D. Group C soils have a slow infiltration rate when thoroughly wet and generally have a layer that impedes the downward movement of water. These soils also have a fine texture, which results in a slow rate of water transmission.

Group D soils have a slow infiltration rate when thoroughly wet and consist of: clay that has a high shrink/swell potential; soils that have a permanent high water table; soils that have a clay layer at or near the surface; and soils that are shallow over nearly impervious materials. These soils have a very slow rate of water transmission.

Soils classified as Type A, and some of those classified Type B, have rapid permeability and high transmissivity rates which result in a more direct interaction between surface and ground water. This rapid permeability requires careful design and installation of septic systems to prevent pollution of groundwater. It also suggests that a significant supply of groundwater may be in the area of these soils. Conversely, soil classified in Group C may also require special septic tank design due to slow infiltration rates. Generally, soils in Group D are unsuitable for septic system usage. Hydrological information was considered during the preparation of Figure 3.3.

3.5.3 Topography and Drainage

Topographical information identifies physical features of the earth, which will influence the cost, and operation of wastewater facilities. Topography also has a direct influence on population distribution and growth.

The topography of North Kingstown is formed by a series of evenly dispersed ridgelines that create rolling hills, meadows, woodlands and valleys. Resulting from these topographical characteristics is a number of small drainage basins as opposed to one large directional flow. Elevations in the planning area range from sea level along Narragansett Bay to 310 feet above sea level in the northwest corner of the Scrabbletown district. The majority of the densely developed areas in the planning area are within 100 feet of sea level.

Approximately 20 percent of the Town is drained by the Annaquatucket River, which flows through the center of the Town toward Bissell Cove. Another 20 percent of the land drains to small streams and coves leading to Wickford Harbor. The Hunt-Potowomut River system drains the northeast portion of the planning area, accounting for 17 percent of the total land area. It is estimated that only 20 percent of the land area drains to the west or away from Narragansett Bay. Significant drainage patterns are shown in Figure 3-3.

3.5.4 Surface Water

The Town of North Kingstown contains many inland surface water features. Primary rivers include the Hunt, Potowomut, Pettaquamscutt, Mettatuxet, Annaquatucket and their tributaries. In addition to rivers and streams, there are ten ponds larger than five acres.

A special area management plan for the Narrow (Pettaquamscutt) River has been developed and implemented by the State's Coastal Resource Management Council. The

watershed of the Narrow River lies in the southeast portion of the Town. Major water bodies in this River system include Silver Spring Lake, Shady Lea Pond, Carr Pond, Gilbert Stuart Pond, Upper Pond and the Mettatuxet River. Among the problems that have been identified in the area is degradation in water quality and the high rate and density of ISDS failures. The Narrow River is presently designated as a Type SA water body. However, due to measured coliform bacteria levels, which consistently exceed the standard for SA waters, use of the River for shellfishing and recreational activities has been periodically restricted. Recommended management strategies to protect the environmental quality of the watershed call for identifying and restoring failed ISDS and prioritizing areas with high rates of septic system failure in adjacent communities for sewering.

North Kingstown also has more than 31 miles of saltwater coastline that forms the Town's eastern boundary. Physically, the coastline is composed of beaches, coves and inlets, which attract human and wildlife activity. Regions such as Sauga Point and Wickford Village are subject to tidal influences, which may flush cesspools and other disposal systems. This contributes bacteria and nutrients to the harbor.

The most recent "Report of the State of the State's Waters" from the RIDEM Office of Water Resources identifies several surface water bodies in the Town that are known to have water quality problems. A summary of impaired surface waters, the extent of contamination, and potential pollutant sources is presented in Table 3-3.

3.5.5 Groundwater

The RIDEM has classified the groundwater resources of the State into four categories: GAA, GA, GB, and GC. Groundwater classified GAA are those groundwater resources that are known or presumed to be suitable for drinking water without treatment and located in:

The state's major stratified drift aquifers that are capable of serving as a significant source for a public water supply ("groundwater reservoirs") and the critical portion of their recharge area as delineated by DEM.

- A 2,000 foot radius circle around each community public supply system well or within the delineation of a wellhead protection delineated by DEM or another delineation accepted by DEM done in accordance with the RI Wellhead Protection Program.

- Groundwater classified GA are those groundwaters, like GAA, that are known or presumed to be suitable for drinking water use without treatment. However, groundwater classified GA does not fall within any of the two priority areas described above. Most of the state, approximately 72 percent (773.5 square miles), overlies groundwater classified GA.

Groundwater classified GB is that groundwater which may not be suitable for drinking without treatment due to known or presumed degradation. Data on groundwater quality is basically limited to known sources of contamination and to groundwater withdrawn from public wells. All of the areas where the groundwater is classified GB are served by public water systems. There is current requirement to restore groundwater

classified GB to drinking water quality, however, the intent is to protect it from further degradation.

TABLE 3-3
IMPAIRED SURFACE WATER BODIES

WATER BODY	IMPACT	POTENTIAL SOURCES
Hunt River	Occasional exceedances of aquatic metal criteria, coliform, and potential VOCs (1,1,1 trichloroethane)	Road runoff, agricultural runoff, gravel washing, contaminated groundwater, unknown other sources
Potowomut R.	Potentially high nutrients, dense bottom nuisance sea lettuce (Ulva)	Upstream nutrient sources to Hunt River, road runoff, ISDS/Cesspools
Allen Harbor	Unknown (potential) impacts from hazardous waste	Former Navy landfill
Mill Creek & Mill Cove	High bacterial levels, dense Ulva growth, possible low oxygen in bottom waters and fish kills in summer	High nutrients and bacteria from failed/inadequate ISDS/Cesspools and road runoff adjacent to area and upstream
Fishing Cove	Occasional high bacteria levels	Inadequate/failing ISDS/Cesspools, boats
Academy Cove, Wickford Cove and Harbor	High bacterial levels, dense Ulva growth and/or algae growth, low oxygen in bottom waters in Summer, fish kills	Inadequate/failing ISDS/Cesspools, boat discharges
Duck Cove	Nuisance algae, possible low oxygen/fish kills	Failing/inadequate ISDS/Cesspools
Bissell Cove (inner cove)	High bacteria levels, nuisance Ulva, potential low oxygen	Failing/inadequate ISDS/Cesspools
Belleville Pond System	High nutrients, algae blooms and/or bottom vegetation, potential low oxygen (Summer)	Abandoned landfill, ISDS/Cesspools
Upper Narrow River	High Bacteria levels	Road runoff, failing/inadequate ISDS/Cesspools
Sandhill Brook	High bacteria levels	Failed or inadequate ISDS/Cesspools

Groundwater classified GC is, or may be, unsuitable for drinking water use. The most appropriate use for land overlying groundwater classified GC as determined by DEM is waste disposal. The areas where the groundwater is classified GC is limited to the DEM permitted waste disposal areas at licensed solid waste landfills and areas surrounding these landfills determined by DEM to be suitable for waste disposal.

The portion of the planning area identified with GAA water quality includes four groundwater aquifers and their recharge areas, including Annaquatucket, Chipuxet, Hunt and Pettaquamscutt. These areas provide all of the Town's drinking water supply. Concern about the vulnerability of these groundwater resources and limited supply alternatives led to the successful petition to the U.S. EPA for Sole Source Aquifer designation for the Hunt - Annaquatucket - Pettaquamscutt Aquifer system. The Town's groundwater protection areas are shown in Figure 3-4.

With the exception of the Quonset Point/Davisville Industrial Park, which has a groundwater classification of GB, the remainder of the Town is underlain by groundwater classified as GA. To protect groundwater quality from contamination, the Town of North Kingstown has adopted a Groundwater Protection Plan and established groundwater overlay zoning districts limiting development to one unit per two acres. This density was determined necessary to ensure that nitrate concentrations would remain below an adopted goal of 5 mg/l. The ordinance also requires nitrogen reducing technology be used for expansion on nonconforming lots when system upgrade is found necessary by the RIDEM. The EPA drinking water standard for nitrates is 10.0 mg/l. The range of nitrate levels in each of the Town's wells from 1990 to 1999 is given in Table 3-4.

TABLE 3-4
GROUNDWATER NITRATE CONCENTRATIONS
1990-1999

WELL NO.	NITRATE CONCENTRATION (mg/L)[1]
1	0.4 – 1.0
2	0.3 – 2.0
3	<0.5 – 0.2
4	1.2 – 2.8
5	0.6 – 3.2
6	1.2 – 2.0
7	<.05 - <.10
8	<.05 - <.10
9	2.0 – 3.9
10	2.4 - 6.6

3.5.6 Coastal Zones, Wetlands and Floodplains

North Kingstown has a network of environmentally sensitive streams, rivers, lakes, and ponds. In addition, the Town has more than 31 miles of coastline. Associated wetland areas, coastal zones and floodplains account for approximately 15 percent of the total land area.

Wetlands generally provide a valuable habitat for a variety of fish and wildlife species and act to improve water quality by filtering nutrients, wastes and sediment from upland runoff. Wetlands also provide flood control and groundwater recharge opportunities. Improper sewage disposal practices and urban run-off, among other factors, continuously threaten wetland areas. Aside from their environmental value, wetlands and floodplains will also indicate areas where high groundwater tables may adversely impact the function of a subsurface sewage disposal system.

The predominant wetland classification in the Town, as defined by the U.S. Fish and Wildlife Service, is the Palustrine System, which includes all non-tidal wetlands dominated by trees, shrubs, emergent mosses or lichens. These areas are generally less than 20

acres with a water depth of less than 2 meters at low water. Palustrine wetlands may be situated shoreward of lakes, river channels, and estuaries.

Estuarine systems comprise the second largest wetland type. These systems are defined as deep water tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land. Estuarine systems extend inland to where ocean derived salt concentrations are less than 0.5 percent. Figure 3-5 shows the approximate locations of wetland and coastal areas within the Town.

Water sources that drain to the coast include Mill Creek, Tibbets Creek, Wannuchecomecut River, Annaquatucket River and the Hunt-Potowomut River. Major coves are identified as Bissell Cove, Duck Cove, Wickford Cove, Mill Cove, and Fishing Cove. Other coastal features of significance include Little Tree Point, Rome Point, Wild Goose Point, Plum Point, Casey Point, Sauga Point, Greene Point, Poplar Point, and Pojac Point.

Freshwater floodplains are valuable resources that provide storage for stormwater when rivers and streams are not capable of carrying flows. The Army Corps of Engineers does not allow changes to the storage capacity of floodplains. In addition, coastal floodplains exist along the coast and are subject to flooding from wave action and tidal surges.

3.6 Historical Water Use

The 1999 estimated population served by the North Kingstown Water Department is 25,360[2]. Approximately 94 percent of North Kingstown's residential population use public water. The remaining 6 percent are presumed to be served by private wells. North Kingstown Water Department obtains 100 percent of its source water from a system of well fields. Ten (10) gravel packed wells are located in the Hunt-Annaquatucket-Pettaquamscutt (HAP) sole source aquifer. The maximum daily capacity of the NKWD is 7.8 million gallons per day. The maximum extended production rate is 6 MGD. Well production data for the period January 1990 through December 1999 follows in Table 3-5. Residential unit growth, based on service connections over the past ten years has averaged 140 new connections per year. However, over the last five years that figure is 170 annually. Using estimated 1999 population and a metered water usage rate of 868 million gallons per year, the per capita water usage is 94 gpd.

[2] [2] Estimated population @ 2.8 per capita per service

Table 3-5
North Kingstown Municipal Well Production Data
1990-1999

YEAR	TOTALmg	AVERAGE DAY	PEAK DAY	LOW DAY
1990	917.5	2.51	5.7	1.3
1991	990.6	2.65	7.8	1.1
1992	918.1	2.38	5.8	1.6
1993	1030.6	2.75	6.5	1.2
1994	971.0	2.61	6.5	1.6
1995	1005.0	2.70	6.2	1.7
1996	958.6	2.58	6.4	1.7
1997	1047.2	2.83	7.8	1.6
1998	1007.0	2.71	6.3	1.6
1999	1090.6	3.00	7.6	1.1
GEO MEAN	**992.3**	**2.67**	**6.62**	**1.43**

Chapter 4 - Assessment of Wastewater Disposal Needs

4.1 Current Wastewater Disposal Practices

Approximately 96 percent of the present population of North Kingstown relies on cesspools and septic systems for treatment and disposal of wastewater. Both are self contained underground waste disposal systems typically designed to handle wastewater generated from individual buildings. The useful life for a cesspool is about 10 years; conventional systems have a useful life of 30+ years. A vast majority of buildings constructed prior to 1964 were serviced by cesspools. These generally consist of a collection tank with singular or multiple discharge points designed to dispose the liquid portion of the waste directly to surrounding soils. Between 1965 and 1979, an increasing number of installed systems were of the septic tank/leachfield type. However, with the absence of adequate regulations until 1968, which were not strictly enforced, many of these systems were of sub-standard installation. Since 1979, when new design standards were adopted and enforced by the State, system construction methods and performance has generally improved.

The main purpose of septic tanks and cesspools is to separate solids from liquids through a settling process. Although biological degradation of solids occurs continuously, the rate is not sufficient to completely eliminate them. Therefore solids must be pumped out on a regular basis.

Lack of proper maintenance, among other factors, contributes to system failure. Data collected by the Town's Sewer Study Committee indicated that many people have adjusted their lifestyles to avoid prevent wastewater backups. For example, some residents have chosen not to wash clothes at home, others have their systems pumped frequently, and others have performed unpermitted repairs.

Septage generated within the Town is hauled by private entities, primarily to one of the following septage handling facilities:

- Quonset Point/Davisville (QPD) WWTF
- South Kingstown WWTF
- Cranston WWTF

There are no existing Town-owned or operated septage receiving and handling facilities. Septage disposal capacity is a topic that has been targeted as a future initiative for the North Kingstown wastewater management program. Data collected regarding system pumpouts will be used to better assess the capacity required for septage disposal. In addition to the issue of capacity, the community sees a need to investigate disposal options for the more difficult to dispose of commercial wastewater.

The population serviced by conventional sewage collection and treatment facilities is located in the immediate vicinity of the QPD Industrial Park. This includes the former Navy housing and apartment complexes on Devil's Foot Road and Newcomb Road, the former Navy housing on Camp Avenue, the Quidnessett and Fishing Cove elementary schools, the Wickford Point development off of Camp Avenue which contains 103 single family house lots and three homes along Mark Drive.

In addition there are four privately owned treatment facilities in the Town. These are:

- Brown & Sharp Mfg. - 100,000 GPD tertiary treatment plant discharging to the Hunt River
- Wickford Housing - Subsurface sand filtration system serving 130 residential units and the Town police and fire departments
- South County Nursing Center - Extended aeration/subsurface disposal system for 200 beds plus staff members
- Ferry Road, Saunderstown - Cooperative ISDS system serving 26 homes and the Saunderstown Yacht Club

4.2 Evaluation of Unsewered Areas

To evaluate unsewered areas within the Town, a methodology was developed for assessing need. To accomplish this, the following subtasks were performed.

1. A thorough review of RIDEM and Town records concerning ISDS permits, septic system overflow violations, and septage pump-out records. Only issued permits involving alterations or repairs to existing systems were noted as these indicated a tendency for the systems to be inadequate. This task was performed by the Town's Sewer Study Committee in 1991 and will be updated as ISDS maintenance report forms are submitted for compliance with the North Kingstown Wastewater Management District ordinance.
2. A review of soil conservation survey information to determine the characteristics of soil as it relates to permeability and development constraints.
3. A review of Town plat maps to determine typical lot sizes and development density.
4. A review of geologic information to determine the assumed groundwater table and the depth to bedrock.
5. An examination of existing reports to identify areas subject to surface water and groundwater pollution.

From the review of RIDEM and Town records, a database quantifying the number of ISDS repairs and the age of each ISDS system was developed for individual Assessor's plats. The plats were grouped into 29 districts, excluding Quonset Point/Davisville. A map of the Town with these districts defined is presented in Figure 4-1. Listed in Table 4-1 is the arbitrary area number, the name that the area is most commonly referred to as, the number of developed lots in the district, the number of ISDS failures[3], the number of "old" ISDS and the average percentage of system failures. Old systems were defined as those constructed prior to 1968. It should also be noted that certain plats within a particular district might have higher incidents of failure than the overall figures shown. For example, Plat 136 (Post Road Commercial) has a failure rate of 21 percent as opposed to the 5.8 percent for the entire sub-area. Plat 160 (Quidnessett Heights) has a failure rate of 12 percent and Plat 145 (Kingstown Heights) has a failure rate of 13 percent.

After reviewing existing data, a list of criteria was developed for prioritizing the need to improve wastewater management in the Town. Criteria used included:

1. Density of development
2. Groundwater table - wetland
3. Soil permeability

[3] ISDS failures were based on a review of RIDEM records regarding system alterations and repairs

4. Depth to bedrock
5. Age of ISDS systems
6. Aquifer area with groundwater protection limitations
7. Reported ISDS failures
8. Coastal area
9. Surface water pollution potential

TABLE 4-1
ISDS PROBLEMS – UNSEWERED AREAS

Area no.	Area name	Plats	# Dev. Lots	# ISDS Failures	# Old ISDS	Percent Failures[1]	Percent Old ISDS
1	Wickford	88,92,116, 117,118,139	639	60	511	9.4	80.0
2	Poplar Point	91, 92	209	28	177	13.3	84.7
3	Shore Acres	142,141,140, 107,178,179	339	14	126	4.1	37.2
4	Hamilton	68,89,26,45	536	52	329	9.7	61.4
5	Plum Point	42	119	15	107	12.6	89.9
6	Plum Bch./Saunderstown	41,19,18,1	306	15	296	4.9	96.7
7	Pettaquamscutt		365	10	310	2.7	84.9
8	Porter Estates	60,62,73	264	15	65	5.7	24.6
9	Mount View	166	238	9	191	3.8	80.3
10	Shore Drive	72,74,75	89	8	61	9.0	68.5
11	Davisville	132,151,150, 152,130	336	17	288	5.1	85.7
12	Frenchtown	177,153,156,154	117	12	98	10.2	83.8
13	Scrabbletown	125,126,127, 128,129	395	8	180	2.0	45.6
14	Old Baptist Rd. - South	112,124	175	9	95	5.1	54.3
15	Post Rd. - Chadsey	146	320	22	278	6.9	86.9
16	Post Rd. - Yorktown	148,147	265	11	244	4.1	92.1
17	Post Rd. - North	158,175,176	426	20	372	4.7	87.3
18	Ten Rod Road	17,114,115,94	179	12	114	6.7	63.7
19	Preston Dr. - Haverhill	85,93	265	17	232	6.4	87.6
20	Cedarfields	87	145	9	47	6.2	32.4
21	Quidnessett Heights	173,174,160, 161,171	305	12	253	3.9	83.0
22	Quidnessett	55,162,50, 164,165,163,84	221	3	105	1.4	47.5
23	Lafayette Road	83,97,77,76	158	2	77	1.2	48.7
24	Post Road Commercial	135,136,108, 138,182,120,181	277	16	163	5.8	58.8
25	Kingstown Heights	143,144,145	197	11	174	5.6	88.3
26	Shady Lea Road	7	26	2	22	7.6	84.6
27	School Street	149	289	16	272	5.5	94.1
28	Thelma Irene	86	68	6	34	8.8	50.0
29	Slocum	54,56,30,29,33	384	6	324	1.5	84.4
Total			***7,652***	***437***	***5,545***	***5.99% average.***	***71.27% average***

1. Defined as the #ISDS failures/#dev.lots

Sources: Pare Engineering, Draft Town of North Kingstown Wastewater Facilities Plan, August 1995
Report of the Sewer Study Committee, October 1993

The Sewer Study Committee Report contained in Appendix A gives a complete description of the prioritization of need and recommended alternatives for each of the problem areas.

Four broad-based recommendations were identified by the Sewer Study Committee that would address the various levels of need in the Town. First, an educational program aimed at encouraging proper maintenance of ISDS systems to prevent wastewater-related problems was considered the base level of action for the entire Town.

Establishing various wastewater management districts coupled with an on-site ISDS rehabilitation program was the second level of action considered. State legislation passed in 1987 allows communities to establish wastewater management districts for the purpose of ensuring inspection and maintenance of ISDS systems. State loans may be obtained for the purpose of ISDS repair. The potential for on-site rehabilitation of ISDS systems is a function of lot size and soil conditions. With recent changes to state ISDS regulations and the acceptance of "innovative" onsite treatment technologies, rehabilitation of existing systems appears to be the most attractive solution.

As mentioned earlier in this document, consideration was given to the use of traditional sewers discharging to the treatment facility located at the Quonset Point/Davisville Industrial Park. The use of sewers was to be limited to high need areas that are in reasonable proximity to the existing Quonset Point/Davisville collection system. However, constructing a new conventional wastewater treatment facility, with an ocean discharge, to be owned and operated by the Town, is most likely not feasible from a regulatory standpoint.

The final broad alternative considered for wastewater management was the use of innovative and alternative collection and treatment technologies in certain districts. These areas, in general, exhibit the same level of need as those where traditional sewering is proposed, however, geographic location (outside the range of QPD collection system expansion) and probable cost would preclude conventional sewering and treatment. However, innovative/alternative (I/A) technologies can be tailored to meet the needs of a specific area.

Appendix B contains information about the evaluation of the central collection and innovative and alternative collection and treatment technologies.

Chapter 5 – North Kingstown Wastewater Management District (NKWWMD)

North Kingstown, like most municipalities, relies on individual property owners/managers to maintain their wastewater disposal systems. Failure of a system can be attributed to any or all of the following factors:

- Improper siting
- Inadequate sizing
- Hydraulic overloading
- Introduction of large quantities of non-biodegradable solids
- Failure to pump the system regularly
- Improper installation or substandard construction materials
- Adverse activities around the leaching field (i.e. planting trees)

To insure the proper performance of on-site wastewater disposal systems in North Kingstown where they will continue to provide an alternative to conventional sewering, the Town Council has established a wastewater management district. The North Kingstown Wastewater Management District Ordinance went into effect on May 1, 1999. (Appendix C)

5.1 The North Kingstown Wastewater Management Districts Program

In 1996, a decision was made by the North Kingstown Town Council to shift the focus away from sewering to maintenance of ISDS through the drafting of a wastewater management district ordinance. The Sewer Study Committee was renamed the Wastewater Management Committee and their charge was revised to reflect the new focus, which included the drafting of a Wastewater Management District Ordinance and an associated public outreach/education program to garner public support for the ordinance. The Committee membership was also expanded to include representation from other Town committees including the Planning Commission, Groundwater Committee, Harbor Management Committee and Historic District Commission. Aqua Fund grant funds were acquired to help with these tasks.

Chapter 8, Article VII or the Code of Ordinances, Town of North Kingstown, entitled North Kingstown Wastewater Management District was adopted at a public hearing held on January 11, 1999 (Appendix C). The ordinance requires that all onsite systems in the Town of North Kingstown be inspected and pumped if necessary once every three years.

The effective date of the ordinance was delayed until May 1, 1999 so that an implementation strategy could be developed. It was determined that implementation of the ordinance would be the responsibility of the North Kingstown Department of Water Supply and an implementation plan for the wastewater management program was presented to the Town Council by the Department of Water Supply in April 1999.

The goals of North Kingstown's Wastewater Management Program include the following:

1. Ensure the proper operation and maintenance of ISDS to prevent malfunctioning systems.
2. Protection the public health from risks associated with septic system failure.
3. Protection of surface and groundwater resources, including the Town's drinking water supply from contamination associated with failure of ISDS.

4. Continued reliance on the use of properly functioning ISDS as a viable and cost-effective alternative to municipal sewers.
5. To maintain the hydrological balance in groundwater recharge areas by reducing the transport of water out of these areas

5.1.1 ISDS Inspections

As stated, the North Kingstown ordinance requires periodic inspection and maintenance of all ISDS in Town. An inspection and pump when necessary approach was developed in recognition of the fact that system maintenance is dependent on how the system is used. In particular, First Maintenance and Routine Maintenance Inspections are required as outlined in Septic System Check-Up: The Rhode Island Handbook for Inspection. A "town approved" inspector must perform inspections and a list of approved inspectors is available at the North Kingstown Department of Water Supply. Inspection procedures are outlined in Table 5-1.

Table 5-1
North Kingstown Wastewater Management Inspection Procedures

First maintenance inspection	**Inspection**
Gather records and data • Interview user/homeowner • Obtain most recent system drawings and certificate of conformance from the RIDEM Gain access to the system components • Locate and gain access to the septic tank/cesspool* • Locate the soil absorption system • Identify any potential retrofits Evaluate and maintain the system components • Inspect and maintain the septic tank cesspool* • Determine the need for pumping** • Inspect the distribution box (if accessible) • Observe the above-ground components **Complete the North Kingstown Wastewater Management District ISDS Maintenance Report form and submit required copies to the homeowner and the North Kingstown Department of Water Supply, 80 Boston Neck Road, North Kingstown, RI 02852**	Gain access to the system components • Locate and gain access to the septic tank/cesspool* • Locate the soil absorption system • Identify any potential retrofits Evaluate and maintain the system components • Inspect and maintain the septic tank/cesspool* • Determine the need for pumping** • Inspect the distribution box (if accessible) • Observe the above-ground components Complete the North Kingstown Wastewater Management District ISDS Maintenance Report form and submit required copies to the homeowner and the North Kingstown Department of Water Supply, 80 Boston Neck Road, North Kingstown, RI 02852

*For multi-compartment tanks, replicate procedure on all tanks/compartments
**Cesspools and systems with metal tanks should be pumped during every inspection

While one of the primary purposes of the maintenance inspection is to determine the need for pumping, a qualified inspector can diagnose and recommend minor repairs before

they become major problems. While the North Kingstown Town Council supports and encourages system maintenance based on inspection results, property owners may opt to have their ISDS pumped in lieu of inspection. Proof of pumping must be submitted to the Town along with the required report form. It is anticipated that this policy will be reevaluated at the end of the first compliance period (May 1, 2002).

5.1.2 Inspector Qualifications

Of particular concern to the residents of North Kingstown was assuring that qualified individuals were conducting ISDS inspections. To address these concerns criteria to qualify inspectors were developed. A worksession was held to discuss inspector qualifications and wastewater professionals were invited to attend. The Town's intent in developing such criteria was twofold. First, Town staff wanted to ensure that appropriate and consistent inspection procedures were followed and that inspectors were trained in these procedure. Second, was a desire to the extent possible, to protect the interest of property owners. The following describes the criteria and approval process that has been developed in North Kingstown for 'Town Approved' ISDS inspectors:

Initial approval as a Town ISDS inspector shall be granted to any individual who meets the following qualifications:

1. ***Has a current State of Rhode Island Class II or Class III ISDS Designer License or;***
2. ***Has a current State of Rhode Island Class I ISDS Designer or Installer License or;***
3. ***Completion of University of Rhode Island Cooperative Extension Onsite ISDS Inspectors Course, and;***
4. ***Has in force the appropriate insurance, and;***
5. ***Has made application for initial listing to the Town.***

Renewal as a Town approved ISDS inspector shall be granted to an individual who meets the following conditions:

1. ***Has a current State of Rhode Island Class II or Class III ISDS Designer License, or;***
2. ***Has current State of Rhode Island Class I ISDS Designer or Installer License and completion of University of Rhode Island Cooperative Extension Onsite ISDS Inspectors Course, and;***
3. ***Has in force the appropriate insurance, and;***
4. ***Has made application for renewal to the Town, and;***
5. ***Has complied with the inspection procedures and reporting requirements.***

VALIDATION PERIOD

Enrollment for listing as a Town approved ISDS inspector shall be continuous. All applications for approval shall expire on 30 April of each calendar year. All individuals listed as approved ISDS inspectors shall require renewal of said approval no later than 1 May of each calendar year.

INSURANCE REQUIREMENTS

All individuals applying for listing as a Town approved ISDS inspector shall be required to obtain and keep in force insurance.

APPLICATIONS

Applications for initial and renewal listing as a Town approved ISDS inspector shall be made available at the North Kingstown Department of Water Supply. Completed applications shall be approved and retained by the Director of Water Supply. The Town will maintain and make available to the public a current list of all individuals approved. The list shall include the inspector's name, company, address, telephone number, qualifications and insurance information.

APPLICATION FEE

Every application for initial approval or renewal shall require the payment of a $20.00 application fee. Payment of application fees for initial listing or renewal shall not be on a prorated basis.

Appendix D includes North Kingstown's Wastewater Management District inspector application procedure and application form.

5.1.3 ISDS Maintenance/Inspection Database

A significant part of the work associated with the NKWWMD will be the tracking of the data for the approximately 10,000 ISDS in Town. The Department of Water Supply investigated a number of data base software packages for this purpose, including the Septic Information Management System developed by Stone Environmental, Inc., the BOH2000 Program developed by the Massachusetts Department of Environmental Protection and SepTrak, developed by Kyran Research Associates, Inc. All of the various software packages were developed in response to Massachusetts Title 5, which requires inspection of ISDS under certain circumstances.

A database will provide a means to document the available information about each ISDS including plat and lot number, size, type, pumpout history, inspection history and other data pertinent to system performance. The software must include a comprehensive wastewater management capability to track ISDS inspections, pumpouts, maintenance, system performance monitoring and loan programs implemented.

An RFP for database software to help administer the wastewater management program was issued in May 1999 and Kyran Research Associates, Inc. has been retained by the Town to provide installation of SepTrak software, data conversion, training and technical support.

5.1.4 Wastewater Management Education

A critical component of North Kingstown's Wastewater Management Program is public education. Section 8.152 of the Wastewater Management District Ordinance requires that a public education program be established and overseen by the NKWWMD.

Components of the education program will include:

Public Forums: Two public forums have been scheduled to coincide with the start up of the ordinance. The purpose of these forums is to answer questions about the requirements of the ordinance and how it will be implemented. Educational materials regarding proper operation and maintenance of septic system will also be available. Additional public forums may be scheduled on a periodic, as needed basis (for example, when the Community Septic System Repair Program is established). Forums may be coordinated with the URI Onsite Wastewater Training Program and the Rhode Island Home-A-Syst Program.

Newsletters and News Releases: The Department of Water Supply has developed a newsletter (The Puddle), which is distributed with the water bills two times per year. Wastewater related articles would be included periodically in the newsletter. Articles will also be submitted for publication in the Town's newsletter, the Compass. In addition, news releases will be submitted periodically to the local newspapers.

Educational Material: The Water Department, in coordination with the Groundwater Committee will develop educational material, which will be available at the Town Hall, Town Library and Senior Center. URI and others have already developed educational brochures and fact sheets on ISDS maintenance. The Water Department will collect appropriate material and make it available to residents.

Presentation Materials: A North Kingstown Wastewater Management District presentation will be prepared and available for use by staff and/or Committee members. Topics covered will be the ordinance requirements as well as information on use and care of septic systems. The presentation will utilize overhead projector slides and also be available on disk for computer presentation.

Miscellaneous: The Department of Water Supply will prepare periodic mailing to targeted groups to encourage ISDS inspections. For example, letters will be sent to homeowner associations suggesting that it may be cost effective for the association to coordinate inspections in a given neighborhood. Inspection reminders will be included in water and wastewater bills. The department may investigate the use of promotional items to encourage ISDS inspection and maintenance.

5.1.5 Enforcement Responsibility and Appeals

The North Kingstown Wastewater Management District ordinance designates enforcement responsibility to the Town's building official. An ISDS owner determined to be in violation of the ordinance will be issued a written notice explaining the nature of the violation, required actions, a 30-day time frame for compliance, and the possible consequences for noncompliance. Any party aggrieved by a decision of the administrative officer shall have the right to appeal that decision to the building code board of appeals. The appeal procedure is outlined in Section 8-157 of the North Kingstown Wastewater Management District ordinance (See Appendix C). Decisions of the board of appeals shall be based on the findings and the record of the administrative officer. An aggrieved party may appeal a decision of the building code board of appeals to the District court.

5.16 Funding Sources for ISDS Repair and Replacement

An important component of the North Kingstown Wastewater Management District Program will be the establishment of a funding source(s) for repair and replacement of failing systems. It is our goal to provide funding options to address a variety of needs and income levels.

The Washington Trust Bank currently makes available loans to homeowners for ISDS Repair/Replacement. Loan terms under this program will allow for a debt to income ratio of 50% and a loan to value of 100%. The interest rate for these loans is ½ % below market. These terms are available to any North Kingstown owner occupant of one to four family dwellings with satisfactory credit. For those homeowners that are eligible based on income and require expanded underwriting to qualify for a loan, the Town through the Community Development Block Grant (CDBG) Program makes available a deferred loan. Repayment of the loan is deferred and a lien is place on the property thus delaying the repayment of the loan until the property changes ownership.

Proposed North Kingstown Community Septic System Loan Program (CSSLP)

Funds are available to local governments through the Rhode Island Clean Water Finance Agency to initiate septic system repair programs. The CSSLP is a source of funds to provide subsequent loans to homeowners for the repair or replacement of failing or substandard systems. Rhode Island Housing and Mortgage Financing Corporation will be the loan servicer on the subsequent homeowner loans. The interest rate on these loans is 4% (subject to periodic changes). In order to be eligible for CSSLP funds, the Town must have a

RIDEM approved On-site Wastewater Management Plan. In addition, the project must be submitted to RIDEM to be ranked and listed on the Project Priority List (PPL).

The community ***may*** apply specific homeowner loan criteria. For example, number of cost estimates needed, maximum number of housing units per structure to qualify, whether loans will be made available to both owner and non-owner occupied dwellings. Funding of group or cluster septic system projects is ***not*** allowed under the program. Loans are to be used for ISDS repair or replacement only and cannot be used for any other home improvements, additions or remodeling. Based on Table 4-1, North Kingstown estimates that there are 437 failed systems and 5,545 substandard systems (most likely cesspools) in Town. Assuming an approximate repair cost of $4,800[4] per system, North Kingstown estimates the total cost of system upgrade and repair to be $28,713,600.[5]

5.1.7 North Kingstown's Eligibility Criteria for CSSLP financing

The North Kingstown Wastewater Management District includes the entire Town of North Kingstown. The North Kingstown Department of Water Supply will be responsible for implementation of the Onsite Wastewater Management Plan and for oversight of the CSSLP program. While it is the goal of the North Kingstown Wastewater Management Program to repair or replace as many failing and substandard systems as possible, it is recognized that available funding will be limited. As such, eligibility criteria have been developed for the North Kingstown Wastewater Management District. In the event the requests for funding based on the number of applications exceed the available funds or reach a critical level ($100,000 remaining), applications will be evaluated and prioritized based on the following:

- Threat to natural resources. Priority will be given to failing systems based on the potential for impact to ground or surface watersheds.
- Owner occupancy. Priority will be given owner occupied (non-income generating) housing units.
- Income level. Priority will be given to residents whose household income level is at or below the median yearly income level as reported by the US Census Bureau.

The Town has established a committee to review requests for funding under the CDBG program for ISDS repair/replacement. It is anticipated that this staff committee will also review applications for financing under the CSSLP program. In addition it is realized that the above criteria established to evaluate loan applications would need to be clarified once the North Kingstown CSSLP program has been established.

To briefly outline how the program would work, the property owner would first come to the Town for an application package. The completed application package would be returned to the Town along with the proposed ISDS design plan for repair or replacement. The Town, after review and approval by the ISDS loan committee would issue a letter stating that the proposal was consistent with the North Kingstown Wastewater program criteria and was located within the wastewater management district. The applicant/application would then be sent to the RI Housing and Mortgage Finance Corporation. As mentioned above the RI Housing and Mortgage Financing Corporation will be the loan servicer. Loan terms shall be three

[4] Average cost of repair based on Community Development Block Grant Program information
[5] Data regarding ISDS problems will be updated as inspection and pumping information is received

(3), five (5) or seven (7) years where a determination would be made of whether the applicant is loan worthy.

Eligible loan amounts are as follows:

REQUEST	MINIMUM $ AMOUNT	MAXIMUM $ AMOUNT
ISDS Repair	$1,000	$7,500
ISDS/Cesspool Replacement	$1,000	$15,000

It shall be the Town's policy to require that effluent filters and risers to grade be incorporated into the design of systems financed under the North Kingstown CSSLP program.

As part of the eligibility for funding under the State Revolving Fund, North Kingstown has submitted a Community ISDS Repair Program request in the amount of $300,000 for evaluation under the Rules and Regulations for the Priority Determination System for Federal and State Assistance to Local and Governmental Units for Construction of Water Pollution Abatement Projects. It is anticipated that approximately 35 systems could be repaired with this money.

The CSSLP program once available will be well publicized through fact sheets, news releases and targeted mailings. Results of ISDS inspection reports will be used to identify properties that could benefit by such funding.

The availability of funding sources for ISDS repair and replacement is considered to be an essential component of the NKWWMD. In addition to CSSLP funding the Town will be investigating and pursuing other funding sources (grants, loans, etc.), in particular to try to address the needs of those that do not qualify for CSSLP funds such as the commercial property owners.

5.1.8 Wastewater Management Program Budget

The Town of North Kingstown has been awarded a Nonpoint Source Pollution Abatement Grant in the amount of $27,800 for the implementation of the Wastewater Management District Program. These funds are to be used for start up costs, which include the development of the implementation plan and an implementation handbook, the purchase of database software for ISDS tracking and the development of educational materials.

A budget for the wastewater management administration will be included as a budget line item and submitted annually as part of the Town budget process. The proposed budget for fiscal year 2000/2001 is $16,807 and includes funding for technical support for ISDS software, printed materials and forms, labor, educational materials, postage and training expenses.

Chapter 6
Projected Future Wastewater Management Initiatives

The following provides a list of actions to be incorporated into North Kingstown's Wastewater Management District Program.

YEAR 2000/2001

- Installation of SepTrak data base software, data conversion (tax assessor, water department)
- Data input as ISDS Maintenance Inspection Report forms are received
- Continue to publicize requirements of the NKWWMD through newsletters, brochures, letters, etc.
- Letter to homeowner associations encouraging coordination of inspections.
- Update Onsite Wastewater Management Plan data using data generated by NKWWMD.
- Development of educational material including slide show and display board which can be set up at town hall, library, or at special functions.
- Organize and hold an inspection workshop in coordination with URI Onsite Wastewater Training Center and RI Home A Syst.
- Organize and hold worksession with ISDS inspectors/wastewater professionals to get feedback on program implementation.
- Integrate GIS capability into ISDS tracking software.
- Modify/clarify ISDS inspection report form and other program forms as necessary.

FUTURE YEAR ACTIVITIES

- Review and update North Kingstown Onsite Wastewater Management Plan and *North Kingstown Wastewater Management District* ordinance as necessary.
- Provide vendor information to residents regarding effluent filters or other items, which could enhance ISDS performance.
- Grant writing for funding of program initiatives.
- Work with URI Onsite Wastewater Training Center to encourage enhanced treatment technologies in sensitive resource areas.
- Investigate ways to handle septage disposal problems. The issue of septage disposal has been raised numerous times by local wastewater professionals.
- Continue to develop and revise education program initiatives to meet the needs of the NKWWMD and the residents/property owners of North Kingstown.
- Investigate septic disposal options. This would include disposal of commercial wastewater (in particular restaurant/food services) and ways to address difficulties associated with disposal that may lead to lack of/avoidance of system maintenance.