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Regional Wastewater Management Plan Land Use, Wastewater Planning, and Growth Management

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Much of the information in this section of the Regional Wastewater Management Plan comes from "[Sewers and Smart Growth, Challenges Opportunities and Strategies.](#)"



Effect of Land Use Patterns and Future Growth on Wastewater Infrastructure

The population of Cape Cod has grown rapidly in the past half century, with much of the development in the form of low-density, large-lot residential subdivisions with associated commercial and industrial land uses. This pattern of land use reflects to some degree a societal trend of the nation in the same time period: the embracing of a suburban lifestyle. But on Cape Cod, where on-site septic systems have been the predominant form of wastewater treatment and disposal, larger lots were also seen as necessary to provide sufficient separation between private wells and wastewater.

A dominant feature of the [Cape Cod Regional Policy Plan](#) and the towns' Local Comprehensive Plans (LCPs) has been to rein in this sprawling pattern of development and to reestablish a more traditional New England village style of development, with compact development in town and village centers and less-dense development in outlying areas. However, towns have not been able to implement this vision for two main reasons: the lack of adequate wastewater infrastructure to support increased density in town centers, and the regulatory hurdles of changing local zoning. A zoning changes require a two-thirds vote at town meeting, whereas a general bylaw requires only a simple majority.

As Cape towns develop Comprehensive Wastewater Management Plans to meet Total Maximum Daily Loads (TMDLs) and other environmental and socio-economic objectives, the amount and pattern of existing land use and that of future development will be a major driver of the costs of installing adequate wastewater infrastructure. The amount and the pattern of development affect the volume of wastewater to be treated, the amount of land necessary for effluent disposal, and the extent of sewer lines and associated infrastructure. On Cape Cod the large influx of seasonal home owners and visitors means that wastewater systems also need to be sized to handle the increase in population during the summer.

For these reasons, land use planning and wastewater facility planning must be fully integrated. Wastewater treatment and disposal capacity must be based on anticipated build-out—the total of new development



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and redevelopment that is projected to occur over a planning horizon (typically 20 years). Each community needs to reconcile current zoning with its LCP to ensure that the availability of wastewater infrastructure reinforces the vision the community set forth in its LCP rather than leading to growth in inappropriate areas.



Coordinating Land Use Planning and Wastewater Infrastructure Planning

Although the prospect of sewers is often viewed as an open invitation for growth (whether wanted or not), planning for adequate wastewater infrastructure is an opportunity to manage growth to enhance community character and vitality while protecting community resources.

As outlined in “[Sewers and Smart Growth](#),” these planning objectives can be used as guides to coordinate land use and wastewater planning.

MANAGE GROWTH WITHIN ENTIRE WATERSHEDS

Designing sewer system capacity to meet a TMDL should be undertaken on a watershed-wide basis whether the watershed is entirely in one town or is in multiple towns, and take into account build-out within the entire watershed and not just the area that is to be sewered. Unanticipated growth in an adjoining town or outside the sewered area will increase the amount of nitrogen entering the water and could result in exceeding the TMDL, thus requiring sewerage of additional areas.

ALLOCATE SEWER CAPACITY TO ENHANCE COMMUNITY GOALS

The configuration of a sewer system and allocation of flow can promote the community’s vision for the location, type, and intensity of future growth at the same time that it impedes excessive growth in undesired locations that threaten community character or encroach on habitat and natural resources.

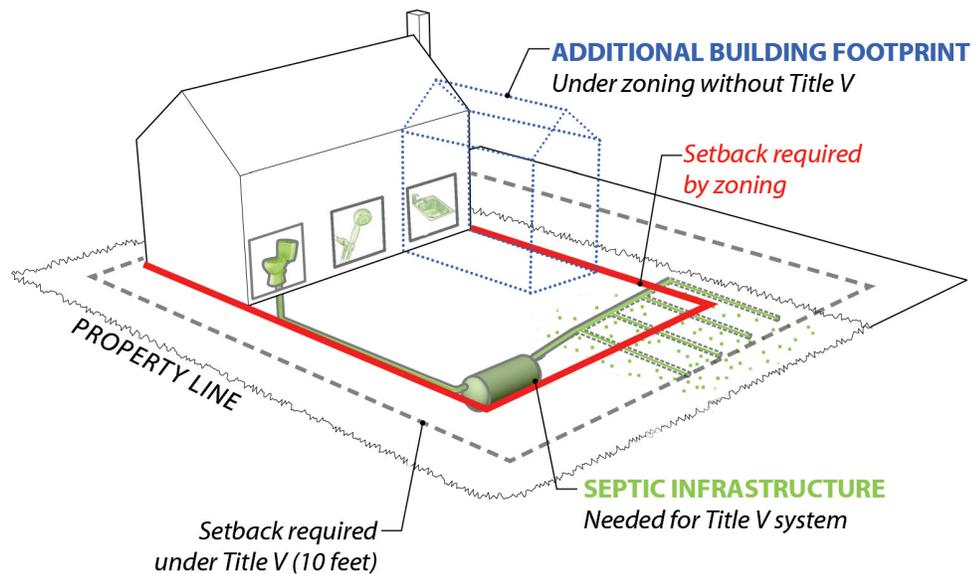


Constraints on Growth under Title 5 and Other Regulations

The availability of sewers has the potential to dramatically alter the amount and pattern of land use on Cape Cod. Sewers are widely viewed as enhancing property values, and expansion of sewered areas may result in an increase in the size of existing structures and an increase in the number of bedrooms.

Several laws and regulations limit the amount of development and growth that can occur where on-site septic systems are in use. These regulations limit the amount of wastewater flow allowed and establish setbacks from lot lines and wetland resource areas. For example, Massachusetts State Sanitary Code, Title 5 ([310 Code Mass. Regs. 15.00](#)) includes system design flow criteria that establish maximum flows based on residential bedroom

FIGURE GM-1: Building Footprint with and without Title 5



SOURCE: [Sewers and Smart Growth, Challenges Opportunities and Strategies](#)



count and different kinds of commercial uses. Title 5 also sets flow criteria for nitrogen-sensitive areas, limiting flow to 440 gallons per day per acre or four bedrooms on a one-acre lot. There are also siting and setback criteria under Title 5 and local board of health regulations that establish setbacks from lot lines and wetland resource areas and other topographical and hydrogeological conditions required to permit an on-site system. If sewers are installed, the above laws and regulations will no longer apply.

Some towns have taken steps to address flow-related growth potential through sewer connection regulations. These regulations limit flow to what existed before sewerage or to a small increase. These regulations are “growth neutral” in terms of design flow but do not address non-flow related criteria such as siting and setbacks.

As Figure GM-1 illustrates, there is great potential for non-flow related growth through changes in building footprint and lot coverage if the land area requirements under Title 5 and other local regulations related to the siting of on-site Title 5 systems were no longer in place.



Managing Growth Effects from Sewers: Local Tools

A variety of regulatory and land use planning tools can be put in place to manage growth in the absence of Title 5 and other regulations that previously controlled development through limitations on wastewater flow and through establishment of setbacks and other dimensional requirements.

Flow-related tools include nutrient management regulations that control the amount of nutrients and flow generated by on-site septic systems, and sewer connection regulations that control the amount of nutrients and wastewater through a sewer connection. Non-flow related tools include bulk and building regulations, zoning changes that direct growth to specific areas, and options in the treatment of non-conformities. Prudent use of these tools will help ensure that TMDLs can be met now and in the future, that limited sewer capacity is directed to those areas where greater intensity of land use is desirable, and that natural resource areas are protected.

NUTRIENT-MANAGEMENT REGULATIONS

Nutrient-management regulations establish limits on the amount of flow from on-site septic systems serving new development and redevelopment or use changes. They can be applied outside of sewersheds in TMDL watersheds and can be applied before sewers are installed. The regulations can be based on existing flow, number of bedrooms, or land area.

Nutrient-management regulations are more strict than Title 5 flow criteria and are often identical to flow limits for nitrogen-sensitive areas, where wastewater flow is limited to 440 gallons per day per acre for residential properties. Most local nutrient-management regulations have included exceptions for certain geographic areas, preexisting properties, or innovative/alternative denitrifying on-site septic systems.

Communities can limit nutrients and wastewater flow through board of health regulations or through a general bylaw implemented by



regulations. Chatham, Orleans, and Barnstable have adopted nutrient management regulations through board of health regulations. Falmouth is considering a general bylaw for nutrient management.

Nutrient-management regulations are sometimes called interim regulations as they provide relief from nutrient loading before sewerage and, as is described below, continue the flow limitation after sewer connections become available.

FLOW-NEUTRAL REGULATIONS

Sewer-connection regulations set limits on the amount of wastewater flow to ensure that the capacity of a planned treatment plant is not exceeded and that TMDLs are met at present and in the future. “Flow neutral” sewer-connection regulations limit the amount of flow from a parcel to a preexisting allowed flow. Unless a community had adopted a nutrient-management regulation that limited flow below what is permitted by Title 5, the preexisting flow would be that allowed under Title 5 design flow criteria. Taken in tandem, nutrient-management and flow-neutral regulations help communities manage growth.

Chatham, Provincetown, and Falmouth have adopted flow-neutral sewer-connection regulations.

Although nutrient-management and flow-neutral regulations do not address non-flow related consequences of the removal of Title 5 and board of health regulations, they are an important component of a community’s growth management plan, both inside and outside the sewersheds.

NON-FLOW RELATED GROWTH-MANAGEMENT TOOLS

The advent of sewers can lead to unplanned growth that cannot be controlled through nutrient-management and flow-management regulations. Non-flow related growth effects include expansion of existing residences or businesses, conversion of seasonal homes to year-round residences, ability to build on previously unbuildable lots, encroachment on wild-life habitat, storm water impacts, and loss of community character. An



overview of several land use planning tools that communities can use to complement flow-related regulations follows.

BULK AND BUILDING FORM REGULATIONS

Bulk and building-form regulations, also known as dimensional requirements, include lot size and coverage, building height, and setbacks (or build-to lines). Towns can alter these regulations to encourage additional growth in a town center by relaxing height, lot coverage, and/or setback requirements. Conversely towns can discourage future growth or redevelopment in other areas by tightening dimensional regulations.

USE-RELATED REGULATIONS

Use regulations specify both the kind of activities and the intensity of activities that can take place on a given parcel. In communities seeking to promote a vibrant town center, a mix of residential and retail uses can be allowed through modifications to use-related zoning provisions. This kind of regulation can also be used to encourage or restrict intensity of uses, depending upon the desired outcome.

NON-CONFORMITIES

When a community changes its zoning in a way that alters allowable uses or structures (dimensional requirements) in a particular zoning district, the new zoning applies to new development only. Preexisting uses and structures are allowed to continue as non-conforming uses or structures. Use non-conformities refer to a preexisting use that is no longer allowed; dimensional non-conformities refer to structures that no longer meet dimensional requirements.

Town regulations that address requirements for alterations of non-conforming uses and structures can be strengthened in several ways to ensure that a proposed alteration does not intensify the non-conformity and be substantially more detrimental to the surrounding neighborhood, thereby undermining a community's ability to meet comprehensive land



use and wastewater infrastructure planning objectives. Recommended improvements to the zoning bylaw include:

- A statement of intent regarding treatment of non-conformities;
- Explicit criteria to apply to the definition of intensification of the non-conformity and to better define when new development is ‘substantially more detrimental to the neighborhood’ for wastewater impacts;
- Compliance with low impact development and wastewater infrastructure standards; and
- Requirement of a special permit for all alterations of non-conformities.

TOWN-CENTER ZONING

It has been difficult to invigorate traditional town centers on Cape Cod because of the lack of adequate wastewater infrastructure to support denser development, and zoning bylaws that were set in place decades ago did not support denser, compact development patterns. With the advent of sewers, communities have an opportunity to rezone villages and town centers where additional growth is desired. Such rezoning can include dimensional standards that increase height and lot coverage and decrease setbacks; requirements for mixed-use development; and support for public places and other pedestrian amenities, such as parking on the sides and rear.

NATURAL RESOURCE PROTECTION

Increased development pressure stemming from the availability of sewers can result in loss of open lands that protect drinking water supplies, wildlife habitat, wetlands, and other natural resources. Increases in impervious surfaces from development also increase stormwater runoff with concurrent impacts to natural resource areas. However, as noted above, the advent of sewers can also provide an opportunity for a community to implement its vision for the future. Just as land use tools can direct growth to town centers where denser, compact development can spur economic growth, land use tools can also protect natural resource areas from development that could threaten these resources.



Natural Resource Protection Zoning

Natural Resource Protection Zoning (NRPZ) is a relatively new form of zoning that has been adopted in several towns in Massachusetts since 2009. It is a variation of a clustered subdivision, but with several enhancements. NRPZ preserves large areas of open space, concentrating all development in a small area. The number of allowed dwelling units is determined by a calculation that first eliminates the amount of important natural resource lands from the determination of the number of allowed units. The net acreage is then divided by the base density to determine the number of units. The base density is less than typically found in Massachusetts towns, but the number of units can be increased if the development includes public benefits such as affordable housing, wastewater treatment for the development itself as well as for other units, preservation of farmland, and other benefits to the larger community.

Stormwater Management and Low Impact Development

The increase in impervious surface areas for roads, paved driveways, and roofs that accompanies development results in a greater volume of runoff from precipitation. Stormwater runoff is a source of many pollutants including the nutrients, nitrogen, and phosphorus. Although the state manages stormwater from some kinds of development (i.e., projects that require state water quality permits or those that fall under the Wetlands Protection Act), management of most stormwater impacts takes place locally.

Town approaches to stormwater management differ; a general bylaw, zoning bylaw, subdivision regulation, wetlands bylaw, site plan review, or Low Impact Development (LID) are all methods employed by towns to manage stormwater. Subdivision regulations and wetlands bylaws do not capture all development that produces stormwater. A zoning bylaw or general bylaw can be applied to more projects and thus have a better capacity to mitigate stormwater impacts. As stated above, zoning changes require a two-thirds vote at town meeting, whereas a general bylaw requires only a simple majority. Low Impact Development is a comprehensive approach to stormwater management that includes site planning similar to Natural Resources Protection Zoning coupled with natural stormwater “Best Management Practices.” These practices include the use of bio-retention filters, vegetated swales, shared driveways, green roofs, and other natural strategies that can be more effective, less intrusive, and less costly than conventional systems.



Wetlands Protection

Installation of sewers could threaten wetlands by removing the design criteria and land area requirements of Title 5 and the more stringent local board of health requirements for natural resource protection. Title 5 requires that a leaching field be located 50 feet from a coastal bank, dune, or beach and from a salt marsh of bordering vegetated wetland that borders a creek, river, stream, pond, or lake. Cape boards of health have increased this required setback to 100 feet. Without this constraint, additional development could be seen in these areas. Installation of sewers would also eliminate the land area requirements for a leaching field, potentially allowing enlargement of the buildable area of a parcel. Additionally, if areas within buffer zones are open to development, erosion and fertilizer runoff could harm adjacent waters and contribute to nutrient loading. All of these possible effects could impact a community's ability to meet TMDL requirements.

Although the jurisdiction of a local conservation commission is restricted to the delineated wetlands resource area and the 100-foot designated buffer (200 feet if the resource area meets the regulatory definition of a riverfront; 100 feet if it meets the requirement for a certified vernal pool), communities may expand the Massachusetts Wetlands Protection Act "protected interests" to include additional conservation values deemed important to the community. The Massachusetts Association of Conservation Commissioners recommends that communities expand protected interests to include:

- Water quality, including surface water bodies
- Erosion/sedimentation control
- Natural habitat, wildlife habitat, rare species habitat, and wildlife corridors
- Agriculture, aquaculture, and shellfisheries
- Storm damage prevention, including coastal storm flowage
- Prevention and control of pollution
- Recreation

By including these as protected interests, the conservation commission has the ability to comment and impose conditions on proposed projects that may threaten resources that are no longer protected due to the elimination of Title 5 criteria.



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Conservation commissions may expand their jurisdiction over proposed projects by changing their bylaws and regulations that concern resource areas and buffer zones. Many Cape towns have established “No Build” and “No Disturb” zones within the 100-foot buffer. In no-build zones, no structures can be placed but some pruning is allowed. In no-disturb zones, no alteration can be made, including disturbing vegetation. Commissions can also extend jurisdiction by expanding the buffer zone beyond 100 feet.

The Cape Cod Commission has a model bylaw that provides language to extend the buffer zone to 200 feet for riverfronts in concordance with the riverfront amendments to the Massachusetts Wetlands Protection Act. Other language also expands the buffer to 300 feet for coastal plain pond shores, 350 feet for vernal pools, and 300 feet for wetlands that are designated as estimated habitat for rare species by the Massachusetts Natural Heritage and Endangered Species Program and for areas within [Areas of Critical Environmental Concern](#).



Managing Growth Effects from Sewers: Regional Tools

The [Cape Cod Commission Act](#) and the [Cape Cod Regional Policy Plan](#) include several tools that can help to manage growth effects from sewers. These include flexible thresholds for Commission review of Developments of Regional Impact, designation of Districts of Critical Planning Concern and Growth Incentive Zones, transfer of development rights, and off-site mitigation.

FLEXIBLE THRESHOLDS FOR CAPE COD COMMISSION REVIEW

Under the [Cape Cod Regional Policy Plan](#) and Cape Cod Commission enabling regulations, towns that designate certain areas as Resource Protection Areas or Growth Incentive Zones, or identify potential threshold changes under Chapter H of the Commission's regulations, can petition the Cape Cod Commission to change the thresholds that trigger Commission review of Developments of Regional Impact. Towns can seek to lower thresholds for review in natural resource areas where there is a need to protect drinking water or other natural resources. Towns can also petition the Commission to raise thresholds in Growth Incentive Zones or under Chapter H, where adequate infrastructure is available to support denser development. Wise use of these planning tools can significantly decrease the cost of sewer extensions and ensure that wastewater treatment plant capacity is not exceeded.

DISTRICTS OF CRITICAL PLANNING CONCERN

Designation of a District of Critical Planning Concern (DCPC) can be an effective way to provide towns the time necessary to address changes in development patterns that might accompany sewerage. A DCPC provides a 12- to 15-month timeout from development pressure. During this time a community could develop and implement policies and regulations to



ensure that limited sewer capacity is directed to areas and uses that are in keeping with community aspirations and that TMDLs are not exceeded from excessive growth in sewerred and unsewerred areas.

TRANSFER OF DEVELOPMENT RIGHTS

Transfer of Development Rights (TDR) is a method of directing growth to “receiving areas,” such as a town center, and away from “sending areas,” such as natural resource areas. A TDR program works by providing a mechanism and a formula that offers incentives for development in receiving areas that are upzoned and a disincentive in sending areas that have been downzoned. Although attractive in principal, TDR has been difficult to achieve on Cape Cod for a variety of reasons. Cape communities can achieve some of the benefits of the TDR idea by purchasing open space as off-site mitigation for Developments of Regional Impact. Such a tool could be an effective way to help manage the growth effects from sewers.

CHECKERBOARD

Prior to the passage of the Environmental Bond legislation in 2008, in the absence of special legislation, towns were required to connect all properties that had frontage along a sewer line. This law deprived towns the ability to identify areas that were and were not appropriate for future growth and redevelopment. In some cases, large vacant tracts of land with frontage, or parcels with redevelopment potential at significant densities, forced communities to design for more treatment and disposal capacity than they wanted, and subjected portions of the community to inappropriate growth. Since the passage of the Environmental Bond legislation, towns may adopt the provisions of the recently amended MGL Chapter 83 to accomplish “checkerboarding.” For more information on checkerboarding please see the document [Technology Assessment - Conventional Infrastructure](#).

