

Part II: Regulatory Concepts

4.0 Nutrient and Flow Management

4.1 Applicable Growth Management Issues

Table 6. Planning Objectives, Potential Growth Influences, Applicable Regulations, Nutrient and Flow Management

Planning Objective	Potential Growth Influence	Applicable Regulations
Meet & do not exceed TMDLs	<ul style="list-style-type: none"> • Removal of Title 5 design flow criteria 	<ul style="list-style-type: none"> • Sewer Connection • Board of Health
Allocate sewer capacity to desired areas & uses	<ul style="list-style-type: none"> • Removal of Title 5 design flow criteria 	<ul style="list-style-type: none"> • Sewer Connection • Land Use
Protect natural resources & community character	<ul style="list-style-type: none"> • Removal of Title 5 setback & site criteria • Increase in attractiveness of development/redevelopment 	<ul style="list-style-type: none"> • Conservation • Land Use

This chapter addresses policies and regulations related to the amount of wastewater flow generated by development, whether treated by on-site septic systems or sewer systems. For on-site septic systems, nutrient and flow management is controlled through Title 5 and Board of Health regulations. For sewer systems, nutrient and wastewater flow management is controlled through sewer connection regulations and bylaws administered by the town sewer commissioners. Strategies for managing and controlling growth and wastewater flow and quality will differ depending on whether Title 5 regulations apply.

As discussed in Chapter 2.0 and in Table 6 above, wastewater flows relate to some but not all of the potential growth management objectives and outcomes associated with sewerage. The growth management issues that can be effectively addressed through nutrient and flow management are:

- Managing nutrient impacts and flow growth outside of sewersheds within TMDL watersheds;
- Managing flow growth and nutrient impacts within sewersheds, occurring through sewer connections resulting from either building growth or change in use that could occur with the removal of Title 5 design flow criteria; and
- Ensuring that flow is allocated to desired areas and uses in sewerage areas.

4.2 Nutrient Management Regulations

Nutrient management regulations and bylaws offer towns a means of limiting nutrient loading from wastewater flows through on-site septic systems before and after installation of sewers. Specifically the regulations help to:

- Limit nutrient impacts and flow growth prior to installation of sewers (all scenarios);

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- Limit nutrient impacts and flow growth outside of sewersheds within TMDL watersheds (scenario 4);
- Provide a basis for establishing flow limitations for future sewer connection regulations (all scenarios).

Several Cape Cod towns are implementing nutrient management controls through Board of Health regulations or general bylaws. Table 7. lists key provisions of nutrient management regulatory tools adopted or under discussion in four towns (see section 8.1 for more information on these regulations.) In most instances, development of nutrient management regulations requires a lengthy process of public discussion to balance the benefits of nutrient flow limits with the rights and expectations of property owners. Nutrient management controls can be adopted as a regulation or as a general bylaw implemented by regulations. Regulations can be adopted by a majority vote of the Board of Health following a public hearing. A general bylaw requires Town Meeting approval, which may be difficult to obtain but indicates strong community support if the rules are ever subject to legal challenge. A bylaw must stipulate the Board or Authority authorized to grant variances, which often is the Board of Health. Ultimately, the approach to implementation taken must ensure that the proposed nutrient management controls are fully vetted, understood, and publicly supported as a critical step toward long-term efforts to manage nutrients.

Nutrient management provisions work by establishing limits on the amount of wastewater flow that can be generated from septic systems serving newly constructed or redeveloped properties, or from use changes. The limits are stricter than otherwise would be allowed under Title 5 design flow criteria, and in many instances mirror more stringent Nitrogen Sensitive Area (NSA) flow limits. As defined under Title 5, NSAs are areas sensitive to the discharge of pollutants from onsite septic systems, including nitrogen, phosphorous and pathogens. The sensitivity warrants restrictions on septic system discharges. Title 5 establishes some areas as NSA, such as zones of contribution to public water supplies. Other areas, such as watersheds to nitrogen sensitive embayments, need to meet certain criteria to be deemed an NSA. In NSAs wastewater flow is limited to 440 gallons per day per acre (gpd/ac) for residential development, which translates into a requirement of 10,000 square feet of lot area per bedroom.

Despite the stricter standard, most local nutrient management regulations include exceptions for geographic areas, pre-existing properties, and use of Innovative/Alternative (I/A) de-nitrifying systems. The nutrient management regulations are sometimes called *interim* regulations because they are intended to provide relief from nutrient loads prior to installation of sewers. Once sewers are installed, the nutrient management controls provide flow limits that can be used to manage flow through sewer connections.

The regulations also help to manage flow growth outside of sewer areas where use of on-site septic systems is expected to continue. In addition, some nutrient management regulations require use of a cluster or I/A systems for subdivisions or commercial developments of a certain size.

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Table 7. Key Provisions of Selected Nutrient Management Regulations

Key Provisions	Chatham	Orleans	Barnstable	Falmouth
Format/Status	Board of Health Regulation - adopted	Board of Health Regulation - adopted	Board of Health Regulation -adopted	General Bylaw – preliminary draft
Findings/Purpose (Each regulation includes a section on findings or purpose statement to demonstrate the need for the limitation.)	<ul style="list-style-type: none"> •Links small lot sizes and porous soil conditions with nitrate nitrogen contamination of water resources. 	<ul style="list-style-type: none"> •Stresses potential for both nitrate nitrogen and phosphorous contamination. 	<ul style="list-style-type: none"> •References MEP analysis leading to TMDLs as justification for the loading limitations; •Regs are interim pending implementation of CWMP. 	<ul style="list-style-type: none"> •Part of a multi-faceted strategy that allows town to manage N and avoid uncontrolled growth in watersheds.
Applicability/ Exceptions	<ul style="list-style-type: none"> •Townwide “Area of Nitrogen Concern”; •Residential and commercial development, redevelopment or use change where flow < 10,000 gpd. 	<ul style="list-style-type: none"> • All septic system permits except in village center, general business district (except 3+ apartments) or Industrial zone; •Residential and commercial development, redevelopment or use change where flow < 10,000 gpd; •Does not apply if existing de-nitrifying system is functioning adequately. 	<ul style="list-style-type: none"> •All residential septic system permits in watersheds with TMDLs where N reduction is indicated. 	<ul style="list-style-type: none"> •Developments within entire town, watersheds with TMDLs or sewer service area.
Standard	<ul style="list-style-type: none"> •440 gpd/40,000ft² lot. •Requires a cluster system for 3 or more lots. 	<ul style="list-style-type: none"> •440 gpd /40,000ft² lot; 	<ul style="list-style-type: none"> •440 gpd/ 40,000ft² lot. 	<ul style="list-style-type: none"> •4 bedrooms/ ac or 3 bedrooms if less than 1 ac. (Must meet Title 5 if in NSA); •Commercial development, redevelopment or use change where flow < 10,000 gpd must meet 12 mg/L; •Requires cluster system at 12 mg/L for subdivisions of 5 or more lots.

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Table 7. Cont'd Key Provisions of Selected Nutrient Management Regulations (See 8.1)

Key Provisions	Chatham	Orleans	Barnstable	Falmouth
Exceptions	<ul style="list-style-type: none"> •Existing buildings get existing flow; •One additional bedroom beyond the 440 gpd limit allowed with use of I/A. •Vacant lot of any size may have a 2-bedroom home constructed on it, unless the lot is located in NSA. 	<ul style="list-style-type: none"> •One additional bedroom beyond the 440 gpd limit allowed with use of I/A. •Vacant lot of any size may have a 2-bedroom home constructed on it, unless the lot is located in NSA. 	<ul style="list-style-type: none"> •Existing buildings get existing flow; •Undeveloped lots under 30,000ft² get 330 gpd. 	<ul style="list-style-type: none"> •Existing buildings/homes get existing flow/bedrooms; •Undeveloped lots get up to 3 bedrooms ; lots > 1 ac get a minimum 4 bedrooms.
Variances	<ul style="list-style-type: none"> •Granted by Bd of Health for hardship <u>&</u> if proposal will not contribute N. 	<ul style="list-style-type: none"> •Granted by Board of Health for hardship <u>&</u> if proposal will not contribute N. •Properties already connected to sewer or I/A 	<ul style="list-style-type: none"> •Granted by Board of Health if connection to sewer unavailable, <u>&</u> enforcement would be unjust <u>&</u> proposed system does not exceed 5 ppm. 	<ul style="list-style-type: none"> •Granted for hardship. Bylaw stipulates Bd of Health as variance granting authority.
Deed Restrictions	<ul style="list-style-type: none"> •Variance requires signing a covenant filed with Registry of Deeds to connect to sewer in future. •Septic system must be designed for three bedrooms, otherwise the home must be deed restricted to current number of bedrooms. 	<ul style="list-style-type: none"> •Variance requires signing a covenant filed with Registry of Deeds to connect to sewer in future. 	<ul style="list-style-type: none"> •Required to limit development of offsite locations used to meet variance criteria. 	
Implementation	<ul style="list-style-type: none"> •Upon adoption 	<ul style="list-style-type: none"> •Allows for a transition period for completion of pipeline projects before provision takes full effect. 	<ul style="list-style-type: none"> •Upon publication. 	<ul style="list-style-type: none"> •Upon adoption. •Includes provision to decommission septic system once sewer is connected

4.3 Flow Management

Once sewers are installed Title 5 design flow criteria or more stringent nutrient management flow limits described above no longer apply. In their place, flow controls stipulated in sewer connection regulations are needed to ensure that properties do not increase flow beyond planned capacity, and to manage growth that could be facilitated if properties were allowed additional flow.

Provincetown, Chatham and Falmouth have adopted sewer connection regulations that incorporate flow limitations. In all three instances, sewer connections are allowed for properties only if they meet flow thresholds specified in the respective regulation. In each instance the flow restrictions are tied to limitations built into treatment capacity of the sewer treatment system. Thus the regulations might be more appropriately called *flow neutral* regulations. Table 8. provides a summary of the key provisions of flow neutral regulations and bylaws (see section 8.2 for more information on these regulations.)

There is an important relationship between flow limitations built into sewer connection regulations and the nutrient management regulations described above (see 4.2). Flow neutral sewer connection regulations limit a property to a pre-existing allowed flow. In the absence of a nutrient management regulation, that pre-existing flow would be determined by Title 5 design flow criteria. Nutrient management regulations provide towns with additional control over flows from individual properties. For example, Chatham adopted its sewer regulation following adoption of the nutrient management regulation. Thus, the regulation allows properties to hook up at flows that are equal to or lower than would have been if calculated under Title 5. For example, a residence on a one-acre (40,000 square foot) lot is allowed a maximum of 440 gallons per day, which equates to four bedrooms. Under Title 5, that property may have been allowed more bedrooms with greater associated flow. By tying the allowed flow to land area rather than use, the standard applies equally to commercial, residential and mixed-use properties. For example, a commercial use with high wastewater impacts that would have been restricted under Title 5 design flow criteria will also have to adhere to the 440 gallons per day per acre limitation.

The flow controls built into the sewer connection regulations carry forward the flow controls achieved in the nutrient management regulation that otherwise would have been lost upon installation of sewers. In such cases towns should consider how they would institute flow controls to sustain the limitations of the interim regulations once sewers are installed. Otherwise, the flow limitations imposed by the interim regulations may be exceeded. Similarly, towns installing sewers should think of whether to institute sewer flow limitations that are linked to flows under Title 5, or to lower flow levels defined by interim nutrient management regulations which may be based on existing flow, bedroom count or land area.

The flow control limitations outlined above limit wastewater flows to predetermined levels, either based on Title 5 or some other level adopted by the town.

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Thus the regulations are neutral in that sewer connections are not allowed for growth in flow beyond what would otherwise be permitted by the Board of Health regulations or bylaws or Title 5. The flow neutral regulations would be effective in preventing unplanned development from exceeding limited treatment capacity.

However, the flow neutral regulations would not address all possible growth effects from sewerage, such as:

- Preventing unbuildable lots (due to inability to meet Title 5 site criteria) from becoming buildable;
- Limiting the expansion of existing residences other than bedrooms
- Limiting seasonal homes converted to year round use;
- Limiting subdivision within environmentally sensitive areas;
- Preventing unwanted expansion of commercial buildings;
- Supporting desired mixed-use development.

Chapter 5.0 describes a variety of land use regulatory tools available to towns to address these potential impact and opportunities.

Table 8. Key Provisions of Flow Neutral Sewer Connection Regulations

Key Provisions	Chatham	Provincetown	Falmouth
Format	Rules and Regulations of the Sewer Department, Article II, Regulation of Sewer Flow; by vote of Town Meeting	Sewer Rules and Regulations; amended to include flow limitations by vote of Sewer Commission.	Town of Falmouth Code, Article VII, New Silver Beach Sewer Service Area; by vote of Town Meeting.
Standard	Existing homes and businesses are allowed to maintain the flow they have as of the effective date of the regulation. New homes or businesses built, renovated or expanded after that date are allowed an amount of flow based on what is allowed under Board of Health regulations, (440 gpd or 4 BR per 40,000 sf) or Title 5, whichever is less.	New construction, expansion or changes of use within specified sewer zones can only have the amount of flow that would be allowed with a fully functioning Title 5 system with no variances.	New construction is limited to 3 bedrooms. Residences with 2 bedrooms may expand to have 3. Pre-existing homes with more than 3 bedrooms may not add bedrooms. Pre-existing multi-family homes may not expand without first obtaining a variance.
Transfers	Sewer allocation policy allows transfers with permission of sewer board		Not allowed
Variations	Under certain hardship circumstances if adequate flow capacity is available and to allow such flow would not be inconsistent with the purposes of the regulations.	Under certain hardship circumstances if adequate flow capacity is available and to allow such flow would not be inconsistent with the purposes of the regulations.	Under certain hardship circumstances if adequate flow capacity is available and to allow such flow would not be inconsistent with the purposes of the regulations. May approve add'l connections or flow for a limited number of uses and, with Town Meeting approval, "other public service uses".

4.4 Oversight of Private Wastewater Infrastructure

In some Cape Cod communities it is likely that private wastewater infrastructure will be necessary to meet some level of nitrogen removal needs. Towns have options available to enhance their oversight of private infrastructure and ensure that private systems are commensurate with overall growth management goals.

4.4.1 Local Actions to Enhance Oversight of Private Wastewater Infrastructure

A report to Barnstable County on planning, administrative and legal tools for municipal wastewater management identified local actions needed to facilitate local oversight of private wastewater facilities.¹ In all scenarios, these actions could potentially help achieve the objective of ensuring that TMDLs are met and not exceeded by future growth. The actions recommended in that report include:

- Adoption of a bylaw or regulation to ensure that projects with a wastewater flow over 2,000 gallons per day evaluate the use of a cluster system and give a local board the authority to mandate a cluster system. Five towns (Harwich, Chatham, Orleans, Mashpee and Barnstable) have adopted Board of Health regulations to require subdivisions above a threshold number of lots to install a cluster treatment system (see 8.1.2).
- Adoption of a bylaw or regulation that requires developers to coordinate with the town in evaluating sewer needs in the vicinity of the project and designing an on-site system that could be adapted to meet area needs. This function currently is addressed through Cape Cod Commission review of Developments of Regional Impact (DRI), but is not formally mandated by any town outside of that process.

4.4.2 Policy on Ground Water Discharge Permits and Projects Under 10,000 Gallons per Day.

MassDEP also has oversight over private wastewater infrastructure through issuance of groundwater discharge permits, which are required for systems with design flow greater than 10,000 gpd. Currently MassDEP employs an informal policy in applying a standard of “no net nitrogen” for such permits issued for projects within watersheds of nitrogen sensitive embayments. No net nitrogen means that projects may not result in a net increase in nitrogen load, and must offset their load by reducing the load of abutting properties through shared treatment, or by some other means. This policy is especially beneficial in instances where a TMDL has been issued but a Comprehensive Wastewater Management Plan (CWMP) has yet to be finalized and approved by MassDEP. This policy has been applied to a number of projects on Cape Cod, including projects developed under a Comprehensive Permit (Chapter 40B,) but the policy has not been formally adopted (see more information on this policy in section 8.6.2). Towns would benefit if MassDEP took the step of formally adopting a policy that would require:

¹ Wright Pierce, Teal Ltd., CLF Ventures, Inc. Enhancing Wastewater Management on Cape Cod: Planning, Administrative and Legal Tools. Report to Barnstable County. July, 2004.

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- Compliance with a MassDEP approved CWMP for all residential and commercial projects seeking a groundwater discharge permit; or alternatively
- Absent a MassDEP approved CWMP, the standard of “no net nitrogen” should be applied for all residential and commercial projects seeking a groundwater discharge permit.

Comparable standards should apply to projects within TMDL watersheds that may not require a groundwater discharge permit but may otherwise require action by MassDEP or other state entity. For projects under 10,000 gpd that do not require MassDEP review or other state action, CWMPs could include a provision that such projects in unsewered portions of TMDL watersheds be required to install a cluster system suitable to achieve de-nitrification comparable to sewer areas in the same watershed. This provision also could be enforced through a Board of Health regulation that requires subdivisions or projects that generate more than a threshold level of wastewater discharge be required to use a cluster system to achieve a pre-determined level of nitrogen treatment (see 4.4.1 above and section 8.1.2 for examples.)

5.0 Land Use

5.1 Applicable Growth Management Issues

Table 9. Planning Objectives, Potential Growth Influences, Regulations, Land Use

Planning Objective	Potential Growth Influence	Applicable Regulations
Meet & do not exceed TMDLs	<ul style="list-style-type: none"> Removal of Title 5 design flow criteria 	<ul style="list-style-type: none"> Sewer Connection Board of Health
Allocate sewer capacity to desired areas & uses	<ul style="list-style-type: none"> Removal of Title 5 design flow criteria 	<ul style="list-style-type: none"> Sewer Connection Land Use
Protect natural resources & community character	<ul style="list-style-type: none"> Removal of Title 5 setback & site criteria Increase in attractiveness of development/redevelopment 	<ul style="list-style-type: none"> Conservation Land Use

The regulatory linkage between land use and wastewater treatment has traditionally centered on Title 5, the state regulation for on-site septic systems. To varying degrees, communities have relied on the design flow and site criteria in Title 5 as a form of growth control because the criteria influence how much and what type of development is permissible on a property. The relationship between land use and wastewater use is altered when sewers are installed and Title 5 regulations no longer apply.

As described in the previous chapter, towns can adopt nutrient management and flow connection controls to replace Title 5 design flow criteria. However, these regulations cannot be relied upon to address other growth effects related to the loss of Title 5 site criteria and setbacks, or the increased attractiveness of development that may follow installation of sewers.

This chapter reviews a variety of land use controls, primarily involving zoning and subdivision regulations, that are available to address potential changes in growth *unrelated to design flow* that may arise when sewers are installed.

When implemented in tandem with flow controls described in Chapter 4.0, these land use regulatory measures can help to more fully address any potential growth influences from sewerage. Land use regulations also are central to achieving two of the coordinated planning objectives identified in this report: allocating sewer capacity to desired uses, and protecting natural resources and community character (see Table 9 above.)

Not all growth facilitated by sewers is unwelcome. Installation of sewers provides new opportunities, previously unavailable, to make development patterns more compact and to preserve many important open space resources that would otherwise be developed. Particularly in town centers where sewers are installed, these newly created opportunities for compact growth can be reinforced by effective land use regulations.

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Possible regulatory measures available to communities to address the potential outcomes related to each scenario are listed below. The measures identified for scenarios 1 and 2 focus on restricting undesired growth that could occur when sewers are installed. The measures identified for scenario 3 focus on maximizing the potential for compact, mixed-use development that arises when sewers are installed.

Scenario 1 growth outcomes that may be addressed through land use regulation include:

- Controlling development of lots that become buildable with loss of Title 5 criteria;
- Controlling the expansion of existing residences other than by increasing the number of bedrooms.

Scenario 2 growth outcomes that may be addressed through land use regulation include:

- Controlling the expansion or intensification of some commercial buildings and uses;
- Supporting mixed-use pedestrian-oriented development in town centers;
- Preparing specific area plans and form-based codes to allow concentration of growth in attractive compact development areas.

Scenario 3 growth outcomes that may be addressed through land use regulation:

- Reducing allowed development density in subdivisions, unless otherwise desirable, especially within environmentally sensitive areas;
- Using Conservation Subdivision and its variants to cluster development while preserving open space.

Scenario 4 growth outcomes that may be addressed through land use regulation include:

- Reducing allowed development density in subdivisions, unless otherwise desirable, especially within environmentally sensitive areas;
- Controlling the expansion or intensification of some commercial buildings and uses;
- Using Conservation Subdivision and its variants to cluster development while preserving open space;

All Scenarios include the following potential growth outcomes that may be addressed through land use regulations including:

- Protecting habitat;
- Minimizing storm water impacts;
- Preserving neighborhood character.

5.2 Protecting Community Character

Community character is a qualitative term that reflects the visual, environmental, historical or cultural qualities of an area. Many factors can contribute to community character. Visually, the types, sizes and uses of buildings in an area can influence community character. Zoning governs many of the aspects of development that in combination contribute to community character. These include building height, architectural design, materials, use and configuration in relation to the street and other buildings. Zoning offers many tools to ensure that growth influenced by the removal of Title 5 site criteria, or from the increased attractiveness of development in a newly sewered area, protects or enhances community character, and does not detract from it.

5.2.1 Bulk and Building Form

Bulk Regulations are elements of the zoning code that address building form and the shaping of spaces between buildings. Also referred to as dimensional requirements, bulk regulations include such things as lot size, lot coverage, building height, and setbacks or build-to lines.

Bulk regulations can influence the compactness of development. For instance, if a town desired to promote a compact village center (scenario 2), it might relax bulk standards to allow greater height, smaller setbacks, and greater lot coverage.

On the other hand, the town might think about tightening bulk regulations in another area of town as a way of limiting future growth (scenarios 3 or 4) or redevelopment (scenario 1). This latter approach may be effective if areas the town wishes to protect contain a large proportion of properties that are undeveloped or under-developed based on current bulk standards. In instances where the majority of properties have reached or exceeded current bulk standards (scenario 1), modifications to bulk standards would have little effect on future growth.

Table 10. Types of Dimensional Requirements

Dimension	General Definition ¹
Lot Size	Minimum size of lot required for zoning district
Lot Coverage	Maximum percentage of lot that may be covered by a building footprint, paving or ancillary structure
Building Height	Maximum building height as measured in feet or number of stories
Setbacks	Distance to lot line from the front, side or rear of building
Floor Area Ratio	Building square feet divided by lot size (square feet)

5.2.2 Use-related Regulations

Each zoning bylaw contains a use table that specifies the uses that are allowed by right, conditionally allowed by special permit or prohibited in each zoning district. By regulating uses, zoning helps communities to separate incompatible uses, such as

¹ Definitions will vary by town zoning code.

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residential dwellings and industrial operations. Likewise, through use regulations towns can allow a variety of land uses in districts such as compact centers where there are benefits to having a mix of residential and commercial activities such as retail stores, restaurants, and offices.

Use regulations also address the intensity of uses. For example, single and multi-family residential districts are both residential in nature, but the intensity of the use and potential development related impacts, such as traffic, stormwater runoff, wastewater or alteration of community character, may be different. The same is true with a general business district designation, which allows a broader array of commercial activity, as opposed to a neighborhood business district designation, which provides for a more limited number of commercial activities that are generally more compatible with nearby residential uses.

Modifications to use-related zoning provisions would not be expected to influence growth effects from sewerage occurring under scenarios 1 or 3 to any significant extent. On the other hand, under scenario 2 use controls could be an important tool for encouraging desired types of growth and managing expansion of uses with heavy wastewater flow potential. Such changes may also influence growth effects from sewerage under scenario 4, depending on the land use characteristics within the watershed.

Table 11. Categories of Uses in Zoning

Use Category	General Definition¹
Allow Uses	Uses that are acceptable and desirable in the district are allowed by right
Prohibit Uses	Uses that are incompatible with desired uses in the district are prohibited
Condition Uses	Uses that may be compatible on a case by case basis and require closer review and/or stipulations
Influence uses through other elements of zoning code	Other elements of zoning can influence the types of uses that locate in a district. These include: limiting square footage per business; limiting or prohibiting take-out or drive-through operations; adopting additional controls for formula businesses ²

5.2.3 Non-Conformities

As described above, modifications in bulk or use-related zoning provisions can influence growth effects from sewerage in some instances. However, whenever zoning is modified pre-existing uses and structures are allowed to continue “as is” even if they do not conform to the newly adopted rules. These ongoing uses and structures are considered non-conformities. *Use* non-conformities arise when a pre-existing use is no longer allowed within the zoning district in which it is located. *Dimensional* non-conformities are created when pre-existing structures no longer meet applicable

² Formula businesses are usually defined by operational characteristics such as a standardized menu, services, décor, signage, architecture or uniformed employees.

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dimensional standards. Changes or alternations in non-conformities, through enlargement, expansion or other alteration, are governed by state and local laws.

The practical effect of altering a non-conforming structure depends on several factors, and different non-conformities pose different impacts and management challenges. Some towns allow liberal treatment of non-conformities to compensate for overly rigid zoning standards that limit desirable flexibility. This case could arise in scenario 2 in a town center where expansion of a non-conforming building is consistent with compact growth even if it is not compliant with current zoning. Of greater concern are the alternations to non-conforming structures or uses that allow the inappropriate expansion of buildings that undermines planning objectives. This case may arise in tightly developed residential neighborhoods (e.g., scenario 1) where additions and teardowns can alter neighborhood character and result in other impacts, or where enlargement of a commercial building may contribute to commercial sprawl. Alternately, under scenario 2, expansion of a pre-existing non-conforming use such as a wholesale businesses or automobile dealership may extend a use that may be less desirable than a shop, office or other business that generates foot traffic and attracts patrons to an area on a regular basis.

All towns on Cape Cod allow alteration of non-conforming structures or uses to some degree under some circumstances.³ Where allowed, alteration of non-conforming uses and structures requires the granting of a special permit based on a finding that the alteration does not intensify the non-conformity and would not be substantially more detrimental to the surrounding neighborhood.⁴ The vague and subjective nature of these criteria often means that decisions about alterations of non-conforming structures are made without the benefit of a clear regulatory framework, resulting in overly permissive treatment that can detract from community character.

Towns can take steps to tighten their controls on alteration of non-conformities. For example, zoning bylaws may include a statement of intent regarding treatment of non-conformities, which provides consistent policy guidance for the building inspector, or permit granting authority. A further step would be to include in the bylaw explicit criteria to apply the definition of intensification of non-conformity, and to determine what is not substantially more detrimental. Towns may also decide to develop different criteria to apply in different areas of town based on community planning objectives. For example, criteria for alternation of non-conformities may be more permissive in areas where compact development is desired, and more restrictive in areas where added growth may contribute to sprawl. Due to the close link between growth and wastewater use, towns may also seek to include compliance with low impact development or wastewater infrastructures standards as an additional special permit requirement for alteration of non-conforming structures.

³ Wellfleet limits alterations to structures other than single or two-family homes only to campgrounds, mobile home parks, cottages and cottage colonies.

⁴ Daley & Witten, LLC. "Vested Rights and Nonconforming Uses and Structures."
Prepared for Cape Cod Commission. Barnstable, MA

5.2.4 Design Standards

Another way to manage impacts to community character resulting from development is through introduction of design standards. While they do not influence the bulk or use of the building, design standards can address such things as roof pitch, windows, building materials and other architectural features. Design standards are commonly applied in commercial or mixed-use districts. Some design standards are written into zoning, as in the Dennisport Village Center bylaw, or in other cases are included by reference as in the Hyannis Design and Infrastructure Plan. Orleans and Chatham are among the towns that have established governmental commissions to review the design of buildings meeting certain threshold criteria. However, outside of historic districts, it is rare to see design standards applied to single-family homes.

Under scenario 1, sustained expansion of existing homes, or development on previously undeveloped lots, could block vistas or views, or could otherwise alter the character of an established neighborhood. Under scenario 3 where new growth could arise through further subdivision of land, impacts to neighborhood character may affect adjacent neighborhoods or natural resources areas, as well as the newly created development. Under scenario 2, design standards would be an important part of comprehensive planning for a compact mixed use center, where visual cohesiveness and pedestrian amenities are important contributors to an area’s economic success.

Table 12. Possible Enhancements to Regulation of Non-Conformities

Area of Regulation	Possible Enhancements ⁵
Clarify or enhance sections of the zoning code dealing with non-conforming structures, uses and lots.	Include: <ul style="list-style-type: none"> • Policy statement of intent concerning treatment of non-conformities; • Qualitative or quantitative criteria (including wastewater impacts) for what constitutes intensification of non-conformity; • Qualitative or quantitative criteria (including wastewater impacts) for determining what is <i>not substantially more detrimental</i>; • Consider differentiating criteria for different areas of town, based on community planning objectives; • Make all alterations of existing non-conforming structures subject to a special permit; • Make compliance with Low Impact Development or wastewater infrastructure requirements special permit conditions.
Other zoning measures that could influence alteration of non-conformities	Establish: <ul style="list-style-type: none"> • Maximum for increase in building size (e.g. % of existing square footage or existing FAR) for teardowns & renovations; • Limit or condition increases in building size or height based on use or other factors (e.g., third story may only be used for residences or for every specified increase in net commercial square feet there must be an addition of residential square feet.)

⁵ Examples of local village center bylaws are found in Chapter 8.0

Table 13. Possible Design Review Mechanisms

Development Type	Possible Design Review Mechanisms
Commercial/Mixed Use	<ul style="list-style-type: none"> • Include design guidelines in the zoning bylaw directly or by reference to an approved document such as a Design and Infrastructure Plan.
Residential	<ul style="list-style-type: none"> • Develop design guidelines for alterations and new construction of single-family homes. • Establish site plan review with clear design guidelines for expansion of homes beyond a threshold size or level of increase.

5.3 Protecting Natural Resources

To different degrees, each of the scenarios poses impacts to natural resources from development influenced by the installation of sewers. On the one hand, development could result in negative impacts that include consumption of open space, disruption of habitat (scenarios 3 and possibly 1 and 4), and increases in impervious surface area and storm water runoff (all scenarios). On the other hand, land use regulations can be used to ensure that the installation of sewers promotes greater protection of open space and habitat and enhanced management of storm water runoff than previous zoning laws could have achieved. Some of the land use regulatory techniques available to towns to prevent negative impacts to natural resources and capture potential benefits of sewerage are described below.

5.3.1 Natural Resource Protection Zoning

Natural Resource Protection Zoning is an effective way to preserve large amounts of open land with natural resource value (farmland, watershed, aquifer, habitat, forestland, scenic areas, wetland buffers, etc.). It preserves a high percentage of land as permanent open space while concentrating development in the most appropriate portions of a site. It is an extension and variation on the basic concept of clustering, but takes it further than is usually seen in Massachusetts.⁶ It is a strategy that is applicable to conditions under scenarios 3 and 4. Some of the key elements of Natural Resource Protection (NRP) zoning are described below.

5.3.1.1 Zoning Status

The NRP approach to development is allowed by right without the need for a special permit, creating an incentive for NRP over conventional development. On the other hand, conventional development requires a special permit, which gives a further advantage to NRP development.

5.3.1.2 Development Density

⁶ This is the approach adopted by the Town of Shutesbury, Massachusetts in May, 2008.

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The number of units allowed to be developed is based upon a “net acreage” formula, not a layout of a conventional subdivision plan.

- The total acreage is reduced by specified percentages of “constrained land” such as wetlands, floodplains, and steep slopes, and then the “net acreage” is divided by the allowable “base density” as stated in the zoning.
- This is a much simpler process than typical “cluster by special permit” and avoids the need to develop a hypothetical conventional plan (“yield plan”), with the concomitant arguments over how many lots could be developed in a conventional subdivision that will never be built.
- The number of allowed units is based upon a base density lower than typically found in Massachusetts (Shutesbury uses a base density of 5 acres in most of the town). This density must be justified by a natural resource protection rationale, not a desire to keep population growth low or reduce build-out.
- The base density can be increased for a specific development based upon incentives that offer a public benefit, such as creation of affordable housing, allowance of public access, donation of land to the Town or a land trust, preservation of working farmland, preservation of more than the required minimum amount of open space, and/or offering infrastructure that the town needs (water supply, sewage treatment, etc.) beyond what is needed to service that particular development.
- The unit count can be modified by treating smaller units (cottage housing and small apartments) as fractional units. This provides an incentive for a greater mix of units and for smaller and less expensive housing units.

5.3.1.3 Design Flexibility

The location and layout of the development area is based upon an in-depth “conservation analysis” of the land, performed before any plan is submitted. This is prepared by the developer and submitted to the Planning Board, which must walk the land, independently evaluate the analysis, and issue “conservation findings” that establish which areas of the site can be built upon and which must be preserved in order to protect the land’s conservation values. Only after the conservation findings have been made will the developer be able to submit an approvable development plan. The conservation analysis and conservation findings requirements must be made part of the subdivision process through the subdivision regulations. This approach is the reverse of the usual way of doing business, where a developer lays out a development according to zoning, brings it to the Planning Board as a preliminary plan, and then finds out (after incurring much expense) which land the Planning Board deems worthy of preservation.

- A minimum percentage of the land must be preserved, selected by the Planning Board based upon the conservation analysis. This may range from sixty to ninety percent, depending upon the community, the type of zoning district, and the natural resources at stake. Incentives in the form of bonus density can push this open space percentage higher, but only if the developer chooses to take advantage of them.

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- The land preserved must be protected in perpetuity by a recorded conservation restriction (or APR or similar statutory instrument) approved by the Board of Selectmen or Town Council and the state.
- There is tremendous design flexibility within the developed areas; generally there is no minimum lot size, minimum frontage, or minimum setback requirement. Variable lot sizes and a variety of housing types are encouraged, to enable the town to provide for different housing needs and the developer to target different price points.
- Dimensional standards for individual lots are established by the developer and approved by the Planning Board, based on design considerations and the availability of water and/or sewer infrastructure. Title 5 and/or Board of Health regulations will control lot sizes and setbacks where there is no sewer system. With sewers, the development can be much more compact and more open space can be preserved.
- Buffers may be required from adjoining land not part of the development.
- Road designs are intended to be appropriate to the scale and location of the development. Flexible frontage requirements can encourage the use of shared driveways in some locations, provided that overall conservation objectives are satisfied.

5.3.1.4 Compatibility with Other Techniques

NRP zoning is compatible with many other land use regulations referred to in this report to mitigate potential negative effects or growth, or garner benefits of growth supported by sewers. For example, a town may establish design standards for the developed areas (see 5.2.4). It may even use a form-based code (see 5.4.2 below) within the developed area if it chooses to do so. It may also choose to enact this approach with mixed-use to enable the creation of a new village center as a complete community located on a large parcel. This approach can be combined with Transfer of Development Rights (TDR) to allow increased density in the developed area in return for preservation of non-contiguous land that the Town would like to protect.

5.3.2 Stormwater Management and Low Impact Development Standards

An increase in storm water run-off is identified as a potential outcome in all scenarios. The increase in non-permeable surface areas (roofs, paved driveways and roadways, patios, etc.) results in a greater volume of run-off from rain and snow melt. On Cape Cod, most of this run-off comes from diffuse sources and is considered a non-point source of pollutants including nitrogen.

Management of stormwater is similarly diffuse. Projects that require a state water quality certificate, or which fall under the Wetlands Protection Act, must adhere to state stormwater best management practices. However, since only a small percentage of projects require wetlands review, stormwater management is also often regulated locally through a zoning bylaw, subdivision regulation, site plan review or all of the above. In practice, not all of these reviews are applied in a consistent manner, or necessarily meet the requirements of the U.S. EPA National Pollution Discharge Elimination System (NPDES) Phase II, which requires municipalities with populations under 10,000 to

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prepare and implement a stormwater management plan. Towns have a number of tools available to enhance management of stormwater impacts from development, even to a point of achieving a standard of “no net increase” in runoff from specific projects.

5.3.2.1 Stormwater Management

As noted above, some towns address stormwater management requirements through zoning while others rely on subdivision regulations. The advantage of having requirements in the zoning bylaw rather than only subdivision regulations is that they can be applied to developments other than subdivisions, such as commercial and single family residential properties. Stormwater requirements within subdivision regulations often are geared to avoiding the inundation of adjacent properties and ways from storm water run-off. Stormwater management requirements often specify how the amount of storm water should be calculated, require subsurface disposal (as opposed to discharge to a wetland), and include design standards for system components including drains, culverts, leaching basins and swales.

Some towns have opted to implement storm water management requirements through a general stormwater management bylaw outside of the zoning bylaw. The advantage of a general bylaw is that it can be passed with a simple majority vote of Town Meeting, rather than a two-thirds vote required for zoning articles. On the other hand, a general bylaw can easily be overlooked in the course of development review, unless reference to the general bylaw is stipulated in the bylaw or regulation. An example of a stormwater management general bylaw and regulation is found in Chapter 8.0.

Table 14. Stormwater Management Regulatory Approaches

Stormwater Management Regulatory Approaches	Advantages/Disadvantages
State Stormwater Best Management Practices	<ul style="list-style-type: none"> • Provide useful standards and information. • Applies only to projects requiring state water quality certificate or other state approval.
Local Wetlands Bylaw and Regulation	<ul style="list-style-type: none"> • Applies only to projects within wetlands protection jurisdiction.
Subdivision Regulation	<ul style="list-style-type: none"> • Applies only to subdivisions. • Usually includes minimal criteria.
Zoning Bylaw	<ul style="list-style-type: none"> • Can be applied to a broader range of development projects. • May include broader standards addressing NPDES Phase II requirements, including on-going maintenance. • Requires 2/3 Town Meeting approval.
General Bylaw and Regulations (stormwater management or Low Impact Development)	<ul style="list-style-type: none"> • Requires simple majority approval at Town Meeting. • Designates an entity with oversight for compliance with requirements town-wide. • May allow other boards to adopt regulations and issue stormwater permits. • May include broader standards addressing NPDES Phase II requirements, including on-going maintenance

5.3.2.2 Low Impact Development

Low impact development (LID) is an enhanced form of stormwater management that promotes a comprehensive look at site plan layout and maximizes use of natural features and non-structural best management practices. In fact, many stormwater bylaws incorporate provisions that promote LID. LID consists of two steps:

(1) Site planning.

Site planning under LID is similar to Natural Resource Protection zoning in that it first identifies the important natural and hydrological features of the site, and then plans development on the remaining areas. Natural features considered or protected by LID include topography, wetlands, habitat, drinking water protection areas, and viewshed.

(2) Natural stormwater best management practices.

Once suitable development area are identified, LID then introduces natural stormwater best management practices that may include vegetated swales, bio-retention basins, rain barrels, reduced hardscape by using shared driveways and narrower roads, using permeable pavers, green roofs, and native vegetation. The natural strategies are less intrusive, less resource consumptive, and in some cases less costly than conventional storm water management systems.

LID is usual implemented in the form of a general bylaw that applies to all types of development or establishes thresholds to determine applicability. An example of a model LID bylaw and regulations is found in Chapter 8.0.

5.3.3 Habitat Corridor Overlay

To provide further protection of habitat, towns may consider a separate habitat protection zoning bylaw. An often-cited example is the Wildlife Corridor zoning bylaw in Falmouth (see Chapter 8.0) This model is referred to in the Cape Cod Commission's model bylaw for protection of wetlands and wildlife habitat. This bylaw requires all subdivisions, applicants for special permits or site plan review, and as-of-right construction involving one-quarter acre or more to under go review by the Falmouth Natural Resource Department. All areas identified in project plans as being important for wildlife protection must remain open space through a conservation restriction. In areas mapped as Wildlife Migration Areas, standards are provided to limit fencing, retain vegetation, avoid negative stormwater impacts and otherwise retain a natural corridor of 300 feet in width for purposes of wildlife migration.

This approach could be applicable in scenarios 3 and 4, where there is significant potential for new subdivision that could disturb large areas of habitat. It is assumed that any habitat disturbance that may occur within scenarios 1 and 2, which would likely be more parcel specific, would not be effectively addressed by this type of bylaw.

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5.3.4 Regional Natural Resource Protection Tools

The natural resource protection tools described in 5.3.1 through 5.3.3 are implemented through changes in local bylaws. Additional resource protection measures to manage growth effects from sewerage are articulated in Cape Cod Commission Act and current Regional Policy Plan (RPP).

5.3.4.1 Flexible Thresholds for Cape Cod Commission Review

The RPP enables towns to seek flexible thresholds for review of Developments of Regional Impact (DRI) through designation of Resource Protection Areas, Economic Centers, and Growth Incentive Zones. Resource Protection Areas may be areas that contain sensitive resources, such as public drinking water supply wells or zones of contribution, and therefore are inappropriate for extensive development (potentially scenarios 3 and 4). By so designating these areas, towns can petition the Commission to lower the threshold for Cape Cod Commission review of development projects, meaning more projects would potentially be required to undergo Commission review. Conversely, through the Economic Center and Growth Incentive Zone designation process, towns can seek to increase thresholds for review of projects in areas such as town centers (scenario 2) where it can be demonstrated that infrastructure is in place to support growth, thereby facilitating development in those areas. Both approaches offer towns the ability to work with the Commission to plan for and respond to growth pressures and opportunities effectively.

5.3.4.2 Districts of Critical Planning Concern

In areas where significant changes in development patterns are expected to occur as a result of sewerage alone or in combination with other factors, towns can seek designation of Districts of Critical Planning Concern (DCPC). The DCPC creates a 12 to 15 month “time out” from most types of development (as identified by the town), affording time for towns to develop and implement new regulations to address current or anticipated pressures and opportunities. DCPCs have been designated and worked successfully in Bourne, Barnstable, Harwich, Falmouth, Dennis, Sandwich and recently, Brewster. In each of these cases DCPCs were used to protect sensitive natural resources, as may be the case in scenarios 3 and 4. However the DCPC designation can also be sought for the purpose of economic development or in areas of significant public investment in infrastructure. These latter purposes may be applicable to growth issues associated with sewerage in town centers (scenario 2) or existing residential neighborhoods (scenario 1). New regulations adopted pursuant to a DCPC designation are not necessarily subject to the grandfathering protections provided through the Massachusetts Zoning Act, Chapter 40A. Towns may choose to provide grandfathering protections, or not, within their DCPC regulations.

5.3.4.3 Transfer of Development Rights and Offsite Mitigation

Transfer of Development Rights (TDR) is often mentioned as regulatory tool for moving development away from sensitive resource areas towns wish to protect and into growth centers where economic growth is desired. TDR is implemented through a local bylaw, and two towns on Cape Cod have such a bylaw. In practice TDR is rarely used and this is largely because the necessary tasks of identifying areas for sending and

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receiving growth, and establishing the administrative system for administering those transactions, are fraught with numerous complicating factors. TDR has potential to be an important tool available to towns to manage growth. In theory TDR would be an effective tool for preventing unwanted growth in scenarios 1,2 and 4, and encouraging desired growth in scenario 2. However TDR's potential will only be realized if difficulties associated with its implementation can be effectively addressed. The current RPP indicates that the Cape Cod Commission will evaluate the feasibility of a regional TDR program and will assist towns seeking to implement municipal TDR programs. Perhaps the Commission's renewed focus will help to unlock this often sited but unproven method.

A more immediately available form of "TDR" is achievable through purchases of open space for offsite mitigation for Developments of Regional Impact. Towns can make the most of this single transaction approach by developing a list of priority parcels developers could seek to purchase if necessary as part of DRI mitigation package, and perhaps provide development incentives for purchase of priority parcels. Another option for implementing TDR on a case-by-case basis is through adoption of a Development Agreement, where they are authorized. In such areas a Development Agreement could restrict development of one parcel while allowing increased development of a second parcel.

5.4 Promoting Compact Town Centers

A town or village center presents an opportunity to create a compact pedestrian-friendly area that embodies the best of the New England Village, a place that has all of the elements that make for a livable community and memorable place. This can be achieved through a group of related concepts that go under various labels, including "smart growth," "new urbanism," and most recently "form-based codes."

What these approaches have in common is that they allow a lively mix of uses and concentrate on creating a harmonious built form and pleasing public realm (streets, sidewalks, public squares, parks, greens, plazas, etc.). The use mix includes different types of residential (single-family, two-family, multi-family, townhouses, apartments over ground floor commercial uses), as well as retail, service, office, civic, educational, religious, and entertainment uses.

Several Cape Cod towns are exploring ways to direct commercial and residential growth to mixed-use town centers. Among the many benefits this land use strategy offers is the ability to divert growth pressure away from sensitive resource areas, provide a greater variety of housing options to Cape Cod's workforce; and create vibrant and attractive economic centers. Another benefit is that infrastructure to support a compact development pattern—from roads and transit to public safety services and wastewater treatment—also can be provided in more efficient and cost effective manner. This is because the proximity and density of uses requires less hard cost (miles of pipe and street) and creates a critical mass of demand, whether for transit or wastewater treatment.

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Scenario 2 is intended to demonstrate the important role sewers play in achieving the community goals for a compact mixed-use town center. Sewers make it possible to accommodate a denser mixed-use development pattern than could otherwise be supported using on-site systems, and with greater environmental benefit and cost effectiveness than an amalgam of private wastewater treatment plants. Land use regulation plays an important role in ensuring that sewer capacity planned to support town center growth leads to the types of mixed-use development consistent with the community vision.

5.4.1 Town Center Zoning

Hyannis, Orleans, Buzzards Bay, and Falmouth are among the many areas on Cape Cod where town center zoning has recently been adopted or discussed. While the town center planning processes for each of these areas must address a distinct combination of community, economic and environmental characteristics, they share common objectives:

Define a desired level of build out.

Town center planning and zoning seeks to develop land use regulations that allow the amount of build out desired for a town center, based on multiple goals of community character, economic impacts, and traffic safety, among others. The town can then ensure that sewer system capacity is sized to provide treatment for wastewater flows at the desired level of build out, and that the phasing of system capacity is timed with likely increases in development during the planning time frame.

Attract development to Town Centers, away from sensitive natural resources.

Sewers provide an opportunity to concentrate growth in town centers as a way of easing development pressure in outlying areas. If density is significantly increased in a town center, a town may seek to identify offsets to growth, by reducing development potential in other areas of town, or by allowing developers credit for reducing development-related impacts such as nitrogen loading or traffic.

Create a compatible mix of uses.

Most successful town centers include a vibrant mix of commercial and residential uses. Retail and office uses bring day-time workers and patrons to the area, while residents help to bolster consumer demand and maintain round the clock activity that adds character and vibrancy to an area.

Make it as inviting and pedestrian oriented as possible.

Sense of place is a term used to define the look and feel of an area. It may emanate from the town center's architecture, natural features, its specific institutions or businesses, or a combination of all of the above. Town center planning seeks to enhance the pedestrian experience, and create a cohesive visual appearance that defines the area.

Make it as safe and easy to access and move around as possible.

Along with visual appeal, safety and ease of access are crucial determinants of whether a town center will be inviting to or avoided by residents and patrons. Town center planning seeks to make it possible to park once and make many stops during a

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town center visit. The creation of vibrant compact town centers increases the likelihood that public transit will become increasingly economical and efficient on Cape Cod.

A number of approaches to crafting land use zoning to achieve these objectives are available to towns. Some towns create a new zoning district, while others may adopt an overlay district, which preserves underlying zoning but creates new elements to it. Still others make seek to achieve land use objectives through modifications to dimensional and use tables of the zoning bylaw. There is no single approach and the right approach for a given area depends on many factors. However, elements common to several successful town center zoning efforts are described in the following table. Some of the listed requirements such as creation of open spaces or requirements for housing units may only apply to larger projects over a threshold of development.

Table 15. Elements of Town Center Zoning

Zoning Feature	Commonly Successful Treatment
Dimensional Standards	<ul style="list-style-type: none"> • Increase lot coverage maximum (60-90%). • Decrease Setbacks (0-15 feet) to strengthen the street edge and reinforce pedestrian connections between buildings. • Allow increased height, up to three or four stories (45+ ft). • Link permissive dimensional standards accompanied to detailed design standards, use related restrictions, and requirements for pedestrian amenities.
Mixed Use	<ul style="list-style-type: none"> • Require fronting retail, ground floor commercial. • Limit square footage per individual businesses. • Allow desired commercial uses by right and prohibit or condition less desirable or more wastewater intensive commercial uses. • Change use in some areas from commercial to lower impact commercial and/or residential. • Require sliding scale mix of commercial and residential in certain size developments (e.g. require 1 unit for every net new 5,000 square feet.) • Require or provide bonuses for a mix of commercial and residential uses in buildings.
Pedestrian Amenities	<ul style="list-style-type: none"> • Require or encourage creation of open spaces and public areas. • Require pedestrian features such as sidewalks, porches, patios, or outdoor cafes.
Access and Parking	<ul style="list-style-type: none"> • Require side or rear parking, prohibit or limit front yard parking • Limit parking requirements (e.g. number of spaces/sf). • Limit curb cuts; promote shared curb cuts and parking areas. • Promote transit service and use.
Design Review	<ul style="list-style-type: none"> • Adopt a formula business bylaw. • Design standards and a review and enforcement process (see 5.2.4)
Infrastructure Requirements	<ul style="list-style-type: none"> • Require or provide incentives for use of LID best management practices (see 5.3.2.2).
Offsets	<ul style="list-style-type: none"> • Transfer of Development Rights (TDR). • Off-site Mitigation. • Nitrogen credits.

5.4.2 Form-based Regulations

One of the best ways to achieve the benefits of a vibrant mixed-use town center is through a detailed area vision plan that is implemented through a form-based code. The advantage of form-based land use regulation is that it can create high-density, compact, mixed use settlement centers that are as attractive as the most beloved places on Cape Cod. Such places are generally viewed as quaint and historic because they were built under a different set of values and assumptions, before zoning existed. Form-based codes are not intended to replicate historic villages, but they are designed to create places that embody similar values and assumptions about community life. When people come together in a charrette environment to envision a future town center, they typically choose to create these kinds of places, which cannot achieve the critical mass necessary for walkability and transit-orientation without sewers. The form-based code is a tool to bring that vision to fruition, but it works best in conjunction with a plan to provide sewer service. Thus, it is an excellent tool to deal with Scenario 2 situations.

A form-based code is a land development regulatory tool that places primary emphasis on the physical form of the built environment with the goal of producing a memorable place. In contrast to conventional land development regulations, which tend to regulate use more than form, form-based regulations subordinate use regulation to form, emphasizing the use of flexible building types whose use can change over time.

According to the Form-Based Codes Institute, form-based land development regulation is a method of regulating development to achieve a specific urban form. Form-based codes (embedded in zoning laws) create a predictable public realm by controlling physical form primarily, with a lesser focus on land use, through municipal regulations. Form-based codes address the relationship between building facades and the public realm, the form and mass of buildings in relation to one another, and the scale and types of streets and blocks. The regulations and standards in form-based codes, presented in both diagrams and words, are keyed to a regulating plan that designates the appropriate form and scale (and therefore, character) of development rather than only distinctions in land-use types. This is in contrast to the focus of conventional zoning on the segregation of land-use types and the control of development intensity through simple numerical parameters (e.g., FAR, minimum lot size, height limits, setbacks, parking ratios). Not to be confused with design guidelines or general statements of policy, form-based codes are regulatory, not advisory. Form-based codes are drafted to achieve a community vision based on time-tested forms of urbanism. Ultimately, a form-based code is a tool; the quality of development outcomes is dependent on the quality and objectives of the community plan that a code implements.

Form-based codes not only look different from conventional land development regulations; their most unusual attribute is the recommended process by which a form-based regulation is initially developed. These regulations are inherently place-specific, so a great deal of planning and public participation (known as a “charrette”) must occur well before the regulations are drafted. It is through this process that the community expresses its desired physical outcome, memorialized by a vision plan; it is from this

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vision plan that the standards contained in the regulations should be derived. While many Cape Cod communities have done a vision plan of one kind or another for a portion of their community, it is rare for them to translate these visions into place-specific regulatory provisions that will have a predictable result.

Although form-based regulations, by their nature, are designed to be place-specific, they have the identifiable components listed in Table 16. Not every set of form-based land development regulations includes all of these sections, and some localities elect not to include the architectural regulations because they may have difficulty achieving consensus on this issue.

Table 16. Features of Form-based Zoning

FBC Features	Description
The Regulating Plan	This is a map, akin to but more detailed than a zoning map, organized by street frontage type, transect zone, or other mechanism, showing the specific locations where the various building form standards apply. A regulating plan may resemble a zoning map, but may also be quite different.
“Urban” or “Building Form” Standards.	These regulations are commonly presented in a graphic form with supporting text covering bulk, height, coverage and “in-building” use standards.
Public Space/Street Standards.	These regulations present in a graphic form the width and dimensions of streets, sidewalks, paths, street trees and furniture, and other standards applicable to the public realm. In Massachusetts, this type of regulation typically is found in subdivision regulations and/or public street standards, so adaptations are necessary to make sure that the subdivision and zoning requirements work together effectively.
Administration and Definitions	A glossary is included to insure the precise use of technical terms and, since one of the goals of form-based codes is to promote predictability in process, and, in some cases, streamline the permitting process, a separate, clearly defined application and project review process is often included
Architectural Standards.	These necessarily diagrammatic and graphic regulations govern the building styles, details and materials that are permitted and the ways in which they can be incorporated into specific building elements.

6.0 Natural Resource Protection

6.1 Applicable Growth Management Issues/Scenarios

**Table 17. Planning Objectives, Potential Growth Influences,
Applicable Regulations, Natural Resource Protection**

Planning Objective	Potential Growth Influence	Applicable Regulations
Meet & do not exceed TMDLs	<ul style="list-style-type: none"> • Removal of Title 5 design flow criteria 	<ul style="list-style-type: none"> • Sewer Connection • Board of Health
Allocate sewer capacity to desired areas & uses	<ul style="list-style-type: none"> • Removal of Title 5 design flow criteria 	<ul style="list-style-type: none"> • Sewer Connection • Land Use
Protect natural resources & community character	<ul style="list-style-type: none"> • Removal of Title 5 setback & site criteria • Increase in attractiveness of development/redevelopment 	<ul style="list-style-type: none"> • Conservation • Land Use

One of the prime benefits of sewerage is its potential to protect or enhance the health of Cape Cod’s natural resources. By treating nutrients from wastewater sewers could protect ponds, estuaries and associated habitat from degradation caused by over-enrichment. By enabling compact growth to occur in designated town centers, sewerage could protect more sensitive areas from over-development. However, in each of the four outcome scenarios identified it is possible that potential growth influenced by sewerage also could encroach on or otherwise alter coastal or inland wetland resources and the plant and animal life they support. This chapter explores some of the regulatory and policy tools available to towns to ensure that sewerage achieves the full benefits of natural resource protection.

Installation of sewers could affect wetlands protection by displacing the design criteria and land area requirements of Title 5, or more stringent local Board of Health requirements for protection of natural resources. Removal of these standards related to wetlands protection could alter land development in some cases. For example, under Title 5 a leaching field must be located at least fifty feet from a coastal bank, coastal dune, coastal beach, salt marsh, or bordering vegetated wetland bordering on any creek, river, stream, pond or lake. Virtually all Boards of Health on Cape Cod have increased this setback to one hundred feet. This criterion may deter development of parcels in cases where the lot size is sufficiently small, unless a variance is granted. Elimination of this setback requirement could result in previously limited lots becoming able to support development. In other instances, elimination of the land area required for installation or upgrading of a Title 5 system could enlarge the buildable area of a parcel for redevelopment or expansion, provided lot coverage is not already maximized under zoning (see Figure 7, section 7.1.1.)

In addition, development within the Buffer Zones to wetland resource areas could alter or otherwise affect coastal or inland wetlands, including surface waters and

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groundwater. This could be the result of removal of native vegetation, erosion with resulting sedimentation, or fertilizer run-off from upgradient development. Modifications to wetlands protection or conservation bylaws and implementing regulations are available to communities to prevent or address these and other possible effects.

Local conservation bylaws and regulations derive their authority from the state Wetlands Protection Act or “WPA” (310 CMR 10.00-10.99). The WPA sets the minimum standards for wetlands protection throughout the state. Local bylaws and regulations may be stricter than what is outlined in the WPA, but in practice, communities must apply extreme care in structuring stricter standards so that they are not overturned by appeal to either MassDEP or the Courts. Conservation bylaws and regulations are arguably less effective than zoning and health bylaws and regulations in controlling growth effects that may accompany sewerage. This is largely because conservation jurisdiction is limited to the delineated wetland resource area and the designated buffer, which is one hundred feet.¹ Nevertheless, there are modifications to local bylaws and regulations governing wetlands protection towns can adopt to address impacts to wetland resources that could result from sewerage. These are discussed below.

6.2 Protected Interests

The WPA sets forth eight interests that are to be protected by the Act. All local bylaws must address these interests, which are shown in Table 18. However, communities may opt to expand the list of interests in their bylaw or implementing regulation to include other conservation values that are of concern to the town. This ensures that Commissions have the ability to review and permit project impacts related to these interests. The Massachusetts Association of Conservation Commissions (MACC) recommends additional protected interests, also shown in Table 18. The addition of any of these interests broadens the range of issues under a Conservation Commission’s purview and therefore their ability to comment or impose conditions on a proposed project that may pose greater impacts on wetland resources due to the elimination of Title 5 criteria as could apply in scenarios 1, 3 and potentially 2. To provide proper legal authorization, it is important to include a reference to the interest in the local wetlands protection bylaw, and also to provide a detailed definition of the interest and its importance in the local implementing regulation.

6.3 Areas of Jurisdiction

As noted above, while wetlands protection laws and regulations are powerful, their applicability is limited to wetland resource areas and their buffer zones. Conservation Commissions can expand the scope of their review by modifying their bylaws and regulations relating to resource areas and buffer zones.

¹ If the resource area meets the regulatory definition of riverfront under state law the buffer is 200 feet; if it meets the requirements for a certified vernal pool the buffer zone for protection of habitat is only 100 feet provided it is located within a regulated resource area.

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Table 18. Required and Recommended Protected Interests

Required under Wetlands Protection Act	<ul style="list-style-type: none"> • Public and private water supply, • Groundwater supply, • Flood control, • Storm damage prevention, • Prevention of pollution, • Land containing shellfish, • Fisheries, and • Wildlife habitat demonstrated to be important for providing food, shelter, migratory or over-wintering areas, or breeding.
Recommended by Massachusetts Association of Conservation Commissions:	<ul style="list-style-type: none"> • Water Quality, including surface water bodies, • Erosion/sedimentation control, • Natural habitat and wildlife corridors, • Agriculture, • Aquaculture, • Storm damage prevention <i>including coastal storm flowage</i>, • Prevention <i>and control</i> of pollution, • Shellfisheries, • Wildlife habitat, • Rare species habitat including rare plant and animal species, • Recreation,
Sometimes Applicable Based on Local Conditions	<ul style="list-style-type: none"> • Aesthetics

One way for towns to extend their jurisdiction is to designate *no build* or *no disturb* zones within the one hundred-foot buffer. Within no disturb zones, often fifty feet from the edge of the wetland resource area, there can be no alteration, including no disturbance of vegetation. In no build zones, there may be some alteration such as removal or pruning of some vegetation, but no structure may be built. Where avoidance cannot be met, variance criteria are usually required for minimization and mitigation to reduce potential impacts. Many towns on the Cape have established no build or no disturb zones, which help to strengthen protection within buffer areas and reduce encroachment on wetland resource values.

An additional step towns can take is to regulate buffer zones as resources areas. Within the regulation, the buffer zone should be listed as having significance to the protection and maintenance of the interests served by the wetland resource area. For example, land within one hundred feet of a salt marsh would be deemed to have significance in maintaining the functions of the salt marsh (i.e., erosion/sedimentation), which relates to the wetland resource area interests the bylaw seeks to protect (for

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example, shellfish and fisheries.) Performance standards developed to protect the resource would then be applied within the one hundred-foot buffer.

Another way towns can enhance their wetland protection controls is to amend their wetlands protection bylaw to extend area of jurisdiction by extending buffer zones. The Cape Cod Commission model Wetlands and Wildlife Habitat bylaw indicates that towns can expand their jurisdiction beyond one hundred feet by inserting language within their wetlands bylaw. For example, towns may wish to enlarge the buffer zone to two hundred feet for riverfront areas to match the riverfront amendments to the WPA. The model bylaw further suggests possible expansions for other resources: three hundred feet for coastal plain ponds, three hundred fifty feet for vernal pools, and three hundred feet for wetlands designated as estimated habitat for rare species by the Massachusetts Natural Heritage and Endangered Species Program (MHESP) and lands within Areas of Critical Environmental Concern (ACECs). However, the extension of the buffer needs to be justified in terms of resource protection. This would be a very difficult alternative to implement without adequate justification because of potential claims of regulatory takings.

6.4 Habitat Protection

Wildlife habitat is protected through local conservation commission review and permitting and by the related reviews of the MNHESP. Conservation Commissions only have the ability to address habitat issues within wetland resources areas and buffer zones, and do not have jurisdiction in upland areas. If a regional or local comprehensive plan has identified an area as having significant habitat value, the town should not rely exclusively on wetlands protection bylaws and regulations to protect habitat values.

Under the WPA, projects located in an estimated habitat of rare wildlife must submit a duplicate NOI to Massachusetts Natural Heritage (Natural Heritage.) Natural Heritage then reviews proposals for consistency with the wildlife interests protected under the WPA, which relates only to animal habitat important for providing food, shelter, migratory or over-wintering areas, or for breeding. Because of the limited nature of their scope, a positive indication from Natural Heritage would not address other forms of significant, rare or endangered plant species.

The Massachusetts Endangered Species Act or “MESA” (321 CMR 10.00) further protects habitat by prohibiting a taking of any animal or plant species that are listed as endangered, threatened or of special concern (state-listed) Projects already filing with Natural Heritage in conformance with the WPA would meet this requirement. Although required under MESA to do so, many other projects in mapped areas of priority or estimated habitat that are located outside of wetlands jurisdiction may not file with Natural Heritage, unless undergoing Cape Cod Commission review. Towns need to ensure that all development permitting departments, including planning, building inspector, zoning officer and Board of Appeals, enforce the requirement of filing under MESA as a step in local review checklist. Also, 40Bs seeking a determination of site

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suitability should be required to file a request for determination under MESA to determine if a site contains state listed species.

MassDEP has issued a policy to coordinate with Natural Heritage concerning reviews for projects filing under the WPA and MESA. However, the applicant must request the coordinated review, and filings may not be enforced unless required by a local permitting authority.

To provide further protection of habitat, towns may consider a separate habitat protection bylaw. An often-cited example is the Wildlife Corridor zoning bylaw in Falmouth (See 5.3.3.) This model is referred to in the Cape Cod Commission's model bylaw. This bylaw requires all subdivisions, applicants for special permits or site plan review and as-of-right construction involving one-quarter acre or more to under go review by the Falmouth Natural Resource Department. All areas identified in project plans as being important for wildlife protection must remain open space through a conservation restriction. In areas mapped as Wildlife Migration Areas, standards are provided to limit fencing, retain vegetation, avoid negative stormwater impacts and otherwise retain a natural corridor of three hundred feet in width for purposes of wildlife migration (See 8.3.2.1.)

6.5 Treatment of Subsurface Sewage Disposal Systems

Wetland review and permitting comes into play in the installation or expansion of a septic system within the area of WPA or local Board of Health jurisdiction. WPA presumes that septic systems that comply with Title 5 or more stringent Board of Health regulations adequately protect wetland resources. This presumption is allowed provided that the leaching area is setback at least fifty feet from resources areas or a greater distance if required by Board of Health. This latter clause suggest that Boards of Health can increase required setbacks from wetlands and that those must be met for the presumption to apply. Conservation Commissions may also have jurisdiction in the review of septic system upgrades if the initial system poses a threat to groundwater resources due to inadequate depth to groundwater or if the leach field is less than fifty feet from the wetland resource. In either case the proximity of the system to the resource heightens concerns about negative impacts from septic system effluent.

The interplay between conservation and health regulations can be a significant opportunity for protection of wetland resources and buffer zones outside of sewerred areas (scenario 4.) All towns on Cape Cod have enacted stricter health regulations that apply in wetland resource areas and with one hundred-foot buffers zones. For instance, all towns require that soil absorption systems (leaching areas) be installed outside the one hundred-foot buffer for new construction. Repairs and upgrades to existing systems must meet this standard to the extent possible. In cases where the soil absorption system cannot be sited outside the buffer zone, some towns may even require additional levels of treatment, depending on the sensitivity of the resource area. For example Eastham health regulations require a nitrogen reduction septic system when a soil absorption system is located less than one hundred feet from a salt marsh or marine or fresh surface water

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body. In these areas, defined in the regulations as *Environmentally Sensitive*, expansion of existing dwellings must go through a higher level of Board of Health review.

Short of establishing nitrogen loading limits town-wide, a higher level of Conservation Commission and Board of Health review of new and upgraded septic systems located near wetland resource areas could help to address the conditions indicated in scenario 4, where growth pressure continues outside of sewer areas within nitrogen sensitive watersheds and could result in a level of development that generates nitrogen loading from wastewater and thereby delays compliance with TMDLs.