

CHAPTER 4 – EXISTING AND FUTURE LAND USE

4.1 INTRODUCTION

Rye was historically a rural farming and fishing community. Since 1962, active agriculture has declined from 679 acres to 217 acres in 2015, a 68 percent decline over 54 years. This change in land use undoubtedly affected the landscape of Rye, replacing sweeping expanses of open fields with mostly single-family residential developments. Today Rye supports a variety of seasonal tourism and recreational uses and many full-time residents both families and retirees. Rye's current housing stock includes single family homes of all sizes, small-lot beachfront homes, multi-family dwellings, vacation homes, manufactured housing, Retirement Community Developments, cabins, apartment houses and accessory apartments. Non-residential uses include municipal facilities, churches, schools, seasonal and year-round retail and commercial businesses and a few remaining small farms.

Land use and development is constrained by physical limitations of the local landscape including shallow soils and bedrock, tidal influence, and groundwater and surface water resources. Rye is bound by the Atlantic Ocean to the east where the shoreline is comprised of a mix of sections of exposed bedrock, sand beaches, inter-coastal waterways and salt marshes, particularly in the northeastern part of Rye, where the land is not suitable for building or development. These inter-coastal marsh lands are most valued for their natural resources and ecosystems, the functions they provide and as rural vistas for which Rye is known.

Rye administers the orderly use of land and resources through an elected Planning Board and elected Zoning Board of Adjustment. The Rye Beach Village District (RBVD) comprises a small area along the coast having jurisdiction over zoning matters through its land use boards: RBVD Planning Board and Board of Adjustment of the RBVD. These governmental entities and land use boards are responsible for issuance and enforcement of fair and consistent regulations. There are many laws and regulations that bear on the use of real property, from environmental protections to open space conservation to establishing workforce housing. In some ways, these laws are not fully complementary. Rye is committed to encouraging the appropriate and wise use of land through its zoning, land development and related regulations to effectively meet the demands of the evolving and growing community.

According to the Economic & Labor Market Information Bureau (ELMIB), NH Employment Security, the Town of Rye contains 12.6 square miles of land area and 24.1 square miles of inland water area. Demographics presented below were obtained from the 2010 US Census website.

- Rye had 2,252 units of occupied housing.
- Rye had 1,787 owner-occupied homes (representing a 79.4% owner versus a 20.6% renter occupied ratio).
- Rye's average property value in 2015 was \$631,145, compared to \$186,200 and \$250,000 for the Nation and New Hampshire, respectively. [Source: Town Assessing data]

- 20.6% (465 units) of occupied housing were rented housing, comparing to a 35.4% national average and compared with 29% for the New Hampshire average.
- 21.0% (600 units) of total housing were empty which is 7.9% higher than the national average and 5.4% higher than the New Hampshire average. Rye has a high percentage of seasonal vacancies at 16.5%.

4.2 VISION

Rye's vision for future land use and development will recognize the following fundamental ideals:

- The purpose of zoning and land use regulation is to safeguard the health, safety and general welfare of our citizens and property owners.
- Accommodating a variety of land uses and protecting significant portions of open space while still maintaining a "semi-rural" character relies on the Town's ability to plan wisely through land use and development standards and environmental protections that achieve the Town's vision.

Rye's goals for future land use and development are to:

- Foster a community that is comfortable for those who live here, and desirable to those who are looking for a town with a sense of its heritage, plentiful open spaces and coastal recreation areas.
- Ensure land use policies are fair and consistent.
- Support balanced land use choices in consideration of public convenience, safety, security, conservation and environmental protection.
- Value the Town's past and present, embracing change when it improves the Town and is consistent with this Plan.
- Preserve open spaces and protect natural resources such as the lands overlying public water supply aquifers, Wellhead Protection Areas, fragile habitats, coastline, marshes, fields and forests for viewing and recreation and public use, where appropriate.

4.3 LAND USE AND DEVELOPMENT

The intent of community planning is to lay the groundwork for deliberate use of land and adoption of development standards that protect the town's resources and interests. Through public input from visioning sessions, citizens help guide community decisions toward desirable developed and natural landscapes. Through zoning and regulations, town representatives can protect the health, safety and welfare of the community with respect for individual property rights, protection of community character, and preservation of its assets and resources for future generations.

1.0 Regulatory: Planning Board and Zoning Board of Adjustment

The Planning Board administers land use and development regulations through a public process of deliberating on applications for Site Plan Review, Subdivision and Conditional Use Permits. The Master Plan is the document that lays out a vision, goals and recommendations for the types of land and resource development that are desirable for the community and those that are not.

The Master Plan guides and informs the Planning Board and the Zoning Board of Adjustment (BOA) with respect to the sort of development Rye wants and where it will be allowed.

It is vital to remember the BOA's role in the land development process. Requests for zoning relief (e.g. variances and special exceptions) must be considered with respect to the vision and goals of the Master Plan. The BOA's role is that of arbiter of land use and development between the proposals of applicants and the standards of the zoning ordinance. The BOA evaluates which parts of development proposals conform to the zoning and which fall outside of the established zoning ordinance parameters. Where it can do so without unduly denying property owners the right to reasonable use of land and without causing harm to neighbors or the community, the BOA must adhere to the letter of the law. The BOA may provide relief from zoning standards based on circumstances particular to the land or that create an unwarranted hardship not experienced by others subject to the same standards. It is a difficult role given that the BOA may grant variances and special exceptions⁺ which fall outside the literal zoning standards but may fit within the spirit of the ordinance. An old saying is, "Only the BOA can interpret the zoning and the only thing the BOA can do is interpret the zoning."

2.0 History of Development and Conservation

Rye's strong commitment to publicly held conservation land complements zoning that preserves the Town's semi rural character and agricultural heritage. The fair treatment of landowners and advocacy for the desires of the community at large requires innovative approaches to development.

Rye does not have much buildable land remaining (i.e., outside of environmental buffers, not on ledge) to sustain subdivision of frontage lots and large lot development. The build out of Rye has been predominately residential subdivisions. There is some commercial development found along Route 1, and there are small business and commercial districts dispersed throughout town. Rye has no traditional commercial village center although many municipal buildings and services are clustered near the existing Town Hall on Central Road.

Figure 4-1 provides data from a study that evaluated aerial photographs at various times since 1962. The Complex Systems Research Center at the University of New Hampshire performed this study of all the communities in Rockingham County to quantify land use change. By interpreting aerial photographs from the years 1962, 1974, 1998, 2005, 2010 and 2015 this study tracked land use changes in land cover-based categories to show how the region's landscape has changed.

This study shows that Rye has maintained a mix of land use given its location on the fast-growing New Hampshire seacoast. Figure 4-1 reports changes in land use from 1962 to 2015. In 1962, the Town had 1,135 acres in residential land use and 5,473 acres of forest and open wetland. By 2015 residential land use increased to 1,832 acres, an increase of 697 acres or 61 percent. The number of acres in agricultural use and farmsteads in 1962 was 681. This total had

decreased to 289 acres in 2015, which represents a decrease of 58 percent. However, the town wide total of 3.5 percent active agricultural use remains high for our region. Loss of forests and open wetland tracks with the increase in acreage for residential subdivision of land including roads and utilities, and loss of agricultural uses. With a steady rate of forest and open wetland retention since 2005, Rye can consider this a successful strategy for retaining rural character in a region that highly values it but has been losing such character in large measures over the last three decades. *Refer to the Land Use maps in Appendix A.*

Note: It is important to acknowledge inherent inconsistencies with interpreting aerial photographs taken over a period of more than fifty years. The scales of the maps differ, leading to varying degrees of quality for interpretation purposes. In addition, the science of aerial photography has improved over this time frame so that more information can be gleaned from the more recent photographs. These factors can create unexplainable differences in some of the land use categories. These issues notwithstanding, the analysis offers valuable data about the trends in land use change and provides a solid baseline for future studies as well.

Figure 4-1

Rye Historical Land Use							
Land Use Category	1962	1974	1998	2005	2010	2015	
	Acres	Acres	Acres	Acres	Acres	Acres	% from 2010
Active Agricultural	679.3	345.0	249.1	219.8	219.8	217.5	-1.0%
Auxiliary Transportation+				9.8	9.8	12.4	26.5%
Farmsteads	2.0			72.7	72.7	71.6	-1.5%
Industrial/Commercial	87.8	103.9	150.4	131.7	131.7	120.6	-8.4%
Mixed Urban+	4.4	119.8	185.2	21.5	21.5	21.5	0.0%
Open Wetlands & Forested*	5,473.2	5,357	5,184.1	4,997.5	4,997.9	4,957.9	-0.8%
Other/Idle	524.5	607.5	325.6	339.4	317.5	304.3	-4.2%
Playing fields / Recreation				217.9	231.5	231.8	0.1%
Railroad				1.6	1.6	1.6	0.0%
Residential	1,135.5	1,356.8	1,776.5	1,762.8	1,770.6	1,832.4	3.5%
Transportation	132.9	143.5	157.7	178.7	178.7	182.0	1.8%
Utilities				11.2	11.2	11.2	0.0%
Water	366.2	372.2	377.2	441.3	441.3	441.2	0.0%
Total	8,405.8	8,405.8	8,405.8	8,405.8	8,405.8	8405.8	
Aggregate Categories	1962	1974	1998	2005	2010	2015	
	Acres	Acres	Acres	Acres	Acres	Acres	% from 2010
Developed Uses	1,360.6	1,724.0	2,269.8	2,117.3	2,125.1	2,181.7	2.7%
Undeveloped Uses	7,045.2	6,681.8	6,136.0	6,288.5	6,280.7	6,224.1	0.9%

* Note: Years 1962, 1974 and 1998 were compiled with a slightly different methodology than 2005, 2010 and 2015. Auxiliary Transportation, Playing Fields and Utilities are categories only broken out in 2005, 2010, and 2015. Classification of wetlands was improved between 1998 and 2005. Due to lesser-quality aerial photos many wetlands were classified as 'Forested' before 2005.

+ Auxiliary Transportation includes cloverleafs, medians, roundabouts and traffic circles. Mixed Urban includes vacant municipal properties, graveyards and other non-specified uses.

It is worth pointing out the significant increase of 32 percent in residentially developed lands from 1974 to 1998, and a 3.0 percent increase from 2005 to 2015.

The Conservation Commission and, formerly, the Parsons Park Corporation and the Rye Open Space Committee have contributed significantly to increasing recreational space in town. In addition, the Town and its recreation supporters have committed to creating and conserving recreation facilities. Rye citizens have shown overwhelming support for these groups and their initiatives.

3.0 Existing Land Use

Figure 4-2 provides brief descriptions of Rye’s zoning districts and the acreage in each district. Further zoning district descriptions can be found in Rye’s Zoning Ordinance. *Refer to the Zoning Districts, Aerial Photograph, and Digital Tax Parcel maps in Appendix A.*

Figure 4-2

Zoning Districts, Sizes and Permitted Uses			
District	Acres	%	Permitted Uses
Single Residence (SRD)	6,088	75.1	Single-family homes, farms, and limited home occupations. And by special exception*: mobile homes, condominium conversions, hospitals, convalescent or nursing homes, and homes for the elderly
General Residence (GRD)	518	6.4	Same as SRD & two single-family units
Business (BD)	57	0.7	Same as SRD & small retail, service enterprises, lodging establishments. By special exception: other expanded uses (including the sale of petroleum products)
Commercial (CD)	293	3.6	Same as BD but no 1-,2-family dwellings. Vehicle salesrooms, lumberyards and building supplies, professional offices or financial institutions. Other uses by special exception provided that they are not detrimental or injurious to the neighborhood
Conservation	706	8.7	Open space and forestry, trails, picnic areas, minimal walkways and structures to support the same
Public Recreation	75	0.9	Recreational purposes on lands owned by the Town of Rye, the Rye School district and the State of New Hampshire reserved for those purposes
Other Lands			
Recreation and Conservation	370	4.6	State owned properties – Rye Harbor State Park, Odiorne State Park

4.0 Housing

Although Rye's housing stock consists of mostly single family residences, there are a number of In-Home Accessory Apartments and multi-family units in town that provide housing diversity. As of 2017, some of these multiple residences and all of the multi-family dwelling units exist as non-conforming lots or structures with respect to the zoning district in which they are located. Over time, it's likely that many of these non-conforming multi-family sites may disappear and be replaced by structures that conform to zoning.

Retaining housing variety has many benefits to the town. Rye desires as much affordable housing as is possible in view of the physical limitations and the cost of land. A new state law was passed in 2016, RSA 674:71-73 Accessory Dwelling Units, to allow accessory dwelling units on residential lots. In 2017, Rye adopted zoning revisions to replace the In-Home Accessory Apartment ordinance with Article V Section 506 Accessory Dwelling Units to be compliant with the new state law and provide standards for construction of these living units. The amended Accessory Apartment ordinance may result in expansion of affordable and workforce housing and introduce more flexible housing choices for residents of Rye. Loss of housing variety can affect changes in school enrollment, demographics, workforce and tax base.

Under current zoning, some of the alternatives to encourage creation of diverse housing are planned unit residential developments, age-restricted developments, workforce housing, multi-family, and back-lot subdivisions.

On March 13, 2006, Rye passed a new zoning classification called "Retirement Community Development" (RCD), Section 401 of the Zoning Ordinance on parcels of 10 or more acres. It allows for 8-16 detached or attached (town houses) units with reduced side and front setbacks. Additional density may be allowed (up to 22 units) if a project provides at least 15 percent of the total units as affordable housing units and is allowed one or two additional units for "excellence in design".

The RCD ordinance controls many physical elements of these developments. The development envelope must be set back on the sides, front and rear with natural screening vegetation. Each unit is permitted no more than two bedrooms with covered parking. If municipal sewer is not available in close proximity to a property, a single community septic system is required. Access roads and driveways are to be private and maintained by a homeowner's association. All units in the RCD are limited to occupants over 62 years of age.

5.0 Historic District

Adopted in 1978, Rye's Historic District is defined as the area from the west end of Grange Park to the intersection of Central and Washington Roads within five hundred (500) feet on either side of the centerline of Washington Road, the State of New Hampshire Isles of Shoals islands, the Brackett Road Massacre Site, and the historic Cable House at 20 Old Beach Road. The goal of preserving our heritage was advanced by the formation of a Heritage Commission in 2011. Any proposal to construct, alter, repair, move, demolish, or otherwise change the exterior appearance

of a structure, construct a new structure or establish a new use of land or buildings within the Historic District must obtain a Certificate of Approval from the Historic District Commission.

In addition to honoring our natural heritage, Rye recognizes the need to protect both historical and cultural resources that combine to recall history that makes the town unique. Every community has a distinctive sense of character resulting from its history. This sense of place gives stability to the town and thus enhances its attractiveness for residents and attracts visitors.

4.4 LAND USE AND ENVIRONMENTAL ISSUES

1.0 Conservation Based Development and Subdivisions

Conventional cookie cutter subdivisions do not meet the standards of rural character and open space that give Rye its distinct character. In 2010, Rye adopted a Conservation Land Developments ordinance (section 403) which replaces conventional area and frontage dimensions with “flexible planning provisions” approved by the Planning Board. The Planning Board may consider further refining this ordinance to incorporate a design based approach, for example, as that outlined in the book *Rural by Design, Planning for Town and Country*, 2nd Edition (Arendt, 2015) available at <http://www.greenerprospects.com/products.html>). This approach allows increased density but also includes criteria for conserving natural features and resources and building in appropriate areas. Town zoning and regulations should allow for flexibility in the layout of subdivisions to promote open space and avoid the “checkerboard” development that only creates larger house lots and more streets. Conservation design is a better match for preserving the town’s traditional historic character and open spaces.

2.0 Natural Resources

Land use strategies employed over the years in Rye have been guided by its high priority on protecting natural resources. The Town’s wetlands, shorelands, aquifer protection, floodplain and other zoning ordinances influence nearly every development proposal that is reviewed by the Planning Board. Wetlands and floodplain development ordinances regulate development around our wetlands, surface waters and shorelands. If the town feels these resources are not being fully protected, these ordinances should be strengthened to provide the desired level of protection. These resources perform vital ecological functions and provide open space, wildlife habitat, flood storage and recreational opportunities, all of which contribute to the town’s rural character.

Salt marsh restoration is being pursued in Rye based on a 1994 study prepared by the USDA Soil Conservation Service. Through a combination of culvert replacements and fill removal, tidal flow has been restored to over 275 acres of salt marsh in Rye. The Rockingham County Conservation District has implemented a *Phragmites* control program in the Seacoast region for many years. Rye’s Conservation Commission will continue to compete for grants from federal and state environmental agencies to fund restoration projects. These funds will complement funds raised from individual contributions and private environmental foundations.

Rye citizens have also taken non-regulatory actions to preserve the town’s natural resources. Both the Open Space Committee and Conservation Commission have undertaken programs to

purchase easements or land to prevent future development. The town's extensive conservation land holdings are shown on the conservation land holding map in Appendix A. The town should continue to aggressively acquire easements and property to protect open space, and natural resources and their functions

3.0 Non-Point Source Pollution and Stormwater Management

1. Non-Point Source Pollution

Nonpoint source (NPS) pollution results from runoff and precipitation on land and impervious surfaces, atmospheric deposition, overland drainage and movement of water through soil and bedrock. Nonpoint source pollution comes from many diffuse sources, unlike pollutants discharged from piped outfalls from industrial sites and sewage treatment plants. Nonpoint source pollution is caused by rainfall or snowmelt moving over land and through the ground, picking up and transporting natural and human-made substances and depositing them into surface waters, groundwater, wetlands, and coastal waters. Nonpoint source pollution commonly originates from:

- Fertilizers, herbicides and insecticides from agricultural lands, residential areas, and landscaped areas
- Oil, grease and toxic chemicals from urban runoff and energy production
- Sediment from improperly managed construction sites, crop and forest lands and eroding shorelands
- Salt from road deicing and irrigation practices and drainage from active and abandoned gravel excavation sites
- Bacteria and nutrients from private septic systems, livestock and pet wastes.

New Hampshire reports that nonpoint source pollution is leading contributor of 90 percent of water quality impairments in surface waters and groundwater. The effects of nonpoint source pollution on specific waters vary depending on local conditions such as soil types, hydrology and slope. Research has documented that non-point source pollution can have harmful effects on drinking water supplies, public health, recreation, fisheries and wildlife.

In an effort to address long term nonpoint source pollution in Rye, a septic system pump out ordinance for the Parson's Creek Watershed went into effect in 2016. Its impact on water quality improvements and the long-term viability of single home septic systems in this low-lying area are still not known as septic systems continue to be pumped for the first time under the program, inspected, and potentially replaced.

2. Stormwater Management

As shown in Figure 4-3, the amount of precipitation associated with the 50-year and greater storms events has increased in the last 40 years. This increase in precipitation has resulted in more frequent flooding and failure of older infrastructure not designed to manage increased runoff volume.

Figure 4-3

	24-hour Rainfall Events					
Source	1 year	2 year	10 year	25 year	50 year	100 year
TP40	2.6	3.1	4.4	5.2	5.8	6.5
NRCC	2.6	3.2	4.8	6.1	7.3	8.8

TP40 Technical Paper 40 (1061) was the previous standard used by the NH Department of Environmental Services, Alteration of Terrain Bureau. NRCC – Northeast Region Climate Center (2014) at <http://precip.eas.cornell.edu/>.

Engineered stormwater conveyance, treatment and detention systems should attempt to cause minimal disruption of the natural hydrological cycle. Traditional practices such as detention ponds and retention basins are not highly effective in meeting water quality goals. Environmental, health and safety issues have arisen with the expanded use of conventional retention and detention ponds to control stormwater runoff in developments and on individual lots. Ponds have, at times, become stagnant mosquito breeding areas and, in some areas, have inadvertently served as collectors of lawn chemicals, animal wastes and other pollutants. Storms flush the pond's polluted water into our surface waters. Alternative approaches, such as low impact development and Green infrastructure that use plants and vegetation to uptake pollutants from stormwater, outperform conventional practices with respect to water quality. Refer to section 4.0 below for more information about these practices.

Stormwater pollution issues should be recognized in any proposed future development by requiring an environmental escrow account which would be held by the Town for three to five years following completion of the development to ensure that stormwater infrastructure functions as designed. To assure water quality protection, a program of increased frequency of sampling both streams and in-shore coastal waters should be funded. Results would be used to document and better locate nonpoint sources of pollution and aid in complying with requirements of the new EPA MS4 permit which will become effective July 1, 2018. The MS4 permit requires the town to manage stormwater and water quality for all municipal facilities including roads, structures and land used for municipal services and public use. The permit requires specific actions be taken each year of the 5-year permit including adoption of stormwater management regulations that include standards for redevelopment and water quality protection and that address existing water quality impairments. The town is required to submit an annual report to EPA documenting its progress toward complying with yearly permit requirements.

3. Impervious Surface

Impervious or impermeable surfaces are hardened surfaces or structures in developed landscapes. Rainwater and snow melt flow across these impervious surfaces rapidly, picking up pollutants such as sediment, nutrients and petroleum-based compounds. Examples of impervious or impermeable surfaces include roads, parking lots, buildings, roofs, concrete, pavement, compacted soils and crushed stone/gravel driveways. An ordinance amendment in 2015 better defined impervious surfaces to include compacted gravel type driveways and parking.

Of the 8,107 acres of land (excluding surface water and wetlands) in Rye, impervious surfaces have increased from 7.2 percent (576 acres) in 1990² to 15.5 percent (1,350 acres) by 2010.³

The increase of impervious surfaces through development affects water resources in several ways. Impervious surfaces impede the infiltration of water into the soil, reducing recharge of groundwater. Impervious surfaces combined with urban drainage systems such as curbs, gutters and storm drain pipes can alter the natural hydrology in a watershed by increasing the volume of stormwater runoff and altering drainage to wetlands and surface waters. Impervious surfaces can also result in loss of aquatic habitat, loss of biological diversity, and an overall decrease in water quality due to the accelerated delivery of pollutants into rivers, lakes, and estuaries (NHEP, 2004).

Studies report that levels of impervious surface in excess of ten percent in a watershed can negatively affect water quality. When the percentage of impermeable surfaces in a watershed is ten percent or less, streams typically retain good water quality and stable channels. More than twenty-five percent impervious surface can lead to severe physical and ecological damage to streams in a watershed.⁵

Increases in impervious surface may result in less infiltration of rainwater into the soil, conveying pollutants to water bodies, increasing flooding, streambed erosion and sedimentation. Runoff may also change the temperature of bodies of water as it may be warmer. Loss of vegetated buffers adjacent to wetlands and surface waters due to development or erosion can also alter water temperature to a level at which species cannot persist.

Impervious surfaces represent a threat not only to natural landscapes, surface water and groundwater, but also to the social and built infrastructure components of municipal services. In other words, reducing impervious surface not only helps to improve water quality, it may also result in lower municipal costs for road maintenance, snow clearing and lower development costs. A 100-foot reduction in road length will result in a savings of about \$15,000. This figure includes savings from reduced pavement, curb and gutter, and stormwater management structures (Center for Watershed Protection, 1998). Well-planned street layouts will reduce impervious surface and increase roadway connectivity. The goal is to protect sensitive resources and habitats, and create a street system that optimizes the ability of town fire and rescue officials to respond to emergencies in a timely and efficient fashion.

3.0 Low Impact Development and Green Infrastructure

² 2013 State of Our Estuaries Report, Piscataqua Region Estuaries Partnership

³ NH GRANIT, 2010

⁵ Deacon, J.R., Soule, S.A., and Smith, T.E., 2005, Effects of urbanization on stream quality at selected sites in the Seacoast region in New Hampshire, 2001-03: U.S. Geological Survey Scientific Investigations Report 2005-5103, 18 p.

1. Low Impact Development (LID)

Low Impact Development is an innovative approach to stormwater management based upon the principals of managing rainfall at or close to its source and preserving the hydrologic functions of natural landscapes. Residential, commercial and industrial developments contribute non-point source pollution that degrade water quality and aquatic habitats. Approximately 80 percent of Rye is residential development making stormwater management for new subdivisions a priority to protect our water quality. Incorporating Low Impact Development will help maintain surface water and groundwater quality, protect the integrity of aquatic resources and ecosystems, and preserve the health of wetlands and habitats.

2. Green Infrastructure

Green infrastructure comprises a wide variety of practices that protect and improve water quality, use living materials as well as hardened landscapes and reduce the volume of stormwater runoff. Green infrastructure includes:

- Tree box filters, rainwater cisterns and collection devices
- Subsurface collection systems and infiltration systems
- Reuse of rainwater and stormwater for landscape irrigation and gray water use
- Natural buffers and landscapes
- Low impact development practices (bioretention, porous pavement, collection and infiltration systems)

4.0 Flood Hazard District

As adopted in Zoning Ordinance Article II Section 302 Flood Hazard District and the Floodplain Development and Building Ordinance, Rye enforces the minimum floodplain standards required by FEMA to maintain Rye's eligibility in the National Flood Insurance Program. FEMA encourages municipalities to adopt stricter standards than the minimum requirements to require safeguards such as freeboard (elevating 1 or more feet above the base flood elevation) for new and substantially improved structures, prohibiting fill in the floodplain and expanding regulatory floodplain jurisdiction to include flood hazards such as sea-level rise.

1. FEMA Flood Insurance Rate Maps and Regulatory Floodplain

The floodplains of Rye have been mapped by the National Flood Insurance Program on Flood Insurance Rate Maps (FIRMs). The current FIRMs were adopted in spring of 2005. The preliminary 2014 FIRMS are anticipated for adoption pending resolution of a map dispute. All towns participating in the flood insurance program must reference the FIRMs and adopt FEMA's minimum floodplain development standards in their zoning ordinance. Based on the new maps, the Town is expected to modify its Floodplain Ordinance.

Rye has 3 different floodplain zones depicted on the FIRMs:

Zone A2: Areas of 100-year flood.

Zone AO: Areas of 100-year shallow flooding.

Zone V: Areas of 100-year coastal flood with high velocity wave action.

With the exception of Locke's Neck, the area protected by the Wallis Sands seawall, Fairhill Manor and parts of Odiorne Point, most of Rye's developed coastline (including approximately half of the densely developed Jenness Beach area) is located in Flood Hazard Zones V, A2, or AO. Inland, Flood Hazard Zone A2 extends to the borders of all of Rye's salt marshes, Witch Creek, most of Berry's Brook and all three of the major ponds.

Inland, the undeveloped land in Rye that is in the 100-year flood zones depicted by the FIRM is land that is also classified as wetlands and thereby precluded from development by the Wetlands Conservation District. However, along the coast, sizable portions of the flood hazard zones are already developed. The requirements of the FEMA National Flood Insurance Program, which are part of Rye's Floodplain Development and Building Ordinance, require that new or substantially improved residential construction have the first floor located above the base flood elevation and that new or substantially improved nonresidential structures located below the base flood elevation be flood proofed. Further floodplain regulation is imposed by the New Hampshire Department of Environmental Services Subsurface Bureau which will not approve a new on-site septic system located in a VE zone (high velocity subject to wave action).

Rye's 500 plus homes located within the floodplain or the High Hazard Flood Area as shown on the 2005 FIRMs are at risk of flooding during storm events. The High Hazard Flood Areas are shown on FIRM maps developed by FEMA as part of their flood insurance program. The flooding here in Rye may take a couple of different forms. The first will be a storm surge with waves that wash over the protective dunes or barriers up to one-foot deep and then flow inland to the salt marshes. This sheet flow will exert forces on the foundations of buildings and can cause erosion of the barriers and the land around buildings in its path. The other will be a rise in the water level of the salt marshes which will cause homes along the edge of the marshes to become submerged or maybe even float off their foundations.

2. Floodplain Development

The purpose of the Floodplain Development and Building Ordinance is to help mitigate and prevent damage from flood hazards. The ordinance requires that all new construction or substantial improvements be raised above the base flood elevation (the water elevation of the 100-year/1% chance storm reported on the FEMA Flood Insurance Rate Maps) and protected from flood events. Homes built to the requirements of the floodplain ordinance will be better suited to withstand the effects of a flood event.

Rye citizens need to plan to maintain the barriers that keep the ocean from causing flood damage and provide greater oversight of these areas. The barriers are the rubble and rock berms (shale piles) that are along Ocean Boulevard. These shale barriers were built by the State and are maintained by both the State and the Town. Considering the value of real estate that is protected by these barriers it may be time

for the Town to take a more active role in coordinating management of these barrier structures with the NH Department of Transportation. It is also important to insure construction does not block the natural flow of storm waters from the marshes to the ocean. Investigations may be needed to identify if any changes to the flow patterns occur during a flood event and whether better management of elevated water levels during flood events is needed.

Floodplains are undesirable locations for development because of the associated risks to life and property. In addition, construction in the floodplains can magnify flood hazards downstream and on adjacent properties. For example, the inundation of septic systems can cause water pollution and public health hazards.

5.0 Natural Conditions Affecting Resource Management and Land Development

1. Topography

Rye's land is gently sloping and ranges in elevation from sea level to approximately 150 feet in elevation at Breakfast Hill in the southwest corner of town. Slopes range from 3 to 8 percent. The town is traversed from northeast to southwest by a low ridge, and five smaller ridges run from the diagonal ridge eastward to the ocean. In between the ridges are tidal and freshwater marshes. The roadway development in the town has followed the ridge lines. *Refer to the 2010 Contours/Elevation map in Appendix A.*

2. Geology and Soils

The major conditions which limit development are prevalence of tidal marshes and freshwater wetlands. The soils suitable for development exist in relatively narrow bands along the ridges occupied by Washington Road, Wallis Road, Central Road, Locke Road, Grove Road, Cable Road and South Road. *Refer to the Soil Potential for Development map in Appendix A.*

The Rye Zoning Ordinance establishes a Wetlands Conservation District, in cooperation with NH DES, which essentially prohibits building construction in tidal marshes, freshwater marshes, streams and ponds. The zoning ordinance also includes a Wetlands Buffer regulation, which provides further protection of wetlands by prohibiting most uses of land within 100 feet of tidal marshes, freshwater marshes, ponds and perennial streams.

Rye's Land Development Regulations and the Building Code require that all septic systems receive the approval of the New Hampshire Department of Environmental Services Subsurface Bureau. Special criteria for septic systems related to the depth to bedrock, seasonal high-water table, land slope and soil percolation rate are also incorporated into the land development and building regulations. Additionally, the Land Development Regulations include provisions for high intensity soils mapping standards for commercial developments and subdivisions.

Potential solutions to high groundwater tables and localized flooding have prompted the town to design complex drainage systems including catch basins. The cleaning of the catch basins has become a time consuming and costly burden to the town. Furthermore, traditional catch basin drainage systems without pretreatment may not be appropriate in some locations such as Parson Creek due to the high groundwater table and influence of tidal waters.

It should also be noted that in the fragile ecological environment of highly developed areas in Rye, blasting for further development should be carefully reviewed and quite possibly prohibited; such blasting interrupts the water table creating even more complicated drainage issues.

4.5 FUTURE LAND USE

Over time, Rye has developed strategies to guide its patterns of development. Zoning has historically been used to establish distinct areas for residential and commercial development. New residential uses have been primarily developed in the interior areas of town. Commercial development has been, with few exceptions, occurred along the US Route 1 and 1A corridors.

Zoning that promotes preservation of open space and compact development provides an alternative to traditional sprawl type development patterns. “A typical subdivision in northern New England requires 1 or 2 acre lots. Twenty houses can consume 40 acres, leaving little open space. Placing the same 20 homes on ¼ acre lots and using attractive landscaping and design elements to create privacy consumes only 5 acres, leaving room for 35 acres of open space.” (Forest Service, 2005; CEP, 2003).

Many important environmental services are provided by both natural and working landscapes, including water filtration, flood control, water recharge areas, wildlife habitat, improved air quality, erosion and sediment loss control, food production, and moderation of climate change, as wetlands, salt marshes and forests serve as carbon sinks, where carbon is sequestered. Rye has a long history and cultural tradition of stewardship of natural and working landscapes. To sustain the many economic, cultural and environmental benefits of these landscapes citizens, planners and developers must work together to ensure that growth is planned to minimize the detrimental effects of development and protect the many economic, environmental and social benefits these landscapes provide.

Future land use should be designed to provide flexibility in design and greater diversity of uses employing the following principles:

- Minimize impervious surfaces such as roads and parking areas.
- Consider adopting mandatory “conservation subdivision” standards to increase open space and natural resource conservation.
- Incorporate alternative road width and construction standards, and provide alternative transportation systems such as bike and walking paths.
- Consider mixed-use development as a tool to encourage non-residential uses while increasing housing variety and supply.

- Apply flexible parking standards to fully utilize all parking resources including municipal and other public buildings.
- Modify floodplain development standards for high risk areas to ensure future development that is resilient to changing water elevations and coastal conditions.

Fragmentation and Sprawl

Economic impacts of fragmentation and sprawl include greater municipal costs for maintenance of roads, water supply, sewers, school bus routes and fire and safety services. As the community requires more services at greater cost, property taxes also rise forcing landowners to make difficult decisions concerning future use of their property. (Forest Service, 2005). Automobile use increases with sprawl resulting in greater fossil fuel use, increased traffic congestion, noise and air pollution when work, residences and goods and services are all in separate locations.

Social impacts of fragmentation and sprawl result in changes to the community. Community culture can change, particularly in small New Hampshire towns where residents once had a close connection to the land through forestry, farming, hunting and fishing and other recreational activities. The community may suffer as a whole from the loss of recreational activities and a shared natural heritage. Residents who are more widely dispersed often have lower levels of participation in civic affairs and community volunteerism due to less frequent contact with neighbors and other residents, resulting in an overall loss of social capital for the town: “Each additional ten minutes in daily commuting time cuts involvement in community affairs by 10 percent” (Putnam, 1995).

Figure 4-5 summarizes the various threats and impacts to natural resources and possible strategies to protect them into the future.

Figure 4-5

Land Use Threats, Impacts and Strategies	
Threats and Impacts	Strategies
Fragmentation and Land Development	Proposed Strategies
Need for Cluster and/or Pocket neighborhood type zoning to protect our Open Space. Increases in impervious surface/decreased flood retention/ faster delivery of pollutants to streams and wetlands	Changes in the zoning and land development Regulations. Allow narrower streets in subdivisions to reduce impervious surface. Require on-site infiltration and vegetated buffers for streams and wetlands. Require low impact development strategies for drainage plans.
Greater automobile emissions, congestion, greater infrastructure costs for isolated subdivisions at the end of long cul-de-sacs	Provide for walkable or bikeable subdivisions. Require two points of connectivity in new subdivisions to existing street networks.
Fragmentation of forests restrictive to species range requirements	Require contiguous areas of wetland/other habitat be designated at beginning of design phase for

	conservation subdivision. Require developers to protect trees from impacts of construction activities.
Roads fragment landscapes and habitats, and disrupt wildlife corridors	Provide tunnels, wider culverts, or other safe crossings for wildlife where roads fragment habitat
Impervious Surfaces	Proposed Strategies
Flooding, reduced suitability of land for water recharge	Conduct a review of Rye's ordinances and regulations. Require on-site infiltration. Amend building codes to require drip beds, rain barrels and other infiltration devices for structures.
Delivery of pollutants to water bodies, wetlands, traveling across paved areas	Buffer waterbodies reduce amounts of impervious surfaces through use of narrower roads in subdivisions. Buffer outfalls of municipal storm drains.
Increased municipal costs, poorly designed road networks that result in congestion and higher municipal costs	Limit lengths of cul-de sacs, roads in new subdivisions. Restrict development to areas adjacent to existing development.
Pavement	Allow narrower street widths.
Wildlife & Biodiversity	Proposed Strategies
Fragmentation of habitat	Protect green corridors through purchase of fee title or easements, follow State Wildlife Conservation Plan and mapping to designate protected areas
Light Pollution	Require dark-sky standards for new developments or site plans for streetlights and other municipal facilities fully shield or full cutoff fixtures.
Private Property Management	Educate landowners about pet predation, disposal of household trash and household lighting. Educate landowners about voluntary federal incentive programs to protect habitat on private land
Invasive species	Monitor invasive species in new development and near critical areas such as wetlands, salt marshes, remove invaders such as Phragmites to slow proliferation. Educate boaters on removing aquatic species from boat hulls.
Nuisance and Conflicts	Educate landowners about nuisance animals through Fish and Game resources. Consider

	possible options for control of animals. Learn seasonal hunting options and restrictions. Coyotes have no closed season and can be hunted at night during certain times of the year.
Threats and Impacts	Strategies
Threats to the Working Landscape	Proposed Solutions for Rye
Loss of farming, fishing and hunting as part of regional character and traditional ways of life. Loss of important environmental services such as water filtration, erosion control, and moderation of climate change.	Protect areas used as hunting grounds, scenic view sheds and farms from development through restrictive zoning, cooperative farms or outright purchase. Encourage outdoor recreation on Rye public lands and on privately owned parcels with legal access. Educate private landowners on practices to protect waterways and provide wildlife habitat.

4.6 CLIMATE CHANGE AND ADAPTATION

Incorporating the latest future projections of sea-level rise and storm related flooding into municipal planning and projects will minimize vulnerability and prove beneficial even if future hazards turn out to be less extreme than anticipated.

Adapting to changing conditions means designing buildings and facilities that account for flooding or modifying uses of land that are compatible under a wide range of conditions. The process of adapting creates buildings and systems that are more *resilient* and better able to perform with fewer impacts.

Adaptation – adjustments in ecological, social, or economic systems in response to actual or expected climatic change and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change. [<http://unfccc.int/focus/adaptation/items/6999.php>]

Resilience - a capability to anticipate, prepare for, respond to, and recover from significant multi-hazard threats with minimum damage to social well-being, the economy, and the environment. [EPA <http://epa.gov/climatechange/glossary.html>]

NH Coastal Risks and Hazards Commission Report (2016)

Rye was represented on the NH Coastal Risks and Hazards Commission (CRHC), whose charge was to investigate future impacts of climate change and coastal hazards including flooding from increased precipitation, coastal storms and sea-level rise. The CRHC's final report is available at <http://www.nhcrhc.org/>. With respect to infrastructure management, land development and natural resource based planning, the Commission's report offers the following guidance as well as 35 recommendations relating to the built landscape, natural resources, heritage and economy:

- **Act Early.** Start planning now. Being proactive will save money in the long term when compared to a more traditional reactionary approach to flood impact management.
- **Respond Incrementally.** Take manageable steps to prepare over the long term.
- **Revisit and Revise.** As the climate science and projections are refined, adjust approaches to match expected conditions.

- **Collaborate and Coordinate.** Work together at state and local levels and across sectors, and with neighboring municipalities to maximize effectiveness and available resources.
- **Incorporate Risk Tolerance in Design.** Design projects based on willingness to accept risk associated with unacceptable performance. Risk tolerance will likely vary based on the importance and cost of maintaining or replacing a structure or facility.
- **Make No Regrets Decisions.** Take actions that offer multiple benefits and will therefore provide added value regardless of the flood scenario that occurs.

Tides to Storms Vulnerability Assessment Report (2015)

The Tides to Storms Vulnerability Assessment report (2015, Rockingham Planning Commission) details impacts from sea-level rise and storm surge flooding to Rye's land and natural resources, transportation infrastructure and critical facilities. ~~By far~~ Local and state roadways and upland (land above highest annual tides) are highly impacted by coastal flooding. The maps and sea-level rise projections from this report should be consulted as part of Planning Board review of development applications and Zoning Board of Adjustment review of variance and Special Exception applications. The report is available at <http://www.rpc-nh.org/regional-community-planning/climate-change/resources>.

Recommendations for Climate Adaptation Actions

(From Tides to Storms Vulnerability Assessment, 2015, NH Coastal Risks and Hazards Commission Report, 2016, and 2015 Master Plan Public Workshop sessions)

- LU1. Incorporate coastal hazards, risks and vulnerability in policies, plans and investments.
 - 1a. Evaluate deficiencies and barriers in municipal plans and policies, and whether they result in local and regional vulnerability.
 - 1b. Enhance public safety and preparedness by providing information about potential flood hazards to businesses and residents and early notification of flood risk during a coastal storm event.
 - 1c. Prepare a multi-tiered evacuation plan for storm events and other types of freshwater flooding. Identify vulnerable populations and seasonal residents, and prioritize areas at highest risk of flooding.
 - 1d. Map public and private properties at risk to flooding from sea-level rise and storm surge as well as extreme precipitation events. Educate the public about flood risks.
- LU2. Use appropriate and available mechanisms to fund climate adaptation strategies (including but not limited to incentives and market-based tools).
 - 2a. Encourage adoption of buffers and setbacks that better account for risk and vulnerability of structures, facilities and natural resources and maintain ecosystem services (e.g. flood storage, storm surge attenuation, reduce impacts to public structures and facilities and private property).
 - 2b. Continue funding land acquisition and easement programs to transfer vulnerable properties into conservation.

- 2c. Implement voluntary transfer of development rights programs aimed at acquiring or conserving property in high risk areas.
- LU3. Support land development regulations that reduce vulnerability and protect benefits that natural ecosystems provide.
 - 3a. Adopt development standards to adapt land and land based uses impacted by future extreme precipitation events and daily tidal flooding from projected sea-level rise.
 - 3b. Adopt land use and development standards that protect natural floodplain functions.
- LU4. Support land development regulations that reduce vulnerability and protect benefits that natural ecosystems provide. (continued)
 - 4a. Support adoption of local flood hazard overlay districts that include higher development standards that minimize impacts from natural hazards and climate change.
 - 4b. Adopt comprehensive floodplain management approaches that prevent and minimize impacts and protect people and property from coastal hazards.
 - 4c. Prepare a watershed-based plan that addresses comprehensive water resource management and stormwater management focused on changes in hydrology and precipitation resulting from climate change.
 - 4d. Consider prohibiting development and/or redevelopment in areas destroyed by storms, experiencing repetitive loss of structures or subject to chronic flooding and erosion. Consider adaptive reuse and/or acquisition of these high-risk properties.
 - 4e. Refer to Tides to Storms maps (RPC, 2014).
 - 4f. Complete a storm simulation analysis of impacts and possible decisions and choice of actions.
 - 4g. Evaluate the burden or cost to the town when property is rebuilt in high risk areas.
 - 4h. Raise level of awareness and discussion in the community.
- LU5. Make existing structures and facilities more resilient to impacts from coastal flooding.
 - 5a. Develop site-specific vulnerability assessment for municipal assets at risk from increased coastal flooding.
 - 5b. Incorporate standards into building codes, land use regulations and stormwater and floodplain management standards that account for projected future increases in sea-level rise, storm surge and precipitation.
 - 5c. Adopt standards requiring existing and substantially reconstructed at-risk structures and facilities and new construction to be elevated above the Base Flood Elevation.
 - 5d. Incorporate vulnerability assessment information and adaptation strategies for structures and facilities planning and investment for long term capital projects in the Capital Improvement Plan.
 - 5e. Encourage private property owners and businesses to incorporate vulnerability assessment information and adaptation strategies in their decision making and preparedness plans.

- LU6. Incorporate vulnerability assessment information and adaptation strategies in economic development plans.
 - 6a. Consider vulnerabilities of the local tax base, economic development, and retention of critical resources and services.
- LU7. Secure new and allocate existing funding sources to conduct vulnerability assessments of assets at appropriate scales and to implement adaptation actions.
 - 7a. Apply for and utilize FEMA mitigation grants and other sources of funding to implement climate adaptation and planning strategies that reduce or eliminate flood impacts.
 - 7b. Identify mechanisms to raise matching funds for FEMA mitigation and other grant programs.
- LU8. Develop a detailed preparation, response and recovery plan that guides reconstruction and new development following a catastrophic event.

4.7 Next Steps

- LU9. Existing and Future Land Use
 - 9a. The Planning Board may consider further refining the Conservation Land Developments ordinance (zoning section 403) to incorporate a design-based approach, for example, as that outlined in the book *Rural by Design, Planning for Town and Country*, 2nd Edition (Arendt, 2015)
 - 9b. Explore options to incorporate zoning to allow for mixed-use development, options for form-based code design standards and flexible parking standards.
 - 9c. Consider the future uses of the former police station with respect to municipal facilities and space requirements.
 - 9d. To address impervious surface in a comprehensive manner, the factors responsible for the steady increase of impervious surface should be identified including an analysis of the types of zoning relief (variance, special exemption, waivers) granted by land use boards that contribute to these increases.
- LU10. Transportation
 - 10a. Evaluate changes to the zoning ordinance and land use regulations that improve transportation, including road condition, safety and function, non-motorized facilities for bicycle and pedestrian access and safety and trails.
 - 10b. Consider adding mixed use zoning and in-town retail possibilities to help provide opportunities for local shopping.
 - 10c. Evaluate both the suitability of existing zoning to encourage desired growth and development and the potential for expanded land uses (e.g. mixed use, greater density) along US Route 1, a high use corridor and major transportation artery for the Seacoast.

LU11. Housing

- 11a. Building upon an established record of planning that predominately supported the construction of single-family homes, continue to provide balanced coverage of diverse and affordable housing options.
- 11b. Inventory how many units have been built under the Retirement Community Development (RCD) ordinance and how many such RCD units remain.

LU12. Waste Water Treatment

- 12a. Consider the extension of wastewater service from Portsmouth through a user-financed sewerage service along Route 1 to support further development within the Lafayette Road corridor.
- 12b. Evaluate the existing and future wastewater service needs for the portion of Rye's coastal area not served by public sewer such as Parsons Creek where private septic systems are a source of water pollution.

LU13. Conservation and Land Protection

- 13a. Continue to aggressively acquire easements and property to expand open space and protection of water quality, drinking water sources and wetlands. Landowners should be educated on their options for preserving land as part of the Town's conservation resources.
- 13b. Protect lands to sustain desirable wildlife habitat and extend wildlife corridors.
- 13c. Strive to protect remaining agricultural activities whenever the opportunity arises. In instances where agricultural uses may be abandoned, efforts to preserve these lands with the goal of potential future agricultural use should be pursued.
- 13d. Promote the use and maintenance of town-owned and conserved lands. Paths and trails should be maintained and marked for public use. Uses that benefit the community should be encouraged on these properties.
- 13e. Consider requiring an environmental escrow account of developers. The Town would hold funds for three to five years following completion of development to ensure that all infrastructure functions as designed.
- 13f. Fund a program of increased frequency of water quality sampling of both the streams and in shore coastal waters.

Land Use Maps

2010 Contours/Elevation

Aerial Photograph 2015

Digital Tax Parcels

FEMA Flood Hazard Areas/Flood Insurance Rate Maps at
http://www.town.rye.nh.us/pages/RyeNH_Flood/S01590CF0?Close=-1

Land Use/Land Cover 1962, 1974, 1998, 2005, 2010, 2015

Soil Potential for Development

Zoning Districts