

**MODEL ORDINANCE FOR THE PROTECTION OF
NATURAL, CULTURAL AND HISTORIC RESOURCES
IN MAJOR SUBDIVISIONS**

Hunterdon County, New Jersey

**Developed as part of the
Environmental Toolbox Committee
Model Clustering Sub-committee**

DRAFT DEVELOPMENT NOTES:

- This draft ordinance development guidance was adapted from the “Model Zoning Ordinance for Rural Cluster Development - #45801 v1 - PG-7 Model Cluster ZO.doc, 02/06/02. Developed by the Southeastern Wisconsin Regional Planning Commission.
- Text has been included in this version from the document titled “Mandatory Resource Protection Development Requirements for Major Subdivisions,” provided by Elizabeth McKenzie.
- Text has been included in this version from the Washington Town Center Zoning and Design Regulations, Mercer County, New Jersey.
- **NOTE: TO ENSURE CLARIFICATION, THE FORMAT OF THIS DOCUMENT SHOULD NOT BE ALTERED BEFORE DISTRIBUTING TO MUNICIPALITIES.**

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SECTION 1: Introduction

Within the _____ zone(s), all major subdivisions shall be designed in accordance with the “Resource Protection Development Requirements” contained in this Ordinance. These requirements shall be satisfied when the proposed development retains the site’s natural, historic, and cultural features to the greatest extent possible within a given zone.

The natural, historic, and cultural features that are to be protected by this Ordinance are described and mapped in the *municipality’s* approved Environmental Resource Inventory (ERI) in order to provide developers with a clear understanding of which features on a parcel are to be preserved. In general, the “Resource Protection Development Requirements” contained in this Ordinance shall be satisfied when construction occurs within the smallest permissible area of a tract on lots having the smallest permissible lot area. Minimum requirements are based on the availability of public sewage disposal systems and soil suitability for individual septic systems, which will vary by location. In some cases, the “Resource Protection Development Requirements” will only be satisfied through the construction of homes on larger lots. It is the burden of the applicant to demonstrate which development type best satisfies the requirements of this Ordinance.

NOTES: Throughout the ordinance, where the words *Municipal* or *Municipality* appear in bold italics, the word City, Borough, Town, or Township may be substituted; and where the term *Municipal Board* appears, the term Planning Board or Zoning Board of Adjustment may be substituted. Suggested values for items left blank will appear in parenthesis in bold italics as follows: (*suggested value*).

* * * * *

SECTION 2: Purpose and Intent

The purpose of this ordinance is to preserve irreplaceable natural, cultural, and historic resources, while permitting development at acceptable densities, located and designed to mitigate the perceived intensity of development. Specific objectives are as follows:

Implement Objectives of *Municipal* Master Plan

To implement the objectives of the adopted *Municipal* Master Plan, or elements thereof.

Augment Existing Land Use Controls

[SECTION 3](#) is further promulgated to provide a functional land use design and control mechanism that will augment the basic land use controls of _____ and the administrative implementation devices of _____.

Protect Health, Safety and Welfare of Citizens

Effective and reasonable application of these regulations will protect the health, safety and welfare of citizens of the *Municipality*.

Protect Natural Features

To maintain and protect the *Municipality's* important landscape elements, including those areas containing unique and environmentally sensitive natural features such as woodlands, hedgerows, stream corridors, wetlands, floodplains, grasslands, ridge tops, steep slopes, critical species habitat, and natural areas. Such areas contained in primary environmental corridors, as identified by the State, County, or *Municipality* are of particular significance for conservation. It is further the purpose of this Ordinance to reduce erosion and sedimentation by retaining existing vegetation and minimizing development on steep slopes.

Protect Historic and Cultural Features

To preserve the *Municipality's* rural heritage in the retention of historic and cultural features including stone walls, spring houses, barn foundations, cellar holes, earthworks, burial grounds, and existing active and passive recreational areas as indicated in the *Municipal* Master Plan.

Preserve Scenic Views

To preserve the *Municipality's* existing predominately unspoiled vistas as viewed from public roadways, public open space, or other public areas, which require protection from destruction, diminution and loss that can result as visually undesirable impacts of development.

Preserve Open Space

To provide a means for owning preserved open space and protecting it from development in perpetuity using private, rather than public funds. It is further the purpose of this Ordinance to (i) promote the preservation and maintenance of prime agricultural soils and soils of County and Statewide importance and (ii) to create opportunities for active and passive recreational uses in designated common open space for residents, or preserved open space, which may be used by the public.

SECTION 2 – Continued

Provide Greater Design Flexibility

To provide for greater design flexibility in the siting of dwellings and other development features in order to minimize the disturbance of rural landscape elements, scenic quality, and overall aesthetic value of the landscape, thereby preserving the *Municipality's* rural character. It is further the purpose of this Ordinance to provide the opportunity for concentrated development on a part of the site in order for the remaining land to be designated as preserved open space.

Increase Flexibility and Efficiency of Services and Infrastructure

To increase flexibility and efficiency in the siting of services and infrastructure, by reducing street length and impervious coverage, utility requirements, and drainage infrastructure that would be required for conventional low-density development.

Provide Affordable and Creative Housing Options

To provide affordable and creative housing options, where possible and consistent with the *Municipal* Master Plan.

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SECTION 3: Natural, Historic, and Cultural Resource Protection

A. Promotion of Purpose

The purposes of this Ordinance, as articulated herein and in the *Municipal* Master Plan, will ordinarily be promoted by confining residential and other permitted development in all major subdivisions to the smallest possible area of a tract, using the smallest permissible lot size, thereby retaining existing natural, historic, and cultural features.

B. Applicability

Within the _____ zones, the requirements, guidelines and controls promulgated in this Ordinance shall be applicable to all major subdivisions, and shall apply as more specifically set forth in [Subsection C](#) below.

C. Resource Protection Development Requirements

1. Application Review Procedures

a. Submission Requirements

The determination as to the satisfaction of the “Resource Protection Development Requirements” shall be made by the *Municipal Board* upon the submission of the earlier of the following:

- i. One or more concept plans for the development of the tract, accompanied by the information called for in [Sub-subsections 1b-c](#) below. The applicant is urged to prepare one or more concept plans to obtain a finding and determination from the *Municipal Board* as to the form of development that best satisfies the “Resource Protection Development Requirements” prior to undertaking the expense of preparing a preliminary plat.
- ii. A preliminary subdivision plat, accompanied by the information called for in [Sub-subsections 1b-c](#) below.

b. Required Documentation

At the time of the submission of the conceptual plan(s) or at the time of the submission of the preliminary plan, whichever comes first, the applicant shall be prepared to demonstrate to the *Municipal Board* that the proposed development meets the “Resource Protection Development Requirements.” The *Municipal Board* will review the following aspects of all major subdivision applications:

- i. The identification of all historic, cultural and environmental features, with plans showing the features that are to be preserved.
- ii. The identification of the areas most suitable for development, with plans showing the location of all proposed lots and buildings. If buildings are visible from public roadways or internal streets, additional drawings satisfying the requirements of [Sub-subsection 7I](#) below will be required to illustrate the siting, size, scale, and architectural features of the buildings, as seen from each public roadway or internal street.
- iii. The layout of proposed streets and driveways, and the location of other proposed infrastructure, such as wastewater facilities.
- iv. Existing and proposed landscaping.

SECTION 3: Subsection C, Sub-subsection 1 – Continued

c. Required Documentation for Large-lot Subdivisions

In some cases, the *Municipal Board* may determine that the minimum development impact can only be achieved with a form of development that utilizes larger lots. It shall be the responsibility of the applicant to demonstrate, and the obligation of the *Municipal Board* to determine, that all of the following apply:

- i. The proposed form of development is more consistent with the goals of the *Municipality's* Master Plan than any of the forms of development resulting in smaller lot sizes.
- ii. The proposed form of development best satisfies the “Resource Protection Development Requirements” in [Subsection 7](#) below.
- iii. The tract in question is unsuitable for any form of development resulting in smaller lot sizes due to factors such as the size or shape of the tract; the tract's location; issues of water quality or water supply; natural features, such as soil conditions and soil types, rock outcroppings, existing woodlands, steep slopes, floodplains, wetlands, wetlands transition areas, streams and required stream corridors, or land under water (except swimming pools); or the impacts of past farming activities.
- iv. The proposed larger lot form of development will have a quantifiably less disruptive impact on the existing natural, cultural, and/or historic features.

2. Review Fees

There shall be a review fee of _____ dollars per lot in addition to any other applicable fees, for any one application for development of a property subject to this Ordinance.

3. Inventory and Site Analysis

To aid the *Municipality* in determining whether the applicant has accomplished the intent and objectives the “Resource Protection Development Requirements,” the initial application for any development shall include an inventory and site analysis of the parcel as described in _____.

NOTE: If a municipality has not completed an Environmental Resource Inventory (ERI) or Natural Resource Inventory (NRI), the specific requirements for an inventory and site analysis of a parcel should be fully described in the Municipal Land Use Ordinance.

4. Calculation of Site Capacity

The calculation of site capacity is used to determine the total area of a tract that is suitable for development after subtracting identified natural, historic, and/or cultural resources, as called for in [Sub-subsection 3](#) above. Calculations shall establish minimum and maximum gross lot areas, maximum lot coverages, and the maximum permitted density of residential development and/or intensity of nonresidential development as described in _____.

NOTE: Municipalities should consult “Ordinance No. 2005-07,” which governs lot coverage, published by Bedminster Township, Morris County, New Jersey, for more guidance concerning this topic. In addition, municipalities should reference *Rumson Estates, Inc. v. Mayor & Council of the Borough of Fair Haven*, where the New Jersey Supreme Court ruled in favor of the Borough’s lot coverage restrictions, effectively overturning the ruling of *Manalapan Builders Alliance, Inc. v. Township Committee of Manalapan*.

SECTION 3: Subsection C – Continued

5. Buildable Tract Area

The portions of the tract best suited for development shall be determined by the following:

- i. The site capacity calculations set forth in Sub-subsection 4 above.
- ii. The “Resource Protection Development Requirements” set forth in Sub-subsection 7 below.

6. Water Supply, Wastewater Treatment, and Stormwater Management Facilities

a. Water Supply

- i. Water supply facilities shall meet the requirements of the County or *Municipality*, and the New Jersey Department of Environmental Protection, (NJAC 7:10 et. Seq.) and RSIS (NJAC Title 5, Chapter 21).
- ii. Water supply systems for multiple users shall be owned, operated, and maintained by a general or special purpose unit of government, or by a private utility in good standing with the New Jersey Board of Public Utilities.

b. Wastewater Treatment

- i. Wastewater facilities may consist of any system meeting the requirements of the County, the *Municipality*, and the New Jersey Department of Environmental Protection. (NJAC 7:9A and NJAC 7:14). Discharge to groundwater (i.e. groundwater recharge) is to be used in lieu of surface water discharge when feasible.

NOTE: It is recommended that municipalities provide incentives, such as a density bonus or a streamlined approval process, for the use of constructed wetlands or other green design systems for the treatment of wastewater. For guidance municipalities should consult the United States Environmental Protection Agency’s document, “Constructed Wetlands for Wastewater Treatment and Wildlife Habitat.” Refer to the APPENDIX for information concerning alternative wastewater treatment systems.

- ii. All Wastewater facilities shall be consistent with the Residential Site Improvement Standards, or RSIS, (NJAC Title 5, Chapter 21).
- iii. All public community Wastewater facilities shall be owned, operated, and maintained by a general or special purpose unit of government or by a private utility in good standing with the New Jersey Board of Public Utilities.

c. Stormwater Management

All stormwater management facilities shall be designed in accordance with NJDEP Best Management Practices as called for in _____.

NOTE: Municipalities should consult the Hunterdon County model “Stormwater Management Plan and Ordinance” for more guidance concerning this topic.

SECTION 3: Subsection C – Continued

7. Standards of Review

The following “Resource Protection Development Requirements” shall guide the design of the proposed development:

a. Prime Agricultural Soils

- i. Within the _____ preservation zone(s), the layout of the development shall avoid intrusions into existing fields, pastures, meadows, and orchards that are currently used for agricultural purposes or are suitable for continued agricultural use, and shall create sufficient buffer areas between proposed non-agricultural uses and existing agricultural uses to minimize potential conflicts, as described in [Sub-subsection 7t](#) below. Access to agricultural uses shall be restricted for public safety and to prevent interference with agricultural operations.

NOTE: Municipalities should consider asking the County Agriculture Development Board (CADB) to review any Ordinances that involve the protection of agricultural lands, in order to assess their impact on agricultural viability and other farming issues.

- ii. Where dwellings must be located in open fields or pastures because of greater environmental constraints elsewhere on the tract, they shall be sited on the least productive agricultural soils or at the farthest edges of fields, especially those that are visible from existing public roadways.

b. Woodlands and Trees

- i. Development shall retain existing hedgerows and treelines between fields and meadows and along roadways and internal streets.
- ii. Within the _____ preservation zone(s), development shall avoid destruction of or damage to woodland areas. All development subject to this Ordinance shall give special consideration to areas that contain numerous mature trees and/or provide a significant wildlife habitat.
- ii. Development of woodlands located on highly erodible soils (as per the Hunterdon County Soil Survey) occurring on slopes greater than _____ (**15**) percent shall be avoided.
- iii. Woodlands determined by the **Municipal Board** to be in poor condition or with long term limited management potential can provide appropriate locations for residential and other permitted development, provided care is taken to place the development in location(s) that minimize the exposure and eventual destruction of large, healthy trees, and wildlife habitats.

NOTE: In order to clarify which environmental features are to be prioritized on any given parcel, municipalities are encouraged to establish preservation zones that are geared toward the preservation of a particular site feature. For example, in a farmland preservation zone development may be directed to nearby woodlands, whereas in a woodland preservation zone development may be directed to existing cultivated land. Municipalities should use a Natural Resource Inventory (NRI) or Environmental Resource Inventory (ERI) as a basis for zone designations. For more information refer to [Sub-subsection 3](#) above. For more guidance concerning Woodlands preservation, municipalities should consult the model “Woodlands Retention Ordinance,” published by the Hunterdon County Planning Board.

SECTION 3: Subsection C, Sub-subsection 7 – Continued

c. Environmentally Critical Areas

Development shall maximize the preservation of steep slopes, woodlands, floodplains, wetlands and wetlands transition areas, streams and required stream corridors, ponds including vernal ponds, and land under water (except swimming pools), and shall protect such areas from clearing, grading, filling or construction.

NOTE: Municipalities should consult the “Steep Slopes Ordinance,” published by the Hunterdon County Environmental Toolbox Committee, for more guidance concerning this topic.

d. Water Quality and Water Supply

Development shall have the least possible impact on the existing quality and reliability of the supply of groundwater and on the quality and flow volumes of surface water.

NOTE: Municipalities should consult the model “Wellhead Protection Ordinance and Well Testing Ordinance,” published by the Hunterdon County Environmental Toolbox Committee, for more guidance concerning this topic.

e. Viewsheds

- i. Development shall have the least impact on existing viewsheds and scenic vistas. As described in [Sub-subsection 7I](#) below, certain types of development shall be located and arranged so as to be visually screened from existing public roadways and/or facilities by existing physical features on the tract, including but not limited to, topography and vegetation.
- ii. In wooded areas, existing vegetation shall be retained along roadways and internal streets for as great a depth as possible, although exceptions to this requirement are allowed in areas where a grouping of ____ (5) or more buildings front the roadway or internal street, as described in [Sub-subsection 7I](#) below. In areas where the aforementioned exception does not apply, existing woodland areas extending ____ feet from an existing or proposed roadway or internal street shall be preserved for a minimum of ____ feet from the said roadway or street.
- iii. All buildings shall be sited on the lower portions of the tract, avoiding prominent hilltops or ridges as described in _____.

NOTE: Municipalities should consult the “Tewksbury Township Scenic Roads Ordinance (1996)” and the “Model Ordinance for Ridgeline, Mountainside, Hillside and Viewshed Protection,” published by the Hunterdon County Environmental Toolbox Committee, for more guidance concerning this topic.

f. Stream Corridors/Buffers

Development shall be located and arranged so as to maintain an upland buffer of at least ____ (100) feet in depth adjacent to all surface water bodies, including creeks, streams, springs, lakes and ponds, and their associated floodplains and wetlands. If a required stream (or other water body) corridor has been previously cleared, the **Municipal Board** shall require its reforestation to a minimum of __ feet, unless a

SECTION 3: Subsection C, Sub-subsection 7f – Continued

continuation of active agriculture is planned. Required plantings shall consist of native species of trees and other vegetation naturally occurring in the vicinity of the water body in question.

NOTE: The NJDEP has designated a special level of protection, which includes a 300-foot buffer, for waterbodies designated as Category One. Municipalities should consult the “Stream Corridor Ordinance,” published by the Stony Brook-Millstone Watershed Association, for more guidance concerning this topic.

g. Wildlife Habitat

- i. Development shall avoid habitat areas for species listed as endangered, threatened or of special concern by the U.S. Environmental Protection Agency and/or by the New Jersey Department of Environmental Protection.
- ii. Where the development will result in the creation of dedicated open space, as opposed to a farm, such open space shall be contiguous and consolidated on the tract and where possible, abut existing or potential open spaces and public facilities on adjacent parcels so that it may be part of a larger, contiguous and integrated open space system. Long thin strips of conservation land shall be avoided except where such configuration is necessary for the protection of a linear feature or for the creation of a trail system.
- iii. Landscaping of common areas and streets shall utilize native species of shade trees and flowering shrubs with high value for wildlife conservation.

h. Historic and Cultural Features

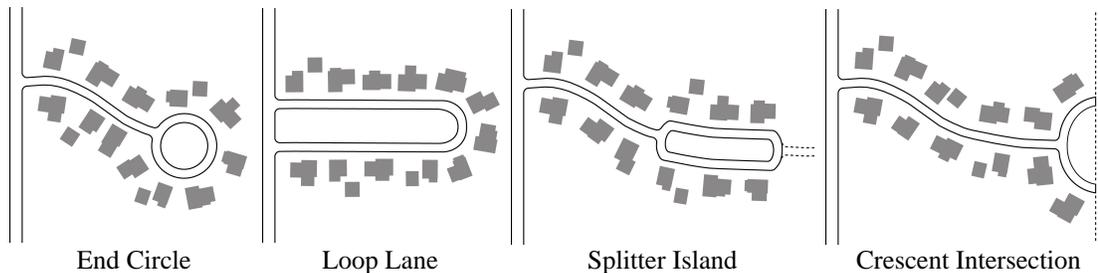
- i. Rural features that are associated with the *Municipality's* agricultural heritage shall be preserved, which include, but are not limited to, stone walls, spring houses, barn foundations, cellar holes, earthworks, and burial grounds, whether or not these features have been determined to have historic significance.
- ii. If recreational areas are to be provided on the tract for use by residents of the development, they shall be conveniently accessible to the proposed dwellings and where appropriate, screened from existing roadways. If recreational areas are to be dedicated for public use, they shall be conveniently accessible to the public with minimal disturbance to existing and proposed residents and shall be optimally located to serve their intended purpose.

i. Pedestrian and Vehicular Circulation Areas

- i. Sidewalks or off-road pedestrian trails shall be provided in groupings of ___ (5) or more buildings, and where possible, shall connect to existing or future sidewalks, off-road pedestrian trails, and/or other public uses within the *Municipality*. Sidewalks are required in groupings of ___ (12) buildings or more.
- ii. Wherever possible, thinning or pruning techniques shall be utilized along public roadways and internal streets in lieu of the razing of vegetation for sight distance.
- iii. Proposed roadways and internal streets shall connect to all existing roadways and internal streets that are accessible from the site, and future roadway and street connections to adjacent buildable tracts shall be allocated, unless sensitive environmental features prevent such connections. The use of cul-de-sacs shall be restricted unless they support a larger design objective, such as extensive pedestrian linkages or greater open space provisions. All cul-de-sacs shall be

SECTION 3: Subsection C, Sub-subsection 7i – Continued

designed as “end circles,” where greenspace is included in the center of a circle drive. End circles shall be sited to preserve significant environmental features within the greenspace. Where no such features exist, transition planting shall consist of an informal arrangement of native plant species, as described in [Sub-subsection 7t](#) below. Other alternatives to cul-de-sacs that house greenspace are encouraged, such as “loop lanes,” splitter islands, and crescent intersections, as shown in the images below:



- iv. Proposed roadways, internal streets, and driveways, shall follow the land’s natural contours, disturbing the topography as little as possible, and shall be designed to preserve significant environmental features along proposed routes.
- v. In groupings of ____ (25) units or more, alleys shall be provided for garage access. If alleys are not provided for garage access, at least ____ (50) percent of the units in developments of ____ (5) units or more shall access common driveways. Front yard driveways shall be no more than ____ (10) feet wide at the roadway or internal street and continuing through the front yard.

NOTE: Refer to the [APPENDIX](#) for sample density and dimensional standards that are based upon studies of Hunterdon County’s historic settlements. A village grouping is defined as a development of 25 units or more, and it is suggested that a group of this size be provided with alleys for garage access. Municipalities should encourage narrow roadways and internal streets in order to calm traffic speeds and maintain rural character. If the cartway widths designated by RSIS are not in character with the area, it is recommended that the municipality designate Special Area Standards for the zone.

- j. Residential Areas
 - i. Residential buildings shall front public roadways and/or internal streets, both functionally and visually.
 - ii. In groupings of ____ (5) units for more, the average lot width shall not exceed ____ (50) feet. In such groupings, the minimum lot width shall be at least ____ (23) feet, and the maximum lot width shall be no more than ____ (70) feet.
 - iii. Lawn areas are restricted to _____ (10,000) square feet, regardless of lot size.
 - iv. The location and design of garages shall follow the standards described in [Sub-subsection 7p](#).
 - v. In developments of ____ (25) or more units, one common green shall be provided for every ____ (50) units unless ____ (50) percent or more of the net buildable acreage (NBA) is preserved open space. Common greens shall be a minimum of _____ (20,000) square feet and shall be located at street frontages

SECTION 3: Subsection C, Sub-subsection 7j – Continued

rather than behind lot lines, unless the preservation of natural features requires such a location.

k. Nonresidential Areas

- i. Nonresidential buildings shall be located to front towards and relate to public streets, both functionally and visually. Buildings shall not be oriented to front toward a parking lot.
 - ii. Nonresidential uses shall utilize on-street and shared parking to the greatest extent possible. Adjacent on-street parking shall be counted towards a land uses' parking requirement, and where a mix of uses creates staggered peak periods of parking demand, shared parking calculations may reflect a deduction in the total amount of required parking. All off-street parking shall be located behind buildings and/or structures, and be completely screened from the viewshed of the roadway and/or internal street by existing vegetation. Where no vegetation exists, transition planting shall consist of an informal arrangement of native plant species, as described in [Sub-subsection 7t](#) below.
- l. Development Visible from Public Roadways or Internal Streets

In addition to the requirements described in [Sub-subsections 7j-k](#) above, development that is visible from public roadways or internal streets shall fulfill the following requirements:

- i. Where new development is visible from a public roadway that the buildings in the development do not front, and the development is not located in or adjacent to an existing hamlet, village, or town, all reasonable efforts shall be made to screen the development from the said public roadway. Buildings shall be sited so that they are screened by existing environmental features; where no such features exist, transition planting shall consist of an informal arrangement of native plant species, as described in [Sub-subsection 7t](#) below. The development may utilize existing manmade features to facilitate screening, such as a location behind existing development or behind existing historic structures and features such as stone walls. Where adequate screening cannot be achieved, the requirements of [vi](#) below shall be fulfilled.
- ii. All buildings shall be oriented so that rear facades are not exposed to public roadways or internal streets, unless the preservation of environmental features requires such an orientation. In such a case, the building shall be sited so that existing environmental features screen the rear façade from the roadway and/or internal street. Where such features do not screen the rear façade, transition planting shall consist of an informal arrangement of native plant species, as described in [Sub-subsection 7t](#) below.
- iii. Where a grouping of ____ (5) or more buildings fronts a public roadway, visual cues, such as splitter islands and brick pavers, shall be used to announce the approaching settlement in a manner that reinforces the character of the community. If deemed necessary by the *Municipal Board*, additional traffic calming measures, such as roundabouts and speed tables, shall be used to slow vehicles traveling along the public roadway.

SECTION 3: Subsection C, Sub-subsection 7I – Continued



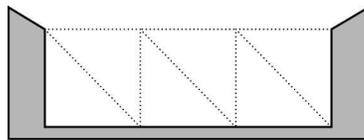
Settlement Entrance



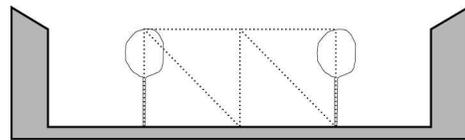
Rural Roundabout

Images from “Virginia’s Route 50 Traffic Calming Project Memorandum,” Fauquier and Loudoun Counties, Virginia, February 2003.

- iv. Where a grouping of (5) or more buildings fronts a public roadway or internal street, the ratio of the average building height to the average distance between principal façades shall be a maximum of (1:3). Buildings may be located further from the roadway or internal street if the ratio of the average building height to the average distance between mature trees (those with a minimum height that is equal to or more than the average building height) is a maximum of (1:2). (One) mature tree(s) per building is required for the latter ratio.



1:3 Ratio By Facade



1:2 Ratio By Landscaping

- v. Where a grouping of (5) or more buildings fronts a public roadway or internal street, the streetscape shall be defined by employing the following methods:
 - (1) Maintaining uniform setbacks or subtly graduating changes;
 - (2) Maintaining the scale of surrounding buildings or subtly graduating changes;
 - (3) The continuous use of front porches on residential buildings;
 - (4) Maintaining cornice lines on buildings of the same height;
 - (5) Extending horizontal lines of fenestration; and
 - (6) Echoing architectural styles and details, design themes, building materials, and colors of vernacular buildings, while offering unique design features.



Unacceptable streetscapes

Problems with these suburban streetscapes include the extensive clearing of existing vegetation, oversized lawn areas, front loaded garages, a lack of front porches, and standardized façade styles that disregard the building’s context.

SECTION 3: Subsection C, Sub-subsection 7l – Continued



Acceptable streetscapes

Groupings of buildings should reflect historic settlement patterns, incorporating small lawn areas, front porches, preserved landscape features, garages that are hidden from view, and buildings with architectural variety.

- vi. In addition to the architectural design requirements described in [Sub-subsections 7m-q](#) below, buildings that are visible from existing public roadways shall replicate at least two aspects of the *Municipality's* vernacular architecture, in addition to the three prescribed in [Sub-subsection 7m](#).
- m. All Buildings
 - i. All buildings shall be designed to preserve existing landscape features. Wherever possible, buildings shall utilize changing site topography and existing vegetation to reduce weather exposure, and be oriented to increase energy efficiency, reducing northern exposure and providing unobstructed southern exposure.
 - ii. Building fenestration shall be greater than _____ (20) percent on any visible façade, and greater than _____ (30) percent on any southern facing façade.
 - iii. All buildings shall replicate at least three of the following aspects of the *Municipality's* vernacular architecture, as defined in the *Municipal* Historic Preservation Master Plan Element:
 - (1) Massing
 - (2) Scale
 - (3) Building materials
 - (4) Exterior materials
 - (5) Façade style
 - (6) Architectural details
 - (7) Roof Style

NOTE: Municipalities should consult the Lambertville City Historic Preservation Master Plan Element for guidance.

- iv. Every building in a major subdivision shall achieve architectural design distinction through substantial differentiation in the front elevation using at least three of the following methods:
 - (1) Façade style
 - (2) Window configuration
 - (3) Entrance treatment
 - (i.e. front porch, portico, front stoop)
 - (4) Roof style
 - (5) Exterior materials

SECTION 3: Subsection C, Sub-subsection 7m – Continued

- v. The architectural treatment of the front façade shall be continued, in its major features, around all visibly exposed sides of a building. All sides of a building shall be architecturally designed to be consistent with regard to style, materials, colors, and details. Buildings with more than one façade facing a public roadway, internal street, or common or public open space shall be designed to provide for enhanced façade treatments on all exposed sides of the said buildings.



Unacceptable views of side and rear walls



Acceptable façade treatments

n. Residential Buildings

- i. All residential units shall have a porch, portico, or decorated entrance on the street façade of the building. In developments of ____ (5) or more residential units, a minimum of ____ (50) percent of the units, except apartments, shall have a front entrance articulated with a covered front entry porch. All porches shall be fully functional, defined by a minimum depth of ____ (6) feet from the front wall of the dwelling to the enclosing porch rail and a minimum length of ____ (10) feet, and shall comprise a minimum of ____ (30) percent of the width of the primary façade (not including the garage). Porches for duplexes, condos, and apartments may be shared.
- ii. In developments of ____ (5) or more residential units, no grouping or block shall have more than ____ (2) consecutive units with the same roof type and roof orientation or the same façade style.
- iii. Façade materials for residential buildings shall consist of the following materials:
 - (1) Wood Clapboard
 - (2) Simulated Clapboard
 - (3) Brick
 - (4) Wood Shingles
 - (5) Simulated Wood Shingles
 - (6) Indigenous Stone
 - (7) Stucco

o. Nonresidential Buildings

- i. Nonresidential, non-agricultural buildings shall avoid long, uninterrupted walls or roof planes. Roofline offsets and building wall offsets, including projections, recesses, and changes in floor level, shall be used in order to add architectural interest and variety.

SECTION 3: Subsection C, Sub-subsection 7o – Continued



Unacceptable



Acceptable

- ii. Façade materials for nonresidential, non-agricultural buildings shall consist of the following materials: (1) Brick (2) Indigenous Stone or (3) Stucco. All facades should have a recognizable “base” consisting of (but not limited to):
 - (1) Thicker walls
 - (2) Richly textured materials (e.g. tile or masonry treatments)
 - (3) Special materials such as ceramic tiles, granite and marble
 - (4) Contrasting colored materials, mullion, and/or panels
- iii. All facades should have a recognizable “top” consisting of (but not limited to):
 - (1) Cornice treatments
 - (2) Roof overhangs with brackets
 - (3) Stepped parapets
 - (4) Richly textured materials (e.g. tile or masonry treatments)
 - (5) Differently colored materials
- iv. In commercial and/or mixed-use buildings, primary display windows shall occupy a minimum of ____ (60) percent of the ground floor façade.
- p. Accessory Structures
 - i. Garages shall be provided in rear or side yards. Wherever possible, garage access shall be from a rear alley. Front loaded garages shall be set back a minimum of ____ (10) feet from the principal façade. The location of the garage shall be set back a minimum of ____ (3) feet from side and rear property lines. Garage doors visible from a public roadway or internal street shall not exceed ____ (8) feet in width unless they are articulated in a manner that reduces the appearance of a long, uninterrupted surface.
 - ii. The construction of accessory apartments above garages is encouraged, and should follow the land use controls of _____.
- q. Exemptions for Architectural Merit

Exemptions to [Sub-subsections 7m-p](#) above may be granted on if the applicant can show, through architectural drawings, renderings or other visual documentation, that the proposed building(s) satisfy the purpose and intent set forth in [Sub-subsection 7](#) of this Ordinance. Exemptions will only be considered for buildings where exemptions are required in order to apply new and innovative architectural design practices that do not compromise the *Municipality’s* rural setting.

SECTION 3: Subsection C, Sub-subsection 7q – Continued

NOTE: Municipalities may want to expand the design regulations section to cover additional topics, such as bulk standards, lighting, signage, fencing and street furniture, or develop a separate ordinance that governs the design of all new buildings within the municipality. Images should be included with all design regulations in order to clarify the objectives of the ordinance. Municipalities should consult the “Washington Town Center Zoning and Design Regulations of Washington Township, Mercer County, New Jersey” for guidance. It is recommended that municipalities consult planning and design professionals, most notably architects, for analysis and feedback regarding the architectural and site design review process.

- r. All Landscaping
 - i. For the purpose of conserving the natural landscape and in recognition of the time value of existing vegetation, the preservation of existing vegetation shall always be preferred to the installation of new plant material. Existing woodlands and hedgerows shall be retained to the maximum extent possible, and shall be incorporated into transition planting, as described in [Sub-subsection 7t](#) below. Suitable existing vegetation shall be credited toward the landscaping requirements of [Sub-subsections 7r-v](#), when, in the opinion of the **Municipal Board**, it would equal or exceed the visual impact of the new required plant material after two years of growth.
 - ii. All new landscaping to be installed and existing vegetation to be preserved shall be protected in accordance with the methods specified in the **Municipality’s** Land Use Ordinance or other applicable **Municipal** ordinances.
 - iii. Although nonstructural stormwater management systems are preferred, if detention basins are used, they shall be designed to blend with the site’s natural features and shall be landscaped with an informal arrangement of native plant species in order to create a low-maintenance, natural landscape, to the extent compatible with safety requirements established by the State.
- s. Street Trees
 - i. Where a grouping of ____ (5) or more units fronts a public roadway or internal street, ____ (1) street tree(s) per ____ (50) feet shall be planted along the said roadway or street. In addition, street trees shall be planted along public roadways or internal streets passing through proposed common or public open space if deemed necessary by the **Municipal Board**. Street trees shall be located so as not to interfere with the installation and maintenance of utilities and paths, trails, or sidewalks that may parallel the street.
 - ii. Informal arrangements of street trees are encouraged to avoid the urban appearance that regular spacing may invoke, unless planted within a grouping of ____ (12) or more buildings, or an existing hamlet, village, or town.
 - iii. The species of street trees shall be selected from the “List of Recommended Species for Landscaping” adopted by the **Municipal Board**. Street tree plantings shall comply with all applicable requirements in the **Municipal** Land Subdivision Control Ordinance or other applicable ordinances.

SECTION 3: Subsection C, Sub-subsection 7s – Continued

NOTE: It is recommended that a “List of Recommended Species for Landscaping” be developed by each local government to be used as a technical reference. It is beyond the scope of this model ordinance to compile such a list; however, it is recommended that street trees be deciduous and native to the Region. For a list of native species, endangered native species, and invasive species, municipalities should reference the Native Plant Society of New Jersey at www.npsj.org.

t. Transitional Areas

- i. Refer to [Sub-subsections 7l](#) above for situations where development shall be screened from public roadways, internal streets, and/or facilities with natural, planted, or manmade features.
 - ii. The boundaries of preserved open space shall be marked by existing natural features, such as hedgerows, edges of woodlands, streams, or individual large trees, wherever possible. Where no natural demarcations exist, transition planting shall consist of an informal arrangement of native plant species combined with infrequent mowing, in order to create a low-maintenance, natural landscape. Where structural demarcations are required, non-intrusive signage or markings shall be used in order to ensure integrity of open spaces, which include, but are not limited to, fiberglass boundary stakes and decorative plaques. Trails in preserved open space that are located within ___ feet of homes shall be marked by existing natural features, wherever possible.
 - iii. In general, transition planting shall be located adjacent to the development rather than adjacent to the public roadway, internal street, and/or public facility.
 - iv. Where structural demarcations, such as fences, are used, they shall be the minimum needed to accomplish this objective, except along the perimeter of agricultural lands. A combination of transition planting and fencing, or other structural demarcations such as alleys, is encouraged to divide residential and other permitted non-agricultural uses from agricultural lands. In no case shall berms be constructed.
- u. Energy Conservation
To reduce solar heat gain, deciduous shade trees shall be planted near the southern facades of buildings to block the summer sun. To reduce heating energy costs, groupings of ____ (5) or more residences shall include the planting of evergreen windbreaks to block northwest winds in the winter, unless the preservation of natural, cultural, and/or historic features precludes such planting.
- v. Maintenance of Natural and Cultural Features
Natural and cultural features shall generally be maintained in their natural condition, but may be modified to improve their appearance, or restore their overall condition and natural processes, as recommended by natural resource professionals and in compliance with an approved land stewardship plan, as described in [SECTION 4, Subsection G](#). Permitted modifications include:

SECTION 3: Subsection C, Sub-subsection 7v – Continued

- (1) Woodland preservation
- (2) Reforestation
- (3) Meadow management
- (4) Wetlands management
- (5) Stream bank protection
- (6) Buffer area landscaping

* * * * *

SECTION 4: Preserved Open Space & Common Facilities

A. Conservation

Preserved open space shall be restricted in perpetuity from further subdivision and/or land development by deed restriction, conservation easement, or other agreement in a form acceptable to the *Municipal Board* upon recommendation of the *Municipal* Attorney and duly recorded in the office of the County Register of Deeds.

B. Permitted Uses in Preserved Open Space

1. Open space uses, primarily passive in nature, including wildlife sanctuaries, forest preserves, nature centers, trails, picnic areas, and similar uses.
2. Conservation of natural features in their existing state.
3. Continuation and expansion of agricultural activities including:
 - a. The cultivation, harvesting, and sale of crops and related products produced on the farm;
 - b. The raising and sale of livestock or fowl, with associated pasture and barnyards that currently exist;
 - c. Orchards, nurseries, and related horticultural uses;
 - d. Growing and sale of Christmas trees;
4. Parking areas where necessary to serve active recreation facilities.

Municipalities may need to shorten or expand permitted uses in preserved open space as it relates to the definition of agriculture set forth in [SECTION 5, Subsection 1](#). Municipalities should carefully evaluate the list of permitted uses in order to ensure the economic viability of agricultural lands. Additional permitted uses could include spin-off businesses, such as bed and breakfast inns.

C. Conditional Uses in Preserved Open Space

The following conditional uses may be permitted by the *Municipal Board*, provided the proposed use shall not adversely impact the rural character of the *Municipality* and shall be consistent with the overall objectives of this Ordinance as listed in [SECTION 2: Purpose and Intent](#).

1. The installation of new buildings or other structures as required by agricultural uses. The total building coverage of such new agricultural buildings or structures shall not exceed _____ square feet.
2. Adaptive reuse of barns to promote the preservation of such structures, provided such barns have existed for at least 20 years prior to the effective date of this Ordinance.
3. The installation of new buildings or other structures as required by recreational uses. The total building coverage of such new buildings or structures shall not exceed _____ square feet.

NOTE: The list of conditional uses may need to be shortened or expanded as appropriate for the local municipality. Typical uses that may be added include: camps and campgrounds, public and private recreation areas for non-intensive uses, hunting or fishing preserves, game farms, and golf courses.

SECTION 7 – Continued

D. Prohibited Uses in Preserved Open Space

1. The use of non-recreational motor vehicles, except on public streets and parking areas. Maintenance, law enforcement, emergency, and farm vehicles are exempt from this limitation.
2. The use of recreational motor vehicles in preserved open space, unless otherwise permitted by _____.
3. Cutting of healthy trees, re-grading, topsoil removal, altering, diverting, or modifying water courses or bodies, except in compliance with an approved land stewardship plan, as described in [Subsection G](#) below.

E. Ownership of Preserved Open Space

The following methods may be used, either alone or in combination, to own common facilities. Common facilities shall not be transferred to another entity except for transfer to another method of ownership permitted under this section, and then only when there is no change in the common facilities. Ownership methods shall conform to one or more of the following:

1. **Homeowners Association**

Common facilities shall be held in common ownership as undivided proportionate interests by the members of a homeowners association, subject to the provisions set forth herein:

- a. The applicant shall provide to the ***Municipality*** a description of the organization, including its bylaws, and all documents governing maintenance requirements and use restrictions for common facilities. Such documents shall be approved as to form by the ***Municipal*** Attorney.
- b. The organization shall be established by the owner or applicant and shall be operating, with financial subsidy by the applicant, if necessary, prior to the sale of any dwelling units in the development.
- c. Membership in the organization shall be mandatory for all purchasers of dwelling units therein and their successors and assigns.
- d. The organization shall be responsible for maintenance and insurance of common facilities.
- e. The members of the organization shall share equitably the costs of maintaining, insuring, and operating common facilities.
- f. The organization shall have or hire adequate staff to administer, maintain, and operate common facilities.
- g. The applicant for any subdivision or development proposed to contain common facilities shall arrange with the ***Municipality's*** Assessor a method of assessment of the common facilities which will allocate to each tax parcel in the development a share of the total assessment for such common facilities.
- h. Written notice of any proposed transfer of common facilities by the homeowners association or the assumption of maintenance of common facilities must be given to all members of the organization and to the ***Municipality*** at least 30 days prior to such event.
- i. The applicant (subdivider) shall not be released from performance guarantees or ***Municipal*** acceptance of improvements until Homeowners Association is fully formed and operational with a duly elected Board of Directors and full facilities to maintain the common space.

SECTION 7: Subsection E – Continued

2. Condominium Agreements

Common facilities shall be controlled through the use of condominium agreements. Such agreements shall be approved as to form by the *Municipal* Attorney and shall comply with current State or local Statutes. All common open space and other common facilities shall be held as “common elements” by the unit owners in the form of undivided percentage interests in accordance with the condominium documents. An association of unit owners shall be formed to govern the affairs of the condominium and membership shall be mandatory.

3. Fee simple dedication to a public agency

The *Municipality* or other public agency acceptable to the *Municipality* may, but shall not be required to, accept any portion of the common facilities, provided that:

- a. There shall be no cost of acquisition, other than costs incidental to the transfer of ownership, such as title insurance.
- b. Any facilities so dedicated shall be accessible to all residents of the *Municipality*, if the *Municipality* so chooses.
- c. The *Municipality* or other public agency shall maintain such facilities.

4. Dedication of conservation easements to a public agency

The *Municipality* or other public agency acceptable to the *Municipality* may, but shall not be required to, accept easements for public use of any portion of the common facilities, title of which is to remain in private ownership, provided that:

- a. There is no cost of easement acquisition, other than costs incidental to the transfer of ownership, such as title insurance.
- b. A satisfactory maintenance agreement shall be reached between the owner and the *Municipality*.
- c. Lands under a *Municipality* easement may or may not be accessible to residents of the *Municipality*.

5. Fee simple dedication to a nonprofit conservation organization

With the approval of the *Municipal Board*, an owner may dedicate any portion of the common facilities to a nonprofit conservation organization, provided that:

- a. The organization is acceptable to the *Municipality*.
- b. The conveyance contains appropriate provisions for proper reverter or re-transfer in the event that the organization becomes unwilling or unable to continue carrying out its responsibilities.
- c. A maintenance agreement acceptable to the *Municipality* is established between the owner and the organization, in accordance with **Subsection C** below.

6. Dedication of conservation easements to a nonprofit conservation organization

With the approval of the *Municipal Board*, an owner may dedicate conservation easements on any portion of the common facilities to a nonprofit conservation organization, provided that:

- a. The organization is acceptable to the *Municipality*.
- b. The conveyance contains appropriate provisions for proper reverter or re-transfer in the event that the organization becomes unwilling or unable to continue carrying out its responsibilities.

SECTION 7: Subsection E, Sub-subsection 6 – Continued

- c. A maintenance agreement acceptable to the *Municipality* is established between the owner and the organization, in accordance with [Subsection C](#) below.
- 7. Ownership retained by the original landowner
 - a. Ownership of common open space and facilities may be retained by the original landowner provided that:
 - b. The *Municipality* and/or residents of the development shall hold conservation easements on the land protecting it from any further development.

NOTE: The Fern Valley development on Block 15, Lot 3 in Tewksbury Township, Hunterdon County is an example of a project where ownership is retained by the original landowner.

- c. Resident access to the land is limited only by agreement of the residents of the development, as indicated by documents signed at the time of purchase of individual dwelling units.
- 8. Other Methods
Other methods acceptable to the *Municipal Board* upon recommendation by the *Municipal* Attorney.

F. Leasing of Preserved Open Space

Common open space lands may be leased to another person or other entity for use, operation, and maintenance, provided that:

- 1. The residents of the development shall at all times have access to such leased lands, except in the case of lease for agricultural purposes, in which case the residents, with their agreement, may be restricted from accessing the lands.

NOTE: Municipalities should consider facilitating the leasing of prime agricultural soils and soils of County and Statewide importance in order to contribute to the viability of the agriculture industry. Municipalities should contact the CABD for further guidance.

- 2. The common open space lands to be leased shall be maintained for the purposes set forth in this Section.
- 3. The operation of such leased open space lands may be for the benefit of the residents of the development only, or may be open to the public, if so determined by the residents.
- 4. The lease, and any transfer or assignment thereof, shall be subject to the approval of the *Municipal Board*.
- 5. Lease agreements shall be recorded in the office of the County Register of Deeds within 30 days of their execution, and a copy of the recorded lease shall be filed with the *Municipality*.

G. The Land Stewardship Plan

The Land Stewardship Plan shall include a narrative, based on the site analysis required by [SECTION 3, Subsection C, Sub-subsection 3](#), describing:

- 1. Existing conditions, including all natural, cultural, historic, and scenic elements in the landscape;
- 2. Objectives for each common open space area, including:

SECTION 7: Subsection G, Sub-subsection 3 – Continued

- a. The proposed end state for the area and the measures proposed for achieving the end state.
- b. Proposed restoration measures, including:
 - i. Measures for correcting increasingly destructive conditions, such as erosion. Address by having an approved Soil Conservation Plan.
 - ii. Measures for restoring historic features.
 - iii. A maintenance and operations plan, identifying activities needed to maintain the stability of the resources, including mowing schedules, weed control measures, planting schedules, and clearing and cleanup measures and schedules.

H. Maintenance and Operation of Common Facilities

- 1. A plan and narrative for the use, maintenance, and insurance of all common facilities, including provisions for funding, shall be provided to and approved by the ***Municipal Board*** prior to preliminary plat approval. Such plan shall:
 - a. Define ownership.
 - b. Establish necessary regular and periodic operation and maintenance responsibilities.
 - c. Estimate staffing needs, insurance requirements, and other associated costs and define the means for funding the same on an on-going basis.
 - d. Include a Land Stewardship Plan specifically focusing on the long- term management of open space lands. A draft Land Stewardship Plan shall be submitted with a preliminary plat, and a final Plan shall be submitted with the final plat. The Land Stewardship Plan shall comply with the requirements of [Subsection G](#) above.
 - e. At the discretion of the ***Municipal Board***, the applicant may be required to escrow sufficient funds for the maintenance and operation costs of common facilities for up to one year.
- 2. In the event that the association established to own and maintain common areas and facilities, or any successor organization thereto, fails to properly maintain all or any portion of the aforesaid common areas or facilities, the ***Municipality*** may serve written notice upon such association setting forth the manner in which the association has failed to maintain the aforesaid common areas and facilities. Such notice shall set forth the nature of corrections required and the time within which the corrections shall be made. Upon failure to comply within the time specified, the association, or any successor organization, shall be considered in violation of this Ordinance, in which case the ***Municipality*** shall have the right to enter the premises and take the needed corrective actions. The costs of corrective actions by the ***Municipality*** shall be assessed against the properties that have the right of enjoyment of the common areas and facilities.

* * * * *

SECTION 5: Definitions

Unless otherwise state, the following words shall, for the purposes of this Ordinance, have the meaning herein indicated. Any word used in this Ordinance that is not defined herein and that is defined in other articles of the *Municipal* Land Use Ordinance shall, for the purpose of this Ordinance, have the meaning defined therein.

Italicized words within definitions are further defined in this section.

Agriculture

The State Planning Commission defines agriculture as farming in all its branches, including: the cultivation and tillage of soil; the production, cultivation, growing, and harvesting of any agricultural, viticultural, or horticultural commodities; the raising and/or breeding of livestock, including but not limited to, dairy and beef cattle, sheep, goats, fur-breeding animals, companion animals, poultry, and swine; the breeding, boarding, or training of equine; the commercial harvesting, production, and processing of fish and shellfish, including aquaculture and marine production; the commercial production of bees and apiary products; the production of nursery, sod, floriculture, and forest products; and the harvesting, storage, grading, packaging, processing, distribution, and sale of such commodities where such activities occur at the point of production.

Municipalities may need to narrow or expand the scope of the definition of agriculture as it relates to the permitted uses in the remaining open space, as set forth in [SECTION 4, Subsection B](#). Municipalities should carefully evaluate the list of permitted uses in order to ensure the economic viability of agricultural lands. Additional permitted uses could include spin-off businesses, such as bed and breakfast inns.

Building Scale

The relationship between the *mass* of a building and its surroundings, including the width of the street, open space, and mass of surrounding buildings.

Cluster Development

Is a form of residential development that concentrates buildings or lots on a part of the site to allow the remaining land to be used for common open space, recreation, and preservation of environmentally sensitive features. The concentration of lots is facilitated by a reduction in lot size. A cluster development will consist of one or more *cluster groups* surrounded by common open space.

Cluster Group

Is a group of single-family detached *housing units* within a cluster development, surrounded by common open space that comprises at least ___ percent of the gross parcel area. The outer boundary of a cluster group shall be defined by the rear lot lines of the lots within the group.

Common Facilities

All the real property and improvements set aside for the common use and enjoyment of the residents of a development, including, but not limited to, buildings, open space, private streets, parking areas, walkways, recreation areas, drainage easements, storm water management facilities, and any utilities that service more than one unit, such as Wastewater and water supply facilities.

SECTION 5 – Continued

Common Open Space

Common open space is space that is dedicated and restricted for the use and enjoyment by residents of the development. It is land that has been designated, dedicated, reserved, or restricted in perpetuity from further development and is set aside for the use and enjoyment by residents of the development. *Common open space* shall not be part of individual residential lots, and shall be substantially free of structures, but may contain such recreational facilities for residents as are shown on the approved development plan.

Community Association

A condominium or homeowners association.

Condominium

A form of ownership combining individual unit ownership with shared use and ownership of common property or facilities, established in accordance with the requirement of New Jersey or *Municipal Statutes*. Common areas and facilities are owned by all members of the condominium association on a proportional, undivided basis. A condominium is a legal form of ownership and not a specific building type or style.

Condominium Association

An association, whose members consist of owners of *dwelling units* in a condominium, which administers and maintains the common property and common elements of a condominium.

Conservation Easement

The grant of a property right or interest from the property owner to another person, agency, unit of government, or organization stipulating that the described land shall remain in its natural, scenic, open, reforested, or wooded state, precluding future or additional development.

Context

The character of the buildings, streetscape, and neighborhood that surround a given building or site.

Conventional Development

Development under conventional zoning, which employs a fixed minimum lot size requirement, as specified in the appropriate regulations.

Cornice

The top part of an *entablature*, usually molded and projecting.

Cultural Feature

A site or location that has inherent cultural or aesthetic significance of local, regional, or statewide importance. Such features include, but are not limited to: greenways and trails, dedicated open space, historic sites and districts, archeological sites, scenic corridors, and natural landscapes of exceptional aesthetic or cultural value and are recognized by the State Planning Commission.

SECTION 5 – Continued

Deed Restriction

A restriction on the use of a property set forth in the deed.

Detached Garage

Garages constructed on residential lots that are not attached to the principal residence except by pergolas, indoor or outdoor connecting corridors or the like.

Dwelling Unit

A dwelling unit refers to a single-family dwelling.

Entablature

Originally an elaborated beam supported by columns. Now the term generally refers to an elaborated horizontal band along the exterior of a building. It is used primarily beneath the roofline, and sometimes on the façade between floors.

Elevation

A head-on view of an exterior *façade* of a structure.

End Circle

A cul-de-sac that houses greenspace in the center.

Façade

An exterior building face or wall.

Farmstead

A group of existing buildings with accessory structures used for agricultural purposes, such as barns, silos, storage sheds, cribs, and coops, and which may or may not include a dwelling.

Fee Simple

A transaction where there is no cost of acquisition, other than costs incidental to the transfer of ownership, such as title insurance. The land has unrestricted rights of disposition.

Fenestration

Window and other openings on a building *façade*.

Floodplains

Are those lands, including the floodplain, flood fringe, floodway, and channel, subject to inundation by the 100-year recurrence interval flood or, where such data are not available, the maximum flood of record.

Hedgerow

A row of shrubs or trees planted or grown for enclosure or separation of fields.

SECTION 5 – Continued

Height of Building

The vertical distance measured from the average elevation of the existing grade of the building to the highest point of a flat or multi-level roof or, for gable or hip roofs, to the mean height between the eaves and the ridge. Chimneys, spires, towers, mechanical penthouses, tanks, silos and other farm buildings, and similar projections not intended for human occupancy shall be excluded.

Historic Feature See *Historic Resource*.

Historic Resource

A site or location that has inherent historic or aesthetic significance of local, regional, or statewide importance. Such features include, but are not limited to: sites and districts, archeological sites, scenic corridors, and natural landscapes of exceptional aesthetic or cultural value and are recognized by the State Planning Commission.

Homeowners Association

An association combining: individual home ownership with shared use, ownership, maintenance, and responsibility for common property or facilities; including private open space, within a land division or other development.

Housing Unit

A housing unit is a single-family detached dwelling on an individual residential lot.

Internal Street

A private or public way that affords the principal means of access to buildings in a development.

Loop Lane

A u-shaped loop drive that houses green space.

Massing

The three-dimensional bulk of a structure: height, width, and depth.

Meadow

A tract of grassland, either in its natural state or used as pasture or for growing hay.

Mid-Sized Hamlet

For the purposes of this Ordinance, a mid-sized hamlet is defined as a residential development of 12 to 29 units with buildable lot areas of less than 10,000 square feet where common open space is encouraged.

Mixed Use Building

A building containing more than one use, e.g. retail on the ground floor and offices and/or housing above.

SECTION 5 – Continued

Natural Feature

See *Natural Resource*.

Natural Resource

Federal and State laws define natural resources as land, fish, wildlife, biota, water (surface/groundwater), wetlands, and other resources, such as forests and parks, that are managed by or held in trust by the government for the benefit of the public. Natural resources are not limited by the ownership of the property on which the natural resources are found.

Natural Resource Grouping

A form of concentrated development designed to preserve natural resources in lieu of or in addition to cultivated land.

Net Buildable Acreage or Net Buildable Area (NBA)

Is the calculated area upon which the density for development is computed. Net buildable acreage is the area of a site remaining after subtracting all or a percentage of infrastructure and conservation areas from the site's gross area, including existing street rights-of-way, streams and required stream corridors, floodplains, wetlands, ponds and lakes, steep slopes, and utility and railway rights-of-way.

Nonprofit Conservation Organization

A nonprofit corporation, charitable trust, or other nonprofit organization described in Section 501(c)(3) of the Internal Revenue Code, which includes the “acquisition of property or rights in property for conservation purposes” as part of its mission, as reflected in the bylaws, charter, or incorporation papers of the organization.

Open Space

See *Preserved Open Space*.

Portico

An open-sided structure attached to a building sheltering an entrance or serving as a semi-enclosed space.

Preserved Open Space

Preserved Open Space shall include land specifically purchased and protected as open space, as well as undeveloped land within a development that has been designated, dedicated, reserved, or restricted in perpetuity from further development and is set aside for open space uses such as: public space, privately owned, Municipality owned, Green Acres, farming, wildlife sanctuaries, forest preserves, nature centers, trails, picnic areas, and similar uses. Preserved open space includes common open space that is dedicated and restricted for the use and enjoyment by residents of the development.

Proportion

The relationship or ratio between two dimensions, such as the height and width of a window in relation to the front *elevation* of a building.

SECTION 5 – Continued

Public Viewshed

That which is reasonably visible, under average conditions, to the average observer located on any public land or right-of-way, or on any semi-public or private space that is normally accessible to the general public.

Right To Farm

The State Planning Commission defines Right to Farm as public policy decision to protect farmers against municipal regulations, private nuisance suites, and unnecessary constraints on essential agricultural management practices, if these practices are consistent with federal and state law and are not a threat to public health or safety.

Restrictive Covenant

See *Deed Restriction*.

Roundabout

A small traffic circle.

Rural Grouping

A form of concentrated development designed to preserve a maximum amount of contiguous farmland.

Rural Character

The existing and preferred patterns of land use and development established for lands designated as rural areas or lands by the ***Municipal*** Master Plan. Rural characteristics include, but are not limited to: open fields and woodlots interspersed with homesteads and serviced by small rural commercial clusters; low residential densities, small-scale agriculture, woodlot forestry, wildlife habitat, clean water, clean air, outdoor recreation, and low traffic volumes; areas in which open space, the natural landscape, and vegetation predominate over the built environment; lifestyles and economies common to areas designated as rural areas and lands under the ***Municipal*** Master Plan; visual landscapes that are traditionally found in areas designated rural areas and lands under the ***Municipal*** Master Plan; areas that are compatible with the use of the land by wildlife and for fish and wildlife habitat; areas that reduce the inappropriate conversion of undeveloped land into sprawling, low-density development; areas that generally do not require the extension of urban governmental services; and areas that are consistent with the protection of natural surface water flows and ground water and surface water recharge and discharge areas.

Rural Heritage

See *Rural Character*.

SECTION 5 – Continued

Scale

The degree of relatedness to the size and *proportions* of a known unit of measurement, typically the human body. The size of the exterior wall planes (or architectural features) is one of the most important measurements of scale. If a wall plane is the approximate dimensions of the human body, it is of a human scale. If the size of the wall plane greatly exceeds the human body, it is referred to as a monumental scale. The term can be broadened to include the relationship between the human body and a variety of landscape elements, including not only buildings, but exterior spaces, such as parks, plazas, and streets.

Small Hamlet

For the purposes of this Ordinance, a small hamlet is defined as a residential enclave with fewer than 12 units and buildable lot areas of less than 10,000 square feet.

Speed Table

A raised portion of a roadway or *internal street* that is flat and often textured, which is designed to slow traffic and in some cases, allow for pedestrian crossings.

Splitter Island

An area of land, usually landscaped, that divides two sections of a roadway or *internal street*.

Stream Corridor

Any river, pond, lake, or wetland, together with adjacent upland areas, that supports protective bans of vegetation that line the water's edge.

Street Furniture

Functional elements of the *streetscape*, including but not limited to benches, trash receptacles, planters, telephone booths, kiosks, sign posts, street lights and bollards.

Streetscape

Any river, pond, lake Built, planted, and/or natural elements that define the character of a street.

Swale

A shallow troughlike depression that carries water mainly during rainstorms or snow melts.

Unconstrained Land

The area of a tract or parcel that: does not contain floodplains, wetlands, steep slopes, or other limiting environmental features.

Vernacular Architecture

A building form native to a particular area based on tradition, but without regard for formal or precise styles.

Vernal Pond

A small, shallow, intermittently flooded wetland, generally dry for most of the summer and fall. Vernal ponds provide critical habitat for breeding amphibians, and are also important for certain invertebrates and plants.

SECTION 5 – Continued

Viewshed

See *Public Viewshed*.

Village

Any river, pond, lake For the purposes of this Ordinance, a village is defined as a residential or mixed-use development with mandatory common open space and at least 30 units with buildable lot areas of less than 10,000 square feet.

Wetlands

An area that is inundated or saturated by surface water or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions (freshwater).

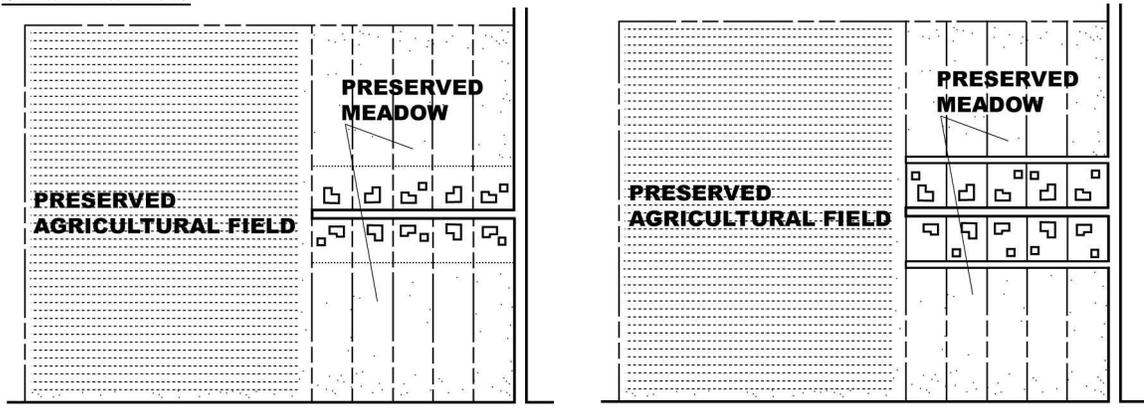
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APPENDIX: Guidance Manual

A. Sample Plans

The following development samples are based upon studies of Hunterdon County’s historic settlements. Three types of groupings have been developed: small hamlets, defined as residential enclaves with fewer than 12 units; mid-sized hamlets, defined as residential enclaves with 12 to 29 units where common open space is encouraged; and villages, defined as residential or mixed-use enclaves with at least 30 units and mandatory common open space. Each type of grouping falls into one of two categories: rural groupings, developments that are designed to preserve a maximum amount of contiguous farmland; and natural resource groupings, developments that are designed to preserve natural features in lieu of or in addition to cultivated land.

1. Small Hamlets



Diagrams 1 & 2: Rural Groupings with Narrow 2-Acre Lots

The sample plans above have been designed to preserve a maximum amount of contiguous farmland, and to maintain rural views from public roadways. Lot sizes are two acres in order to accommodate onsite septic systems. In order for the development to be configured into a small hamlet, houses are positioned at the front of long, narrow lots and lawn areas are limited to 10,000 square feet. Preserved meadows to the back of the residential lots would be managed by each lot owner, although a maintenance agreement for the necessary planting and mowing could be arranged with the neighboring farmer(s) or other party. In the image on the right, alleys are positioned at the edge of the buildable lot area in order to prevent easement creeping. Wherever possible, transitional areas between agricultural and residential land uses should include a combination of vegetative buffers and structural barriers such as alleys and fencing. In no cases should berms be constructed.

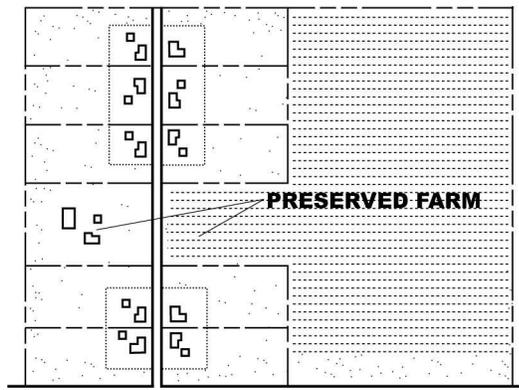


Diagram 3: Multiple Rural Groupings with Wide 2-Acre Lots

In the above example, the development has been configured into multiple groupings in order to preserve an existing agricultural field and associated farm buildings. In cases where the remaining open space is retained as a farm, the development should be designed to maintain the viability of agricultural activities.

APPENDIX: Subsection A – Continued

3. Mid-Sized Hamlets

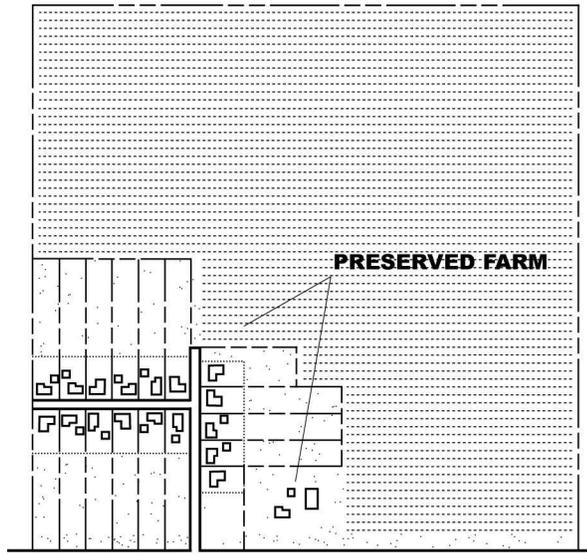


Diagram 1: Rural Grouping with 1-Acre Lots

The above hamlet has been designed to preserve a maximum amount of contiguous farmland. Lot sizes maintain one acre in order to accommodate onsite septic systems or a community wastewater system. Long, narrow lots with limited lawn areas provide opportunities to buffer new residences from agricultural uses and to preserve rural views from public roadways. Preserved meadows to the back of the residential lots would be managed by each lot owner, although a maintenance agreement for the necessary planting and mowing could be arranged with the neighboring farmer(s) or other party.

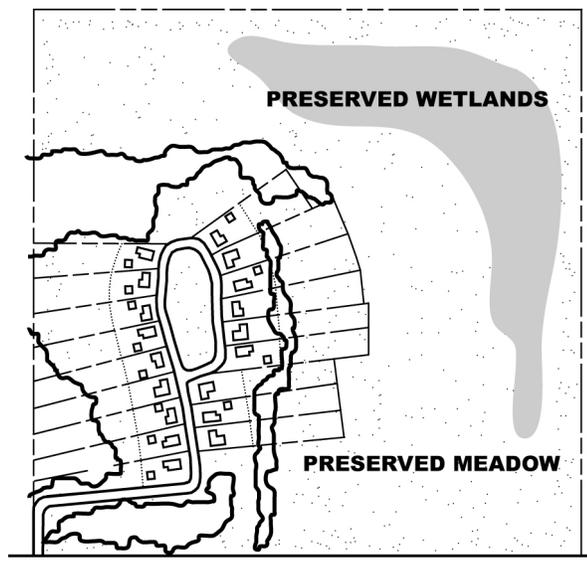


Diagram 2: Natural Resource Grouping with 1-Acre Lots and Common Open Space

In the above example, the development has been designed to preserve existing woodlands and wetlands, provide common open space, and maintain rural views from the public roadway. The interior street is positioned along the lot line in order to provide a roadway connection with the neighboring parcel.

APPENDIX: Subsection A – Continued

3. Villages

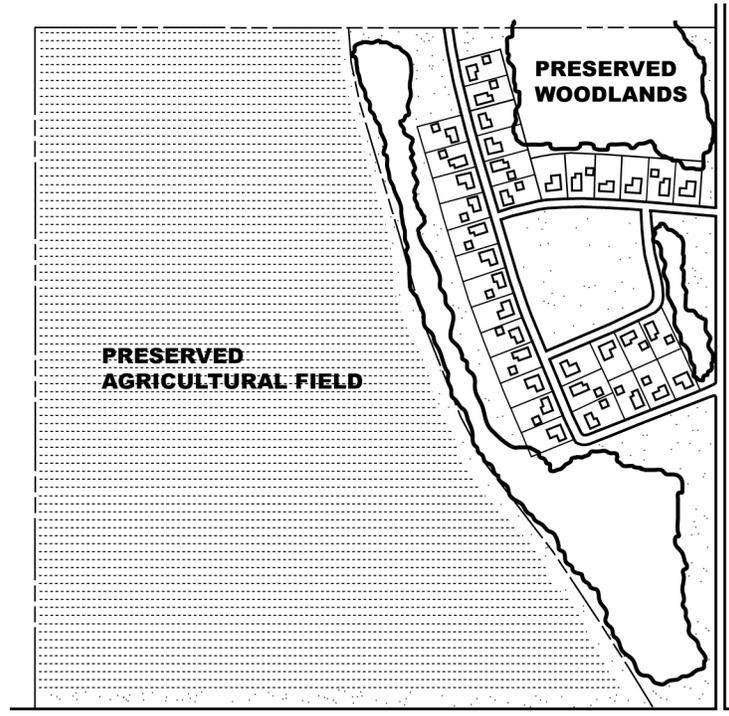


Diagram 1: Natural Resource Grouping with Common Open Space

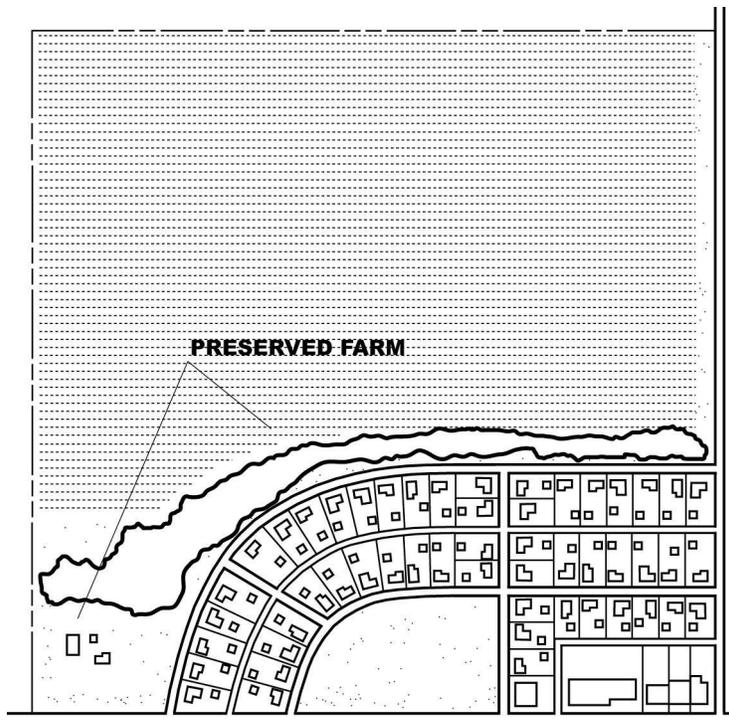


Diagram 2: Rural Grouping with Common Open Space and Commercial Uses

APPENDIX: Subsection A – Continued

4. Hamlet and Village Combinations

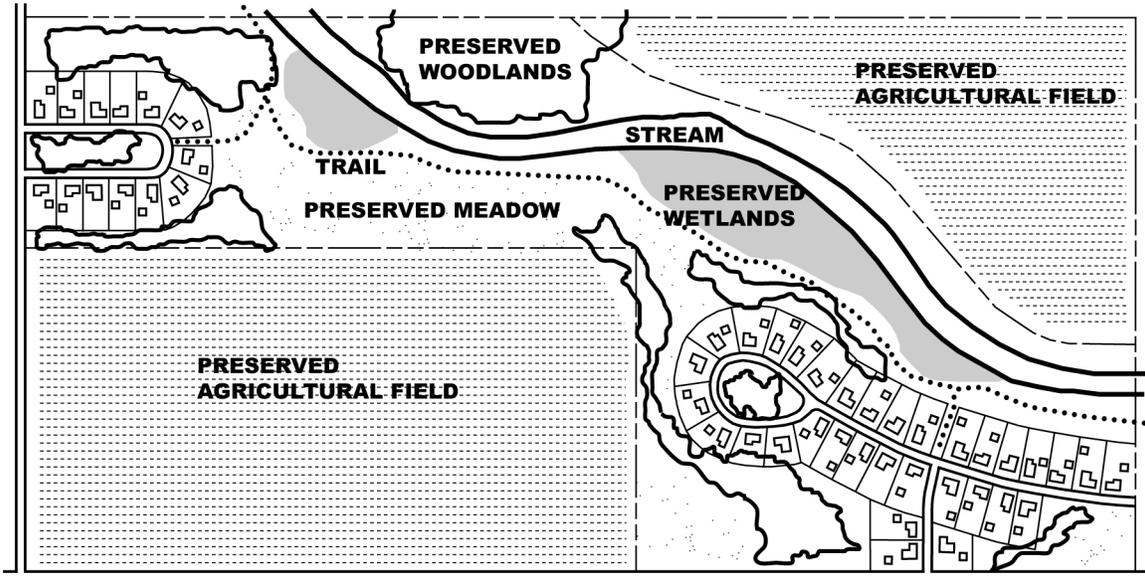


Diagram 1: Natural Resource Groupings Designed Around Several Environmental Features

APPENDIX – Continued

B. Sample Design Regulations for Groupings

The following sample design regulations for concentrated development patterns are based upon studies of Hunterdon County’s historic settlements. The “Maximum Density” values below are for demonstration purposes only; actual densities will vary depending on local conditions. Three sets of standards have been developed: one for village groupings; a second for rural hamlet groupings; and a third for natural resource hamlet groupings.

1. Village Grouping

a. Density and Dimensional Standards

Minimum Site Area	75 acres
Minimum Development Size	25 units*
Maximum Density	1 dwelling unit per 3 net buildable acres
Minimum Open Space	88% (10% noncontiguous)
Lot Area	See Sub-subsection 4 below.

*Village lot sizes preclude the use of septic systems. For developments under 50 units, nonstructural wastewater systems such as constructed wetlands may need to be considered. Refer to [Subsection C](#) below for information regarding alternative wastewater management systems. Municipalities may wish to determine a maximum development size, although without density transfers or higher-density base zoning an uncharacteristically large parent tract would be required to develop a grouping of more than 100 units.

b. Architectural Design Regulations

Maximum Principal Structure Height: Minimum Maximum	1.5 stories 3 stories or 35 feet
Maximum Non-Agricultural Accessory Structure Height	18 feet
Maximum Agricultural Accessory Structure Height	100 feet
Minimum Fenestration on Visible Facades	20%
Minimum Fenestration on Southern Facing Facades	50%
Housing Design Variety	See SECTION 3, Subsection C, Sub-subsection 7j.
Housing Type Variety (i.e. Apartment, Attached House, Detached House): Minimum for 100 units or less Minimum for more than 100 units	See Sub-subsection 4 below. 2 3

APPENDIX: Subsection B – Continued

2. Rural Hamlet Grouping

a. Density and Dimensional Standards

The following density and dimensional standards have been designed to provide for larger lot areas in order to accommodate individual septic systems. Nonetheless, the maximum buildable lot area and maximum front setback require homes to be positioned to the front of long, narrow lots, ensuring that developments reflect the size and scale of Hunterdon County’s historic settlements.

Minimum Site Area	30 acres
Development Size: Minimum Maximum	5 units 24 units*
Maximum Density	1 dwelling unit per 3 net buildable acres
Minimum Open Space	66% (10% noncontiguous)
Lot Area:	
Minimum	1 acre
Maximum	2 acres
Maximum Buildable Lot Area	10,000 square feet
Maximum Front Setback	25 feet**

*Long, narrow 1- to 2-acre lots, as required by the maximum buildable lot area and maximum front setback, preclude large-scale developments from being tightly grouped.

**Refer to [Sub-subsection 4](#) below for a full list of suggested setbacks and related design regulations for the developable section of each lot.

b. Architectural Design Regulations

Maximum Principal Structure Height: Minimum Maximum	1.5 stories 3 stories or 35 feet
Maximum Non-Agricultural Accessory Structure Height	18 feet
Maximum Agricultural Accessory Structure Height	100 feet
Minimum Fenestration on Visible Facades	20%
Minimum Fenestration on Southern Facing Facades	50%
Housing Design Variety	See SECTION 3, Subsection C, Sub-subsection 7j.

APPENDIX: Subsection B – Continued

3. Natural Resource Grouping

a. Density and Dimensional Standards

The following density and dimensional standards have been designed to provide for larger lot areas in order to accommodate individual septic systems. Contiguous open space requirements have been lessened in order to allow the development to be designed around existing natural features.

Minimum Site Area	30 acres
Development Size: Minimum Maximum	5 units 24 units*
Maximum Density	1 dwelling unit per 3 net buildable acres
Minimum Open Space	66% (50% noncontiguous)
Lot Area:	
Minimum	1 acre
Maximum	2 acres
Maximum Buildable Lot Area	10,000 square feet**

*The assumption is that developments with more than 24 units should have lot sizes smaller than 1 acre in order to preserve contiguous open space and provide opportunities for a mix of uses.

**Refer to [Sub-subsection 4](#) below for a full list of suggested design regulations for the developable section of each lot.

b. Architectural Design Regulations

Maximum Principal Structure Height: Minimum Maximum	1.5 stories 3 stories or 35 feet
Maximum Non-Agricultural Accessory Structure Height	18 feet
Maximum Agricultural Accessory Structure Height	100 feet
Minimum Fenestration on Visible Facades	20%
Minimum Fenestration on Southern Facing Facades	50%
Housing Design Variety	See SECTION 3, Subsection C, Sub-subsection 7j.

APPENDIX: Subsection B – Continued

4. Sample Housing Type Standards

The following standards are intended to supplement a housing type variety requirement, as described in this [Sub-subsection 1b](#) above. Municipalities may want to include such a requirement in subdivisions with 25 or more units in order to ensure a balance of housing types within a municipality, providing opportunities for affordable housing, as well as for market-rate housing for underrepresented demographic groups, such as recent graduates and newlyweds.

a. Attached House

This housing type has been designed so that the maximum contiguous building width is in scale with a large detached house.

Lot Area (Buildable Lot Area for lots greater than 3,500 square feet): Minimum Maximum	1,800 square feet 3,500 square feet
Lot Width (measured at front lot line): Minimum Maximum	23 feet 36 feet
Front Yard: Minimum Maximum	5 feet 10 feet
Side Yard: Minimum Maximum	0 feet (5 feet for end unit) 0 feet (10 feet for end unit)
Minimum Rear Yard	23 feet
Accessory Building Setback: From Side Lot Lines From Rear Lot Lines	0 feet (3 feet for end unit) 3 feet
Maximum Total Floor Area	3,000 square feet
Maximum Building Footprint	50% lot area or 1,000 square feet
Maximum Impervious Cover	80%
Maximum Contiguous Building Width	4 units or 100 feet



Attached homes designed to blend with single-family homes

APPENDIX: Subsection B, Sub-subsection 4 – Continued

b. Small Detached House

This housing type has been designed to be in scale with small groupings of attached homes (See images below).

Lot Area (Buildable Lot Area for lots greater than 6,500 square feet): Minimum Maximum	3,000 square feet 6,500 square feet
Lot Width (measured at front lot line): Minimum Maximum	30 feet 50 feet
Front Yard: Minimum Maximum	5 feet 15 feet
Minimum Side Yard	5 feet; 12 feet combined
Minimum Rear Yard	35 feet
Accessory Building Setback: From Side Lot Lines From Rear Lot Lines	3 feet 3 feet
Maximum Total Floor Area	3,000 square feet
Maximum Building Footprint	33% lot area or 1,500 square feet
Maximum Impervious Cover	70%



Small detached homes blend with attached homes that are designed as rowhouses

APPENDIX: Subsection B, Sub-subsection 4 – Continued

c. Large Detached House

The maximum lot width, maximum building footprint, and maximum floor area requirements have been designed to keep large houses in scale with the neighborhood, and to discourage the placement of large garages to the front of the property.

Lot Area (Buildable Lot Area for lots greater than 10,000 square feet): Minimum Maximum	6,501 square feet 10,000 square feet
Lot Width (measured at front lot line): Minimum Maximum	50 feet 70 feet
Front Yard: Minimum Maximum	10 feet 25 feet
Minimum Side Yard	5 feet; 12 feet combined
Minimum Rear Yard	35 feet
Accessory Building Setback: From Side Lot Lines From Rear Lot Lines	3 feet 3 feet
Maximum Total Floor Area	4,500 square feet
Maximum Building Footprint	1,500 square feet
Maximum Impervious Cover	40%



Examples of historic and contemporary large single-family homes

APPENDIX – Continued

C. Alternative Wastewater Treatment Systems

The conventional septic system is still the most commonly used device to dispose of domestic sanitary wastewater. However, new and innovative devices and components are becoming available that are often capable of performing better, of providing more effective pollution control, or perhaps are able to overcome certain site constraints. The New Jersey Department of Environmental Protection can presently enable the use of innovative or alternative systems or components through the issuance of a Treatment Works Approval, and will soon be able to approve them through its proposed Innovative and Alternative Approval Process. The following resource from the University of Minnesota is an overview of such systems.

“Residential Cluster Development”

J. L. Anderson and D. M. Gustafson, University of Minnesota Extension Service, 1998.

1. Introduction

Minnesota has a long history of providing wastewater treatment for clustered residential developments. In general, that has involved the installation of collector systems to solve existing problems. The best examples of these systems are found in lakeshore areas. Initially, most systems provided sewage treatment for resorts, where groups of cabins or lodges were hooked together by a sewer line delivering septic tank effluent to a soil-based treatment system. These systems have not been installed in new residential developments.

Some municipalities and small communities need to upgrade their wastewater treatment systems. Others are considering a cluster design for new residential developments. Local officials must decide what kind of wastewater treatment system to use. Until recently local officials had to choose from either a municipal wastewater treatment plant or a decentralized approach utilizing septic tanks and drainfields. There are now additional options available when using a decentralized approach. These alternatives include aerobic tanks, sand filters and constructed wetlands. Local officials need to review and evaluate their options carefully before selecting a specific system — including alternative systems — because the same approach won’t work in every case.

Currently, these alternative systems typically provide pretreatment to septic tank effluent before being discharged to a drainfield. To use these alternatives, more than the usual amount of long-term monitoring will be necessary to ensure that these systems consistently meet the operating standards claimed by manufacturers and proponents. From both a surface and groundwater perspective, soil-based treatment systems — if properly sited, installed, and maintained — can offer a high degree of protection and reliability.

In general, alternative systems serving clustered developments require more monitoring than systems that use septic tanks for pretreatment. Usually, alternative systems require additional pumps and sewage tanks, which results in extra maintenance. That’s why the organizations in charge of operating these systems need to be fiscally competent. While clustering has the potential to make operation and maintenance easier for an individual homeowner, a detailed plan for a development must be written and followed consistently.

APPENDIX: Subsection C, Sub-subsection 1 – Continued

If that is not done, treatment will be less effective and there will be a greater negative impact on water resources.

Once the decision is made to use a cluster design, there are a number of factors to consider before choosing the appropriate wastewater treatment system.

2. Design and Siting Considerations

To be cost-effective and provide acceptable sewage treatment, the following factors must be addressed before choosing a system type and design:

- a. Where the wastewater will be discharged to the environment;
- b. The type of collector sewer used;
- c. The estimated volume of flow (a number used to design the final treatment system);
- d. Site characteristics (including the land footprint and projected future use);
- e. System reliability and monitoring;
- f. System maintenance and personnel requirements;
- g. Adaptability to changes in system operation

3. Pollution Control Agency Permits

When wastewater is discharged to the surface or ground waters of the state, a National Pollutant Discharge Elimination System (NPDES) or a Minnesota State Disposal System (SDS) permit is required. These permits detail the wastewater source, types of requirements for discharge, the amount of monitoring necessary, and the minimum level of treatment required. The Minnesota Pollution Control (MPCA) issues and administers both of these permits. Effluent limits are developed to protect water quality standards and the designated uses of waters. Both permits require monitoring to ensure the system is meeting the assigned effluent limitations.

When wastewater is discharged to the ground water via the ground's surface a State Disposal System (SDS) permit is required. Additionally, if the discharge to the ground water is via the subsurface and over 10,000 gallons per day (gpd) an SDS permits is required. Local permits are required if the volume of wastewater discharged to the subsurface is less than 10,000 gpd. Future rules regarding class V injection wells, defined as any system that serves over twenty people, may impact the permitting of systems used in residential clusters.

An SDS permit requires ground water monitoring to demonstrate that drinking water standards are being met at the property boundary. If the system includes a licensed facility, such as a resort, mobile home park, hospital, retirement facility, etc., the Minnesota Department of Health (MDH) must also review the plan. The permit's terms and conditions will vary depending on the ultimate disposal location of the treated wastewater.

APPENDIX: Subsection C, Sub-subsection 3 – Continued

If the discharge is to surface water, effluent limitations will be specified within an NPDES permit to protect water quality standards and the designated uses of the waters of the state. If the discharge is to ground water, the permit applicant will be required to meet drinking water standards at the property boundary. In both cases the permit will include monitoring of the effluent to ensure that standards are being met and to demonstrate that the system is operating efficiently.

To obtain an NPDES or an SDS permit, a permit application must be submitted to the MPCA at least 180 days prior to starting construction of the wastewater treatment facility.

4. Site Characteristics

There are several factors that should be considered when planning a wastewater treatment system that serves a cluster development and discharges to groundwater. The first is a general assessment of the suitability of a site's geology and soil. Existing water table elevations, shallow aquifers, land slope, soil texture, and permeability must all be evaluated. In sensitive areas, additional treatment of the sewage effluent will be required. Site soil type and landscape position also need to be identified.

Soil type and wastewater flow determine the size of the system. The size and location of the soil treatment unit is determined by the estimated daily sewage flow and a sizing factor based on soil texture and permeability. Although not required, it is good planning practice to make sure that there is a secondary treatment site of equal size available. In the case of larger systems, those over 10,000 gpd, it is wise to be able to accommodate 2.5 times the estimated volume of flow. Providing additional area allows maximum operational flexibility and leaves room for future expansion.

There are a number of siting factors that can have a long-term impact on the operation and use of the system. Road and sewer development need to be coordinated with system siting and construction, for example. The collector sewer needs to conform with appropriate design standards. Location of the sewage treatment site needs to fit with the overall physical plan of the development. Areas reserved for future development need to be clearly identified. And the proposed sewage site needs to fit with existing plans for open space and buffers around a development's residences (see [Figure 1](#)).

APPENDIX: Subsection C, Sub-subsection 4 – Continued

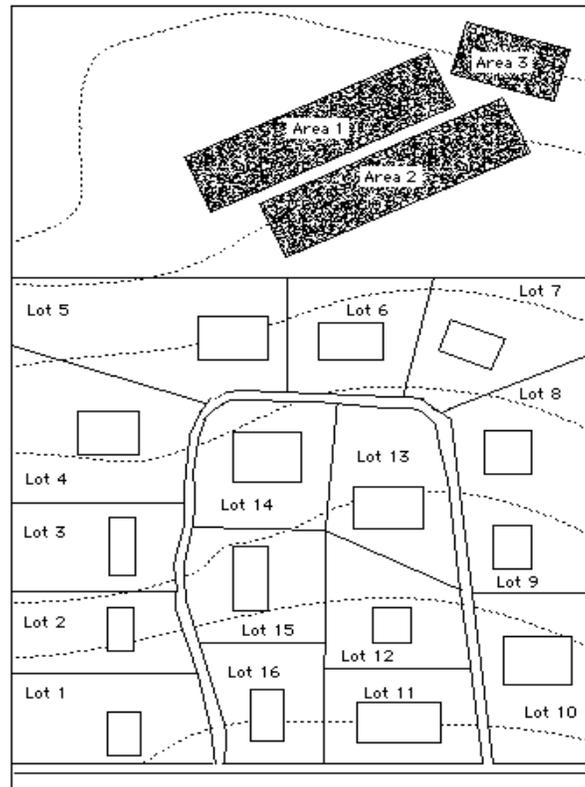


Figure 1. Siting of the proposed wastewater treatment system should fit in with the plan for the development.

5. Estimated Daily Sewage Flow

Once site characteristics have been defined, an estimate can be made of the volume of sewage flow from a development. There is no simple recipe to follow when estimating such flows. It's as much an art as it is a science. However, because the estimates of flow volume will greatly influence the type of system selected and how well that system performs, it's important that system designers and community decision-makers be as accurate as possible.

The regulatory agencies, MPCA and MDH, play a major role in estimating flow volumes. If the agencies choose to continue with the current approach, considered to have a large safety factor built in, then minimal deviation from the current conservative estimates spelled out in Minnesota Rules Chapter 7080 should be used ([Table 1](#)). Currently, any reduction in flows from Chapter 7080 requires approval by the permitting authority.

APPENDIX: Subsection C, Sub-subsection 5 – Continued

Table 1. Estimated sewage flows in gallons per day

Number of bedrooms	Type I	Type II	Type III	Type IV
2	300	225	180	
3	450	300	218	
4	600	375	256	60% of the values in Type I, II, or III columns
5	750	450	294	
6	900	525	332	
7	1050	600	370	
8	1200	675	408	

Type I: The total floor area of the residence divided by the number of bedrooms is more than 800 square feet, or more than two of the following water-use appliances are installed: automatic washer, dishwasher, water softener, garbage disposal, or self-cleaning furnace.

Type II: The total floor area of the residence divided by the number of bedrooms is more than 500 square feet, and no more than two water-use appliances are installed.

Type III: The total floor area of the residence divided by the number of bedrooms is less than 500 square feet, and no more than two water-use appliances are installed.

Type IV: Type I, II, or III homes but with no toilet wastes discharged into the sewage system.

Onsite Sewage Treatment Manual, University of Minnesota Extension Service, 1998, St. Paul.

Oversizing systems can have positive and negative results, depending on the final treatment system selected. For example, if a package plant (a non-soil-based treatment unit consisting of an aerobic tank followed by a chlorination process) provides wastewater treatment, oversizing leads to increased costs and lower operational efficiency.

On the other hand, some oversizing is desirable for soil-based treatment systems. Oversizing allows a treatment system’s parts to be rested periodically, creating more flexible operation and extending system life. From a regulatory view, oversizing also reduces the need for monitoring and maintenance. Both of these are positives for individual systems, where it is hard to get individuals to perform such simple maintenance tasks as the regular cleaning of septic tanks.

APPENDIX: Subsection C, Sub-subsection 5 – Continued

Flow is a critical piece of the puzzle. Keep in mind that basic decisions made early in designing a wastewater system carry through the construction and operating phases, and can have a large impact on system performance.

When estimating flows, it is important to strike a balance among three considerations — the desired treatment, the level of monitoring, and costs.

6. System Monitoring

In cluster wastewater systems, there is more focus on flexible operation and a greater need to monitor how well a system is doing. Monitoring adds an additional burden, to the owner-operator as well as the regulatory agency, because of the need to track, evaluate and change (or add to) a system based on its operating record.

7. System Types

After identifying the site and flow characteristics, the type of system can be selected. There is a wide variety of choices and they all offer advantages and disadvantages. The key is understanding each system's requirements and having a plan in place that will ensure the system's long-term operation. In looking at the available treatment options, it is necessary to discuss how they fit into a development plan, and where they should be used. It is important to note that all the systems described below require pretreatment, either through septic tanks or some other kind of sewage tank.

▪ **Sub-surface Systems**

· · · *Community Drainfields*

For individual sewage treatment systems not limited by soil conditions, the most commonly used unit is trenches. A drainfield trench is constructed by making a level excavation 18-36 inches deep. Clean rock is placed in the bottom of the excavation to a depth of 12-24 inches; then, a four-inch diameter distribution pipe, using one pipe per trench, is placed on the rock and covered with soil (Figure 2). Pipe or chamber systems without gravel can be used as substitutes for the rock. Treatment occurs in the natural soil through interrelated physical, chemical, and biological processes.

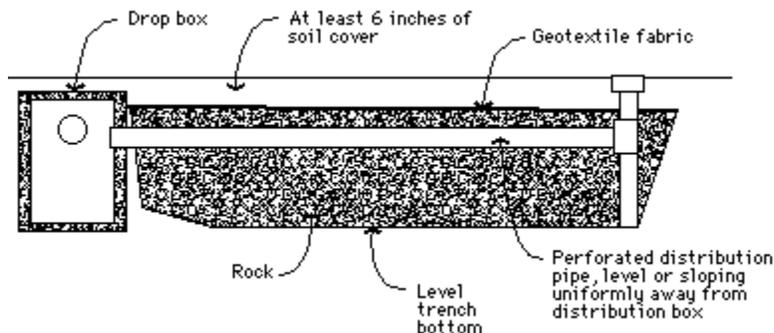


Figure 2. A typical drainfield trench installation.

APPENDIX: Subsection C, Sub-subsection 7 – Continued

Special siting considerations for trench systems include:

- trenches need to be installed on a site's contour with the excavation depth limited by saturated soil or bedrock;
- a minimum of 10 feet on center must be maintained between trenches;
- the site must be large enough to accommodate a series of trenches laid along the natural slope.

· · · *Soil Treatment Mounds*

In areas where limiting soil conditions do not allow the installation of sewage treatment trenches, mounds are an option. They are constructed with a layer of clean sand and leveled with a foot-deep rock layer before being covered by soil (see [Figure 3](#))

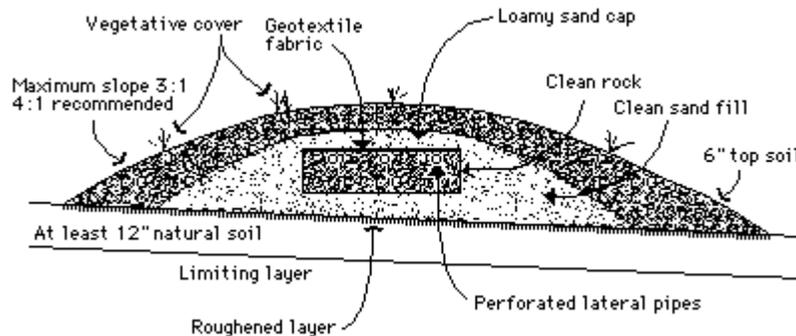


Figure 3. A typical mound installation.

Special siting and construction considerations for cluster mound systems are:

- the configuration needs to be a long, narrow rectangle;
- mounds need to be installed on a site's contour with the special consideration that they don't act as dams for surface or subsurface flow across the site;
- if more than one mound is required (which is usually the case), there must be adequate distance between them to allow for construction and to assure they do not interfere with one another hydraulically.

APPENDIX: Subsection C, Sub-subsection 7 – Continued

· · · *Constructed Wetland Systems*

Constructed wetlands treat wastewater by bacterial decomposition, settling, and filtering (see [Figure 4](#)). As in tank designs, bacteria break down organic matter in the wastewater, both aerobically and anaerobically. Oxygen for aerobic decomposition is supplied by the plants growing in the wetland. Solids are filtered and finally settle out of the wastewater within the wetland. After about two weeks in the wetland, effluent is usually discharged by gravity to an unlined wetland bed.

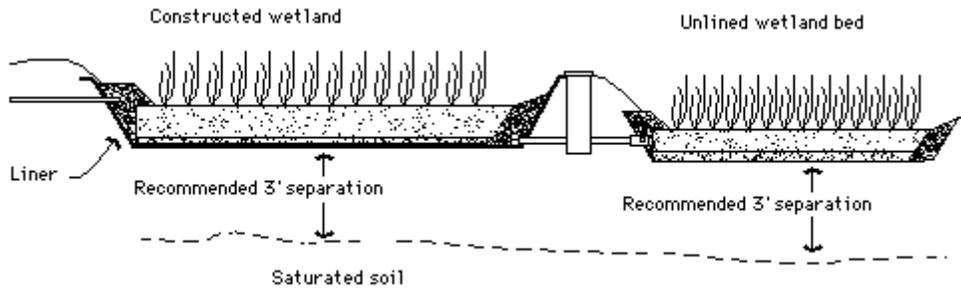


Figure 4. A constructed wetland system.

If these systems discharge effluent to surface ditches, they require a National Pollutant Discharge Elimination System (NPDES) permit. In theory, any wetland design could incorporate a soil treatment system for final effluent treatment, but since the wetland itself takes up a lot of space, communities are unlikely to construct a soil treatment system in addition to the wetland.

· · · *Sand Filters*

The sand filter uses sand, like a mound in a box, as a medium for treating wastewater. This system has been used with great success for over 100 years and there is a large amount of information available about design and applications (see [Figure 5](#)).

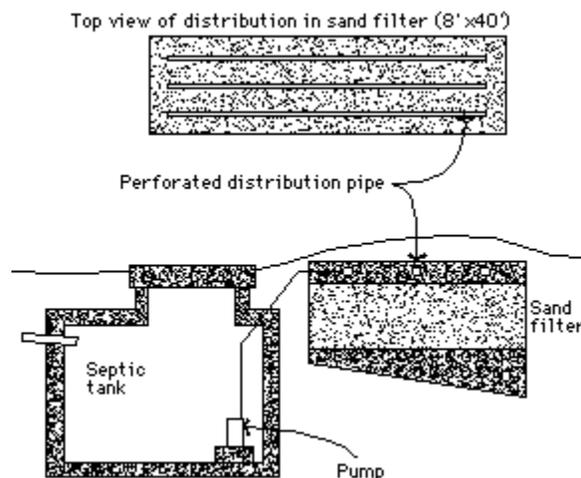


Figure 5. A typical sand filter installation.

APPENDIX: Subsection C, Sub-subsection 7 – Continued

Wastewater should be introduced by pressure distribution. The goal is to load the system as evenly as possible over the filter surface. This is best accomplished by using a pump to put the wastewater under pressure inside the pipe. This allows the waste to move through the filter at a rate that maximizes treatment. This system's treatment mechanisms are physical filtering and ion exchange. A properly operating sand filter should produce high quality wastewater.

· · · *Drip Irrigation*

This soil-based treatment system has been tested and used extensively in the southern United States. It uses small diameter tubing and a series of emitters to apply wastewater to the soil's upper layers (see [Figure 6](#)).

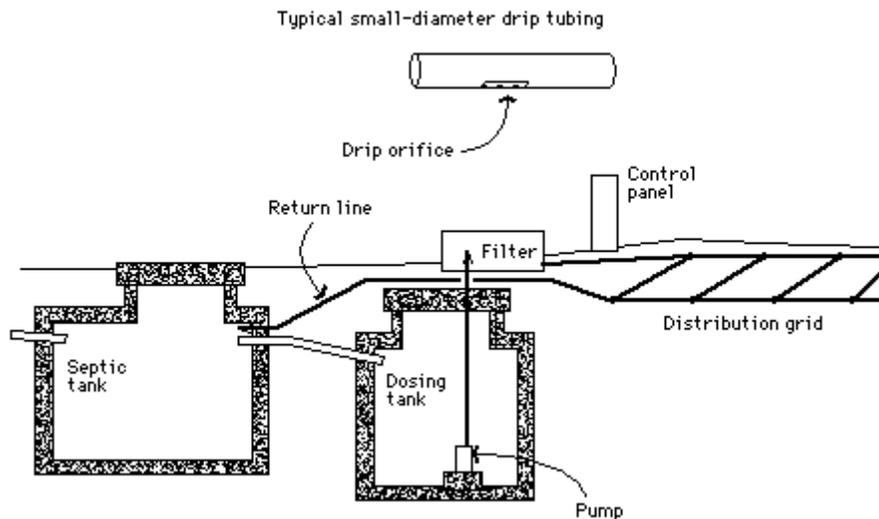


Figure 6. A typical drip irrigation installation. Figure 6 from Onsite Sewage Treatment Manual University of Minnesota Extension Service, 1998, St Paul.

By applying small amounts of effluent over a large area, evaporation is maximized, as is plants' ability to take up water and nutrients. The system is slightly larger than a conventional trench system. Although adding the effluent slowly over a large area increases treatment efficiency, lines freezing in winter can be a problem.

▪ **Above-surface Systems**

· · · *Aerobic Tanks and Package Plants*

Aerobic tanks treat wastewater far better than conventional septic tanks. This is due to the oxygen that is added to the liquid in the tank (see [Figure 7](#)). Aerobic tanks are, however, considerably more complicated to design, construct and maintain than septic tanks.

APPENDIX: Subsection C, Sub-subsection 7 – Continued

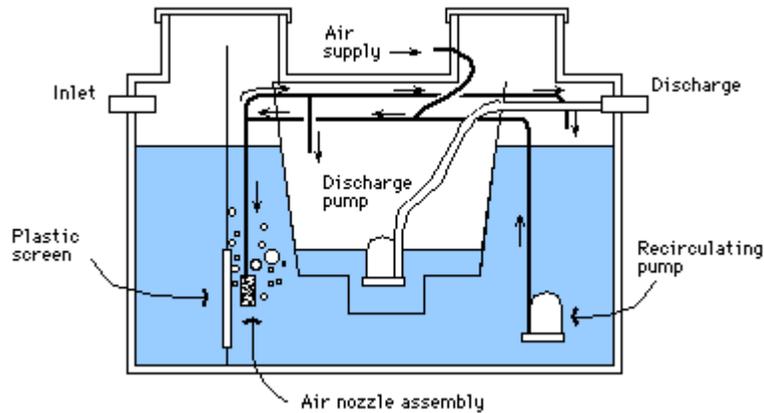


Figure 7. Schematic of an aerobic tank.

Aerobic tanks are available in residential or small-community sizes. In either case, these tanks require more maintenance than conventional septic tanks. If problems arise with the supply of air to the bacteria, an aerobic tank loses all its effectiveness. If there are problems with settling (more likely in these designs than with conventional tanks), there will be problems in the soil treatment system. It's critical that aerobic tanks be monitored regularly and repaired as needed.

For community aerobic tanks, there is a single location that needs checking and maintenance. Individual aerobic tanks provide multiple opportunities for problems and each one must be inspected as frequently as larger tanks. The aerobic tanks serving individual residences contain both the aeration and settling areas within the same tank. Since the discharge is to the soil there is no disinfection.

Package plants for small communities usually consist of an aeration tank followed by a settling tank and some type of disinfection or chlorination unit that treats the water before discharge.

➤ *Spray Irrigation*

Spray irrigation uses both biological and chemical processes to treat wastewater. The pretreated and often disinfected wastewater is applied at low rates to agricultural or wooded areas.

A spray irrigation system often consists of a septic tank (that provides a highly pretreated effluent), a sand filter and a disinfection unit within a spray application site. The final product is applied to the spray field through a conventional sprinkler system (see [Figure 8](#)).

APPENDIX: Subsection C, Sub-subsection 7 – Continued

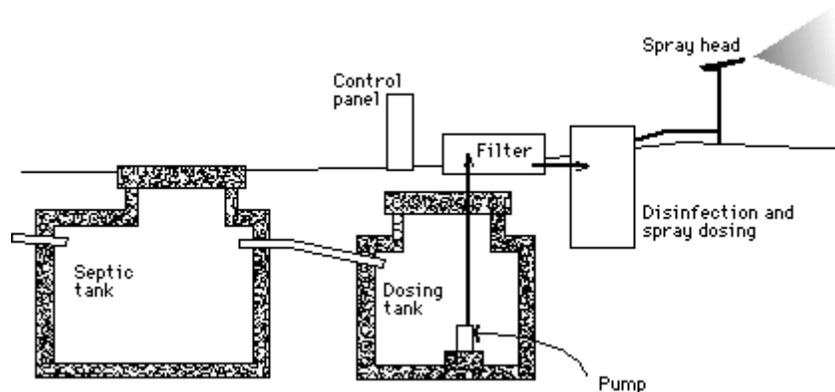


Figure 8. Typical spray irrigation system.

Site suitability is determined by soil permeability, the depth to saturated soil or bedrock, the availability of a buffer zone, and land slope. For proper treatment of wastewater, the soil must remain unsaturated, just as it does in subsurface systems.

Compared to other wastewater treatment alternatives, spray irrigation systems require more land. That's why they may be best suited for recreational areas (such as golf courses) and agricultural land.

8. System Costs

Estimates should be made of a system's capital costs and its operational costs over its expected lifetime. Capital costs include land, equipment (tanks, pumps, rock, etc.) and construction. Operational costs include electricity, pump replacement, repairs, and such routine maintenance as the periodic cleaning of septic tanks or the replacement of sand in sand filters.

It is difficult to know whether one system is better than another. That's because any comparison depends on numerous factors, including how flows are estimated and whether research will confirm that less soil treatment area is needed for effluent that is largely pretreated. Other important considerations affecting comparisons are the specific site conditions, a site's slope and the location of individual lots.

It currently appears that the standards for soil treatment units contained in Minnesota Rules Chapter 7080 are cost-effective at flows of 5,000 gpd and less. For flows between 5,000 and 15,000 gpd, the least costly system is a series of individual septic tanks (one for each residence) connected to a communal drainfield or mound system. Sand filters, aerobics tanks and package plants become more advantageous, especially if a 50 percent reduction in the size of the soil treatment area is allowed. If there is plenty of low-cost land available, spray irrigation becomes a viable, cost-effective system. For flows over 15,000 gpd municipal wastewater treatment systems such as waste stabilization ponds and mechanical treatment plants start becoming cost-effective depending on the individual situation.

APPENDIX: Subsection C – Continued

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