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June 27, 2011

Mr. Robert Brewer
Director of Planning
Cumberland Co. Dept. of Planning and Development
790 E. Commerce Road
Bridgeton, New Jersey 08302

RE: Cumberland Co. Dept. of Planning and Development
Open Space Wastewater Management Plan
Submission of Final Plan
HMM Job No.: 284619

Dear Mr. Brewer:

Attached please find one (1) printed copy and one (1) electronic copy (CD) of the final Wastewater Management Plan for Open Space Areas and Visitor Sites with Limited or Unique Infrastructure Needs as prepared by Hatch Mott MacDonald (HMM). The final Report incorporates County's comments and suggestions as presented to HMM on June 6, 2011.

Should you have any questions on the attached Plan, please contact this office at (732) 780-6565. Thank you.

Very truly yours,

Hatch Mott MacDonald

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cc: Robert Mainberger, PE
File 284619-III-1 (Open Space WMP)

Hatch Mott MacDonald

Wastewater Management Plan for Open Space Areas and Visitor Sites with Limited / Unique Infrastructure Needs

FINAL REPORT
JUNE 2011

County of Cumberland
Department of Planning & Development
790 East Commerce Street, Bridgeton, NJ 08302

CUMBERLAND COUNTY, NEW JERSEY

Wastewater Management Plan for Open Space Areas and Visitor Sites with Limited / Unique Infrastructure Needs

Table of Contents

Page Number

Table of Contents

TABLES

FIGURES

1.0 Introduction

Open space is considered one of Cumberland County's greatest assets. The many societal benefits of open space preservation are well-documented: mitigation of development pressure, relief of stress on environmentally sensitive areas, provision of recreational opportunities for residents, economic benefits (eco-tourism) and the preservation of the rural / agricultural nature of large areas of the County.

These areas are of immense value to both County residents and visitors. However, as more and more people visit these locations, demand arises for facilities to meet basic needs – specifically water and sanitary facilities. If these needs are not met at some level, undesirable consequences can arise, including the loss of economic benefits as people curtail their visits or avoid the sites entirely.

Approximately 38% of the County's land (approx. 321,500 acres) is preserved in one form or another as open space; this is one of the highest percentages in New Jersey. The nature of the preserved spaces varies widely, from urban micro-parks in Vineland, Millville and Bridgeton to large, pristine wilderness areas with almost no human footprint, as well as preserved farmland and linear (i.e., trail) parcels.

Much of the preserved open space area in the County is considered to be environmentally constrained, due to the presence of wetlands, tidal marshes, steep slopes, etc., as well as man-made (i.e., regulatory) constraints such as sewer service area limitations, CAFRA / Pinelands regulation, etc. These constraints limit the feasibility and/or effectiveness of certain types of wastewater treatment and disposal, or can preclude their use entirely.

This disparity in site characteristics, coupled with the constraints on some of the sites, means that no single wastewater management strategy will be effective in every open space location. It is the intent of this Plan to categorize the County's open space into groups of similar characteristics, and to provide guidance on specific strategies that would be considered effective within those groups. However, it should be noted that even within a particular category, specific site conditions may differ (for instance, a park may fall within a Sewer Service Area, but not have sewers nearby; or wetlands may be present in one portion of a site, but not another); therefore, each site must be considered individually when the decision is made to provide wastewater facilities.

Section 2 of this Plan examines the County's inventory of open space parcels, and develops several broad categories of similar properties based upon shared characteristics (with examples of each). Section 3 presents several different strategies for the treatment and/or disposal of wastewater, from conventional installations (such as sewered buildings and septic systems) to more innovative methods like onsite treatment, grey water separation, constructed wetlands, rainwater capture and waterless system. It also looks at non- construction alternatives such as the use of nearby business establishments, and considers what circumstances may warrant no facilities whatsoever.

Finally, Section 4 revisits the different categories of open space parcels, and recommends one or more potential wastewater strategies that might be feasible and cost-effective for each. Please note these recommendations are presented as a reference guide for planning purposes only; actual determination of the need for and type of facilities to be provided must be made on a site-specific basis.

2.0 County Open Space

Approximately 38% of Cumberland County's total land area (approx. 321,500 acres) is preserved in one form or another as open space. This is one of the highest percentages in New Jersey, where the Statewide average is approximately 26%. The nature of preserved spaces varies widely, from urban micro-parks in Vineland, Millville and Bridgeton to large, pristine wilderness areas with almost no human footprint.

The first Task in the preparation of this Plan was to compile information on the County's open space parcels, examine certain characteristics that may impact the need and/or desirability of wastewater facilities, and to divide the parcels into several broad categories with similar characteristics in order to later determine the optimal strategies for wastewater facilities and management.

2.1 Sources of Data

Data for this Task was compiled from several sources. The primary source was the County's own Geographic Information Systems (GIS) data, which included information on the open space parcels, surrounding areas, environmental constraints and planning information.

Additional data regarding specific parcels was gathered from the County and various municipal websites. In addition, contacts were made with several organizations with a stake in open space preservation, to obtain their input on priority sites and particular constraints impacting wastewater management at the sites.

Finally, the recently-released draft of the County's Open Space & Recreation Master Plan (OSRMP) was reviewed to ensure compatibility of goals and approaches to open space utilization and wastewater management between the two Plans.

2.2 Parcel Characteristics

There are several characteristics of a parcel that can impact the selection of an optimal wastewater strategy, including size, location, ownership, usage, environmental constraints and availability of sewer service. Each of these characteristics will be examined more closely in the following Subsections.

2.2.1 Size / Location

The size of a preserved parcel does not have a direct impact on wastewater strategy; however, it has an indirect impact via its effect on other characteristics. In Cumberland County, the largest areas tend to be undeveloped parcels such as Wildlife Management Area, with lower and less intense human uses. There are some exceptions to this generalization, such as the Belleplain State Forest), where opportunities for long-term usage such as camping may require the provision of easily-accessible wastewater facilities. Large parcels may also have multiple areas for different activities, potentially requiring multiple facilities.

Many of the County's preserved spaces are located in remote areas, with limited or no vehicle access. This limited access can suppress the visitation of a parcel, reducing the need for wastewater facilities. Somewhat mitigating against this in some instances is the fact that limited access points tends to concentrate use near those points, where a single facility can meet the needs of the entire parcel.

At the other extreme, very small (<5 acre) urban and suburban parks are often located in residential neighborhoods, where local residents can use the park for a short time and return home if a bathroom break is needed. Also, in areas without sewer service (either outside a Sewer Service Area or not near existing sewers, these small parks may not have sufficient land to install a typical septic disposal system. Therefore, these parcels are less likely to be targeted for the provision of wastewater facilities

2.2.2 Ownership

Cumberland County does not itself own significant open space holdings (with the exception of the County Fairgrounds in Millville); therefore, its relationship with the owner of a parcel can impact if, when and how wastewater facilities are provided and maintained. Ownership of preserved open space in the County falls into the following categories:

2.2.2.1 State-Owned Lands

The largest owner of open space in Cumberland County is the State of New Jersey. Lands held by the State include State Parks (Stow Creek Landing), State Forests (Belleplain), and Wildlife Management Areas (WMA's, such as Peaslee or Heislerville). The State also owns several previously-developed properties, which are planned for future use as parks.

There are several State agencies which own property, including the Divisions of Parks and Forestry, and Fish and Wildlife, within the New Jersey Department of Environmental Protection (NJDEP).

Discussions with the New Jersey Department of Environmental Protection (NJDEP) indicated that the State would look to the County for recommendations on providing sanitary facilities at State-Owned preserves; however, the actual planning, design and construction of the facilities would require coordination with the Department.

2.2.2.2 Municipally-Owned Lands

According to the County's draft Open Space Master Plan, many (but not all) of the municipalities within the County own preserved land. These parcels tend to be smaller than the State-owned properties; however, some of the larger parks (such as Bridgeton's City Park) can be quite large and complex, hosting multiple uses and attractions. Municipally-owned parks also tend to have more visits, and more intense activities, which may require a higher level of wastewater management.

The management structure for municipally-owned properties varies widely, with the larger cities having dedicated Parks Departments to operate and maintain wastewater facilities. Smaller municipalities may not have this structure in place, and the parks may fall under the purview of the Public Works Department (which may also be responsible for roads, buildings, trash collection and many other duties). Obviously, in these towns, construction and maintenance of wastewater facilities may be more difficult.

2.2.2.3 Non-Government Organizations (NGO's)

Cumberland County also contains many parcels preserved by private ownership. These owners may be non-profit agencies (such as The Nature Conservancy or the Natural Lands Trust), corporations (such as PSE&G), or private citizens (preserved farmland). Because public use on corporate properties and preserved farmland is likely to be severely limited or non-existent, the areas with these forms of ownership will not be considered further in this Plan. Therefore, the term "NGO" will be used to refer to those non-profit agencies that manage their preserved land for public use.

Usage at NGO lands (see below) is primarily passive in nature, although they can draw significant numbers of hikers, canoers and bird-watchers. Use density is fairly low, so wastewater facilities (if any) would likely be located near an entrance or a Visitor Center. NGO's may have a small paid staff, but rely heavily on the help of volunteers, meaning that sufficient manpower for the care and maintenance of facilities cannot always be guaranteed.

2.2.3 Usage

The nature of public use at a parcel is one of the most critical factors in determining the need for wastewater facilities. Uses at open space facilities can be divided into what are known as "active" or "passive"; these general categories encompass a number of factors that have a direct influence on wastewater needs: number and type of visitors, length of stay, visitor density and auxiliary services.

2.2.3.1 Active Uses

Active uses entail specifically-targeted activities, and the particular property is usually modified to adapt to these uses. Examples of active uses in open space areas include ball fields, playgrounds, bandstands, zoos, boat launches and picnic areas. These are primarily designed to attract large numbers of visitors, including families with children, and gather them into a relatively concentrated area. Visitors tend to stay in a particular location longer, and associated amenities such as water fountains and/or food concessions may be offered.

All of these factors increase the need for sanitary facilities, and any facilities provided would likely generate significant use and require a fairly high level of maintenance.

2.2.3.2 Passive Uses

On the other hand, passive uses such as hiking, canoeing, fishing and birding do not require large-scale modifications to the landscape (indeed, the lack of modifications is a large part of their attraction). These are usually solitary or small-group activities, and even if the total number of people in a property is large, they are usually spread out in a low-density pattern.

Another type of passive use is in so-called "linear" sites, such as trails along railroad rights-of-way, roadways or waterways. These are primarily designed for hiking, jogging or other forms of mobility. Wastewater facilities are not normally required for this type of open space; however, if there are particular high-volume access points (such as old rail stations, etc.), facilities may be deemed appropriate.

Parcels with passive uses usually have a lesser need for facilities, except perhaps at access points and high-interest location where people might tend to gather. The facilities could be smaller than those provided at active use sites, and could be tailored to a particular site to present a less intrusive look and feel.

2.2.3.3 Other Use Considerations

It should be noted that several categories of recreational activities can fall into either definition of use, depending on the particular circumstances. For instance, a primitive backwoods campsite could be considered a passive use, while a permanent, multi-site campground would be an active use. Similarly, a simple horseback trail is a passive use for a parcel; however, a horse-rental stable or show-jumping facility would be an active use.

In addition, a single parcel may contain areas for many various activities of active and/or passive uses – for example, a large city park may contain ball fields, a zoo and boat rentals, while also containing hiking paths for more quiet enjoyment.

2.2.4 Environmental Constraints

Once the need for wastewater facilities has been determined, there are several factors that can limit the type of facility to be provided. Whether naturally-occurring or resulting from human (i.e., regulatory) activities, these constraints must be considered in selecting an optimal wastewater management strategy.

Plate 2 included with this Report presents mapping of various areas of constraints in the County, which are explained in further detail below. The map provides a helpful tool in locating potential sites for wastewater facilities, particularly for those parcels where only a portion of the property area is constrained.

2.2.4.1 Sewer Service Areas

One of the primary constraints on the ability to provide wastewater facilities at preserved open space sites is the availability (or more particularly the non-availability) of sewer service. The lack of sewer service usually means that groundwater-discharged-based methods of wastewater treatment and disposal must be utilized, which require larger footprints, onsite equipment, and certain soil and groundwater conditions to be viable.

In New Jersey, sewers are limited to designated Sewer Service Areas (SSA's) as identified in a County or utility's Wastewater Management Plan (WMP). These areas are generally located in urban or suburban areas where adequate treatment facilities are available. In areas where sewer service is available, it is usually the most cost-effective option for providing restroom facilities, as construction can be limited to the building itself and a connecting lateral.

Currently there are two WMP's covering various areas of Cumberland County: the Landis Sewerage Authority (LSA) is the lead agency for the City of Vineland, while Cumberland County (in conjunction with the Cumberland County Utilities Authority) manages the WMP for the remaining portions of the County. The bulk of SSA's in the County lie within the cities of Vineland, Millville and Bridgeton and in Upper Deerfield, Hopewell and Fairfield Townships. (Lawrence, Downe, Commercial, Stow Creek and Greenwich Townships have no SSA's within their borders).

It should be noted that just because a site is located within an SSA, sewer service is not necessarily available (WMP's are based upon 20 year projections of infrastructure need). When evaluating individual sites for wastewater facilities, both the SSA and the actual location of existing sewer lines must be taken into account. The need to extend a sewer line to a park or other open space site adds significantly to construction costs, and may make a groundwater-based disposal system more feasible.

2.2.4.2 Wetlands

Large portions of the County's open space (primarily located along the Delaware Bayshore) are considered tidal wetlands. Other areas (along the Maurice and other rivers) are considered freshwater wetlands. Wetlands, while providing many environmental benefits, do not lend themselves to either active recreational uses or wastewater disposal methods. Wetland areas are not typically included in SSA's, and high groundwater levels preclude the use of groundwater-based disposal systems.

The New Jersey Department of Environmental Protection (NJDEP) regulates construction in wetland areas, and would need to approve the building of any type of wastewater facilities within a wetland or buffer area. The time and expense of obtaining such approval(s) needs to be reviewed when considering particular parcels for sanitary services.

Given the significant overlap of many of the County's open spaces with wetlands, wastewater strategies are limited. In some areas, upland areas may exist where groundwater-based disposal systems may be used (particularly if these areas coincide with access points or attraction locations); if these areas are very small, certain strategies may be used to either reduce the volume of wastewater or to treat the wastewater on site (requiring a smaller disposal area than a typical septic system). If facilities are required in wetland areas, or the available lands simply cannot support groundwater disposal, waterless systems may be considered.

2.2.4.3 Water Supply

In almost all sanitary facilities, a supply of fresh water is necessary for flushing, hand washing and equipment cleaning. In urban and suburban areas, this water supply may be a public water system; in more rural and remote areas, small individual wells may be drilled.

In some areas, water supply may be limited – soil conditions may prevent a well from achieving a useful yield, or the groundwater may be brackish (particularly along the Bayshore). Several strategies can be employed to reduce the amount of water required at a facility, or a waterless facility can be installed. However, it should be noted that maintenance is more challenging in these types of facilities, as some water may have to be brought in for cleaning purposes.

2.2.4.4 CAFRA / Pinelands Jurisdiction

In addition to the wetlands program noted above, there are several other agencies that may have a say in the construction of wastewater facilities in some portions of the County.

The Coastal Area Facilities Review Act (CAFRA) regulates (through a formal NJDEP permitting program) land development within 150 feet of the Mean High Water line along the Bayshore; beyond this line, it regulates construction of larger residential and commercial developments. For purposes of this Plan, it is assumed that CAFRA would be a constraint only for sites immediately along the Bayshore.

The Pinelands National Reserve encompasses approximately 1.1 million acres throughout southern New Jersey, including portions of the City of Vineland and Maurice River Township within Cumberland County. An independent commission (the Pinelands Commission) has been established to oversee development within this area, and would need to be consulted for any wastewater facility construction therein.

2.2.4.5 Power

For the majority of strategies noted in Section 3 of this Plan, access to a power supply is required for lighting, ventilation, and pumping equipment (if needed). HMM did not have access to power supply mapping; therefore, power was not considered further as a constraint. When evaluating individual parcels, however, the availability of power (whether from utility, generator or renewable sources such as solar or wind) must be taken into account.

2.3 Categorization of Open Space Parcels

Each individual open space parcel is unique; however, several parcels may share specific characteristics that allow them to be considered together when evaluating wastewater treatment and disposal options. In examining the County's open space GIS data, HMM has developed several broad categories of parcels based upon the factors noted earlier in this Section.

In developing these categories, parcels with sites for both active and passive uses were considered to be active, as the active portion of the property would be more likely to be considered for sanitary facilities. Parcels were considered constrained if more than 50% of the total area fell within the various constraint layers in the mapping; however, it should be noted that individual parcels may have enough non-constrained land to be provided with conventional wastewater facilities.

There are several parcels in the County's GIS mapping that are currently undeveloped (either forested or cultivated). These parcels will not be categorized in this Plan; it is recommended that they be revisited when future decisions are made regarding their ultimate use.

These categorizations solely consider the suitability of a type of parcel for wastewater facilities; they do not take into account whether or not a parcel currently has restroom facilities or the condition they are in.

The results of HMM's characterizations are summarized at the end of this Section in Table 2-1; mapping of the categorized parcels is included immediately thereafter.

2.3.1 Category 1– Large, Constrained Parcels - Passive Use

This category encompasses much of the land along the Bayshore. The typical property in this category is large (>50 acres), with limited access points. The land is very wet, falling entirely (or nearly so) within the 100- or 500-year floodplain of the Bay or its tributaries. Riparian buffer zones (both regular and C-1 classifications extend throughout the parcels, severely constraining most uses. No active use facilities are provided, passive activities are limited to canoeing, birding, hiking and the like.

Examples of this category include:

- Stow Creek Landing State Park
- Dix Wildlife Management Area
- Gandy's Beach Preserve
- PSE&G – Bayside Tract

2.3.2 Category 2– Large, Unconstrained Parcels - Passive Use

Parcels in this category are found in more upland areas – while they may have areas of constraints (particularly around waterways), or be located within the jurisdiction of CAFRA or the Pinelands Reserve, they have sufficient areas where conventional facilities could be provided. As in the Category 1 properties, uses within these properties are primarily passive; upland activities such as camping, bicycling, and horseback riding.

Examples of this category include:

- Belleplain State Forest
- Edward G. Bevan Wildlife Management Area
- Peaslee Wildlife Management Area
- Lummis Ponds Preserve

2.3.3 Category 3- Smaller, Constrained Parcels - Passive Use

Smaller (5-50 acres) constrained parcels may be found primarily along the Bayshore or near the Maurice River and its tributaries, although some may exist near other waterways. Even if these areas fall within a designated Sewer Service Area, it is unlikely that sewers will be readily available. The sites near the rivers are usually more accessible than those along the Bayshore.

Examples of this category include:

- Seabreeze Preserve
- Panther Branch Preserve
- Dividing Creek Wildlife Management Area

2.3.4 Category 4- Large Parcels - Active Use

Larger, active use parcels tend to attract some of the highest number of visitors due to both their size, accessibility and variety of attractions. The nature of these parcels generally requires that wastewater facilities be provided. They are generally (but not always) located within Sewer Service Areas, and if sewers are available, problems with environmental constraints on the use of groundwater-based disposal systems may be avoided.

Examples of this category include:

- City Park (Bridgeton)
- South Vineland Park (Vineland)
- Cumberland County Fairgrounds (Millville)
- Fowser Road Boat Ramp (Millville)
- Municipal Recreation Complex (Upper Deerfield)

Cedar Lake in Lawrence Twp. is an example of a large, active use property that falls outside a Sewer Service Area.

2.3.5 Category 5- Small Parcels - Active Use

Smaller, active use parcels (defined for purposes of this plan as 5-50 acres) can be found in most of the County's municipalities, both inside and outside the designated SSA's. They are primarily ball field complexes and mixed-use parks and depending on some of the sub-factors noted above (location, events, auxiliary amenities), may currently contain sanitary facilities.

Examples of this type of parcel within an SSA include:

- Waltman Park (Millville)
- Pagliughi Park (Vineland)
- Mary Elmer Park (Bridgeton)

Examples outside an SSA include:

- Fortescue Marina (Downe)
- Rosenhayn Park (Deerfield)

2.3.6 Category 6- Very Small Parcels - Active Use

These parcels (<5 acres) are generally neighborhood playgrounds located in residential areas. As noted in previous sections, users at these parcels tends to be nearby residents, who can return home for sanitary purposes.

Examples:

- Bank Street Mini-Park (Bridgeton)
- West Earl Drive Mini-Park (Vineland)

Some NGO-owned properties fall into this category; while they are not neighborhood-based locations, their size tends to result in short visits, whereby facilities may not be needed.

Examples:

- Sharp's Branch Preserve (Vineland)
- Maple Hollow (Fairfield)

CUMBERLAND COUNTY

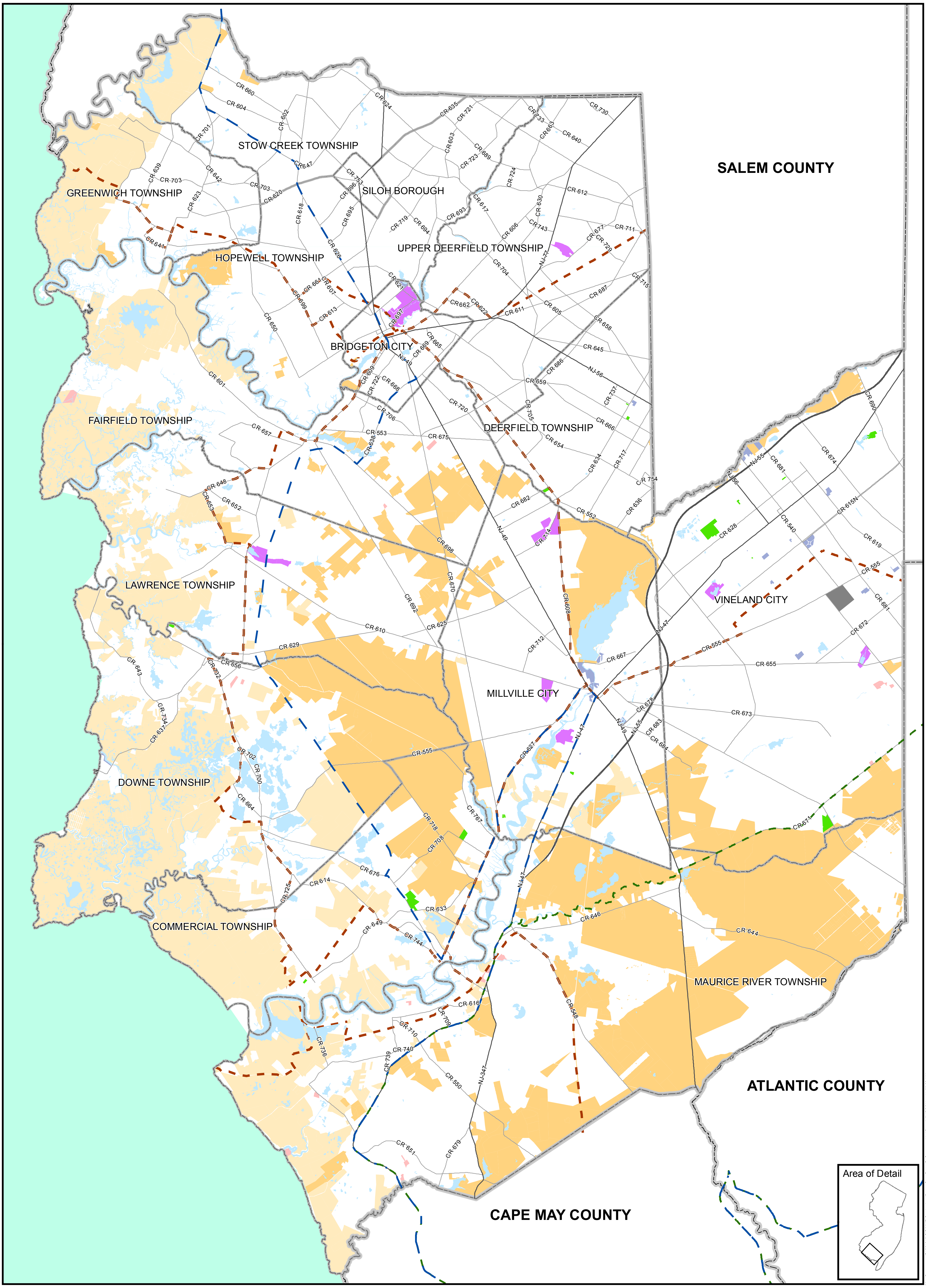
Wastewater Management Plan for Open Space Areas and Visitor Sites with Limited / Unique Infrastructure Needs

TABLE 2-1
OPEN SPACE CATEGORIZATION

Use	Name	Municipality	Owner	Acreage	Constrained Acreage	Wetland?	Floodplain?	Landscape Project?	NHPS?	Riparian Corridor?	Sewer Svc Area?
	Category 1 - Large, Passive Use, Env. Constraints										
PRESERVE	GANDY'S BEACH PRESERVE	DOWNE TOWNSHIP, LAWRENCE TOWNSHIP	TNC	6753.4	6752.0	Yes	100	Yes	Yes	Yes	No
WMA	EGG ISLAND	COMMERCIAL TOWNSHIP, DOWNE TOWNSHIP	FGW	6088.3	6016.0	Yes	100	Yes	Yes	Yes	No
WMA	HEISLERVILLE	COMMERCIAL TOWNSHIP, MAURICE RIVER TOWNSHIP	FGW	5440.3	5439.2	Yes	100	Yes	Yes	Yes	No
CON	PSE&G - EEP	COMMERCIAL TOWNSHIP, FAIRFIELD TOWNSHIP, MAURICE RIVER TOWNSHIP	PSE&G	4757.8	4754.8	Yes	100	Yes	Yes	Yes	No
CON	BAYSIDE TRACT	GREENWICH TOWNSHIP	PSE&G	4480.1	4457.5	Yes	100	Yes	Yes	Yes	No
WMA	NEW SWEDEN	FAIRFIELD TOWNSHIP, LAWRENCE TOWNSHIP	FGW	4284.0	4213.9	Yes	100	Yes	Yes	Yes	No
WMA	MILLVILLE	COMMERCIAL TOWNSHIP, DOWNE TOWNSHIP, LAWRENCE TOWNSHIP, MILLVILLE CITY	FGW	2975.0	2930.0	Yes	100	Yes	Yes	Yes	No
WMA	BERRYTOWN / TURKEY POINT	COMMERCIAL TOWNSHIP, DOWNE TOWNSHIP	FGW	2326.0	2326.0	Yes	100	Yes	Yes	Yes	No
State Park	STOW CREEK LANDING SP	STOW CREEK TOWNSHIP	DEP	2157.3	2072.0	Yes	100	Yes	No	Yes	No
WMA	FORTESCUE WMA	DOWNE TOWNSHIP	FGW	1860.8	1860.8	Yes	100	Yes	Yes	Yes	No
WMA	NANTUXENT	DOWNE TOWNSHIP, LAWRENCE TOWNSHIP	FGW	1140.1	1140.1	Yes	100	Yes	Yes	Yes	No
WMA	DIX	FAIRFIELD TOWNSHIP	FGW	3236.5	3214.9	Yes	100	Yes	Yes	Yes	No
PRESERVE	MENANTICO CREEK PRESERVE	MILLVILLE CITY	TNC	525.7	523.7	Yes	100	Yes	No	Yes	No
State Forest	BEAR SWAMP EAST	DOWNE TOWNSHIP	PF	272.4	272.4	Yes	100	Yes	Yes	Yes	No
PRESERVE	NLT PRESERVE FORTESCUE RD	DOWNE TOWNSHIP	NLT	265.1	265.1	Yes	100	Yes	Yes	Yes	No
PRESERVE	MAURICE RIVER BLUFFS PRESERVE	MAURICE RIVER TOWNSHIP, MILLVILLE CITY	TNC	196.2	195.0	Yes	100	Yes	Yes	Yes	No
PRESERVE	NLT PRESERVE RAILROAD, NEWPORT	DOWNE TOWNSHIP	NLT	181.1	181.1	Yes	100	Yes	Yes	No	No
PRESERVE	NLT PRESERVE COOK ROAD	COMMERCIAL TOWNSHIP	NLT	122.6	122.6	Yes	100	Yes	Yes	Yes	No
PRESERVE	NLT PRESERVE OLIVE ST	MAURICE RIVER TOWNSHIP	NLT	52.1	52.1	Yes	100	Yes	Yes	Yes	No
	Category 2 - Large (>50 Ac), Passive Use, Unconstrainted Areas										
WMA	PEASLEE	MAURICE RIVER TOWNSHIP, MILLVILLE CITY, VINELAND CITY	FGW	21245.2	20444.4	Yes	100	Yes	Yes	Yes	No
WMA	EDWARD G BEVAN	COMMERCIAL TOWNSHIP, DOWNE TOWNSHIP, LAWRENCE TOWNSHIP, MILLVILLE CITY	FGW	12441.2	11996.3	Yes	100	Yes	Yes	Yes	No
SF	BELLEPLAIN	MAURICE RIVER TOWNSHIP	PF	3852.1	3843.4	Yes	100	Yes	Yes	Yes	No
WMA	UNION LAKE	DEERFIELD TOWNSHIP, MILLVILLE CITY, VINELAND CITY	FGW	3717.1	3694.1	Yes	100	Yes	Yes	Yes	No
PRESERVE	MANUMUSKIN RIVER PRESERVE	MAURICE RIVER TOWNSHIP, MILLVILLE CITY	TNC	3468.9	3438.8	Yes	100	Yes	Yes	Yes	No
WMA	BUCKSHUTEM	FAIRFIELD TOWNSHIP, LAWRENCE TOWNSHIP, MILLVILLE CITY	FGW	3532.9	2989.6	Yes	100	Yes	Yes	Yes	Yes
PRESERVE	LUMMIS PONDS PRESERVE	FAIRFIELD TOWNSHIP, LAWRENCE TOWNSHIP	TNC	739.5	681.1	Yes	100	Yes	Yes	Yes	No
WMA	COHANSEY RIVER	BRIDGETON CITY, GREENWICH TOWNSHIP, HOPEWELL TOWNSHIP	NJDEP	703.4	699.7	Yes	100	Yes	No	Yes	See Note
WMA	MAURICE RIVER	LAWRENCE TOWNSHIP, MILLVILLE CITY	FGW	557.4	510.7	Yes	100	Yes	Yes	Yes	No
PRESERVE	WILLOW GROVE LAKE PRESERVE	VINELAND CITY	TNC	449.3	221.3	Yes	100	Yes	No	Yes	No
WMA	MENANTICO POND	MILLVILLE CITY	FGW	395.9	376.7	Yes	100	Yes	No	Yes	No
WMA	CLARKS POND	BRIDGETON CITY, FAIRFIELD TOWNSHIP	FGW	316.3	295.2	Yes	100	Yes	No	Yes	Yes
WMA	OSBOURNE TRACT	MAURICE RIVER TOWNSHIP	FGW	246.7	246.7	Yes	100	Yes	Yes	Yes	No
PRESERVE	NLT PRESERVE 2112 2ND ST S	MILLVILLE CITY	NLT	180.3	180.1	Yes	100	Yes	Yes	Yes	No
State Park	STOW	STOW CREEK TOWNSHIP	PF	125.3	118.2	Yes	100	Yes	No	Yes	No
WMA	MAURICE RIVER GREENWAY	MAURICE RIVER TOWNSHIP	FGW	98.3	98.3	Yes	100	Yes	No	Yes	No
WMA	DIVIDING CREEK	LAWRENCE TOWNSHIP	FGW	83.1	47.9	Yes	100	Yes	Yes	Yes	No
Park	WILLOW OAK NATURE AREA	VINELAND CITY	CITY OF VINELAND	68.4	46.6	Yes	100	No	No	Yes	No
PRESERVE	RICHARD BUHLMAN	FAIRFIELD TOWNSHIP	NLT	57.6	56.3	Yes	100	Yes	No	Yes	Yes
WMA	CEDARVILLE POND	LAWRENCE TOWNSHIP	FGW	39.5	19.6	Yes	100	No	Yes	Yes	No
WMA	MAD HORSE CREEK	GREENWICH TOWNSHIP	FGW	22.3	22.2	Yes	100	Yes	No	Yes	No

Use	Name	Municipality	Owner	Acreage	Constrained Acreage	Wetland?	Floodplain?	Landscape Project?	NHPS?	Riparian Corridor?	Sewer Svc Area?
	Category 3 - Small (5-50 Ac), Passive Use, Env. Constraints										
PRESERVE	SEABREEZE PRESERVE	FAIRFIELD TOWNSHIP	TNC	49.6	49.6	Yes	100	Yes	Yes	Yes	No
CON	PSE&G / FRANCIS CORPORATION	MAURICE RIVER TOWNSHIP	PSE&G	38.4	38.4	Yes	100	Yes	No	Yes	No
PRESERVE	PANTHER BRANCH	VINELAND CITY	NLT	30.9	30.9	Yes	100	Yes	No	Yes	No
PRESERVE	ELDORA NATURE PRESERVE	MAURICE RIVER TOWNSHIP	TNC	28.1	28.1	Yes	100	Yes	No	Yes	No
PRESERVE	NLT PRESERVE E/MAIN ST	DOWNE TOWNSHIP	NLT	20.6	20.6	Yes	100	Yes	Yes	No	No
PRESERVE	KINGS END	FAIRFIELD TOWNSHIP	NLT	19.0	19.0	No	No	Yes	No	No	No
PRESERVE	SHOREBIRD ORR	MAURICE RIVER TOWNSHIP	NLT	16.7	16.7	Yes	100	Yes	Yes	Yes	No
PRESERVE	SHOREBIRD ENV. CONCERN	MAURICE RIVER TOWNSHIP	NLT	9.8	9.8	Yes	100	Yes	No	Yes	No
PRESERVE	NLT PRESERVE RIGGINS LN	MAURICE RIVER TOWNSHIP	NLT	6.4	6.4	Yes	100	Yes	Yes	Yes	No
PRESERVE	NLT PRESERVE 245-269 SCHOOL HOUSE RD	DOWNE TOWNSHIP	NLT	6.2	6.2	Yes	500	Yes	Yes	Yes	No
PRESERVE	SHARPS BRANCH	VINELAND CITY	NLT	5.6	5.6	Yes	No	No	Yes	Yes	No
PRESERVE	MAPLE HOLLOW	FAIRFIELD TOWNSHIP	NLT	4.9	4.9	No	No	Yes	No	No	No
	Category 4 - Large (>50 Ac), Active Use										
Park	CITY PARK	BRIDGETON CITY	CITY OF BRIDGETON	297.1	172.3	Yes	100	Yes	No	Yes	Yes
Park	CEDAR LAKE	LAWRENCE TOWNSHIP	TOWNSHIP OF LAWRENCE	147.7	109.7	Yes	100	Yes	Yes	Yes	No
Park	ROSEN RD/MORIAS AVE	MILLVILLE CITY	COUNTY OF CUMBERLAND	95.4	90.6	Yes	No	Yes	No	No	No
Park	CEDARVILLE ROAD RECREATION CENTER	MILLVILLE CITY	CITY OF MILLVILLE	90.5	18.9	No	No	Yes	No	No	No
Park	FOWSER ROAD BOAT RAMP	MILLVILLE CITY	CITY OF MILLVILLE	84.9	83.0	Yes	100	Yes	Yes	Yes	No
Park	SOUTH VINELAND PARK	VINELAND CITY	CITY OF VINELAND	78.8	10.8	Yes	No	No	No	No	No
Park	MID-COUNTY FAIRGROUNDS	MILLVILLE CITY	COUNTY OF CUMBERLAND FAIR ASSO	61.0	9.1	No	No	Yes	No	No	No
Park	ALBERT GIAMPIETRO MEMORIAL PARK	VINELAND CITY	CITY OF VINELAND	59.3	58.2	Yes	100	Yes	No	Yes	No
Park	MUN. SPORTS COMPLEX - HOOVER RD	UPPER DEERFIELD TOWNSHIP	UPPER DEERFIELD TWP	65.1	12.3	Yes	100	Yes	No	No	Yes
	Category 5 - Small (5-50 Ac) Publicly-Owned, Active Use										
MARINA	FORTESCUE MARINA	DOWNE TOWNSHIP	NJDEP	8.6	8.6	Yes	100	Yes	Yes	Yes	No
Park	MARY ELMER PARK	BRIDGETON CITY	CITY OF BRIDGETON	30.8	15.2	No	No	Yes	No	Yes	Yes
Park	JEDDY'S POND	BRIDGETON CITY	CITY OF BRIDGETON	10.6	9.9	Yes	100	Yes	No	Yes	Yes
Park	STEWARD ESTATE	MILLVILLE CITY	CITY OF MILLVILLE	36.9	36.7	Yes	100	Yes	No	Yes	No
Park	SHARP ST PARK	MILLVILLE CITY	CITY OF MILLVILLE	25.8	22.5	Yes	100	Yes	No	Yes	No
Park	CORSON PARK	MILLVILLE CITY	CITY OF MILLVILLE	15.7	12.1	Yes	100	No	No	Yes	No
Park	UNION LAE BALLFIELD	MILLVILLE CITY	CITY OF MILLVILLE	13.9	9.9	No	100	Yes	No	No	No
Park	WALTMAN PARK	MILLVILLE CITY	CITY OF MILLVILLE	11.8	10.6	Yes	100	Yes	No	Yes	No
Park	BABE RUTH PARK	MILLVILLE CITY	CITY OF MILLVILLE	9.2	8.7	Yes	100	Yes	No	Yes	No
Park	WATERFRONT PHASE II	MILLVILLE CITY	CITY OF MILLVILLE	7.8	3.0	No	100	Yes	No	Yes	No
Park	WESTSIDE PARK	VINELAND CITY	CITY OF VINELAND	43.9	43.8	Yes	100	Yes	No	Yes	No
Park	LANDIS PARK	VINELAND CITY	CITY OF VINELAND	33.3	0.0	No	No	No	No	No	No
Park	FRANK TEJERAS PARK	VINELAND CITY	CITY OF VINELAND	24.6	24.6	Yes	100	Yes	No	Yes	No
Park	PAGLIUGHI PARK	VINELAND CITY	CITY OF VINELAND	17.4	0.5	No	No	No	No	No	No
Park	CUNNINGHAM PARK	VINELAND CITY	CITY OF VINELAND	14.2	0.0	No	No	No	No	No	No
Park	JOHN C. GITTONE PARK	VINELAND CITY	CITY OF VINELAND	12.9	1.5	No	No	Yes	No	No	No
Park	NORMANDIE LANE FIELDS	VINELAND CITY	CITY OF VINELAND	10.9	0.0	No	No	No	No	No	No
Park	FIOCCHI FIELD	VINELAND CITY	CITY OF VINELAND	8.7	0.0	No	No	No	No	No	No
Park	ROSENHAYN PARK	DEERFIELD TOWNSHIP	TOWNSHIP OF DEERFIELD	7.9	0.0	No	No	No	No	No	No
	Category 6 - Very Small (<5 Ac) Municipal-Owned, Active Use										
Park	BANK STREET MINI-PARK	BRIDGETON CITY	CITY OF BRIDGETON	0.1	0.0	No	No	No	No	No	Yes
Park	9593 HIGHLAND ST	COMMERCIAL TOWNSHIP	TOWNSHIP OF COMMERCIAL	0.3	0.3	No	100	No	Yes	No	No
Park	RIVERSIDE/SPRINGSTREADAH	MILLVILLE CITY	CITY OF MILLVILLE	2.2	2.2	No	100	Yes	No	Yes	No
Park	COLUMBINE AVE	MILLVILLE CITY	CITY OF MILLVILLE	0.9	0.2	No	No	Yes	No	No	No
Park	FOURTH ST PARK	MILLVILLE CITY	CITY OF MILLVILLE	0.1	0.0	No	No	No	No	No	No
Park	FOURTH and F TRIANGLE	MILLVILLE CITY	CITY OF MILLVILLE	0.1	0.0	No	No	No	No	No	No
Park	JOE BUCK PARK	MILLVILLE CITY	CITY OF MILLVILLE	0.1	0.1	No	100	No	No	Yes	No
Park	ROBERTO CLEMENTE PARK	VINELAND CITY	CITY OF VINELAND	4.0	0.0	No	No	No	No	No	No
Park	VINELAND - PLUM ST	VINELAND CITY	CITY OF VINELAND	2.2	0.0	No	No	No	No	No	No
Park	WEST EARL DRIVE MINI-PARK	VINELAND CITY	CITY OF VINELAND	0.2	0.0	Yes	No	No	No	No	No

Use	Name	Municipality	Owner	Acreage	Constrained Acreage	Wetland?	Floodplain?	Landscape Project?	NHPS?	Riparian Corridor?	Sewer Svc Area?
	Category - Undeveloped										
Park	8080 HIGHLAND ST	COMMERCIAL TOWNSHIP	NON-MUNICIPAL OWNER	59.9	42.8	Yes	No	Yes	No	No	No
Park	1270 SPRING GARDEN RD	COMMERCIAL TOWNSHIP	TOWNSHIP OF COMMERCIAL	20.5	12.8	No	No	Yes	No	No	No
Park	2412 MEMORIAL AVE	COMMERCIAL TOWNSHIP	NON-MUNICIPAL OWNER	3.8	3.8	Yes	100	Yes	No	No	No
Park	525 IRVING AVE	DEERFIELD TOWNSHIP	TOWNSHIP OF DEERFIELD	9.1	6.4	Yes	100	No	No	Yes	No
Park	CEDAR,POPLAR,PINE,VINELD	DEERFIELD TOWNSHIP	TOWNSHIP OF DEERFIELD	3.7	0.0	No	No	No	No	No	No
Park	MORTON AVE, N SHILOH	DEERFIELD TOWNSHIP	TOWNSHIP OF DEERFIELD	1.2	0.1	No	No	Yes	No	No	No
Park	NANTUXENT CRK/LANDING RD	DOWNE TOWNSHIP	PRIVATE	6.1	6.1	Yes	100	Yes	No	Yes	No
Park	LAUREL LAKE	MILLVILLE CITY	CITY OF MILLVILLE	4.0	4.0	No	No	Yes	No	No	No
Park	DELSEA VILLAGE	MILLVILLE CITY	CITY OF MILLVILLE	3.9	1.1	No	No	Yes	No	No	No
Park	1271 S MILL RD	VINELAND CITY	CITY OF VINELAND	87.0	0.0	No	No	No	No	No	No
Park	MAYS LANDING RD	VINELAND CITY	CITY OF VINELAND	50.3	50.3	Yes	100	Yes	Yes	Yes	No
Park	W ARBOR AVE	VINELAND CITY	CITY OF VINELAND	28.3	24.6	Yes	100	No	No	Yes	No
Park	265 S MILL RD	VINELAND CITY	CITY OF VINELAND	3.3	1.9	Yes	100	No	No	Yes	No
Park	1567 W OAK RD	VINELAND CITY	CITY OF VINELAND	2.3	0.0	No	No	No	No	No	No
Park	776 S WEST AVE	VINELAND CITY	CITY OF VINELAND	0.6	0.6	Yes	100	No	No	Yes	No
	Category - Other										
Park	VINELAND DEVELOPMENTAL CENTER	VINELAND CITY	STATE OF NEW JERSEY	166.9	7.9	No	No	Yes	No	No	No
Park	2669 OGDEN AVENUE	COMMERCIAL TOWNSHIP	STATE OF NJ DIV OF STATE POL	0.6	0.6	No	100	Yes	Yes	No	No



CAFRA Boundary Line
Rails to Trails
Pinelands Boundary Line
Municipal Boundary
County Boundary
Open Water

Open Space Areas

Category 1 - Large, Passive Use, Env. Constraints
Category 2 - Large (>50 Ac), Passive Use, Unconstrained Areas
Category 3 - Small (5-50 Ac), Passive Use, Env. Constraints
Category 4 - Large (>50 Ac) Active Use
Category 5/6 - Small (<50 Ac) Active Use
Category - Undeveloped
Category - Other

0 12,000 Feet

This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

Hatch Mott MacDonald
27 Bleeker Street
Millburn, New Jersey 07041

CUMBERLAND COUNTY
OPEN SPACE
WASTEWATER MANAGEMENT PLAN
OPEN SPACE INVENTORY

Designed	Drawn	Checked	Approved	Date
	RLB			6/17/2011

3.0 Wastewater Management Strategies

3.1 General Constraints

Various technologies and innovative systems are presented within this section of the Open Space Wastewater Management Report to provide alternatives for providing sanitary service to the many open space properties owned by the County. Each alternative has advantages and disadvantages and the technologies will serve some properties better than others, taking into consideration the differing property constraints. However, there are common general constraints that must be taken into consideration for each strategy. These general constraints are detailed below:

3.1.1 Maintenance

Maintenance of the selected wastewater management strategies is an important issue. If a particular technology requires frequent maintenance, there is a cost associated with having a County Public Works employee or vendor provide service. Frequent maintenance of a system can become very costly in the long term. Technologies were primarily chosen that did not require more than bi-annual maintenance. However, there were certain technologies presented that would require more frequent maintenance (such as holding tanks) if the County had a very constrained tract of land and had no other options to provide service. Certain maintenance is inherent in the operation of restroom facilities (such as weekly cleaning of the inside of a building) to protect health and public safety and cannot be avoided.

3.1.2 Vandalism

The majority of the open space properties are isolated and thereby any rest room facility constructed within these remote areas becomes a prime target for vandalism. It is in the County's best interest to construct facilities at the most heavily trafficked and open areas within a particular site. The wastewater management strategies detailed take this into account and most, if not all, of the technologies incorporate components that can be buried. This should lessen the probability of damage due to vandalism.

3.1.3 Available Utilities

The availability of water and electric at a particular property or restroom location will ultimately be a driving factor as to which wastewater management strategy is best. If electricity is not available, those systems that incorporate mechanical components or alarms will not be feasible. If electricity is available but water is not, private wells will need to be drilled or alternative water saving technologies will have to be incorporated into the design.

3.2 Traditional Wastewater Disposal

3.2.1 Municipal Sanitary Sewer

Municipal sanitary sewer systems are found in more densely developed areas and consist of a central collection, conveyance and treatment system shared by hundreds or thousands of users. Wastewater is piped directly from a residence (or restroom) and is discharged to collector pipelines, which eventually convey all flow to a centralized wastewater treatment plant for eventual treatment and disposal. Municipal sanitary sewers are convenient but Cumberland County generally lacks this type of infrastructure. If a County open space facility was located at a property with access to a municipal sewer, the installation of a gravity lateral or unit pump station would be the most cost-effective and maintenance free method for providing sanitary service. Unfortunately, the majority of the County open space facilities are not located in areas with available infrastructure.

3.2.2 Septic Systems

3.2.2.1 Conventional Septic Systems

A conventional septic system is an on-site wastewater system designed to separate wastewater into its solid and liquid components, and then treat the waste prior to disposal. A typical septic system consists of two parts: a septic tank and an absorption field (a.k.a. “leach field”). Water leaving the building or the facility first enters the septic tank. While in the tank, the solids settle out on the bottom of the tank in the form of sludge and the liquid rises to the top (being that it’s lighter than the solids). The liquid (a.k.a. “effluent”) then leaves the septic tank and enters the absorption field. A traditional absorption field consists of lengths of perforated pipe buried in gravel-filled trenches. The effluent passes through the holes in the pipe, trickles through the gravel, and is absorbed by the soil. Under ideal conditions, the soil particles filter out pathogens and nutrients before the treated effluent reaches the underlying groundwater. However, if a septic system is not properly installed or maintained, the effluent may not be treated properly. Most septic systems will eventually fail. On-site systems typically have a design life of 15 to 25 years even when properly maintained. Eventually, the soil in the absorption field becomes clogged with organic material, and percolation will no longer occur.

When designing a new septic system, the most important factor to consider is the soil characteristics in the absorption area and the percolation (or “perc”) rate of the soil. The perc rate is the time it takes for water to percolate down through the soil. If the soil in the absorption area is sandy, the perc rate will be higher, meaning the soil will absorb effluent faster. Conversely, if the soil has a high clay content, the perc rate will be slower, sometimes prohibitively so.

It is also important to consider the setback and isolation distances when designing a septic system. The distribution box and leach field must be located at least a 100 feet away from any water well. Additionally, the system must be located at least 50-feet from any seasonal or perennial water body or wetland. Ideally, a 100-percent reserve area should be designated for a replacement system in the event of a future system failure.

Limitations of a conventional septic system include the following:

- Slopes must be less than 25 percent.
- Systems may not be sited within a Federal Flood Insurance flood zone.
- Systems may not be placed in fill areas.
- Percolation rates must be between 6 to 90 minutes per inch.

- The depth of undisturbed soil to the top of the limiting zone must typically be 60-inches or greater. The system must then be installed so that the bottom of the system is a minimum of 48 inches above the limiting zone. This may be difficult in areas of a high seasonal groundwater table (which is typical for many of the lower lying areas within the County).

Estimated costs to construct a conventional gravity-fed septic system (inclusive of septic tank and disposal field) are in the range of $25,000 to $35,000. Costs could increase by roughly $5,000 or more if an effluent pump is required due to site topography. This system is relatively conventional and does not require significant time to install. All systems should be properly designed to meet the requirements of the NJDEP and may require a Treatment Works Approval permit.

The disadvantages of a conventional septic system are potential poor soil suitability or other site constraints, and the relatively large amount of space required per system for installation. Isolation distance for property lines, water bodies, and drinking water wells may make siting of these systems difficult, if not impossible, on smaller properties.

The simple schematic below shows a conventional septic system. Usually, conventional septic systems consist of a septic tank along with a drain field. The septic tank is made of reinforced concrete and is buried in the ground close to the building. Wastewater from the facility goes into the tank, where the solids settle out and the liquid rises to the top. The water that has been separated in the middle of the tank runs through an effluent pipe connected to a distribution box, which distributes the effluent into the disposal field.

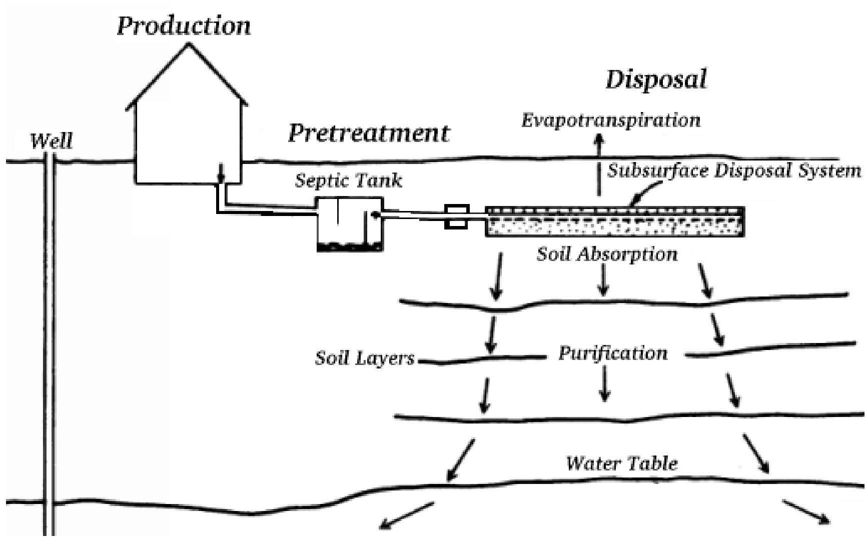


Figure 3.1: Schematic of a typical conventional septic system.

A typical drain field is made up of approximately (6) different trenches with perforated PVC or HDPE pipes covered with rock and soil. The drain field is responsible for slowly leaching wastewater to the rocks and soil so that viruses and bacteria can be effectively filtered out and decomposed, or perhaps absorbed into the soil until they are no longer viable.

3.2.2.2 Elevated Sand Mounded Septic Systems

Elevated sand mounds (a.k.a. "turkey mounds" or "mounded septics") are a variation of conventional on-site septic systems with the exception that the absorption field is installed within a raised sand mound. The raised sand mound is typically required to obtain a minimum distance required between the disposal field, and the Seasonal High Water Table (SHWT). This ensures proper percolation and filtering of the effluent. For an elevated sand mound, the distribution pipes in gravel trenches in the absorption system are situated within a mound of sand and topsoil that is placed on top of the original soil. A properly designed and maintained sand mound system has a typical design life of approximately 20-years. The main advantage of a mound system is the less restrictive site requirements compared to a conventional septic system. An elevated sand mound septic system costs approximately $30,000.

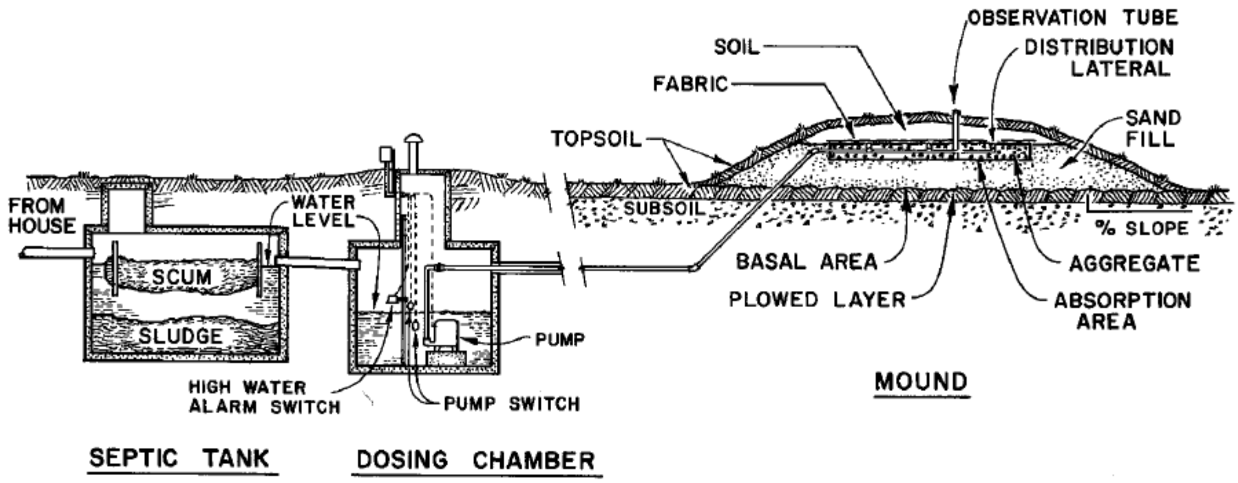


Figure 3.2: Schematic of a typical sand mounded septic system.

It is important to note that mounded septic systems are required in the presence of a high seasonal groundwater table. Although effective, mounded septics are generally unsightly and it can be assumed that these would be required for a majority of the County's open space parcels that are located within the lower lying areas near the Delaware Bay. Pumps are required to convey effluent from the wet well (dosing chamber) to the disposal field, as it is unlikely that local topography (particularly near the Bayshore) would permit the installation of a gravity system for most areas. A reliable source of electric power would be required to power the pumps.

3.2.2.3 Spray Irrigation System

Spray Irrigation is a wastewater disposal method that involves spraying treated wastewater effluent directly onto vegetated land. The wastewater evaporates, infiltrates through the soil, or is taken up by plant material. The spray irrigation system is a conventional disposal method for on-lot sewage that can be used for sites with certain restrictive soil conditions such as high water tables or shallow bedrock. However, the system requires the availability of a relatively large parcel for the disposal field, often applicable as a community wastewater treatment method rather than an on-lot method. In addition, spray irrigation systems do not function in winter months where temperatures are below freezing, so these systems would likely be limited to seasonal facilities only.

The cost of a typical community spray irrigation wastewater disposal system is also relatively higher than other conventional methods between $40.00 to $60.00 per gpd of capacity, depending on land availability, number of connections, amount of sewage, and site constraint.

3.2.2.4 Drip Irrigation System

Drip irrigation systems apply treated wastewater to soil absorption fields slowly and uniformly from a network of narrow plastic, polyethylene or pvc tubing. The treated wastewater is pumped through the drip lines under pressure but drips slowly from a series of evenly spaced openings. The difference between the drip irrigation systems and conventional on-lot wastewater systems is that irrigation systems are specifically designed to allow the water and nutrients to be used by plants. The system requires minimal site disturbance and costs approximately $15,000.00 to $25,000.00. It is important to note that spray irrigation systems do not function properly during winter months, where freezing temperatures can become an issue.

3.2.3 Holding Tank and Hauling Systems

A holding tank receives wastewater from a building and stores it until it is pumped out and hauled to a receiving/processing facility. Although similar to septic tanks, vaults have no outlet piping and must be watertight. Additionally, the tank must be equipped with a standpipe and a quick disconnect to which the pumping truck can be directly connected for efficient (minimum spillage) emptying of the vault. The volume can range from 1,000 gallons to 4,000 gallons or more. The vault must be equipped with an audible and visible high-water alarm, which alerts the local authority to the need for pumping.

Holding tanks can be used for the entire wastewater flow in cases where conventional and typical alternative systems are not feasible. They are often used by seasonal homes in sensitive environmental settings. Holding tanks can also be used to collect only a part of the wastewater flow. For instance, the tank can be used to collect the grey water (sink/shower drainage) when non-water-carriage toilets and urinals are employed in sensitive areas. This option permits a significant reduction (usually one-third or more) in the number of tank pumpouts as compared to the whole wastewater collection system. Another holding tank option is to collect only the black water (toilets) fraction of the wastewater while the grey water is treated in an onsite wastewater treatment system (absorption field). This option is usually popular in estuarine areas, where significant nitrogen removal is required because the blackwater may contain from 70 to 90-percent of the total nitrogen load.

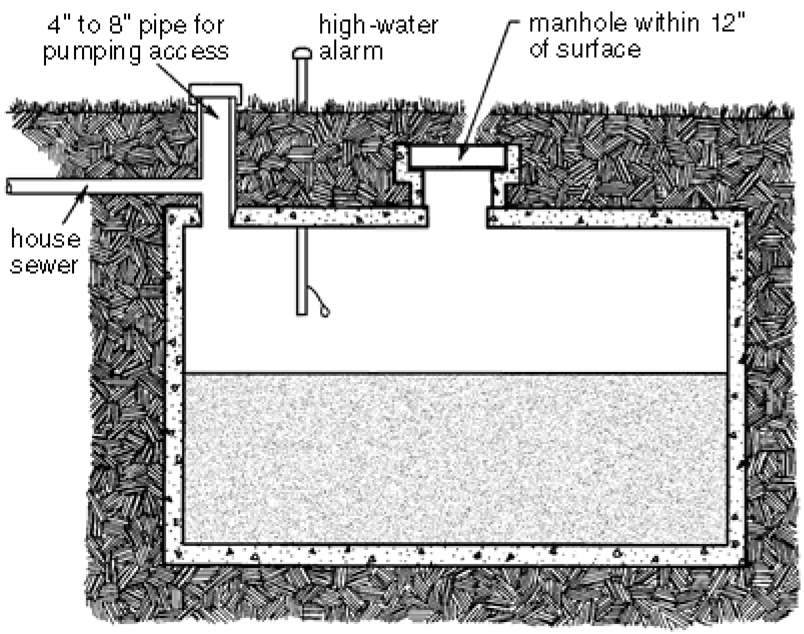


Figure 3.3: Schematic of a typical holding tank.

Pump and haul collection is best used when soil absorption fields do not work due to bedrock or ground water levels near the ground surface, and there are no other alternative sewer systems which can be implemented. Typical applications may include seasonal usage of the facility, isolated building with no running water, temporary structures or gathering places, or where nutrients must be excluded from ground water to protect environmentally sensitive areas. Pump and haul systems are viable only under a situation in which a local authority has the means to remove and dispose of the waste (ie: relatively local wastewater treatment facility which accepts wastewater sludge, or septage). Construction requirements are essentially the same as for a septic tank. However, in addition to timely pumping, operation and maintenance requirements should include checking the alarm function, cleaning the activation floats, and comparing volume used vs. volume accumulated in the tank. Pump and haul collection may also simply be the least expensive alternative in some places. However, the cost may be high when the usage is year-round, volumes are significant, and the hauling distance is not local.

The estimated cost to install a holding tank is approximately $10,000.00 (for a 5,000 gallon tank), including the installation of the alarm system. The cost to pump, haul, treat and dispose of the wastewater is generally in range of 10- to 30-cents per gallon, to which labor, travel and equipment amortization may be added. Travel cost will dominate if the round-trip distance between the truck's home base, the holding tank, and the disposal site exceeds 50 miles.

3.3 Alternative Treatment Systems

3.3.1 Onsite Advanced Treatment

On-site treatment of generated wastewater using alternative systems, such as septic tank effluent filter media, have been extensively tested and used in the United States. Some wastewater treatment filters use peat, pea gravel, crushed glass, shredded recycled tires, or polyurethane foam cubes. The function of these various types of filters is to pre-treat septic tank effluent by filtering it through the specific media before sending it to the soil treatment system.

3.3.2 Peat Filter Treatment

A peat filter pre-treats septic tank effluent by filtering through a (2)-foot thick layer of sphagnum peat before sending it to the soil treatment system. Peat is partially decomposed organic material with a high water-holding capacity, large surface area, and chemical properties that make it very effective in treating wastewater. Unsterilized peat is also home to a number of different microorganisms, including bacteria, fungi, and tiny plants. Two main types of peat filters are modules and lined filters. Modules are manufactured plastic peat treatment cells, and lined peat filters are built on site and usually lined with 30 mil polyvinyl chloride (PVC). Wastewater leaving a peat filter system is considered a high-quality effluent and useful for sites with disturbed soil and for environmentally sensitive areas such as shoreland areas in shallow bedrock areas, aquifer recharge areas, and wellhead protection areas.

Wastewater flows from the building into a septic tank where the large solids settle out and the liquid flows into a pump tank. An effluent screen or filter is often installed to restrict smaller solids and grease from flowing out of the septic tank. The liquid effluent is then pumped to the peat filter, where it is pre-treated and delivered to the soil treatment system for final treatment. Typical design standard for a modular peat filter is one module per bedroom. For a built in pit filter (lined peat filter), the recommended size is 1 gallon/sq. ft./day. To determine the design size of the filter, the volume of wastewater flow from the residence or restroom is divided by the loading rate. The length-to-width ratio is not as important as a distribution system that applies wastewater evenly to the filter surface at regular intervals. The use of a timer to spread the application out is recommended. Most soil disposal field systems will last longer when treating effluent from a peat filter, than when treating effluent from a conventional septic tank. These systems can be smaller than those designed to receive conventionally pretreated effluent.

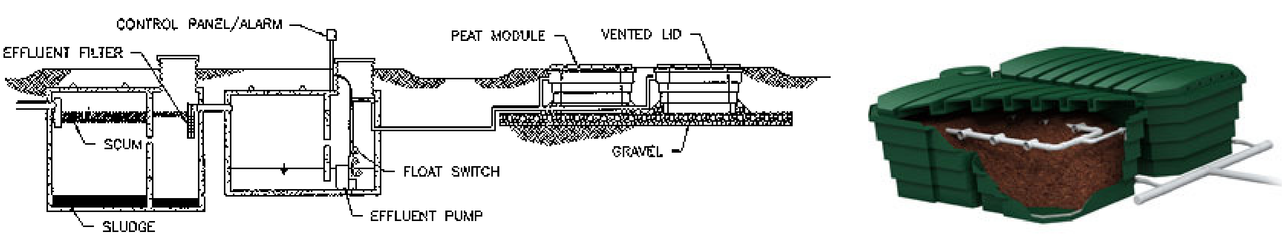


Figure 3.4: Schematic of a typical peat filter system and peat module diagram.

All routine operation and maintenance practices suggested for onsite treatment systems apply to peat filters. A maintenance contract is strongly recommended as the peat filters require more maintenance than conventional septic tank drained systems. Because of the high organic content of peat, the filter media must be periodically replaced. Typical life expectancy of the peat media in a filter is estimated to be 10 to 15-years. Daily running costs for a peat filter are based on the operation of a small submersible pump, pumping repairs, maintenance and usage of electricity.

A standard (4) module peat filter system, which will treat up to 600-gallons per day, costs approximately $11,000.00, not including the cost for the septic tank, pump tank and the installation of the system.

3.3.3 Foam Cube Septic Media Filter

Another alternative wastewater treatment option is the use of a foam cube septic media filter system. This type of system is operated in a very similar way as the peat filter system and permits wastewater treatment on very small properties or properties with soil conditions that do not permit a conventional septic tank and disposal field system. Open-celled polyurethane cubes, called “foam cubes”, are typically placed into a container to form a packaged or pre-fabricated septic media filter system, which is used in either single pass or re-circulating effluent mode as part of the treatment process. Wastewater flows out of the building into a septic tank where the large solids settle out and the liquid flows into a pump tank. The liquid effluent is then pumped to the pre-fabricated filter media container, commonly known as a “Biofilter Basket”. Primarily, these Biofilter Baskets are sized site specific depending on the average daily flow and locally available tanks to reduce costs for the installer. The Biofilter Baskets are filled with foam cube septic medium, shipped to site, and placed in a concrete or fiberglass tank. Treated effluent is pumped from the biofilter treatment unit to a small disposal bed, leaching field or trench. As mentioned earlier, the basket biofilters operate in recirculation mode for increased nitrogen removal. The only moving parts are two high-quality, energy efficient ½ horsepower effluent pumps that operate intermittently throughout the day.

Basket biofilters are ideal for clay type soils and smaller lots. The system is completely below ground and the baskets are custom sized to reduce excess treatment capacity and cost. Tanks are also sealed to block any potential odors. For a typically-sized (5,000-gallon) septic tank, carrier tank, Biofilter Basket and pump chamber, installation cost is approximately $40,000.00. Smaller sized tanks (for facilities with low utilization rates) will cost less.

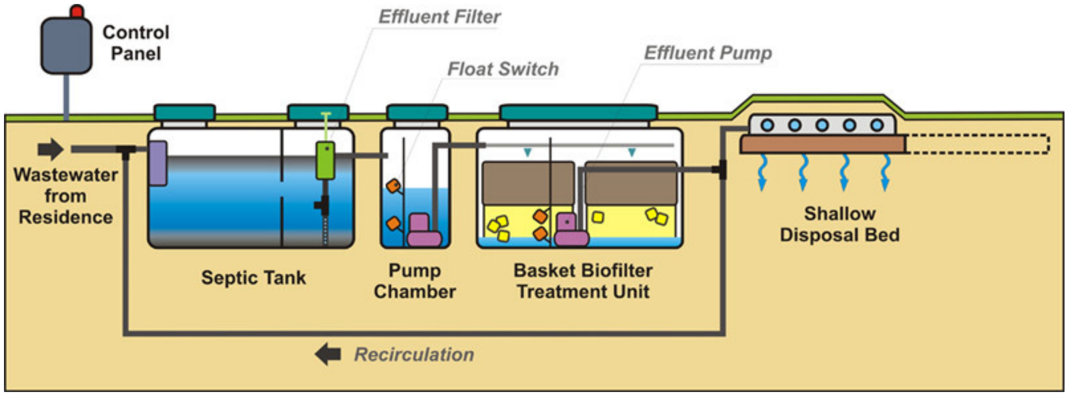


Figure 3.5: Schematic of a typical Basket Biofilter system.

3.3.4 Wastewater Treatment (Constructed) Wetlands

Interest has been growing in treating and recycling wastewater with constructed wetlands. These systems effectively integrate wastewater treatment and resource enhancement at a competitive cost, in some cases with significant reduction from the cost of conventional mechanical systems. Because chemical treatment of the wastewater is not necessary, the effluent is far less environmentally damaging. Not only do constructed wetlands offer open space and visual amenities, recent studies by the USEPA reveal that they significantly improve water quality and provide many additional benefits such as wildlife habitats (U.S. EPA, 2000).

Constructed wastewater treatment wetlands use the nutrient-absorbing abilities of natural vegetation to treat wastewater. This type of treatment option can offer an affordable solution to wastewater disposal in sites with failed conventional absorption fields, narrow or oddly-shaped lots, high water tables, and/or low soil percolation rates. It is considered a type of treatment system, but not a method of disposal. Methods of disposal of the treated discharge from constructed wetlands could include subsurface absorption areas (a conventional trench system of an elevated mound system), land application (spray or drip irrigation), or direct discharge to surface water.

The two types of constructed wetlands are subsurface flow systems (SSF) and free water surface (FWS) systems. In SSF wetland systems, the effluent runs beneath a course substrate such as gravel bed matrix, limiting odors and other nuisances. SSF wetlands work better than free water surface wetlands in colder climates. The FWS systems (FWS) simulate natural wetlands and allow the water to flow over surfaces at shallow depths through dense vegetation.

Wastewater treatment wetlands may be less costly to construct and are usually less costly to maintain than traditional wastewater treatment systems. However, the wetland system is actually only part of an overall treatment system. Pretreatment of the wastewater is still required, and it may consist of septic tanks or lagoons. Vegetation that is adapted to saturated conditions is grown in the wetland bed, removing nutrients, organic matter, suspended solids, and pathogens from the effluent. The pretreated effluent from the wetland bed can be discharged to a land application system or be discharged to a stream with a Part I NPDES discharge permit. A typical wetland treatment system, therefore, might consist of pretreatment lagoons, the wetlands, disinfection, and discharge to a stream or to a land-based disposal system.

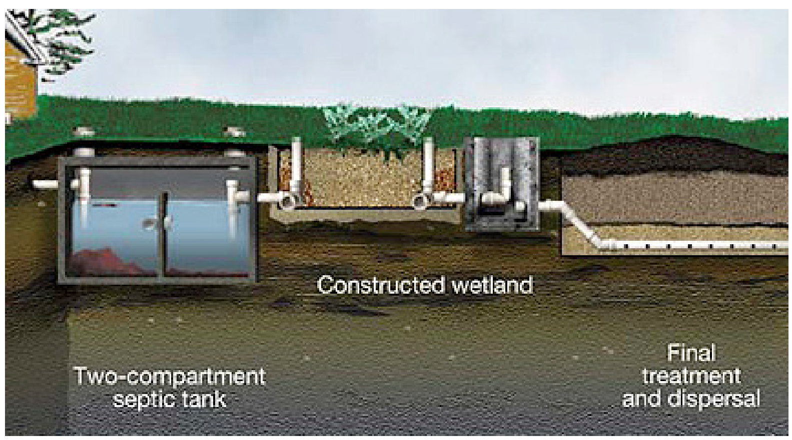


Figure 3.6: Schematic of a typical constructed wetland for wastewater treatment.

3.3.5 Grey Water Reuse

Grey water is wastewater which does not contain sewage, typically coming from building sinks, showers, and laundry facilities. Grey water systems can reduce the liquid effluent load on or size of a septic system, and grey water separation, filtration, storage, and piping system can conserve water for recycling or various uses such as flushing toilets, landscaping, or irrigation.

Grey water does not contain human waste products. Therefore, when it is disposed of on site, it does not need to be treated to the same extent as is required for sewage or 'black water'. In fact, soil infiltration and soil biomat treatment of grey water can produce very clean water for ultimate discharge into the environment. However, in most jurisdictions it is not allowed to simply dispose of grey water by dumping it onto the ground without being treated, such as via filtration through the drywell system.

For sites where there is limited space available for septic disposal and treatment, grey water can be separated by using piping and equipment, which allows the reduced sized septic bed. However, space will still be needed for grey water handling. The other reason for installing a grey water handling system is a shortage of potable water or the need to conserve and recycle water for re-use. A typical grey water system can save 50 to 100 gallons of water a day or more, depending on the level and types of water usage.

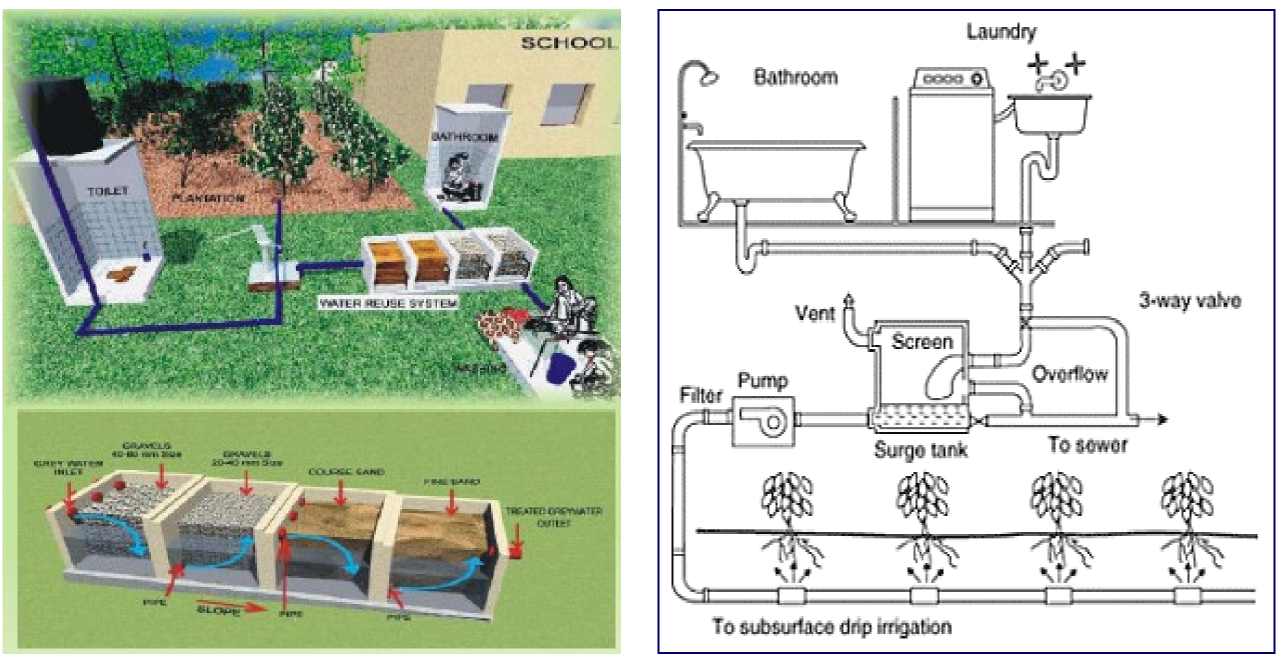


Figure 3.7: Schematics of a typical greywater re-use system.

3.3.6 Rainwater Capture and Storage for Non-Potable Applications

Collection of rainwater and storage, for the use in non-potable applications, such as, reuse in toilet flushing and/or landscape and agricultural uses can reduce both the amount of water demand and wastewater generation for the County. Rainwater collection systems were widely used before well drilling equipment and treated municipal water supplies became available. In many parts of the world, rainwater still provides the majority of the water needed to meet agricultural requirements and, in some cases, potable waters as well.

Most rainwater collection systems are designed to capture rainwater from the roofs of the buildings. The water is then transported through gutters and other pipes into cisterns or tanks, where it is stored until needed. The tank can be installed either above ground or underground, depending on the site locations and safety concerns.

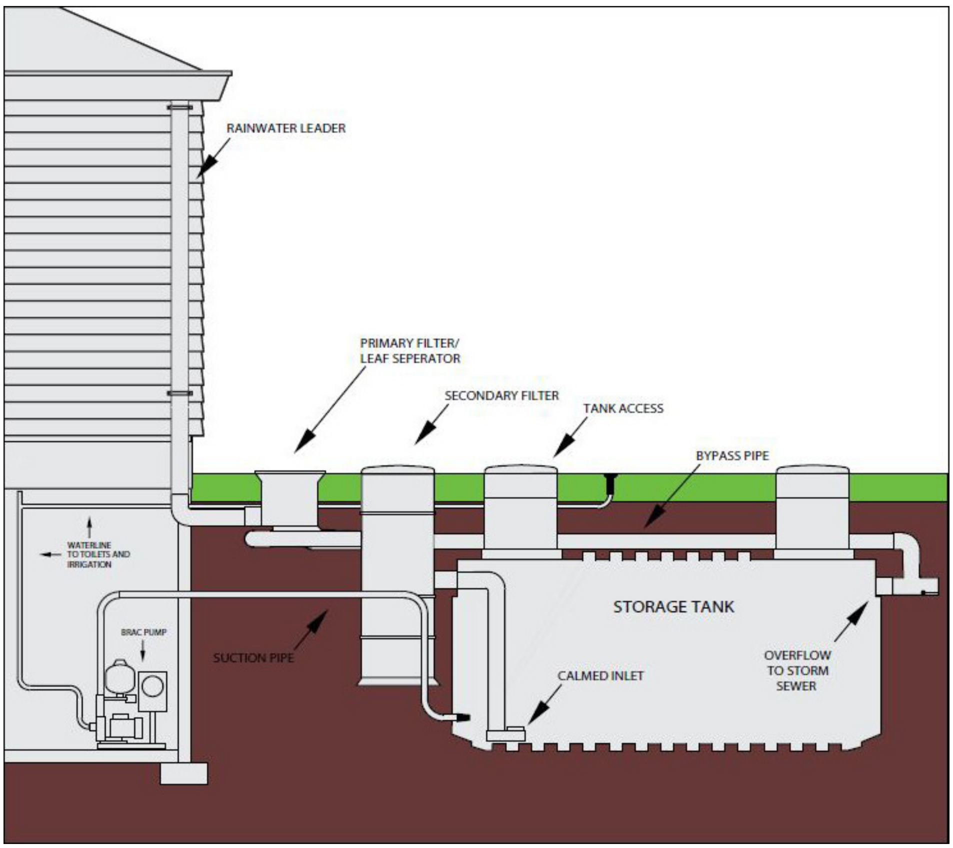


Figure 3.8: Schematic of a typical rainwater capture and re-use system.

A typical rainwater collection system consists of the following:

- A collection area (usually the roof of a building, parking lot, or impervious surface)
- A method of conveying the water (surface runoff, gutters, downspouts, and piping)

- A filtering device (pre-filtration process of removing debris from collected water before it enters into the storage tank)
- Oil-water separation (collecting surface runoff has the potential for hydrocarbons to mix with rainwater, a process is needed to separate the two before it is utilized)
- A storage tank (above ground, below ground, plastic, concrete or composite, inside or outside, size is determined by analyzing how much rainfall can be feasibly captured and the site's typical water-cycle requirements)
- A system to distribute the water as needed (depending upon the electrical, hydraulic and physical size requirements of the site, pump enclosures are tailored to be as compact as possible, and placed virtually anywhere on site)

The construction cost of the rainwater storage tank widely varies from the size, materials it made with and installed location, whether it be on above ground or below ground. While plastic storage tanks are in the approximate range of $1,000 for a 2,000 gallons sized tank, the same sized fiberglass tanks are approximately $8,000. Installation of the tank, complete filtration process and distribution components of the recycled water system are estimated to cost approximately $25,000.

3.3.7 Composting Toilets

Composting toilets are a type of wastewater treatment system that use little or no water and generally do not require hookup to a sewer or septic system. It uses a complete natural process of decomposition and evaporation to recycle human waste. Waste entering the toilets is over 90% water, which is evaporated and carried back to the atmosphere through the vent system. The small amount of remaining solid material is converted to useful fertilizing soil by natural decomposition. The correct balance between oxygen, moisture, heat and organic material is needed to ensure a rich environment for the aerobic bacteria that transform the waste into fertilizing soil. This ensures odor-free operation and complete decomposition of waste. When human waste is properly composted, the end product does not contain any pathogens or viruses (these are destroyed by bacterial breakdown). This nutrient-rich fertilizer can be used on plants or around the base of trees, as part of the natural cycling of nutrients.

The composting toilets are available in many different types and sizes, including non-electric or powered toilets. All composting toilets must perform three completely separate processes:

- Compost the waste and toilet paper quickly and without odor
- Ensure that the finished compost is safe and easy to handle
- Evaporate the liquid

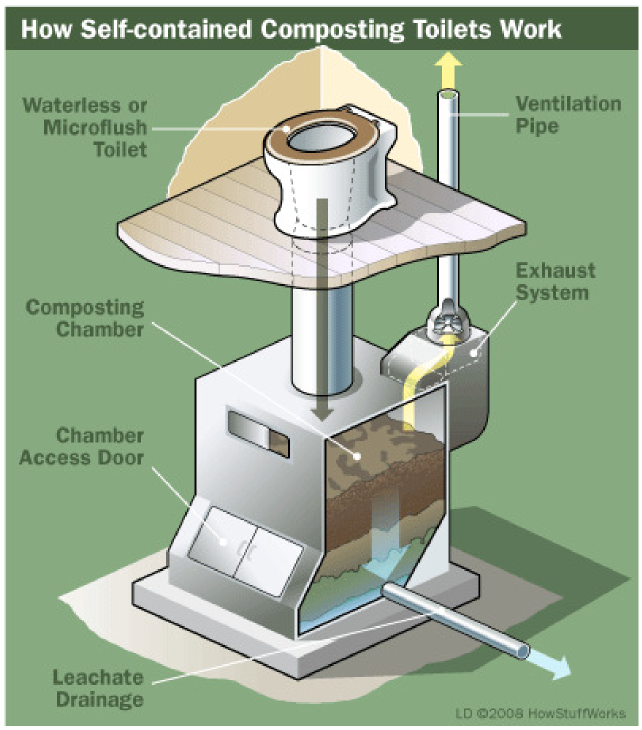


Figure 3.9: Schematic of a typical composting toilet system.

Typically, the composting toilets are attached to a composting chamber containing peat moss or similar product like pine wood shavings. To mix and aerate, the chamber automatically begins to turn to activate once the waste enters into the chamber. This process creates a mixture with all the components required to induce aerobic decomposition. An electric fan located in the upper back of the toilet continuously draws air into the toilet, therefore, preventing any odors from escaping. The air is circulated through the unit and heated by a thermostatically controlled heater. The warm air evaporates the liquids in the toilet, keeping the solid material inside at the proper moisture/ carbon/nitrogen ratio for optimum decomposition. The moisture-laden air is then vented to the outdoors through a vent pipe running from the toilet to the outside of the structure where the toilet is housed. When reliable power is not an option, using a process known as batch composting can be utilized to handle high volume of usage. Batch composting is a process where the batch is collected in the chamber and then removed from service. Using the batched compost method, alternating bins are used to compost the material. Air circulation through the unit occurs due to the natural convention of air through the ventilation pipe. This is induced by the heat that is produced by the composting process, temperature differentials between the inside and outside of the structure, and by the natural chimney effect created by the vent pipe. Installing an optional 12V DC fan into the vent pipe can induce additional circulation of air and increase the capacity of the unit.

Another similar option available in areas where septic system cannot be installed, or where there is no power or water available, or simply in situations where a regular toilet is too costly or difficult to install are the Incinerating Toilets. These toilets are self-contained units typically consisting of a traditional commode-style seat, which is connected to a holding tank, and a gas-fired or electric heating system to incinerate waste products deposited in the holding tank. Such systems do not require water to operate. When properly maintained and functioning, they produce a fine, sterile ash that can easily be disposed of with other trash.

This system is perfect in areas where a water toilet is needed, but pumping out the waste is problematic or too costly. Incinerating toilets are relatively odorless and they can be used in unheated buildings, although if using propane, the EPA recommends that the propane tank be sheltered from severe winter conditions. Typically each incinerating cycle uses about 1.5KWH to 2.5 KWH depending on the unit used. Costs varies from $500.00 to $2,000.00 for composting toilets and from $1,800.00 to $3,500.00 for incinerating toilets.

3.3.8 Waterless Systems

Waterless systems incorporate urinals that appear and work like conventional urinals, with the exception that they do not flush and therefore do not require the use of water. The waterless urinals are plumbed to a standard drain line but do not use a conventional water filled trap. Instead, the urinal internals contain specially designed traps that utilize proprietary sealant liquids that act as a vapor trap. Essentially, the sealant liquids are lighter than water. The urine is heavier than the sealant liquid, passes through and goes down a drain. The sealant liquid remains in place to trap odors and prevent them from escaping to the bathroom atmosphere. Different types of drain traps are available depending upon user preference and include removable (and recyclable units), units integrally cast into the urinal and built-in waste traps located in the drain line. The drain trap cartridges are designed to act as a strainer to keep unwanted solids from entering the drain line.

Waterless (a.k.a. "no-flush") urinals are very versatile and can be installed anywhere conventional flush-type urinals would go. Locations have included airports, schools, offices, hospitals, stadiums, convention centers, parks and rest areas. These units are especially practical where facilities are not connected to a sanitary sewer system. Due to the fact that water is not used to flush the urinals, septic systems or other methods of on-site treatment facilities do not fill as quickly. Additionally, freeze protection is not required in the winter, thereby eliminating the need to provide heat tracing or heaters to keep conventional flush-type urinals from freezing.

Following are several advantages offered by waterless urinal systems when compared to conventional flush-type urinals:

- Water savings - no water is needed to use the urinals.
- Low maintenance - the absence of water valves and piping eliminates repairs and reduces opportunities for vandalism.
- Improved hygiene - waterless units are designed to dry out between uses, thereby eliminating the moist environment where germs can grow; the units are also touch-free, so a user is less likely to come into contact with any germs.
- Odor control - the sealant liquid trap is design to eliminate or greatly reduce odors.
- Environmentally friendly - wastewater requiring treatment is reduced, water is not used and the sealant liquid to control odors is environmentally friendly.

Waterless urinal fixtures may typically cost more than their flush-type counterparts, however, when considering the fact that less plumbing is necessary, their overall costs are generally lower. A typical cartridge could cost as much as $40.00 to replace and needs to be replaced approximately once every 5,000 uses. Waterless urinals can offer a very viable and environmentally friendly alternative to conventional flush-type units. The waterless urinals result in reduced maintenance and are more readily suited for the isolated installations that will be required at the County open space facilities.

3.4 Other Strategies

3.4.1 Use of Off-site Facilities

If a particular property is located near a commercial facility that has adequately sized sanitary facilities, it may be in the County's best interest to enter into an agreement for those facilities to offer the use of their rest rooms. The agreement may be monetary in nature, with the commercial facilities ultimately responsible for operation and maintenance of their systems, and could result in a cost-savings to the County. The commercial facilities would benefit as well, with increased traffic that could lead to larger sales. It could be a win-win scenario, if feasible.

3.4.2 Innovative Use of Existing On-Site Facilities

Numerous open space areas are located on properties that may be of historical significance or that may contain structures of historical significance. At these particular sites, innovative use of the existing significant structures should be promoted, such as conversion of the structures into bathroom facilities. One such example is the Bayshore Discovery Project's conversion of an old railroad boxcar to serve their facility in Bivalve. A series of railroad boxcars once served the clam industry that flourished in Bivalve for the first half of the 20th century. These

boxcars were used to distribute clams on railcars for transportation around the country. At the time that the Bayshore Discovery Project decided to make Bivalve the homeport for New Jersey's tall ship, the A.J. Meerwald, the boxcars were dilapidated after years of no use. Funding from the County has since been obtained and an old boxcar was refurbished and converted into a bathroom to serve the A.J. Meerwald homeport facility. The boxcar bathroom contains five (5) composting toilets and has been in service for approximately 1-year at the time of this report. It is sufficient to serve the Discovery Project's staff and tours that regularly visit the site.

This innovate use is an example of the wastewater management strategies discussed in this report and not only helps to serve the property but has also enhanced and preserved a piece of Cumberland County history for decades to come. The County should welcome similar innovative uses of open space areas, where possible.

3.4.3 Sites with No Facilities

It may not be economically or physically feasible to provide sanitary service to every open space property within the County. If a particular property is very isolated and rarely used, it does not make economic sense to expend the money necessary to provide sanitary service. Additionally, the County may identify particular properties as being extremely environmentally sensitive and may not want to promote visitation. Those properties may include land that is frequently flooded or that which is habitat for an endangered species. In these instances, it may be the best solution to provide no sanitary facilities.

3.4.4 Temporary Wastewater Management

If a particular open space property is sparingly used during the year but occasionally hosts certain high-usage events, the purchase or rental of temporary facilities (Porta-Johns or similar units) maybe the most feasible and economic solution. A vendor can deliver, service and pick up the Porta-Johns at the end of their use and no maintenance would be required by County personnel. This is a very flexible option to consider for fairground sites, carnivals, or scout "camporees".

4.0 Recommendations

4.1 Evaluation of Wastewater Needs

After categorizing the County's various open space parcels (Section 2), and reviewing the various methods of wastewater management strategies (Section 3), this Section aims to evaluate the effectiveness of each strategy for a particular category of parcel. Strategies were evaluated on the basis of technical, economic and operational feasibility, utilizing a base usage of approx. 500-1000 gpd for purposes of comparison. All of the management strategies were evaluated for all categories of parcels, and particular strategies were rejected if site environmental constraints or regulatory requirements prevented their implementation, or the strategy was found to not be cost-effective.

Based upon familiarity of design, ability to standardize facility layouts, and cost-effectiveness, the default recommendation for each category is conventional facilities - sewered facilities within a designated SSA; private well and septic outside the SSA. If conditions exist within a certain category that would preclude the use of these strategies, other alternatives were evaluated and recommended if merited. Recommendations are listed in order of preference, and particular site conditions which would require or support the use of a particular strategy are noted in the recommendation.

As noted in earlier sections of this Plan, because each parcel has its own unique characteristics, these recommendations are intended as guidance only. Final determinations of the need for wastewater facilities and type of strategies to be provided must be made by local Planning personnel on a site-by-site basis.

4.2 Category 1 – Large Parcels, Environmental Constraints, Passive Use

4.2.1 Evaluation of Strategies

The defining characteristics of these sites are 1) the lack of Sewer Service Areas, precluding the use of sewered facilities; and 2) extensive areas of wetlands, which not only limit significant areas of the acreage to water-based access (thereby suppressing total visitation figures), but can significantly or entirely prevent the use of ground-water-based disposal methods. As a result, available wastewater management strategies are limited to self-contained or off-site options.

The large acreage of the parcels, combined with the passive nature of the recreational activities at these sites results in a very low density of use, meaning that onsite restroom facilities may not be necessary. If there are business establishments located near the site entrance(s), the County may wish to inquire as to their willingness to open their facilities to Park users.

If visitation and usage patterns at a site require that restrooms be provided, self-contained facilities (holding tanks or composting toilets) may be provided at or near the entrance. Water may need to be brought in for maintenance if an onsite source of supply is not available, and regular removal of waste material must be scheduled with a licensed waste hauler.

4.2.2 Recommendations

The following wastewater strategies are recommended for use at this type of open space location:

a. None (no wastewater facilities provided);
b. Use of nearby business facilities;
c. Composting toilets and waterless urinals;
d. Wastewater holding and hauling;

4.3 Category 2 – Large Parcels, Some or No Constraints, Passive Use

4.3.1 Evaluation of Strategies

Sites in this category are subject to a wider range of activities than those discussed in the previous Subsection, due to fewer wetlands and more space available for land-based activities (hiking, cycling, horseback, etc.). In addition, the parcels are normally located closer to the County's population centers and have easier access, leading to higher visitation rates.

While these types of parcels are normally located outside of designated SSA's, their inland nature can provide the opportunity for groundwater-based wastewater strategies. Sites are likely to be found within the parcels that are suitable to conventional septic treatment and disposal. Water supply would be drawn from an onsite well, unless a public supply was located nearby (unlikely). If site conditions are such that a well is not feasible, a rainwater collection system may be employed to provide water for the facilities.

If site-specific environmental conditions limit the area available for a conventional disposal field, there are several management strategies available that would reduce the size of the field – grey water separation, which would divert wastewater from sinks and/or showers for toilet and urinal flushing; and onsite treatment (peat filter or similar equipment), which would treat the wastewater to reduce contaminants, lessening the need for native soil treatment.

4.3.2 Recommendations

The following wastewater strategies are recommended for use at this type of open space location:

a. Conventional treatment – well and septic;
b. Rainwater collection (if water supply is scarce);
c. Onsite treatment (if disposal field space is limited);
d. Grey water separation (if disposal field space is limited, and there are grey water uses at the site)

4.4 Category 3 – Smaller, Constrained Parcels – Passive Use

4.4.1 Evaluation of Strategies

As with the larger costrained parcels noted above, the lack of sewer service and environmental constraints at this type of site severely limits or precludes the use of most conventional wastewater strategies. Exceptions may be made if there are areas of uplands where suitable soils are present (onsite treatment systems may reduce the area needed for a groundwater-based system), and if they are located in suitable areas of the parcel (i.e., near the entrance or at a site likely to draw visitors.

In many cases, the presence of significant environmental constraints may suppress visitation, reducing the need for wastewater facilities. Unless significant numbers of visitors are anticipated, it may not be feasible to provide facilities at these parcels.

However, local business establishments (where available nearby) could provide some amenities if agreed to in advance (signs would be located at the parcel entrance/exit noting this, with distance and direction provided on the signs). If no businesses are available or willing to provide access, and facilities are deemed essential, waterless systems (composting toilets) may be considered, or temporary units installed strategically for special events that may be expected to draw a larger number of visitors.

4.4.2 Recommendations

The following wastewater strategies are recommended for use at this type of open space location:

a. None (no wastewater facilities provided);
b. Use of nearby business facilities;
c. Onsite treatment and disposal (if suitable soil areas are available and significant visitation is anticipated)
d. Composting toilets and waterless urinals;
e. Temporary wastewater facilities for short-term events

4.5 Category 4 – Large Parcels, Active Use

4.5.1 Evaluation of Strategies

Parcels in this category are among the most heavily visited in the County's open space inventory. Most contain a mix of active and passive uses; however, those areas within the park dedicated to active use are the most likely to require sanitary facilities. Whether a zoo, swimming area or a multi-field sports complex, these areas draw large numbers of people into a relatively compact area, attract families with children, and visitation length is extended, all leading to increased need for restrooms.

Several of these large parcels (for example, City Park in Bridgeton or the County Fairgrounds in Millville) are located within a designated SSA. As noted previously, not all areas within SSA's will have ready access to sewers; however, if such access is available, sewered facilities are the most compact and cost-effective method of wastewater disposal. By removing the treatment and disposal aspects of the facilities (which are handled by the receiving treatment plant), only the restroom itself and a sewer connection need be built at the site. In certain cases, a small pump station may be needed to convey wastewater to available sewer lines.

If the parcel does not have direct sewer access, or is located outside a designated SSA, conventional septic treatment and disposal may be considered. Because these active sites attract significant numbers of visitors, water supply (whether public supply or onsite well) may already be present; restroom facilities need only to connect to existing piping. If water supply is not available, an onsite well may be considered.

If these attractions also contain non-potable water uses (e.g., lawn or landscape irrigation, animal washdown, etc.), a grey water separation system may result in cost savings to the property owner / manager due to decreased water use, or a reduced area requirement for a septic disposal system.

4.5.2 Recommendations

The following wastewater strategies are recommended for use at this type of open space location:

a. Sewered Facilities (if sewers are readily available);
b. Conventional treatment – septic disposal with public or well water;
c. Grey water separation (if there are non-potable water uses at the site)

4.6 Category 5 – Small Parcels, Active Use

4.6.1 Evaluation of Strategies

This category consists primarily of municipally-owned parks and recreation complexes. They are not necessarily the regional attractions that might be found in the larger parcels; however, they can draw a significant number of local users in a high-density usage. Many of these locations already have restroom facilities; this evaluation may be useful in upgrading these facilities if appropriate, as well as providing facilities at locations that do not currently have them.

This type of parcel can be located either within a designated SSA or outside. If the parcel is within a designated SSA (and sewers are available), sewered facilities should be the first strategy considered, for the same reasons as noted in the previous Subsection. If sewers are not available, or if the parcel is outside the SSA boundary, individual site characteristics (size, soil conditions, groundwater depth) must be considered in deciding whether a site can support a conventional septic system installation. Depending on the constraints present, onsite treatment, grey water separation or rain water collection systems may be used to provide appropriate wastewater management.

For remote, highly constrained and/or low usage sites, it may not be cost-effective to provide facilities. In this case, nearby businesses may be contacted to gauge their willingness to open their facilities to park users. If not, visitors should be notified that no facilities are available.

4.6.2 Recommendations

This category has the highest variety of options available for wastewater management; it is critical that individual site conditions be reviewed during the planning process. The following wastewater strategies are recommended for use at this type of open space location:

a. Sewered Facilities (if sewers are readily available);
b. Conventional treatment – septic disposal with public or well water;
c. Onsite treatment w/ groundwater disposal (if site is too small to support a full disposal field);
d. Grey water separation (if there are non-potable water uses at the site)
e. Rainwater collection (if water supply is scarce);
f. Use of nearby business facilities;
g. None (no wastewater facilities provided)

4.7 Category 6 – Very Small Parcels, Active Use

4.7.1 Evaluation of Strategies

These parcels are primarily neighborhood parks and playgrounds, drawing primarily local residents as users. The size of these parcels (from 0.1 up through 5 acres) and local focus likely means that there will not be a high demand for wastewater facilities (locals can go home and return quickly if desired). Therefore, it is not recommended that facilities be provided at these locations.

The exception to the above would be if a parcel functioned as an entry point to a larger parcel, or a linear parcel (e.g., trail heads or access points, boat launches, etc.). These sites can concentrate users at particular points, and can attract visitors that have been using the trail for an extended period. Low-footprint wastewater facilities should be considered at these locations, particularly if a related structure is already in place, or planned. For example, if an old station on a rails-to-trails route is to be refurbished, or if a boat launch contains a canoe rental facility, restrooms can be designed or retrofitted into the structure. The strategies considered in these instances are similar to those noted in Subsection 4.6; however, the limited area may preclude use of groundwater disposal methods.

4.7.2 Recommendations

The following wastewater strategies are recommended for use at this type of open space location:

a. None (no wastewater facilities provided)
b. Sewered Facilities (for point-of-access facilities where sewers are readily available);
c. Use of nearby business facilities (for point-of-access facilities where sewers are not readily available)
d. Incorporation into other structures (if provided)

4.8 Conclusion

Because open space is such a large part of Cumberland County (both in acreage and importance to the County's residents and visitors), efforts must be made both to accommodate users at existing sites and encourage visitation at some lesser-known parcels. A significant part of these efforts is the provision of sanitary facilities. Provision of accessible, clean and effective facilities can greatly improve a visitor's experience, leading to both repeat visits and positive word-of-mouth promotion.

This Report is intended as a guideline to selecting wastewater treatment and disposal strategies in open space areas, or areas with unusual needs. Proper use of the Report requires the input of many different parties, including both County and Township Planning Departments, property owners, local non-governmental organizations and the public at large. The interaction and cooperation of these groups is vital to implementing a comprehensive, consistent and effective management plan.

As can be seen in the preceding Sections, there are many different strategies to provide wastewater service at an open space parcel; while not every strategy may be feasible at every site, this Report was able to identify multiple strategies for each major category of parcel. Determining which strategy is optimal for a particular parcel requires a careful analysis of that particular site, including anticipated usage, availability of existing utilities, the presence of environmental constraints, projected costs and available funding source(s). Incorporating some innovative usages into a project, such as the boxcars at the AJ Meerwald site, or the use of renewable power sources at remote locations, can also bring positive attention to a site.