Section 3
Summary of Relevant Data

3.1 Introduction

The first step in assessing the wastewater needs of the Town was to compile available data from various sources including local, regional, and state resources to characterize existing conditions. This section summarizes the data obtained for this CWMP from each data source and describes its relevance to the CWMP process.

3.2 Past Reports and Studies

The following reports and studies were gathered during the development of the CWMP. These reports originated largely from either the Town or state environmental agencies.

- "Performance of Innovative/Alternative Onsite Septic Systems for the Removal of Nitrogen in Barnstable County, Massachusetts 1999 –2007," Barnstable County Department of Health and Environment
- "Linked Watershed Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Pleasant Bay System, Orleans, Chatham, Brewster, and Harwich, Massachusetts," May 2006, Massachusetts Estuaries Project
- "Final Pleasant Bay System Total Maximum Daily Loads for Total Nitrogen," May 2007, MassDEP Bureau of Resource Protection
- "MEP Technical Memo, Updated Water Use and Muddy Creek Nitrogen Attenuation and Nitrogen Loading to Pleasant Bay," June 25, 2010, Massachusetts Estuaries Project
- "MEP Technical Memo, MEP Scenarios to Evaluate Water Quality Impacts of the Addition of a 24 foot Culvert in Muddy Creek Inlet," October 5, 2010, Massachusetts Estuaries Project
- "Linked Watershed Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Allen, Wychmere and Saquatucket Harbor Embayment Systems, Harwich, Massachusetts," June 2010, Massachusetts Estuaries Project
- "Linked Watershed Embayment Model to Determine Critical Nitrogen Loading Thresholds for the Herring River Embayment System, Harwich and Dennis, Massachusetts," June, 2012 Massachusetts Estuaries Project
- "Final Report – Natural Attenuation of Nitrogen in Wetlands and Waterbodies," April 2007, MassDEP
- "Fecal Coliform Evaluation and the Mitigation Planning for the Allen's Harbor Watershed, Town of Harwich, Massachusetts," May 2003, Stearns & Wheler
- "Technical Memorandum – Summary of USGS Modeling of Potential Effluent Recharge Sites," October 3, 2006, Stearns & Wheler, LLC

- "Evaluation of Wastewater Management Options for Freshwater Ponds, Guidance Document and Case Study Report for The Great Sand Lakes," June 2007, Stearns & Wheler, LLC
- "Comprehensive Site Assessment, Queen Anne Road Sanitary Landfill," May 1998, Weston & Sampson Engineers
- "Ecologic Memorandum, Harwich Ponds," June 30, 2008, EcoLogic, LLC
- "Ecologic Memorandum, Harwich Ponds, 2009-2010 Data Review," April 18, 2011, EcoLogic, LLC
- "Skinequit Ongoing Pond Study," December 7, 2005, Harwich Natural Resources Department
- "Review and Interpretation of Harwich Ponds Volunteer Monitoring Data, Final Report," December 2006, Cape Cod Commission Water Resources Program
- "Brewster Freshwater Ponds: Water Quality Status and Recommendations for Future Activities, Final Report," September 2009, SMAST Coastal Systems Group and Cape Cod Commission Water Resources Program
- Town of Harwich Local Comprehensive Plan, latest plan adopted May 2011

These reports were used to understand the existing conditions within the Town and within particular watersheds.

3.3 GIS Data

Geographic Information System (GIS) data layers used during the data accumulation phase were available from several sources. GIS coverages were obtained from MassGIS, the Cape Cod Commission (CCC), the U.S. Geological Survey (USGS), and the U.S. Department of Agriculture (USDA). Table 3-1 lists all GIS data sources including MassGIS, the USGS, and the USDA, along with the year the data were obtained. CCC data sources are described separately in the next subsection.

Table 3-1
Summary of GIS Data Sources

Information	Source	Date
Orthophotos (Aerial Photos)*	MassGIS	2005 & 2009
Wells & Zone IIs**	MassGIS	2007 & 2010
100-Year Floodplain	MassGIS	2007
Wetlands***	MassGIS	2006 & 2009
Natural Heritage and Endangered Species Program Priority Habitat Areas	MassGIS	2006 & 2008
Surficial Geology	MassGIS	2007
Soils	USDA	2011
Freshwater Ponds	USGS	2006
Estuaries	USGS	2008
Groundwater Contours	USGS	2008

*BING orthophotos have also been used during the course of the project.
**Zone II data were updated in 2010, but the majority of CWMP analyses were already performed using the 2007 data.
***No changes were made in Harwich between the 2006 and 2009 MassGIS wetlands data layers.

3.4 CCC Data

The Cape Cod Commission is the regional planning agency for Cape Cod, Massachusetts. Where MEP watersheds cross town boundaries, parcel information for adjacent towns was required to assess alternatives for meeting MEP goals. Watershed boundaries and parcel data for adjacent towns were provided by the CCC. Table 3-2 below lists the information obtained from the CCC and the date of the data.

Table 3-2
Data Obtained from the Cape Cod Commission

Information	Date
MEP watersheds and subwatersheds	various
Water use data (for Harwich)	2004
Harwich parcel information	2006
Brewster parcel data	2006
Orleans parcel data	2004
Chatham parcel data	2004
Dennis parcel data	2009

3.5 Groundwater

Groundwater contours in Harwich are shown on Figure 3-1. This figure was produced using USGS steady state current conditions modeling from early February 2008. The groundwater contours are shown in blue on a USGS topographic map to relate the groundwater contours to ground surface contours.

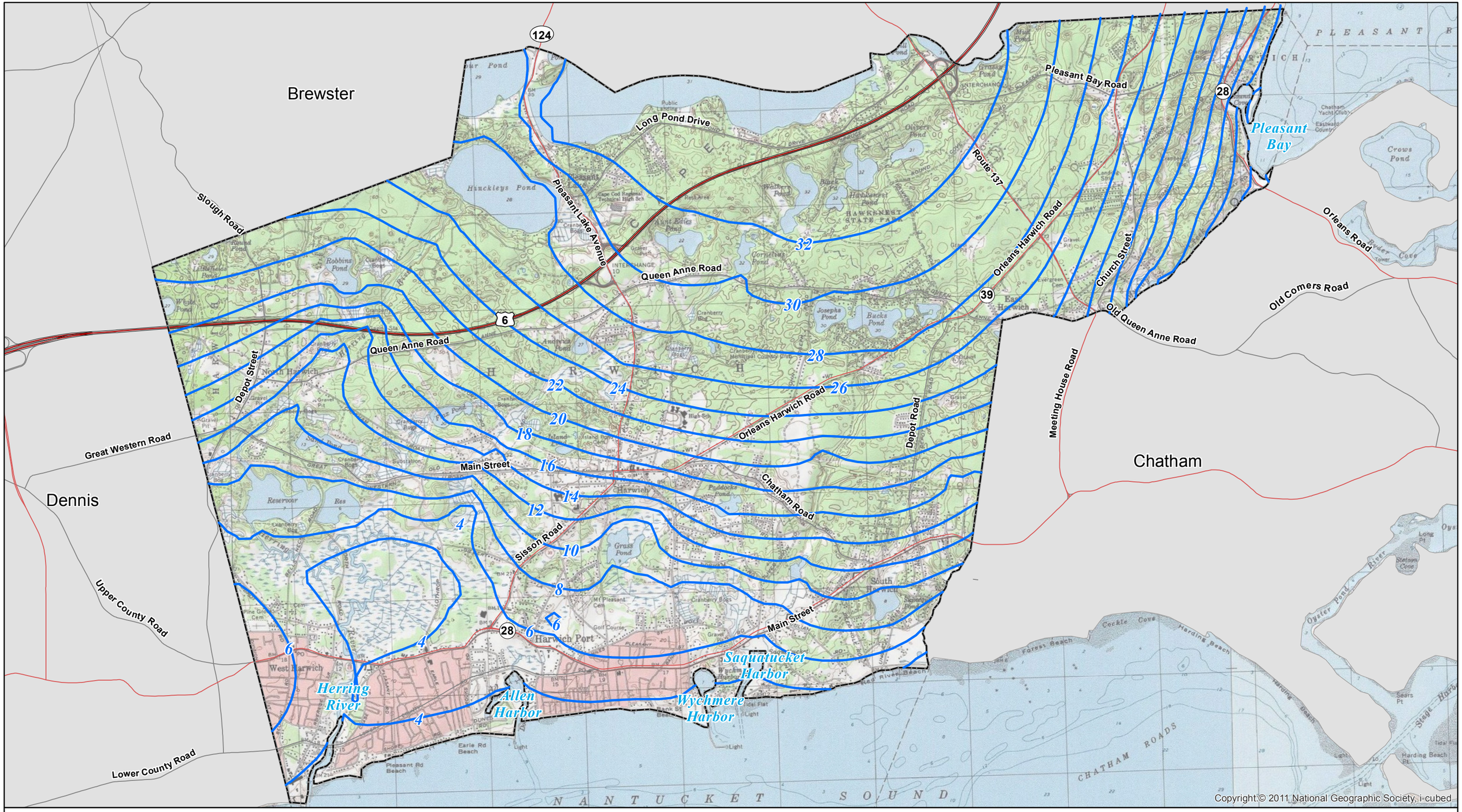
Figure 3-2 shows three ranges of depth-to-groundwater. Areas in orange are located where the depth-to-groundwater is expected to be 5 feet or less. Areas in light green depict locations where groundwater may be encountered at a depth of 5 to 15 feet. The dark green regions show areas where the groundwater is more than 15 feet below the ground surface. Note that groundwater levels are dependent on the season during which measurements are taken. The levels shown on this map are intended to reflect average annual conditions.

Generally, shallow depths to groundwater occur closer to the shore and adjacent to waterways. Interviews with Harwich Board of Health (BOH) officials and a local soil evaluation consultant report that especially shallow depths to groundwater are seen in areas along the bogs south of Great Western Road and near Cranberry Lane.

Developed properties in the areas with up to a 5-foot depth to groundwater may have on-site septic systems that are too close to the groundwater table at certain times of year and may provide less than adequate treatment. Alternatively, systems in these areas may require mounded systems to achieve the appropriate separation between groundwater and the leaching field.

3.6 Wetlands

Figure 3-3 shows the extent of wetlands coverage in Harwich as of 2007. As listed above, this information came from MassGIS and is dated 2006. MassDEP updated the wetlands layer again in 2009, but there were no changes identified in Harwich.



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Legend

Groundwater Contours (ft)

Town of Harwich
Comprehensive Wastewater
Management Plan

1 inch = 3,000 feet

0 1,500 3,000 6,000 Feet

Figure 3-1
Groudwater Contours

CDM Smith

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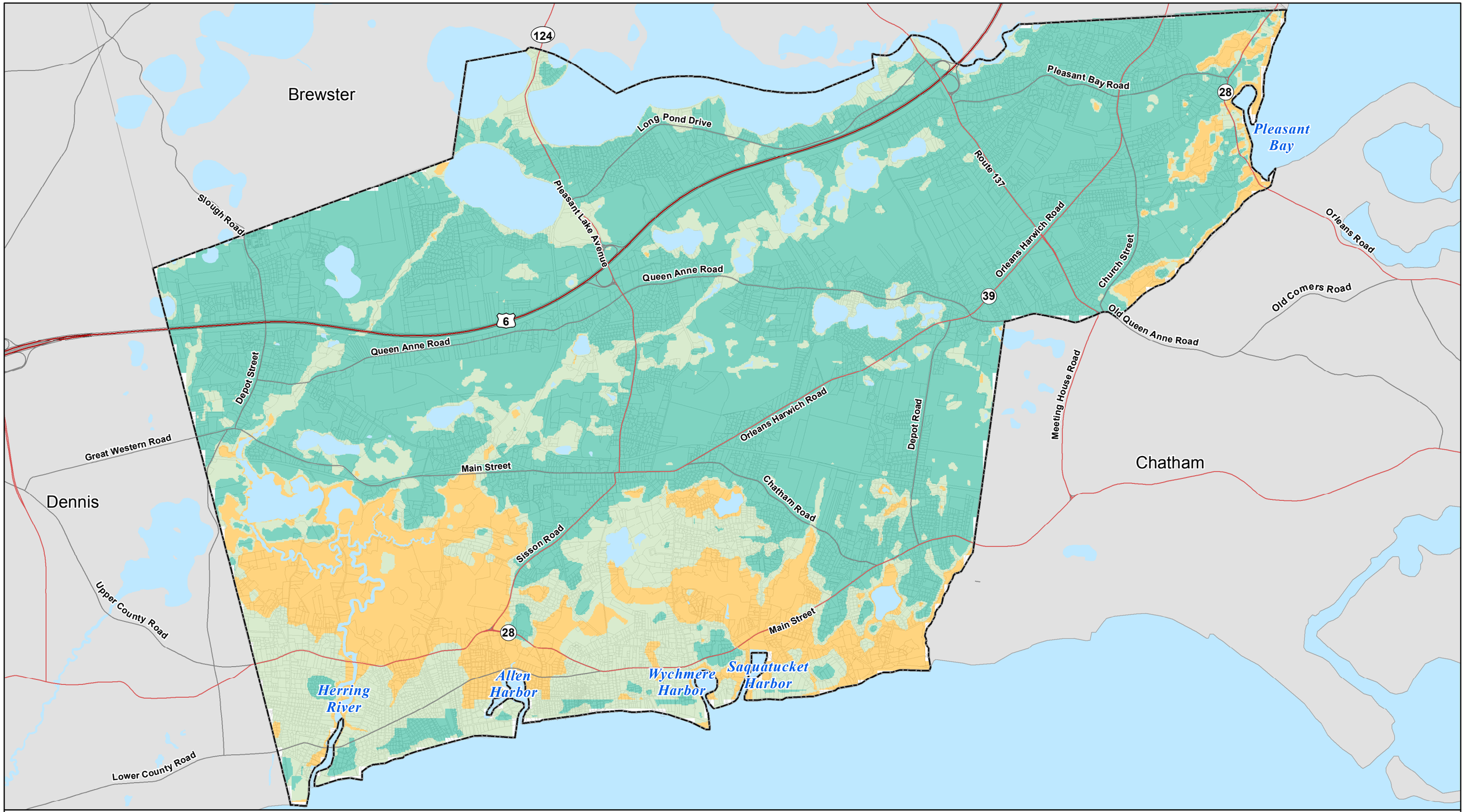

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Legend

Water Table Distribution (feet below ground level)

- < 5 feet
- 5 - 15 feet
- > 15 feet

Town of Harwich
Comprehensive Wastewater Management Plan

1 inch = 3,000 feet

0 1,500 3,000 6,000 Feet

Figure 3-2
Depth to Groundwater

CDM Smith

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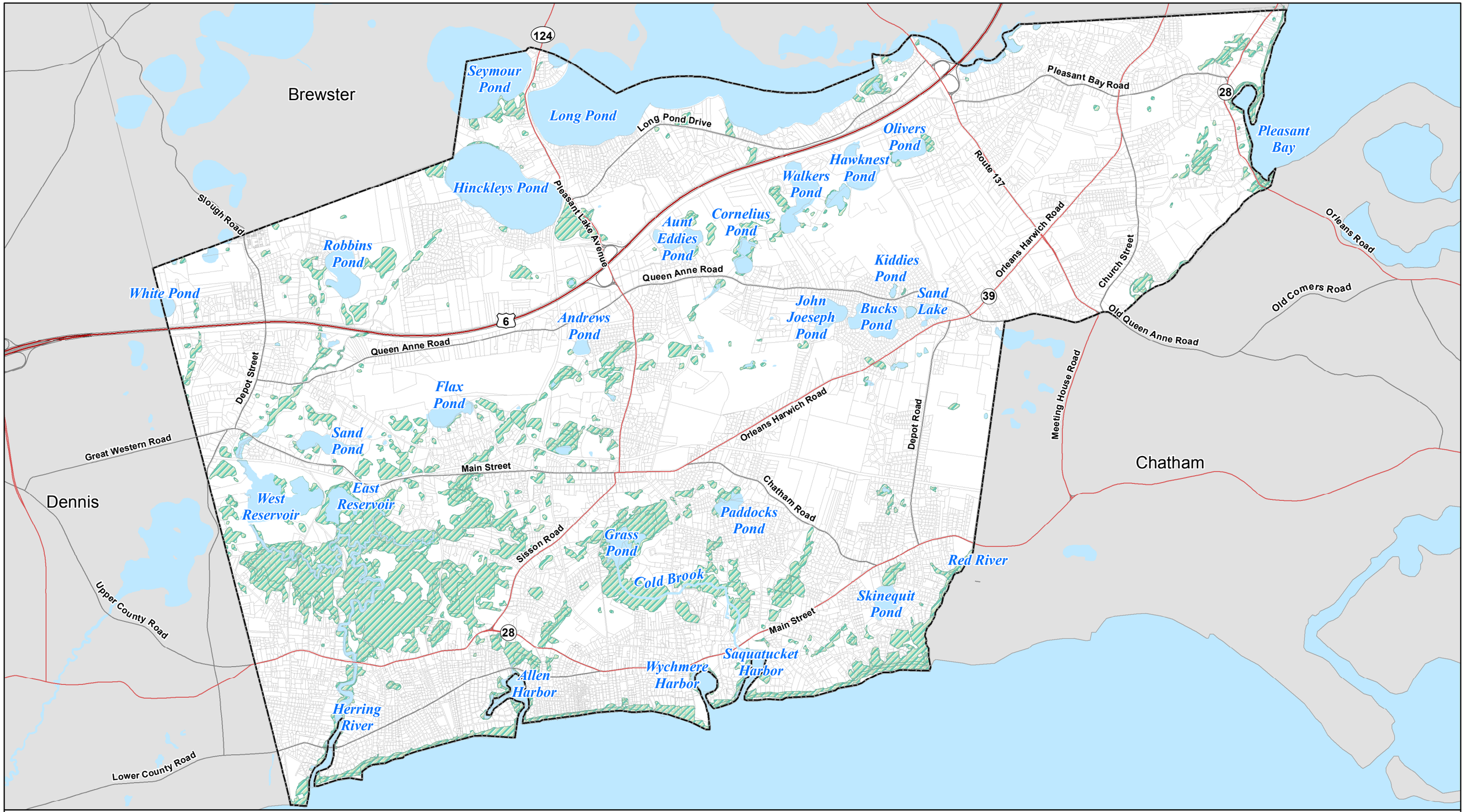

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Legend

Wetlands

Town of Harwich
Comprehensive Wastewater
Management Plan

1 inch = 3,000 feet

0 1,500 3,000 6,000 Feet

Figure 3-3
Defined Wetlands

CDM Smith

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Wetland locations are relevant in that setback requirements dictate the allowable proximity of on-site septic systems to wetland resource areas. Furthermore, wetland areas by definition have high groundwater conditions during the spring season and are indicative of less permeable and more organic soil types.

3.7 Floodplains

Areas of 100-year floodplain are shown on Figure 3-4. Shoreline velocity zones (listed as VE zones) are also shown on this figure. MassGIS is the source of this information. This data layer shows the extent of the 100-year floodplain and velocity zones as of 2007 and is based on the Federal Emergency Management Agency's Flood Insurance Rate Maps.

3.8 Natural Heritage and Endangered Species Program

The Natural Heritage and Endangered Species Program (NHESP) is part of the Massachusetts Division of Fisheries and Wildlife. The priority of the NHESP is the protection of habitat for the animals and plants officially listed as "Endangered, Threatened, or of Special Concern" in Massachusetts. Boundaries of priority and estimated habitat areas are shown in the Natural Heritage Atlas. Work within the boundaries defined in the atlas requires regulatory review. The most recent edition of the Natural Heritage Atlas was published in 2008, and the boundaries were obtained for this project via data layers obtained through MassGIS in 2006 (previous edition) and 2008. The 2008 data is shown on Figure 3-5.

3.9 Soils

Understanding the general surficial and subsurface conditions in a community is an important component in formulating long-term wastewater management options. Soil conditions impact both the efficacy of individual on-site systems and the suitability of a site for effluent recharge from a larger scale treatment system. The following subsections describe the available soils and surficial geology data evaluated.

3.9.1 MassGIS Soils Data

General soil conditions in Harwich are shown on Figure 3-6. A significant majority of subsurface soils in Harwich are sands and gravels with rapid or high permeability. These areas are shown in light yellow on Figure 3-6. With a high infiltration rate, these soils act as poor filters from a wastewater treatment perspective. Soils with lower permeability are shown in the olive color. Very low permeability soils can make siting of a fully compliant on-site septic system even more challenging, due to restrictions in the leaching capability. Lower permeability soils generally exist along or within waterways or water bodies. The soils data on Figure 3-6 originated from 2007 MassGIS data layers.

Certain areas, mainly in West Harwich within the Herring River watershed, consist of soil layers with silty loams and clays as reported by Harwich BOH officials and a local soils consultant. These layers restrict the downward movement of wastewater and cause a perched water level above the restrictive layers. Certain localized areas of Division Street, Kelley Road, and adjacent to Pleasant Lake Avenue within the Herring River Watershed consist of these fine silts and clays.

Brewster
Dennis
Chatham
124
6
28
39
Slough Road
Long Pond Drive
Pleasant Lake Avenue
Queen Anne Road
Depot Street
Great Western Road
Upper County Road
Lower County Road
Main Street
Sisson Road
Orleans Harwich Road
Route 137
Pleasant Bay Road
Church Street
Orleans Road
Old Comers Road
Old Queen Anne Road
Meeting House Road
Depot Road
Chatham Road

N

Legend

FEMA Q3 Flood Zones

- A
- AE
- AO
- VE

Town of Harwich
Comprehensive Wastewater
Management Plan

1 inch = 3,000 feet

0 1,500 3,000 6,000 *Feet*

Figure 3-4
Overview of Flood Zones

CDM Smith

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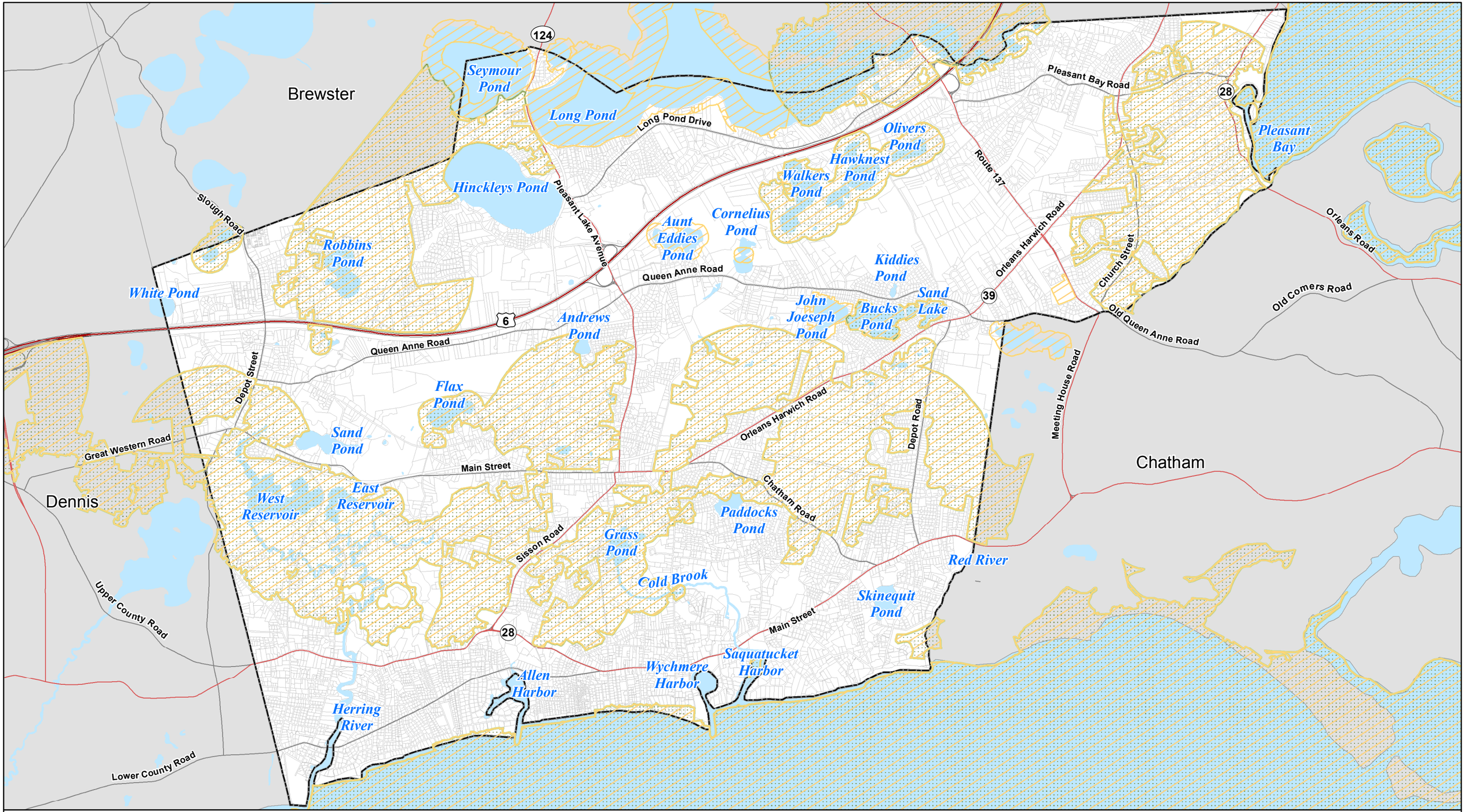

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Legend

- NHESP Priority Habitats of Rare Species
- NHESP Estimated Habitats of Rare Wildlife

Town of Harwich
Comprehensive Wastewater
Management Plan

1 inch = 3,000 feet

0 1,500 3,000 6,000 Feet

Figure 3-5
National Heritage and
Endangered Species Program

CDM Smith

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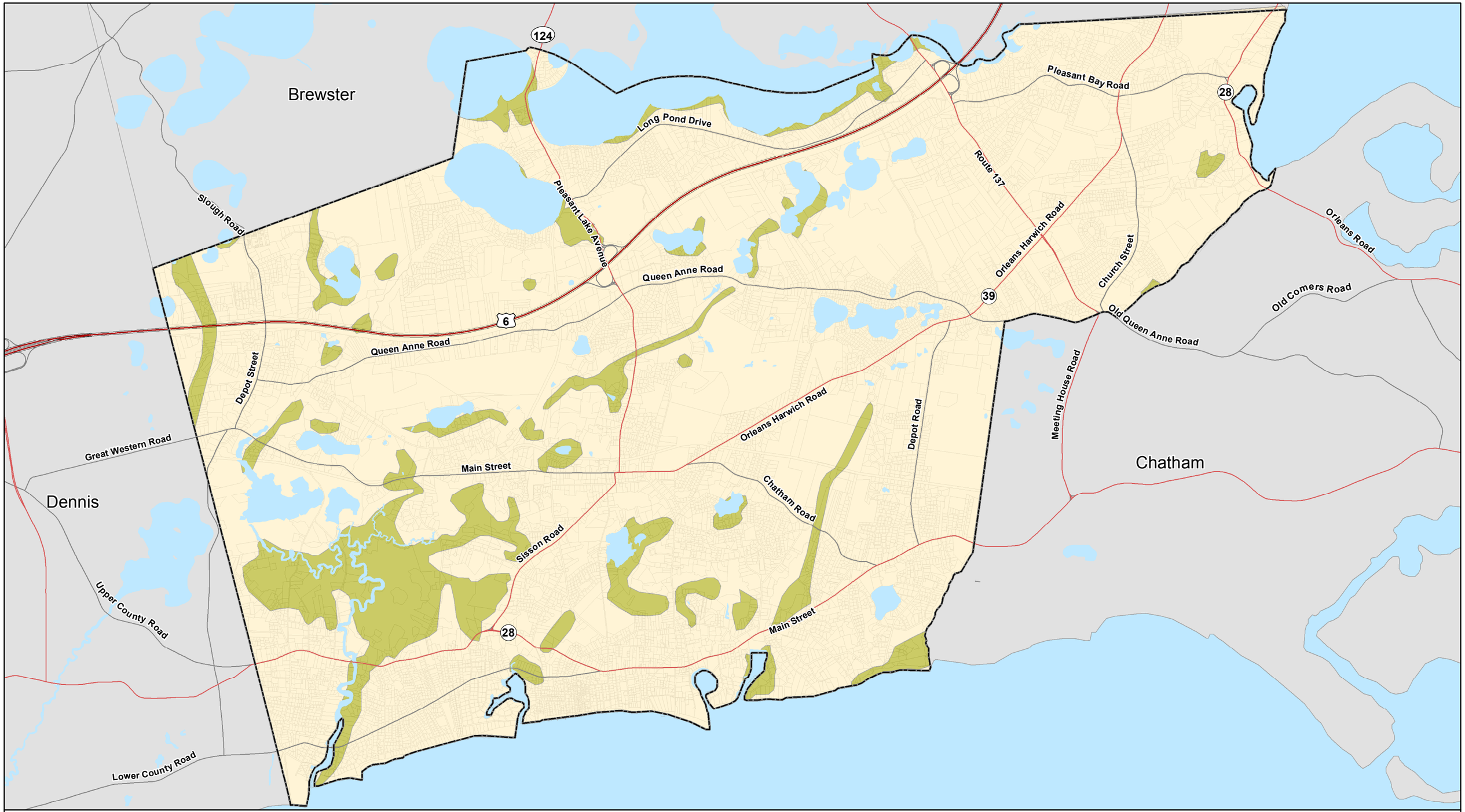

N

Legend

Surficial Geology

- High Permeability
- Low Permeability

Town of Harwich
Comprehensive Wastewater
Management Plan

1 inch = 3,000 feet

0 1,500 3,000 6,000 *Feet*

Figure 3-6
Surficial Geology

CDM Smith

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3.9.2 Natural Resources Conservation Service Data

Natural Resources Conservation Service (NRCS) soil classification mapping indicates that the majority of Harwich consists of Carver type soils. A triangular area including Herring River and its watershed consists of Ipswich-Pawcatuck-Matunuck soils. This is consistent with the low-lying wetland and bog areas along the lower Herring River. The south coastal beaches are described as Hooksan-Beaches-Dune soils. These soil classifications are defined below and NRCS soil mapping for Harwich is shown on Figure 3-7.

Carver soils are nearly level to steep, very deep, excessively drained, sandy soils formed in glacial outwash and ice contact deposits, on outwash plains and kames. The soil description for Carver soils includes limitations for "septic tank absorption fields," due to the rapid permeability. "The poor filtering capacity may result in [bacterial] pollution of groundwater. The degree of pollution rises with the density of housing.". Sand and gravel deposits with high permeability (shown in the tan color in Figure 3-6) dominate the Town, and floodplain alluvium soils with generally low permeability (shown in the olive color on Figure 3-6) follow waterways and waterbodies or exist in low, flat areas such as marshes and wetlands.

Ipswich-Pawcatuck-Matunuck soils are nearly level, very deep, very poorly drained peats formed in marine organic and sandy deposits, in areas sheltered from ocean waves along coastal shorelines, and adjacent to bodies of brackish water.

Hooksan-Beaches-Dune soils are beaches, dune land, and nearly level to steep, drained, sandy soils formed in windblown deposits along coastal shorelines.

3.10 Town Planning Data

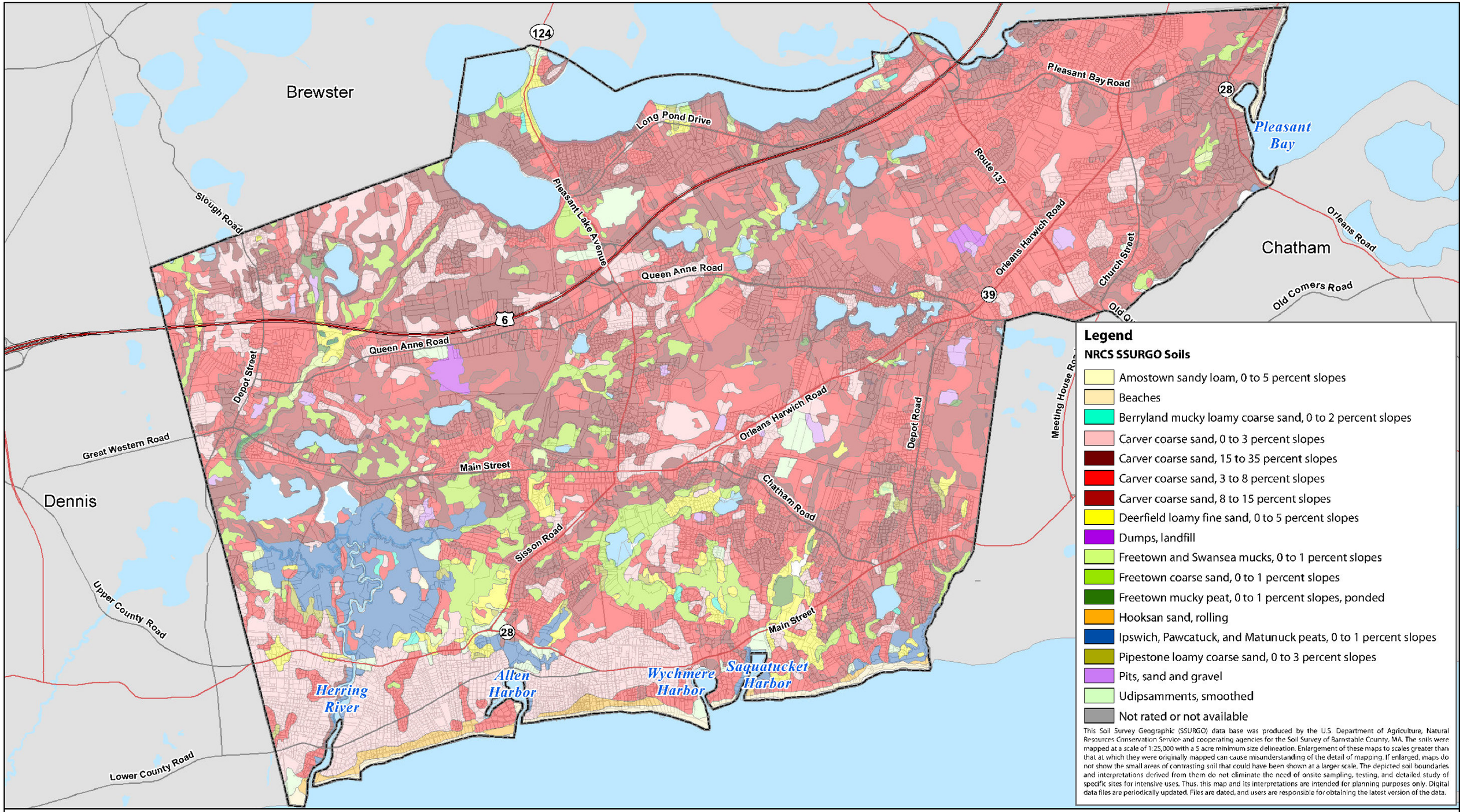
3.10.1 Town and Parcel Zoning Data

A Harwich zoning map is provided as Figure 3-8. This map depicts the areas zoned for residential, business, and industrial uses in Harwich, along with overlay districts, using 2007 town data.

The source of specific parcel data used for this CWMP was dependent upon where the data were used. In the original Pleasant Bay MEP report, 1999 parcel data were used to describe current conditions and relate them to buildout and water use. More up-to-date parcel data from 2006 were used in all subsequent Harwich MEP reports. For the purpose of performing site screening for potential effluent recharge sites, 2006 parcel data were used. Each set of parcel data were obtained from the CCC.

3.10.2 Lot Density and Size

Existing lot development density is depicted on Figure 3-9. Small lot sizes are shown in the more prominent colors. Properties with a lot size less than or equal to 5,000 sf are shown in orange. Purple illustrates lot sizes between 5,000 and 10,000 sf., and green indicates lot sizes between 10,000 and 20,000 sf. Properties 20,000 sf and one acre (43,560sf) are brown and properties from 1 to 2 acres are pink. Properties greater than two acres are white. Concentrations of dense development are clearly evident in this figure as clusters of orange and purple lots, such as those seen along the shoreline and along prominent roadways.



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Town of Harwich
Comprehensive Wastewater
Management Plan

1 inch = 3,000 feet
0 2,000 4,000
Feet

Figure 3-7
NRCS Soil Classification

CDM Smith

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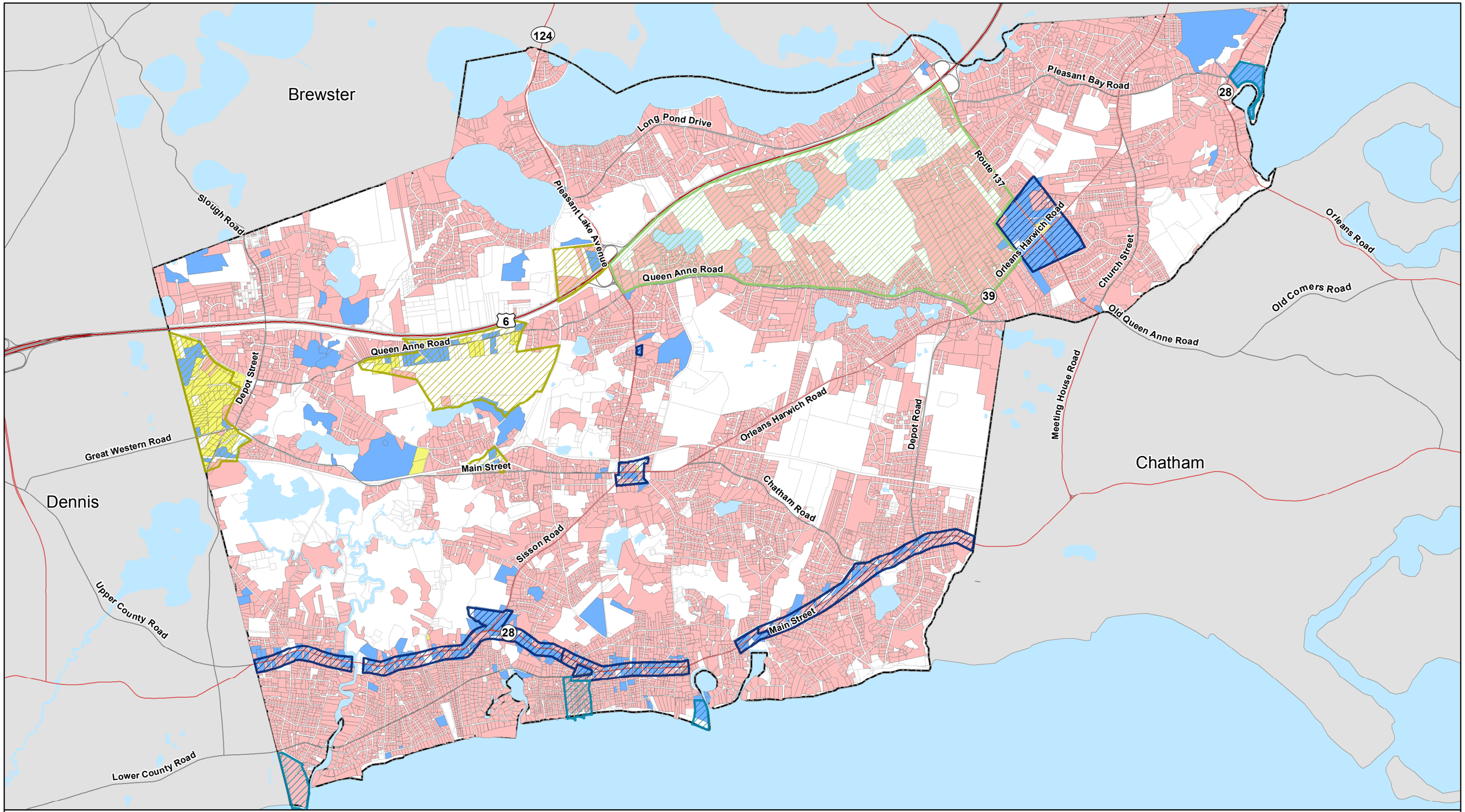

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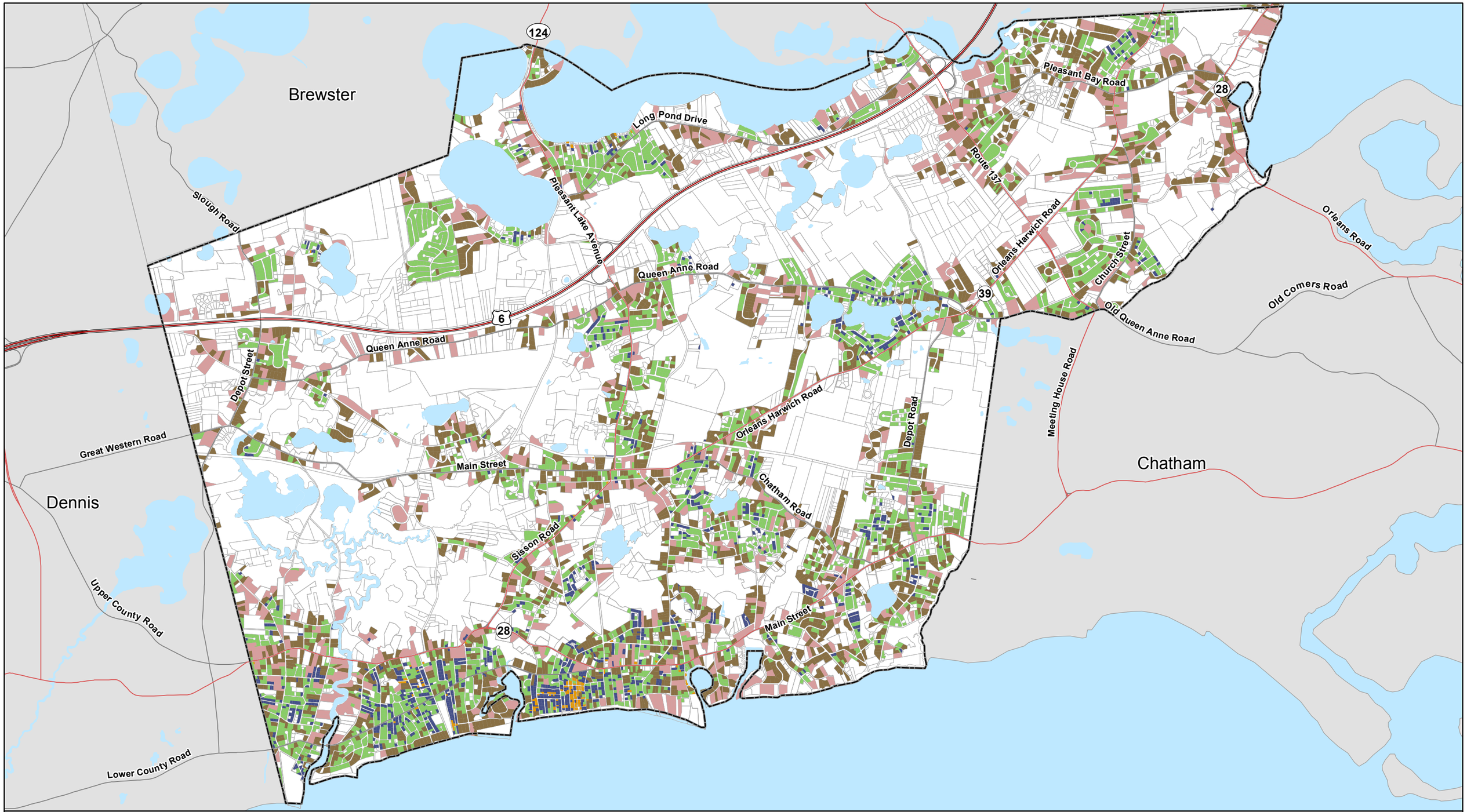
Brewster
Dennis
Chatham
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Slough Road
Long Pond Drive
Pleasant Lake Avenue
Queen Anne Road
Queen Anne Road
Depot Street
Great Western Road
Main Street
Orleans Harwich Road
Depot Road
Chatham Road
Sisson Road
Main Street
Upper County Road
Lower County Road
Pleasant Bay Road
Route 137
Orleans Harwich Road
Church Street
Orleans Road
Old Comers Road
Old Queen Anne Road
Meeting House Road
N
Legend
Harwich Developed Parcels
0 - 5,000 Sq Ft
5,000 - 10,000 Sq Ft
10,000 - 20,000 Sq Ft
20,000 Sq Ft - 1 Acres
1 - 2 Acres
> 2 Acres or Non-Developable
Town of Harwich
Comprehensive Wastewater
Management Plan
1 inch = 3,000 feet
0 1,500 3,000 6,000
Feet
Figure 3-9
Lot Development Density
CDM Smith
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Small lot size can restrict or preclude the ability to design, construct, or repair an on-site septic system in full compliance with state and local regulations. Furthermore, the overall density of development is also a function of lot size. Densely developed areas, with large numbers of on-site systems, are a potential threat to groundwater supplies. Even when performing correctly, on-site systems in densely developed areas can degrade groundwater quality through increased nitrogen loads, as traditional systems do not treat nitrogen effectively.

Using the Harwich Zoning By-Law as a starting point, the smallest lot size of 5,000 square feet was selected for consideration 1) to identify the small lots that were developed prior to zoning controls, and 2) because the Clean Water State Revolving Fund (SRF) uses lots smaller than 5,000 sf as an indicator of the potential for widespread on-site system failure in their project rating criteria.

The other lot size thresholds were chosen to illustrate the prevalence of lots as they generally double in size to 10,000sf, 20,000sf, 43,560sf or one acre, or two acres. These ranges for the first three gradations up to 20,000sf are shown in Table 3-3 below. Lot sizes above about ½ acre (20,000 sf) are generally considered acceptable for siting a septic system, although in some instances, more land may be required due to challenging soil conditions.

Table 3-3
Prevalence of Densely Developed Lots by Size

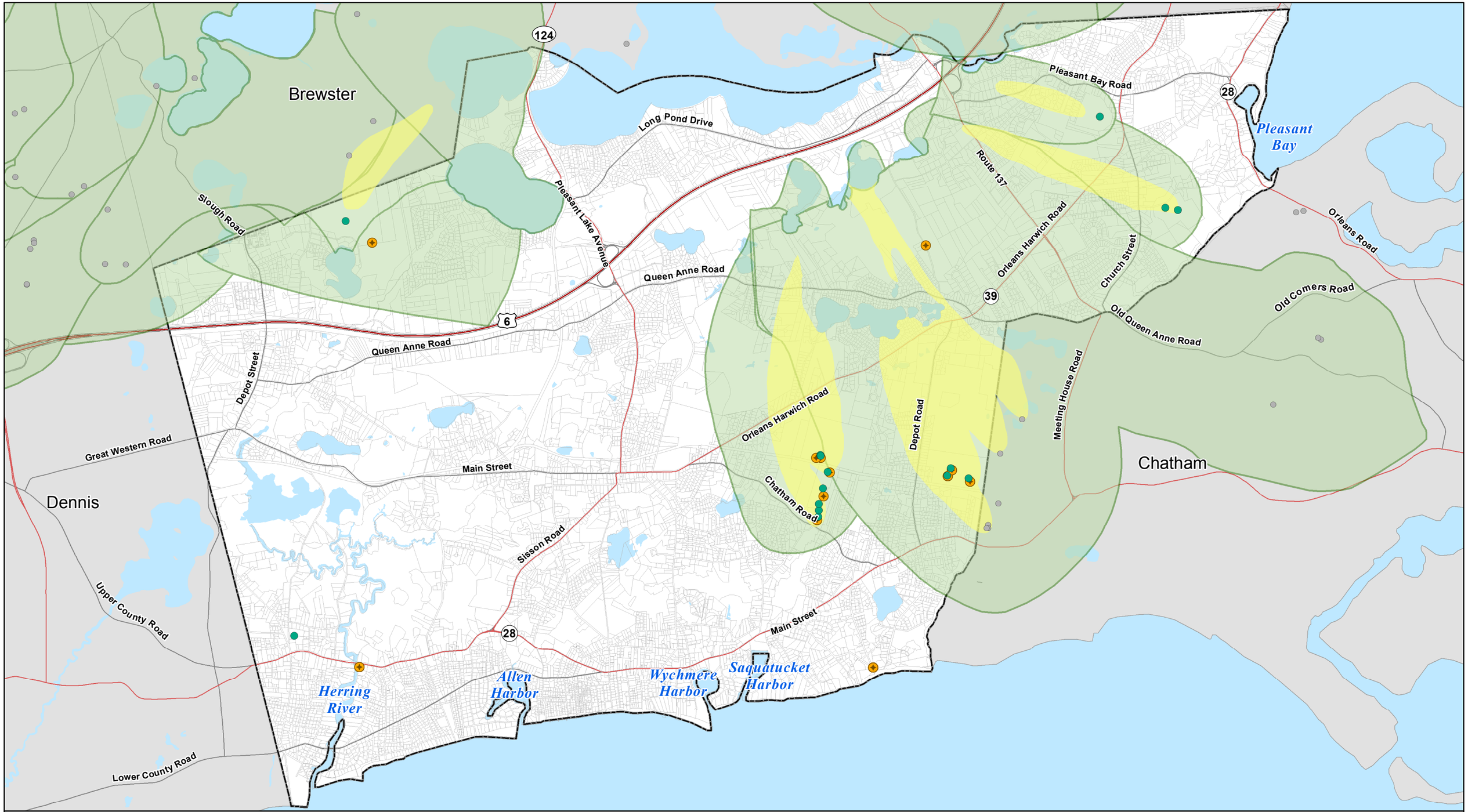
Lot size Condition	Number
Up to and including 5,000 sf	200
Between 5,001 sf and 10,000 sf	1225
Between 10,001 sf and 20,000 sf	3874

Approximately 46 percent of the parcels in Harwich are 20,000 square feet or less in size.

3.11 Water Department Data

Municipal drinking water supply is available throughout most of Harwich from fourteen gravel packed public groundwater supply wells. Well fields are located in the southeast, northeast and northwest areas of town. All of these wells draw water from the Monomoy Lens Aquifer. The Harwich public water system was recognized in 2006 for being within the top 5 percent of public water systems in the Commonwealth. A small percentage of properties (approx. 7%) use private on-site wells for drinking water.

Harwich drinking water resources are shown on Figure 3-10. This figure shows the locations of Harwich's public wells, along with their state-defined protective zones. These zones are referred to as Zone I and Zone II. For public water supply wells with an approved yield of 100,000 gpd or greater, Zone I is the area located within a 400 foot radius of the well.


Brewster
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Slough Road
Long Pond Drive
Pleasant Lake Avenue
Queen Anne Road
Depot Street
Great Western Road
Main Street
Upper County Road
Lower County Road
Sisson Road
Orleans Harwich Road
Chatham Road
Depot Road
Route 137
Church Street
Meeting House Road
Pleasant Bay Road
Old Queen Anne Road
Orleans Road
Old Comers Road
Pleasant Bay
Herring River
Allen Harbor
Wychmere Harbor
Saquatucket Harbor
N
Legend
Public Water Supplies
Harwich
Other Communities
USGS Groundwater Monitoring Wells
Well Contribution Zones
Zone II (Aquifer)
Town of Harwich
Comprehensive Wastewater
Management Plan
1 inch = 3,000 feet
0
1,500
3,000
6,000
Feet
Figure 3-10
Drinking Water Supplies
CDM Smith
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A Zone II is the entire area of contribution to a well under the most severe pumping and recharge conditions that can realistically be anticipated. This equates to 180 days of pumping at the approved yield, with no recharge from precipitation. These areas were delineated by the MassDEP Drinking Water program in 2007 and again in 2010.

In addition to these two zones defined by MassDEP, the MEP defined well contribution zones based on historic pumping and recharge rates. These zones are also shown on Figure 3-10. Information on groundwater quality and zones of contribution to the municipal wells is described more fully in Section 4.

3.11.1 Water Pumping Records

Water pumping records show the volume of water pumped from each well in Harwich. The Town pumps approximately 2 mgd on an average annual basis. While this is valuable information, water use records from water meters on individual properties are most appropriate to use to estimate sewer flows, as the metered flow represents the actual usage, a percentage of which becomes wastewater flow.

3.11.2 Water Use Records

Water use records originate from water meters on individual properties. The Town presently reads water meters twice per year and is in the process of installing automatic meter reading units. The meter reading data is stored in a database from which water bills are produced. This information is also linked to the Town's GIS, allowing water usage to be queried for individual parcels or groups of parcels. Water use records from 2004 to 2007 were used in the analysis in this CWMP, for consistency with the data used in the MEP reports. Sewer use is typically about 90 percent of water use, due to uses such as lawn watering which do not result in water going down the drain. Estimates of water and sewer use associated with this CWMP are presented in Section 7.

3.12 Present Wastewater Management Data

Harwich relies on the use of on-site sanitary disposal systems (referred to as septic systems) for wastewater treatment and disposal. The Harwich Board of Health is responsible for administering the State Environmental Code (Title 5) and local rules and regulations governing the use of subsurface disposal systems to protect groundwater quality and public health.

3.12.1 Title 5 – State Environmental Code

Title 5 (310 CMR 15.000: The State Environmental Code) provides minimum standards for the design, construction and maintenance of on-site systems. This regulation provides minimum standards including setback distances from system components to buildings, property lines, groundwater, and environmental resources. The standards also define the size of system components based on design wastewater flows, subsurface soil permeability and groundwater conditions. Title 5 requirements also include on-site system inspection and upgrade standards for real estate transfer.

Title 5 was originally instituted in 1978 and underwent significant revisions in 1995.

3.12.2 Local Sewage Disposal Guidelines and Regulations

Due to the reliance on on-site systems for wastewater management and the importance of protecting the Town's water supply, environmental resources, and public health, the Harwich BOH has been proactive in developing programs, policies and by-laws to enhance wastewater treatment requirements in town.

The BOH has adopted the following policies and procedures:

1. The Town enforces a local Board of Health "Regulation for the Subsurface Disposal of Sewage."

2. A Real Estate Transfer (R.E.T.) program was instituted in 1988 requiring inspections of existing systems prior to property transfer. (This also became a Title 5 requirement in 1995.)

3. Cesspools are not permitted. Property owners must upgrade to an on-site septic system in conformance with Title 5 and local requirements at the time of property transfer or when substantially improving the property.

4. The BOH rigorously enforces system upgrade standards. Upgrade provisions of Title 5 have a stated goal of "maximum feasible compliance." Relief from local and Title 5 standards is considered for applicants on rare occasions, and usually involves dimensional setback requirements that may limit the ability to be 100 percent in compliance with the regulations. Small lots (e.g. 5,000 square feet) are examples where dimensional waivers are considered due to parcel coverage and positioning of structures on the property.

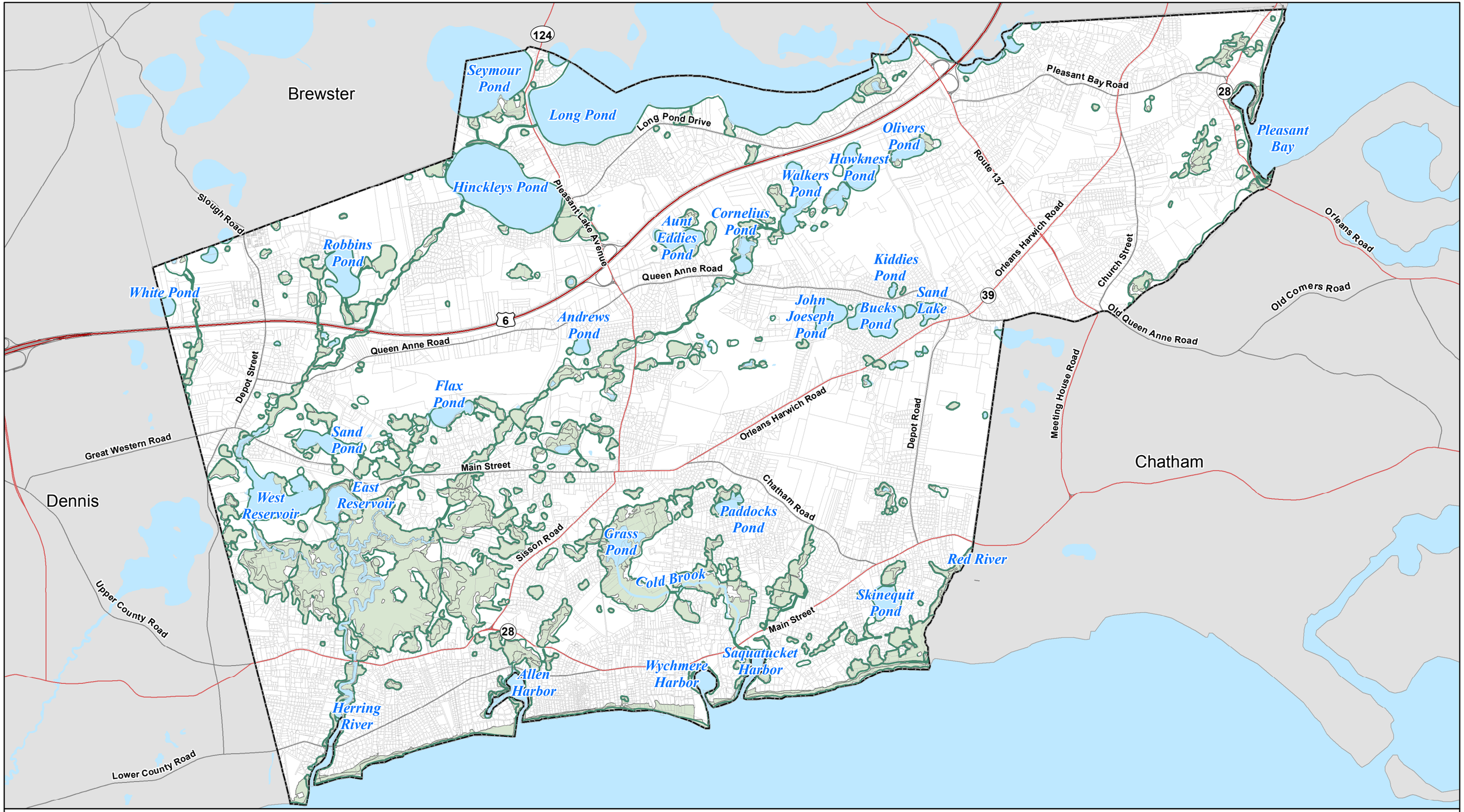
5. No waivers or variances from Title 5 or local BOH Rules and Regulations are allowed for new construction.

6. Upgrades or new construction projects consisting of 2,000 gpd or more wastewater flow may require enhanced treatment. These projects require a hearing before the BOH and, depending on the findings, "Innovative/Alternative" (I/A) or "package" treatment technologies may be required to reduce nitrogen and phosphorus loading to subsurface soils if located within the Pleasant Bay watershed.

7. "Environmentally sensitive areas" have been delineated with enhanced protection requirements and may require no net increase in nitrogen loading in that watershed. These areas are shown on Figure 3-11.

3.12.3 Board of Health Data

The Harwich BOH was used as the primary information source for Harwich septic systems. Harwich BOH staff were interviewed, and pertinent records relating to wastewater management and surface and groundwater quality were reviewed. Data are available in paper and electronic format, with paper documents filed by the year of permit issuance, and then by property address. Files generally include on-site system applications, site plans, reports on subsurface conditions (soils and groundwater), and inspection reports. Electronic information maintained by the BOH includes permit lists related to on-site systems, public swimming area water quality data, and package treatment system inspection reports.



N

Legend

- Title 5
- Wetlands

Town of Harwich
Comprehensive Wastewater
Management Plan

1 inch = 3,000 feet

0 1,500 3,000 6,000 Feet

Figure 3-11
Title 5 Environmentally Sensitive Areas

CDM Smith

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3.12.4 Areas of Known Title 5 Concern

Areas along the southern coast and south of Route 28 represent challenges for long-term wastewater management. Dense development, small lot sizes and shallow depth-to-groundwater conditions can limit the ability to design and construct septic system upgrades in compliance with Title 5 and local regulations. Figure 3-12 shows the combination of these conditions in Harwich - areas which have been designated as “Areas of Title 5 Concern.” One of these areas east of Allen Harbor, known locally as “the Campgrounds,” generally consists of small lots with a significant percentage of seasonal occupancy. Many of these properties were developed prior to local zoning codes and prior to health standards for the design and construction of on-site systems. Many of these properties are believed to use cesspools for wastewater treatment and disposal due to the age of construction in this area. Septic system upgrades in this area usually require waivers or variances from Title 5 or local regulations. In some cases, limitations are placed on future expansion or increases to the number of bedrooms through deed restrictions.

3.12.5 Package Treatment Systems in Harwich

The term "package treatment system" refers to the assembly of various individual treatment process components such as settling tanks, aerators, and disinfection equipment into a compact, pre-packaged, and sometimes pre-assembled system. Package plants involve installation of pre-assembled equipment in buried tanks or in small buildings. These plants can achieve a high degree of treatment provided they are sited, designed, operated and maintained effectively. Other names sometimes used to describe package systems include decentralized facilities and innovative and alternative (I/A) systems. The term “decentralized” is used to reflect the differences between these systems and larger, more centralized facilities that serve entire municipalities or large portions thereof. Also, package plants are usually largely automated, so an operator only checks performance and conducts maintenance periodically, unlike municipal facilities that have greater staffing requirements.

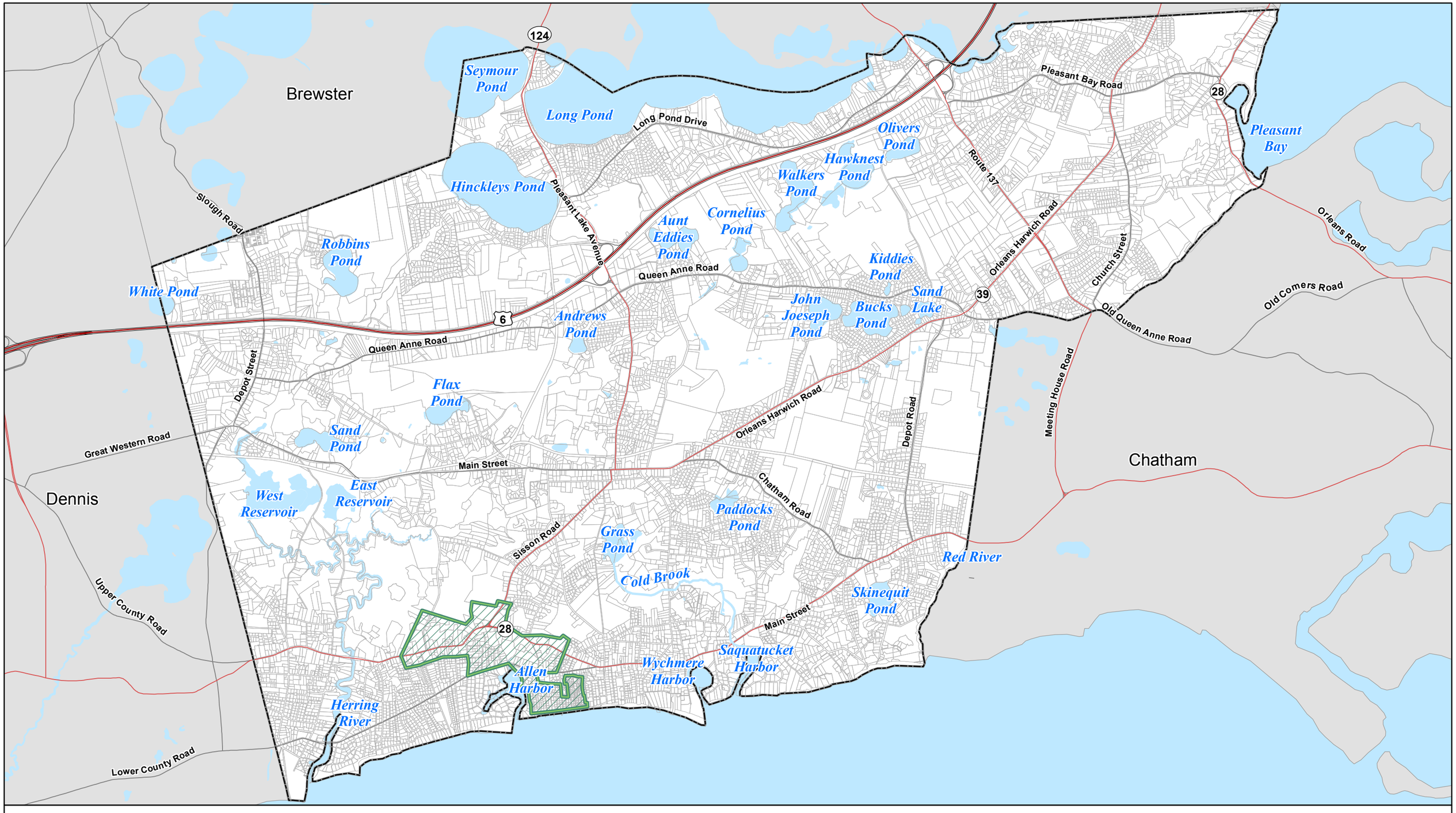
Package treatment systems can be utilized to cover a wide range of wastewater flows such as:

1. Serving single family homes (e.g., 330 gallons per day);

2. Larger systems serving multiple homes (clusters), condominium complexes, or institutions; and

3. Decentralized or neighborhood systems serving areas accommodating flows up to about 200,000 gpd.

Review and permitting of package treatment systems with Title 5 flows above 10,000 gallons-per-day is administered by MassDEP and requires a Groundwater Discharge Permit (314 CMR 5.00). Discharge and effluent treatment limits are assigned on an individual basis dependent upon the proposed use, site location, and environmental considerations. Enhanced treatment for these larger systems is required to limit priority effluent constituent loading including nitrogen, phosphorus, total suspended solids (TSS), and biochemical oxygen demand (BOD).



N

Legend

Areas of Title 5 Concern

Town of Harwich
Comprehensive Wastewater
Management Plan

1 inch = 3,000 feet

0 1,500 3,000 6,000 Feet

Figure 3-12
Areas of Title 5 Concern

CDM Smith

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Package treatment systems with enhanced nitrogen removal capabilities are required by law for new residential construction with design flows in excess of 440 gpd/acre in "nitrogen sensitive areas" (310 CMR 15.214-15.216). These areas include:

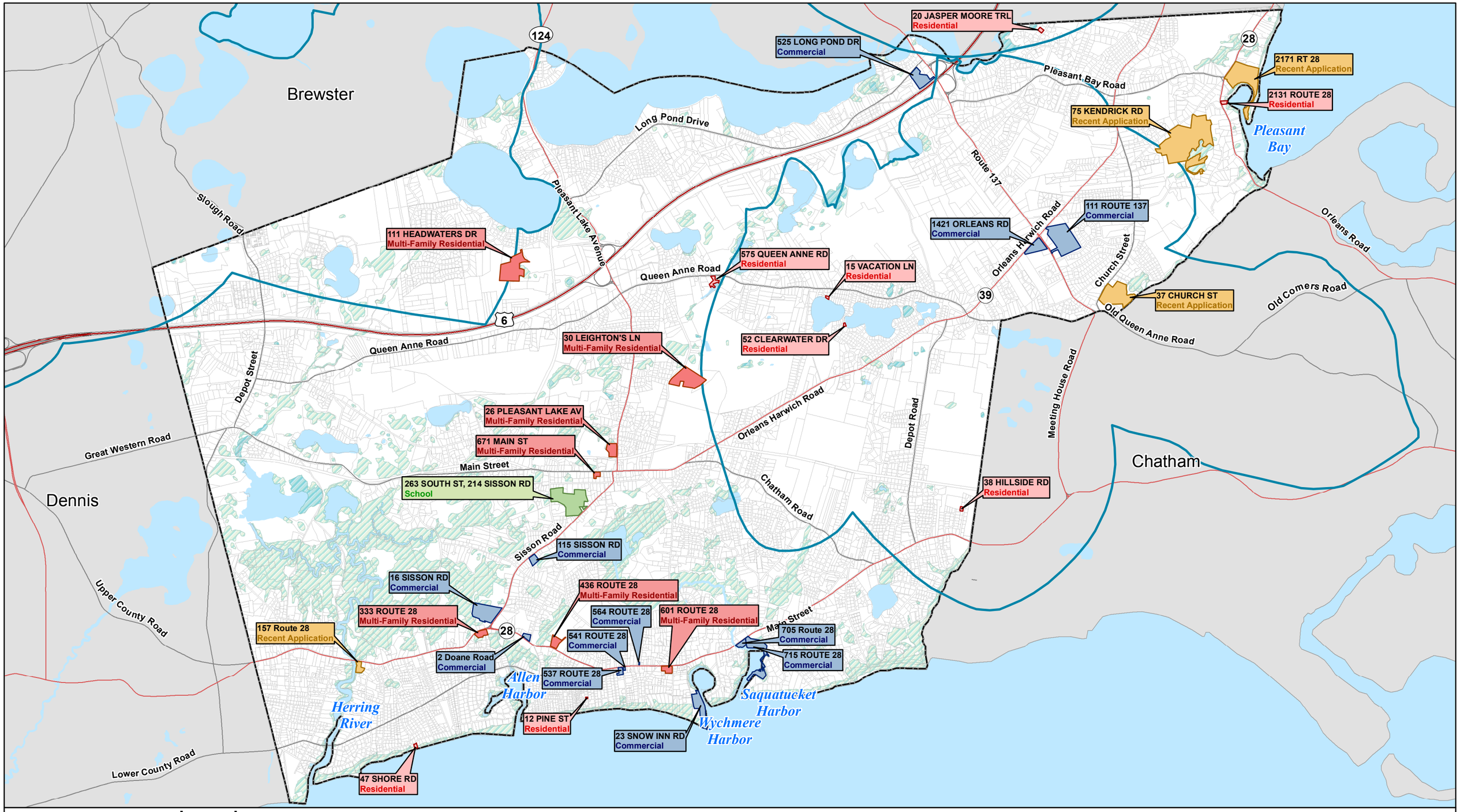
- Interim Wellhead Protection Areas ("IWPAs") and Zone II areas contributing to public water supplies, and
- Nitrogen sensitive embayments (or estuaries) not regulated by MassDEP.

Individual municipalities may also promulgate more stringent criteria to protect local groundwater and environmentally sensitive areas. In addition to Title 5 requirements, the BOH has taken the proactive step to adopt regulations regarding the use of enhanced treatment systems with wastewater flows exceeding 2,000 gpd within the Pleasant Bay watershed. Specifically, a hearing is required before the BOH and, depending on the findings, I/A or package treatment technologies may be required to reduce nitrogen and phosphorus loading to subsurface soils. Also, I/A systems are currently required for new shared systems for five lots or more within the Pleasant Bay watershed. Nitrogen removal limits for I/A systems are required to be those approved by MassDEP for the technology proposed. Pressure distribution of effluent is considered on a case-by-case basis where environmental variances are involved.

The Harwich BOH has records of 28 package treatment systems at locations throughout Harwich. Twenty-three of these are under the jurisdiction of the Harwich BOH Rules and Regulations, while the other five exceed the state threshold and are thus regulated by MassDEP. The type of treatment system utilized is equally divided between two technologies: the FAST system (Fixed Activated Sludge Treatment) and the Bioclere system. Both systems are widely used in Massachusetts. The locations of these package treatment systems are shown on Figure 3-13. These systems are also summarized in Tables 3-4 through 3-6. Details of the specific treatment technologies are described further in Section 12 of this report.

3.13 Water Quality Data

Water quality data used in this CWMP includes coastal water quality data evaluated through the MEP, local pond quality, the quality of local groundwater and drinking water supplies, and water quality for recreational purposes. Due to the extensive data obtained for each of these resource areas, water quality is described in detail in later sections of this report. Specifically, public swimming area and groundwater quality are described in Section 4, freshwater ponds are described in Section 5, and the MEP estuary and embayment data is provided in Section 6.



Legend

Land Use

- Commercial
- Residential
- Multi-Family Residential
- School
- Recent Application
- ZONE II
- Wetlands

N

Town of Harwich
Comprehensive Wastewater
Management Plan

1 inch = 3,000 feet

0 1,500 3,000 6,000 Feet

Figure 3-13
Package Treatment Sites

CDM Smith

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Table 3-4
Groundwater Discharge Program Package Treatment Systems in Harwich

System Location (MassDEP Permit #)	Type of Treatment System	Wastewater Flow	
		Design (gpd)	Actual (gpd)
Snow Inn 23 Snow Inn Road (#324)	RBC[1]	80,000	22,500
Cranberry Point Nursing Home 111 Headwaters Drive (#357)	RBC	12,800	10,580
Harwich Middle & Elementary Schools 263 South Street & 214 Sisson Road (#631)	Bioclere/Tetra Technologies Denite	16,100	14,020
Harwich Laundry & Cleaners (#613)	Sand Filter	14,400	360
Wequassett Resort and Golf Club 2171 Route 28 (#851)	Amphidrome	27,390	(not in operation during subject months)

1. Rotating Biological Contact (RBC)

Table 3-5
FAST Systems in Harwich

System Location (Harwich BOH Tracking No.)	*Type of Treatment System*	*System Performance*	*Comments*
601 Route 28 (Main Street) Melrose House Condominium (HAR26801FMO)	Modular FAST	41 reports with exceedances of one or more of the permit limits (N, Ammonia, BOD, Total N, TSS, pH)	Component failure noted Period of record 9/96 to 6/07
705 Route 28 (Main Street) (HAR28705FAS)	FAST	7 intermittent reports with exceedances of one or more of the permit limits (N, Total N)	Period of record 3/04 to 6/07
20 Jasper Moore Trail (HAJas020FAS)	FAST	5 reports with exceedances of one or more of the permit limits (Ammonia, BOD, Total N, TSS)	Exceedances may be due to seasonal use. Period of record 10/01 to 6/07
564 Route 28 (Main Street) George's Pizza (HAR28564FAS)	FAST	8 reports with exceedances of one or more of the permit limits (Ammonia, BOD, Total N, TSS)	Period of record 2/03 to 6/07
12 Pine Street (HAPin012FAS)	FAST	8 reports with exceedances of one or more of the permit limits (N, Total N)	Period of record 7/99 to 6/07
52 Clearwater Drive (HACle052FAS)	FAST	1 exceedance including N, Total N, and BOD	Intermittent Inspection & Reporting Period of record 8/01 to 6/07
47 Shore Road (HASho047FAS)	FAST	8 reports with exceedances of one or more of the permit limits (N, Ammonia, Total N,)	Period of record 8/96 to 6/07
15 Vacation Lane (HAVac015FAS)	FAST	3 reports with exceedances of one or more of the permit limits (N, Total N)	Period of record 1/98 to 6/07
38 Hillside Raod (HAHil038FAS)	FAST		Component replacement or service needed Period of record 3/05 to 6/07
671 Main Street Rosewood Manor (HAMai671FAS)	FAST	5 intermittent reports with exceedances of one or more of the permit limits (N, Total N, BOD, TSS)	Component replacement or service noted Period of record 1/03 to 6/07
Saquatucket Harbor (HASaqFAS-A)	FAST	13 reports with permit limit exceedances (N, Total N, Ammonia, BOD, TSS, pH, and Fecal Coliform)	Component service noted Period of record 7/97 to 6/07
537 Route 28 (Main Street) (HAR28537FAS)	FAST	5 intermittent reports with permit limit exceedances (N, Total N, TSS, and Fecal Coliform)	Component replacement or service needed Period of record 1/01 to 6/07

Table 3-6
Bioclere Systems in Harwich

System Location (Harwich BOH Tracking No.)	Type of Treatment System	System Performance	Comments
541 Main Street The Port Restaurant (HAMai541Bio)	Bioclere	4 reports with exceedances of one or more of the permit limits (Total N, BOD, TSS)	Good System performance noted at 10 times Period of record 6/04 to 6/07
525 Long Pond Road Cape Cod Hospital (HALon525 Bio)	Bioclere	20 reports with exceedances of one or more of the permit limits (N, Total N, BOD, Ammonia, TSS)	Very Frequent reporting schedule Good System performance noted Period of record 5/05 to 6/07
26 Pleasant Lake Avenue (HAPle026 Bio)	Bioclere	29 reports with exceedances of one or more of the permit limits (N, Total N, BOD, Ammonia, TSS)	Good System performance noted at 8 times Period of record 10/95 to 7/07
575 Queen Anne Road (HAQue575Bio)	Bioclere	4 intermittent reports with exceedances of one or more of the permit limits (Total N, BOD, TSS)	Good System performance noted at 11 times Period of record 12/98 to 6/07
333 Main Street (HAMai333Bio)	Bioclere	3 intermittent reports with exceedances of one or more of the permit limits (N, Total N, BOD)	Good System performance noted Period of record 1/02 to 7/07
Rte. 39 & Rte. 137 Harwich East Plaza (HAR37000Bio)	Bioclere	16 reports with exceedances of one or more of the permit limits (N, Total N, BOD, Ammonia, TSS)	Good System performance noted Period of record 5/02 to 7/07
115 Sisson Road (HASis115Bio)	Bioclere		Period of record 12/05 to 8/06
2131 Route 28 (Main Street) (HAR28213Bio)	Bioclere	2 intermittent reports with exceedances of one or more of the permit limits (Total N, Fecal Coliform)	Period of record 4/00 to 7/07
Oak Street/30 Leighton's Lane Pine Oaks III (HAOak000Bio)	Bioclere	6 intermittent reports with exceedances of Total N permit limit	Period of record 4/03 to 7/07
436 Route 28 (Main Street) Seaport Village (HAR28436Bio)	Bioclere	5 intermittent reports with exceedances of one or more of the permit limits (Ammonia, Total N, BOD, TSS)	Period of record 11/01 to 7/07
16 Sisson Road Star Market (HASis018Bio)	Bioclere	7 reports with exceedances of one or more of the permit limits (N, Total N, Ammonia)	Good System performance noted Period of record 7/03 to 7/07
Rte. 39 & Rte. 137 Stop & Shop (HAR39000Bio)	Bioclere	11 reports with exceedances of one or more of the permit limits (N, Total N, BOD, Ammonia, TSS)	Very Frequent reporting schedule (~140) Period of record 4/06 to 7/07

3.14 Affordable Housing in Harwich

On May 2, 2000 the Town adopted the Local Comprehensive Plan which included a section on affordable housing. That section includes a housing strategy for the Town of Harwich and contains 19 recommendations with respect to affordable housing. One of the recommendations calls for an update of the affordable housing analysis every three years. A letter from the Massachusetts Department of Housing and Community Development dated August 27, 2002 notified the Town that in order to become housing certified by 2004 the Town must have a housing strategy in place. According to the letter, the housing strategy must contain sufficient information and unit production goals so as to be able to determine whether the units added are sufficient to grant future certifications.

The Town set the following goals for affordable housing at the annual Town meeting held on May 5, 2003.

1. To promote the annual development, whether by new construction, acquisition, and/or conversion of existing buildings, by town action and action of others.

2. To promote the development of funding sources and income streams to support the development of affordable housing.

3. To continue to review town by-laws, and other regulations, and strive to remove barriers preventing the development of affordable housing.

The goals set at this Town meeting highlighted Harwich's commitment towards the state's 10% affordability goal under Chapter 40B through a wide range of initiatives. From 2003 to 2008, Harwich added less than 30 units of affordable housing, however as of July 2009, the Town had 40 affordable units permitted to proceed and another 92 affordable units in various stages of development. The Town is continuing to work to develop affording properties to achieve its goal of 586 affordable units.

In 2009, the Town published their affordable housing production plan in partnership with Community Development Partnership (CDP), Housing Assistance Corporation, The Harwich Ecumenical Council for the Homeless (HECH), and Habitat for Humanity of Cape Cod. This plan gives an update on the progress of affordable housing and also discusses a plan for an affordable housing program into the future. The plan defines housing goals, demographic data, housing characteristics, housing needs, obstacles to development and lists several properties that are being considered for affordable housing. The plan shows that Harwich is committed to the development of affordable housing and understands the importance of making progress towards the state's 10% affordability goal under Chapter 40B.

In addition to the affordable housing plan, the Town has worked with several local and regional agencies to achieve its affordable housing goals. The agencies are listed below along with a short description of the Town's involvement with them and with a description of funding initiatives, if applicable. Additional information is available in the Harwich Housing Production Plan dated October 2009, which is the source of the following list.

1. Harwich Housing Authority

The Harwich Housing Authority was established in 1986 and currently owns and manages 20 units of affordable housing including 12 family rental units.

- Loans - The Harwich Housing Authority recently introduced a Rental Assistance Revolving Loan Program to provide qualifying households with first, last and/or security deposits for rental units.
- The Harwich Housing Authority received funding of $100,000 through the Town's Community Preservation Fund towards the purpose of making it easier for households to access year-round housing and to build opportunities for lower income households to budget for homeownership.
- Buy-down Program - This program received $280,000 in funding from the Town's Affordable Housing Fund and $75,000 in HOME funds.

2. Harwich Community Preservation Committee

The Community Preservation Act (CPA) was enacted to provide Massachusetts cities and towns with another tool to conserve open space, preserve historic properties and provide affordable housing. This allows municipalities to create a community preservation fund by surcharging 3% of the property tax with a corresponding state match of up to 100%. In November 2004, the Harwich Town Meeting adopted the CPA and ballot approval occurred in May 2005, with the support of 82% of all voters. Estimates indicate that the surcharge will raise approximately $900,000 from local funds annually.

To date, the Town has allocated the following for housing:

- $90,000 for Habitat for Humanity's development at Gomes Way.
- $100,000 for the Rental Assistance Revolving Loan Program operated by the Harwich Housing Authority.
- $70,000 in support of HECH's South Harwich development.
- $100,000 for predevelopment work on the Portuguese Men's Club and CDP's sponsored housing development.
- $30,000 in predevelopment funding for the Housing Authority's and CDP's Main Street Extension development and another $300,000 to further subsidize the affordable units.
- $25,000 sponsored by the Harwich Housing Committee towards the Harwich Housing Authority's administration of the American Dream Program I and an additional $20,000 towards down payment costs.
- $200,000 towards the Housing Authority's Infrastructure Development Fund that is available to developers who are in the beginning stages of producing rental housing. The funds can be used for predevelopment activities or small gap financing needs.

- A total of $296,750 in five articles in 2006, 2007 and 2008 towards the Rec. Building West Harwich School Cultural/Housing Mixed-Use Development.

3. Harwich Housing Committee

The Harwich Housing Committee was established by the Board of Selectmen to further the Town's 10% affordable housing goal. The Board of Selectmen appoint five members that work with the Harwich Housing Authority.

4. Harwich Council on Aging

The Harwich Council on Aging is a town department that supports Harwich's elders. The Council on Aging and the Town enacted a tax rebate program for qualifying seniors. The Town currently allows seniors to work for the community and reduce their tax burden by $750 in exchange for volunteer hours. The Town has additional tax abatement programs for income-eligible seniors, veterans and surviving spouses geared toward reducing property tax bills.

5. Harwich Affordable Housing Fund

Harwich has an affordable housing fund designed to preserve, promote, and increase affordable housing within the community. The Board of Selectmen is authorized to expend fund monies to pay for a wide range of affordable housing activities associated with affordable housing projects. Under this fund, Harwich has allocated the following for housing:

- Two contributions of $325,000 and $185,000 to Habitat for Humanity of Cape Cod for the Gomes Way project.
- $143,000 to subsidize the resale price of two affordable homes where deed restrictions would have resulted in unaffordable prices (the deed restrictions were rewritten to insure that the resale price formulas were no longer tied to market values).
- Support for Barnstable County's homelessness prevention program.
- Additional funding for predevelopment work on potential developments including $260,000 to Harwich Ecumenical Council for the Homeless and $368,000 for the Community Development Partnership.
- $280,000 for Harwich's Buy-down Program.
- $20,000 for American Dream I.
- $15,000 for American Dream II.
- $20,000 for the Second Story Program, and
- $5,000 towards the preparation of the Housing Production Plan.

6. Cape Cod Commission

The Cape Cod Commission was created as the regional planning and regulatory agency for the Cape. In addition to coordinating a wide range of planning and policy activities, the Commission

administers the Technical Assistance Program (TAP), which provides funds for consultants to assist communities in promoting affordable housing. The Commission also manages the allocation of a number of housing subsidy funds that can be made available to communities to support affordable housing efforts including the oversight of HOME Program funds on behalf of the Barnstable County HOME Consortium, the Soft Second Loan Program to subsidize mortgages for first-time homebuyers, the DRI Fund Management, and the County Home Ownership Fund (CHOP).

7. Barnstable County HOME Consortium

This Consortium includes all municipalities in Barnstable County and provides federal HOME Program funding to support the financing of a wide variety of housing activities. These funds are available to all towns participating in the Consortium, including Harwich, and are administered by the Cape Cod Commission. HOME funding for Harwich included:

- $11,800 for the HECH duplexes at Uncle Willis Lane.
- $100,000 for HECH's Sisson Road development.
- $80,000 for Pine Oaks III.
- $117,286 for 836 Route 28 (Little Homesteads Project).
- $64,332 for the Down Payment/Closing Cost Program.
- $71,221 for nine (9) loans as part of the Homeowner Repair Program.
- $125,000 for CDP's Main Street Extension project.
- $75,000 for the Buy-down Program, and
- $125,000 for Habitat for Humanity of Cape Cod's Gomes Way project.

8. Harwich Ecumenical Council for the Homeless (HECH)

Harwich Ecumenical Council for the Homeless (HECH) was formed in 1991 by clergy and lay people from seven Harwich churches for the purpose of providing housing for homeless families with children. HECH has developed programs in homelessness prevention, mortgage foreclosure prevention, child care, and youth counseling. In 1996, HECH began purchasing its own rental housing and has purchased a house or condominium to keep a family housed. The organization raises funds from individual donors and through special events. To date the organization has produced 15 units of affordable housing units through its Sisson Road and Uncle Willis Lane developments and has another 14 affordable units (20 total units) underway, either under construction or in planning including a rental development in South Harwich and a rental project in West Harwich.

9. Community Development Partnership (formerly called the Lower Cape Community Development Corporation)

The Community Development Partnership (CDP), formerly known as the Lower Cape Cod Community Development Corporation (LCCCDC), was established in 1992 to promote affordable housing and economic development in the towns of the Lower Cape. Through its housing development program it is creating new, year-round, affordable housing units by purchasing existing units or building new units.

10. Habitat for Humanity of Cape Cod

Habitat for Humanity is an ecumenical, non-profit Christian ministry dedicated to building simple, decent homes in partnership with families in need that has grown over the past two decades into one of the largest private homebuilders in the world. The organization is in the process of developing 13 new affordable homes in Harwich on Gnomes Way.

11. Housing Assistance Corporation (HAC)

The Housing Assistance Corporation (HAC) has proclaimed its mission to "promote and implement the right of all people on Cape Cod and the Islands to occupy safe and affordable housing". This non-profit organization is working throughout the Cape as a sponsor of affordable housing developments and has a wide range of financial and educational resources available for renters, existing homeowners and first-time homebuyers including HOME Program funding and rental subsidies.

3.15 Summary of Relevant Data

The present wastewater management approach in Harwich is the use of on-site septic systems on individual properties. These systems rely mainly on primary treatment (settling) with distributed discharge to underlying soils that act as a filter of the effluent to remove some nutrients (mainly phosphorus) and pathogenic organisms. The continued use of these systems town-wide is not feasible while meeting the goals developed by the MEP for nitrogen reduction to the Town's coastal embayments and other town planning and environmental objectives.

The data described above can collectively be used to target areas that are best suited for off-site wastewater management options. These areas are identified using a combination of existing data relating to soils, groundwater, wetlands, water resources, development density, areas of desired population and economic growth (such as affordable housing and village centers), proximity to town drinking water wells, and areas of known concern for achieving compliance with existing BOH and MassDEP on-site system regulations.