

CHAPTER 4

SOLID WASTE MANAGEMENT SYSTEM

ASSESSMENT AND ALTERNATIVES

4.0 ASSESSMENT OF SOLID WASTE MANAGEMENT ALTERNATIVES

In this chapter, the existing County solid waste management system is evaluated for its adequacy to meet the goals and objectives of Carroll County for the period of this Plan. Alternative technologies, management techniques, and regulatory modifications that could be used to meet identified requirements are discussed. In addition, siting constraints for potential new solid waste management facilities are also reviewed.

The County has established a hierarchy of solid waste management that is to be used to guide the evaluation of potential technologies, from most preferable to least:

1. Reduce the generation of waste.
2. Reuse materials prior to their entering the waste stream.
3. Recycle generated waste materials.
4. Waste utilization, i.e., composting and waste-to-energy.
5. Landfilling of unusable waste.

This hierarchy was used both to evaluate the suitability of potential alternatives for the County as well as in the development of the Action Plan presented in Chapter 5.

4.1 COLLECTION AND TRANSFER

Alternatives considered for collection of residential and other non-rubble waste and recyclables include the existing system, franchising/contracting, a licensing system, and a county-operated system. Large commercial, industrial, and institutional establishments currently contract directly with private haulers for collection. These establishments often have requirements related to collection frequency, containers, and collection hours, which are best addressed by individual contracts; therefore the existing arrangements for these facilities should be maintained. Alternatively, commercial establishments should have the option of being included in the residential waste or recyclable collection system for their geographic area, if satisfactory service can be provided.

4.1.1 ALTERNATIVE COLLECTION SYSTEMS

4.1.1.1 THE OPEN SYSTEM (SUBSCRIPTION)

In the unincorporated portions of Carroll County, most residential and commercial solid waste is collected by private haulers who contract directly with the individual homeowner, apartment complex, commercial establishment, industry, or institution. Individual clients are billed for services by the private hauler on a monthly or quarterly basis. All haulers operating in Carroll County must secure a license from the County and are required to operate under the requirements of the Solid Waste Ordinance (see Appendix D).

The Town of Sykesville operates its own collection system, using municipal employees and equipment. The remainder of the municipalities in the County contract directly with a private hauler for collection services within their boundaries.

Municipal taxes are used to pay for collection costs within the municipalities.

The existing system requires minimal involvement and financing by County government. The individual or commercial establishment is free to deal with the hauler of his/her choice. If service is unsatisfactory, there are no barriers to choosing another hauler. The system generally serves existing needs of the County in a satisfactory manner. The cost for hauling and disposal of waste is billed directly to the customer by the hauler with no County involvement.

In either a subscription or open system, overlapping routes are prevalent; typically, a neighborhood or block will be serviced by several private haulers. In terms of labor, equipment, operation, and maintenance, this system is potentially less cost-effective than a system with assigned routes that do not overlap.

Due to the number of haulers and lack of County involvement, it may be more difficult to implement modifications to collection practices that may be desirable to meet the goals and objectives of the County Solid Waste Management Plan. These could include volume-based billing for collection services and mandatory collection of recyclables by solid waste haulers.

When collection is voluntary, vagrant dumping to avoid collection fees or trips to the landfill can be a problem. Dumping complaints have increased over the past years.

4.1.1.2 CONTRACT COLLECTION

Under contract collection, the County would be divided into collection districts with approximately equal residential populations. Municipalities could either comprise a separate collection district, or could be included within an adjacent unincorporated area. One hauler is generally awarded the collection contract for each district based on competitive bidding. Each hauler could be responsible for billing each customer for collection and disposal services according to the rate established in the competitive bidding process. Alternatively, the County would pay each hauler based on their bids. This cost could be reflected on the tax rate or through a waste generation fee.

The County would be responsible for determining the number and geographic location of collection districts and establishing uniform performance requirements and standards for the franchisee. Under this system, additional County staff members might be required to conduct the franchise award process and administer the contracts. The following considerations must be addressed when establishing a contract system:

- The length of the contract,
- Whether collection is mandatory or voluntary within the district,
- The collection of recyclables,
- Who will provide containers for both refuse and/or recyclables,
- The frequency of collection for refuse, recyclables, yard waste, white goods, bulky items,

- The servicing of multi-family housing, commercial, institutional, and industrial establishments,
- Collection hours and days,
- Performance standards, i.e. spillage, litter, noise, equipment,
- Whether a disposal or processing facility will be designated,
- Billing and bill collection procedures,
- Performance bonding of collection contracts, and
- Insurance, indemnification and record keeping.

The elimination of redundant collection routes should result in the reduction of collection costs for homeowners and commercial accounts. The contract system gives the County an opportunity for flow control and facilitates the implementation of new management policies through incorporation of requirements in contracts.

Although recyclable collection and volume-based billing can be implemented in the open free enterprise system, the increased control afforded to the County in a contract system would facilitate implementation and monitoring of these measures.

Mandatory collection can significantly reduce the occurrence of vagrant dumping and out-of-county waste from entering the waste stream and through the reduction of collection redundancy and have a positive affect on air quality.

4.1.1.3 HAULER LICENSING

A licensing system provides a compromise between the completely open collection system and a contract system. The licensing system allows existing private haulers to remain in business; however, these haulers are then required to meet requirements imposed by the County, i.e., vehicle/container standards or reporting requirements. The haulers are responsible for billing each customer and for disposal services.

Under this system, Carroll County is responsible for establishing uniform performance standards for the haulers. Additionally, the County must also establish procedures and policies for licensing haulers. The following considerations must be addressed in establishing a licensing system:

- Length of license,
- Mandatory or voluntary collection,
- Collection of recyclables,
- Provision of containers for refuse and recyclables,
 - Collection frequency, and
 - Performance standards.

Carroll County now operates under the Solid Waste Ordinance, Chapter 185 of the County Code, (Appendix D) that provides for limited licensing. That authority could be expanded to achieve some waste flow control. A licensing system allows for the individual and commercial establishments to deal with

the hauler of his/her choice. Therefore, small private haulers would be given an equal opportunity to compete with the large haulers. The system allows for the customer to select and change haulers at his/her option.

In addition to customer choice, the licensing system gives the County the opportunity to control flow and facilitates the implementation of new management policies through the requirements of the license.

4.1.1.4 GOVERNMENT COLLECTION

Under this option, collection and hauling services would be provided by County employees using equipment owned by the County. Collection could be made either voluntary or mandatory throughout the County. Financing of the system could either be through the tax system or by direct billing that reflected the true cost of maintaining the program.

This alternative provides the most control for the County; this could be important for implementation of source reduction and recycling programs, as well as providing a uniform quality of service. Theoretically, economies of scale could be realized by such a large operation in the procurement of equipment and supplies. In addition, the public operation does not have to earn a profit or pay taxes. However, a large capital expenditure would be required by the County to procure the necessary equipment to take over all collection and hauling.

4.1.2 VARIABLE RATE VS. BASE RATE FEE FOR SOLID WASTE COLLECTION SERVICE

One way for a community to provide an incentive to its residents, to reduce the amount of waste disposed, is to institute a variable rate charge for collection services. Currently, most refuse haulers charge a flat monthly fee (i.e., base rate) for collecting an unlimited amount of refuse. As a result, there is no economic incentive for residents to reduce the amount of waste disposed. In order to create an economic incentive to reduce the amount of waste disposed, citizens could be charged based on the amount of refuse put at the curb each week (i.e., variable rate). As the amount of waste disposed increases or decreases, the cost to the resident either increases or decreases.

Variable rate programs are commonly referred to as pay-per-unit or pay-as-you-throw programs. Under such programs, residents place waste in specially designated bags or containers purchased from the hauler, local government or cooperative retail outlets. Essential to a pay-per-unit program is the availability of recycling programs and educational material on ways to reduce the amount of waste generated. Programs exist that are totally based on a per-unit rate or regardless of the specifics, a pay-per-unit program provides two main benefits:

- It gives residents a certain level of control over their disposal costs, and
- It reduces the amount of waste requiring landfill disposal.

Another alternative could use a combination of a base rate for a threshold volume and a greater per bag fee above that threshold.

4.1.3 WASTE COLLECTION IN CARROLL COUNTY

The current system, in unincorporated areas of the County, continues to be an open ended/subscription system. However, as a result of a Solid Waste Study conducted in 2005 by R.W. Beck for Carroll County, the Board of County Commissioners adopted a resolution (Resolution No. 658-06, See Appendix "H") giving the Department of Public Works, with the assistance of the Northeast Maryland Waste Disposal Authority, the task to develop a Solid Waste Management Plan to meet long term needs of the County.

One of the items in the resolution is to explore the possibility of establishing a contract or franchise form of collection rather than the current system.

4.1.4 TRANSFER

A transfer station is used to consolidate waste from residential, commercial, and other collection vehicles into a larger vehicle for transportation costs savings. An example of this savings would be to take the waste from two or more route collection vehicles with two-man operating crews and place the waste into one semi truck-trailer, with one driver transporting waste to the disposal facility. The savings are realized by using less manpower to transport the waste, by increasing the time collection vehicles can spend collecting waste, and by using one vehicle instead of multiple vehicles (thus saving the hauler operating costs, i.e. fuel, maintenance, and labor).

Transfer stations also provide a better opportunity to recycle by allowing the opportunity to target high value commercial loads.

Through a contract with Waste Management, Inc., Carroll County began transferring waste off the face of the landfill in July, 1997. At the same time, the County began negotiations for the construction of a transfer station at the Northern Landfill. Transfer operations from the transfer station began December 1, 1998.

Options for dealing with MSW in the event of routing disruptions, loading problems, or need to evacuate the transfer station include landfilling (in the near term and for short periods of time) and/or resumption of transfer off the face of the landfill. The latter requires notification to, and approval, by MDE.

4.2 WASTE REDUCTION

4.2.1 WASTE REDUCTION AS PART OF AN INTEGRATED WASTE MANAGEMENT APPROACH

Waste Reduction can be defined as:

"The process of reducing the amount of solid waste generated. It includes product reuse, increased product life, reduced material use in product design, and decreased consumption of products. It also includes activities such as grasscycling and backyard composting of yard trimmings."

4.2.2 CARROLL COUNTY, MARYLAND - WASTE REDUCTION POLICIES

Carroll County will continue to implement waste reduction through the adoption of internal policies and citizen education programs. To achieve this, Carroll County has:

- Developed a waste reduction education and information package for use by local municipalities, consumer groups, clubs and service organizations, and homemakers' organizations.

- Included waste reduction information on Carroll County's website.
- Surveyed its waste generation patterns and took measures aimed at reducing waste generation rates.
- Included in all presentations of waste management (at meetings in all communities of the County) a segment on waste reduction.
- Provided technical assistance upon request, on the subject of waste reduction targeted at the homeowner and small business.
- Provided technical assistance upon request, to municipal governments, schools, and quasi-public institutions such as hospitals, health care facilities, and housing for the elderly, enabling them to implement local waste reduction programs.
- Provided technical assistance for promoting and implementing backyard compost and mulching programs for yard trimmings to homeowners and residential developers.
- Implemented in-house purchasing procedures resulting in less waste being generated, and procedures that encourage the purchase of materials that have a reuse value and the purchase of materials made from recycled material.
- Investigated opportunities to expand the County's present policy of purchasing used equipment when possible.

4.3 SOURCE SEPARATION/RECYCLING

4.3.1 SOURCE SEPARATION/RECYCLING AS PART OF AN INTEGRATED WASTE MANAGEMENT PROGRAM

Source separation implies the removal of materials, at the point of generation, from the municipal solid waste stream, prior to the collection, disposal, or processing of the remaining mixed municipal solid waste. The materials subject to "source separation" could be yard trimmings, recyclable glass, aluminum, ferrous metals, electronics, paper, corrugated cardboard and some plastics. Also implied are systems of collection, processing, and marketing of separated materials, i.e., recycling. Recycling results in the ultimate reuse of the subject material. Technically, no material is waste as long as it has a use. Only when the use of any material has been exhausted is true waste generated. When this is accepted as an axiom, waste management will become efficient and effective from an environmental, engineering and economic perspective. Source separation/recycling is one method of meeting legislative requirements for "materials recovery".

Effort expended by waste generators could consist of separating the materials from the waste stream collected as trash and making them available for either pick-up or taking them to a drop-off site. This may currently be considered by some as an inconvenience, but as the cost of disposing or processing solid waste increases, and as the public becomes more aware of solid waste management, source separation/recycling becomes more attractive. Depending on how the program is designed, recyclable materials may be mixed together or separated by type. Yard trim typically is bagged if it is collected via routed pick-up or it can be loose if it is delivered to a drop-off site.

Collection consists of routed pick-up done either separately or in conjunction with the pick-up of trash, or delivery of materials to a drop-off site by the generator. Routed pick-up is appropriate to areas that have a fairly dense population, such as the larger cities of Carroll County. Sites can be as simple as an unattended site with containers for disposal or they can be as involved as a MRF designed to separate and process materials. They may also include redemption centers. In the Spring of 1988, the Maryland General Assembly passed the Maryland Recycling Act (The "Act" - House Bill 714) requiring all Maryland's Jurisdictions to develop and implement recycling programs. The Act mandated that jurisdictions with populations greater than 150,000 reduce waste, through recycling, by 20%, while jurisdictions with populations less than 150,000 are required to reduce waste by 15%. The jurisdictions were required to meet their recycling goals by 1994. The Act also required each jurisdiction to prepare and submit a Recycling Plan outlining steps on how the recycling rates would be achieved. Carroll County submitted their Recycling Plan (Executive Summary - Appendix G) to the Maryland Department of the Environment in July of 1992.

From the time the Recycling Act went into effect up to September 1998, Carroll County fell into the 15% recycling category. However, as of October 1998, Carroll County's population surpassed the 150,000 mark, requiring the County to reduce its waste through recycling by 20%. Carroll County's recycling rate has exceeded the 20% mark since 1993. The County recycling rate has decreased since the County's waste no longer is transferred to a waste-to-energy facility where the ash and scrap metal were recovered for recycling. (see Table 4-1).

4.3.2 CARROLL COUNTY'S CURBSIDE RECYCLING PROGRAM

Carroll County currently administers a recycling program that includes drop-off facilities, curb-side collection and yard trim/mulch composting. In 1990, Carroll County placed thirteen drop-off bins at strategic locations around the County. The bins and the County's Recycling Center, formerly located near the Westminster Airport, provided citizens with the opportunity to divert material that would otherwise have ended-up in the County landfill. The bins and the center consistently yielded a 5 to 7% recycling rate. Due to the fact that Maryland law required the County to increase that rate to 15% by January of 1994, the Board of County Commissioners adopted the Solid Waste Ordinance (see Appendix D). That Ordinance requires individual haulers to provide at least weekly curb-side pick-up of residential recyclables. Between 1992 and 1998, the County contracted with Phoenix Recycling, Inc., (which was bought by Waste Management, Inc.) for the processing of all recyclables. Haulers delivered collected recyclables to the Phoenix site in Finksburg for processing and shipment. Commingled glass, metals, and plastic were then shipped to Waste Management's processing plant near York, Pennsylvania, for separation, packaging and shipment. Other materials, such as mixed paper and cardboard, were also processed for recycling markets. Waste Management then reported back to the County regarding the disposition of the processed material.

The recycling contract with Waste Management expired June 30, 1998. Partners Recycling was awarded the new contract that became effective on July 1, 1998. It was a 1-year contract with four 1-year renewal options. The County constructed a Material Recovery Facility (MRF) adjacent to the transfer station. All of the recyclables delivered to the MRF were processed by Partners. The containers were reloaded and hauled to Partners' Baltimore facility for further sorting and marketing. The mixed paper and cardboard were sorted, baled and marketed from the County's MRF. July of

2001, Partners notified the County that they would be getting out of the recycling business. They would, however, continue to honor the contract until they found a buyer who would assume the contract, or until the County could secure another service.

On December 1, 2001, Office Paper Systems, Inc., assumed the contract and committed to honor all terms of the existing contract for the remainder of the term which expired June of 2003. A new bid for MRF services has distributed in 2003. Recycle America Alliance, a subsidiary of Waste Management, Inc., was awarded the bid. The new contract is a five-year

agreement effective July 1, 2003 through June 30, 2008 with two additional five-year renewal options.

The County Recycling Center, formerly located near the airport north of Westminster was relocated to Northern Landfill in 1993. The Landfill also provides other recycling programs for:

- Electronics
- White goods, Scrap Metals
- Textiles
- Yard trim
- Car batteries

The County began an electronics recycling program on December 1, 2005. The County participated with the Northeast Maryland Waste Disposal Authority for a term contract for the management of the collected electronic equipment. The term is for one year with 4 one-year renewal options.

Yard trimmings are diverted to a location at Northern Landfill where they are processed through a grinder or placed in windrows for composting. Textiles are picked up by a non-profit organization and consolidated with Howard County's program. White goods/scrap metals are sold to a contractor for recycling.

Carroll County's Recycling Program has been successful in achieving the 20% rate mandated by the Maryland Recycling Act. In 2004, Carroll County recycled over 61,691 tons of material. This includes recycling tonnages from commercial establishments and industrial facilities, the drop-off center, hauler curb-side collection, white goods/scrap metal, as well as yard trim, textiles and electronics.

The thirteen drop-off sites were phased out as curbside recycling increased. The County currently provides two drop-off sites for residents who do not use a hauling service. One drop-off site is located at the Northern Landfill and the other at Hoods Mill Landfill (available on Saturday only).

4.3.3 YARD TRIMMINGS (COMPOST/MULCH)

One goal of Carroll County's source separation efforts has been the diversion of yard waste trimmings from the landfill. Much has been written concerning the benefit of home composting. The Carroll County Recycling Office, as well as other agencies such as the Extension Service, have been promoting grasscycling and backyard composting through workshops and holding compost bin sales

events. In spite of these efforts, yard waste continues to be a noticeable part of the waste stream.

Yard trim compost is a material which has undergone a biological decomposition of organic matter and is stabilized to the stage of being beneficial to plant growth. Composted yard waste products can be generated for use such as a mulch, soil amendment, topsoil, or potting soil.

4.4 WASTE PROCESSING TECHNOLOGIES

Various alternatives have been evaluated, and will continue to be, in order to effectively maximize the life of the County landfills. The waste processing alternatives evaluated in this section are:

- Waste Combustion/Resource Recovery
- MSW Composting
- Leachate Recirculation
- Mining

4.4.1 WASTE COMBUSTION/RESOURCE RECOVERY

This alternative has the capability to extend landfill life considerably. The technology, however, is controversial and requires a complex development scheme including a detailed site selection and evaluation study. Modern waste combustion facilities, whether the technology is intended for waste-to-energy or simply incineration, are outfitted with state-of-the-art air pollution control technology to control air emissions. Mass burn technologies available today are capable of reducing material volumes going into the landfill by up to 90%.

The cost of this technology may be, however, higher than other methods of disposal per ton due to the considerable capital cost associated with facility licensing, design, and construction. One option that has been used more often of late involves the use of private investment to construct public projects. Many municipalities have allowed private venture to fund, design, construct, and operate in their jurisdictions in exchange for long-term contracts for tipping, steam and energy sales. The arrangements generally involve the sale of steam and/or electricity that is used to offset the cost of operations. The private corporations agree to construct, own and operate the facilities for a designated number of years (normally 20 years) on a lease-back arrangement in exchange for the agreed-to tipping rate. Facilities are designed in various configurations including waste separation before combustion. For example, materials such as glass and metals that do not add to the BTU's needed during combustion and are more readily recycled, can be separated. After combustion, the revenue realized through the sale of steam and/or electricity are used to offset and minimize tipping costs.

Resource recovery is about seeing waste as a resource. A resource recovery system consists of waste processing technologies designed to process municipal solid waste and converting it into a resource such as compost or energy. Using such a technology will reduce land disposal capacity needs. Carroll County is currently participating with the Northeast Maryland Waste Disposal Authority and other jurisdictions on evaluating waste-to-energy technologies

4.4.2 SOLID WASTE COMPOSTING

Municipal solid waste (MSW) composting has been practiced for many decades in a limited fashion around the world. In the United States, it has met with limited success because of high cost, production odors, faulty technology, and poor product quality. Typically, the economics of

solid waste composting require high landfill tipping fees to justify the high cost of capital, operation, maintenance, and product marketing. Solid waste composting is often used to further process residual wastes generated by a MWPF.

About 70 to 75% of a typical solid waste stream which consists of newspaper, corrugated, mixed paper, food, and yard wastes can be composted. The remaining 25 to 30% must be landfilled, recycled, or processed in some other method. During periods when markets for recyclables, such as paper, that are easily composted are high, they would be diverted for sale and not composted. For that reason, a ratio resulting in 1/3 marketed for recyclables, 1/3 composted, and 1/3 residual is assumed. Composted material may be used as landfill cover, for agricultural purposes or for landscaping. The market for composted municipal solid waste within Carroll County and the mid-Atlantic region has not been fully developed. In the event that an MSW composting facility is considered for Carroll County, the determination of markets for the composted material should be a priority. Failure of composting projects in the United States is most often found to involve quality control and market failure.

There are several composting technologies available today; however, the general process involves mechanical preparation of the incoming waste, materials recovery (in some cases), composting, curing, and product screening.

4.4.3 LEACHATE RECIRCULATION

This process seeks to speed the decomposition of MSW by introducing leachate into the sanitary waste cell. This would be done by spraying leachate uniformly on the surface, or more effectively, and in greater volume, by drilling a number of wells through the layers of compacted MSW and filling these wells with leachate. In this way, the leachate contacts the MSW throughout the cell. The speed and effect of this process will vary by site, but at least one landfill in Maryland has obtained significant measurable results in reduction of filled space (and therefore, creation by recapture of air space) through this approach.

4.4.4 LANDFILL MINING

Landfill mining refers to excavating previously buried waste with the goal of separating easily recovered ferrous metals, screening for separation of residual fine material, and final disposal through landfill or combustion. The goal of this effort is the recovery of airspace in the landfill cell.

4.5 ALTERNATIVES FOR SEWAGE SLUDGE PROCESSING AND UTILIZATION

4.5.1 SEWAGE SLUDGE CREATION AND MANAGEMENT IN CARROLL COUNTY - INTRODUCTION

Sewage sludge is the by-product of both the water and wastewater treatment process. In order to ensure that the water used for domestic and commercial/industrial use is clean and not harmful it must be treated. Treatment systems are designed individually for each water source.

Sewage sludge created when treating water for use are not the greatest concern. Sewage sludge resulting of the treatment of both domestic and industrial wastewater has a much higher potential to be contaminated with pathogens and pollutants such as heavy metals and pesticides.

The components of a sewage sludge treatment system at a municipal wastewater treatment plant are, to a large extent, driven by the selected sewage sludge disposal option. Sewage sludge management options traditionally include:

- Landfilling

- Land application
- Thermal reduction (incineration) and ash disposal, and
- Composting

At present, sewage sludge and other residual solids (screening, grit and grease) are landfilled at a County-owned landfill. As such, this report will focus on the requirements of land application options as a primary disposal option with landfilling as a secondary (back-up) option.

Much of the sewage sludge generated in Carroll County, and some generated in other counties, is land applied on Carroll County farms. When sewage sludge is applied to land, the application rate is specified by the permit issued and restrictions are placed on the future use of the land. To the extent that sewage sludge adds organic matter to the soil, the process can be beneficial. However, sewage sludge may also contain heavy metals and other compounds and these can accumulate. These elements build up in the soil with repeat applications and could result in levels that may be toxic. Sewage sludge can also contain, plant nutrient, organic chemicals, nitrogen, potassium and phosphorus. When sewage sludge application rates are set, however, only nitrogen is a consideration.

The permit to apply sewage sludge is issued for each farm and each field. The permits are not transferable. In order to qualify specific soil pH must be maintained. Sewage sludge application permits also define any limitations that will be placed on the area to be treated; the required soil depth to bedrock or ground water, defines the buffer zone requirements and restricts application during adverse weather conditions.

4.5.2 SEWAGE SLUDGE GENERATION BY CARROLL COUNTY PUBLIC FACILITIES AND CURRENT DISPOSITION PRACTICES

There are eight publicly-owned community water supply and sewerage systems in Carroll County. Forty percent of the County's population has the benefit of a public water supply, while 38% have sewer service.

Carroll County owns, or has a direct interest in, five sewage treatment plants. These plants service the Hampstead and Freedom areas, Pleasant Valley community, and two public schools. The two school-based plants and the plants at Hampstead and Pleasant Valley are operated by County personnel while Freedom is owned and operated under contract by Maryland Environmental Service (MES). In 2005, the Hampstead Plant generated an estimated 963 wet tons of sewage sludge while the Freedom plant generated 3,454 wet tons. The sewage sludge produced at the Hampstead Plant is landfilled. Freedom sewage sludge is land applied.

The six other publicly-owned sewage treatment plants are located within Carroll's towns: Manchester, Mount Airy, New Windsor, Taneytown, Union Bridge and Westminster. Each of these is operated by the incorporated town that they service. Tonnages for these plants are illustrated in Table 3-4. Four of the towns, i.e. Mount Airy, Taneytown, Union Bridge and Westminster, have traditional contracts for land application of sewage sludge. That application is accomplished under a permit from the Maryland Department of the Environment and by their standards. All of Manchester's sewage sludge is landfilled, and in the winter, all may use landfill disposal as land application is not possible during the winter months. New Windsor has not generated sufficient sewage sludge to necessitate dredging of their lagoon.

As landfill disposal is often necessary, special conditions have been established for that disposal. Section §185-4, D(3) a & b of the Solid Waste Ordinance (Appendix D) requires that

sewage sludge can only be accepted at County landfills under specific circumstances. Sewage sludge disposal must first be approved by the Maryland Department of the Environment (MDE) and the County. Sewage sludge must be dewatered and tested as specified in the Solid Waste Ordinance as referenced above. The County also reserves the right to request additional testing to ensure that the sewage sludge does not exhibit any hazardous characteristics. Sewage sludge may not be mixed with any other material.

Sewage sludge generated within Carroll County is not the only concern. As Carroll County is traditionally agricultural, many farmers are solicited to accept sewage sludge generated in other areas for land application. That sewage sludge cannot always be immediately applied and storage is sometimes necessary. Chapter 223 of the Code of Public Laws and Ordinance of Carroll County, Page 22314.1 is intended to provide regulation of sewage sludge storage. That Ordinance is proposed to regulate sewage sludge and other material storage based on the location of the storage facility relative to the County's Water Resource Protection Areas. Under the above Ordinance, sewage sludge can only be stored at publicly-owned sewage treatment plants. Sewage sludge storage is defined as an interim measure prior to either land application or landfill disposal. Currently there are no licensed sewage sludge storage facilities in Carroll County.

4.5.3 SEWAGE SLUDGE CO-COMBUSTION IN CEMENT KILNS

Wastewater treatment plant sludge has been combusted in cement kilns in Europe for some time. Countries in the European Union have prohibited both land application as well as landfill disposal making combustion the remaining alternative. The Lehigh Portland Cement plant in Union Bridge, Maryland has secured a research permit to investigate the feasibility of burning Class A Biosolids in their rotary kiln. If that successful, the plant would be regularly co-combusting dried Class A comparable material in their cement kiln along with coal.

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4.6 TECHNOLOGY FOR FINAL DISPOSAL

4.6.1 THE EXISTING LAND DISPOSAL SYSTEM IN CARROLL COUNTY

Carroll County is currently operating one landfill with adequate capacity to serve its needs for the tenure of this Plan. The County continues to investigate the possibility of further integrating its solid waste management system with alternatives other than landfilling.

In 2005, the Board of County Commissioners, through the Northeast Maryland Waste Disposal Authority (NMWDA) contracted with R.W. Beck to conduct a study for Solid Waste Management Options for the County. As a result of the study, a number of recommendations were made, (see Executive Summary, Appendix J) which resulted in the Commissioners adopting a resolution (Resolution No. 658-06) addressing some of the recommendations. Resolution No. 658-06 gave authority to the Department of Public Works, with the assistance of the NMWDA, to proceed to develop a plan to implement the recommendations. The resolution included: conducting a procurement for the purpose of obtaining contract terms and costs for a waste-to-energy facility including siting; exploring joint disposal efforts; and beginning process of site selection for a future landfill.

4.6.2 LANDFILL DESIGN TECHNOLOGY

A sanitary landfill contains compacted solid waste within an enclosed lined area to minimize potential adverse environmental impacts. All landfills within Maryland must satisfy requirements established for construction, operation, maintenance, expansion, modification, and closure as stipulated by MDE.

Despite environmental and public concerns associated with landfills, every integrated waste management system must have access to a landfill. Recycling, composting, and material separation and removal can divert significant portions of the waste stream from final disposal, but not all materials are recyclable. Combustion of solid waste significantly reduces waste volumes, but even the most advanced facilities must dispose of ash residues. Also, waste may need to be disposed of during plant shutdowns.

Today, sanitary landfills are significantly more sophisticated than the open dumps of the past. "State-of-the-art" landfills use a variety of specific technologies and practices including:

- Liner systems,
- Leachate collection and removal systems,
- Leachate treatment and disposal systems,
- Closure techniques which reduce the amount of leachate generation,
- Gas collection, venting/reuse, and monitoring systems,
- Provisions for closure and post-closure care and, maintenance,
- Ground and surface water monitoring systems, and
- Monitoring and control of materials entering the site.

4.6.3 ALTERNATIVES AT OPERATING LANDFILLS

4.6.3.1 NORTHERN LANDFILL

The operation of the Northern Landfill is planned to continue in the current manner. The majority of the waste received, 85% - 90% of waste received at the Northern Landfill is transferred for disposal at an out-of-county facility. The remaining 10%-15% is disposed of in the County landfill. According to plan, Cell 3 will be constructed in 2006 and will accept waste in 2007. The County plans to utilize this landfill well into the 21st Century. At this time and at the current fill rate, approximately 50 years of life remains in the Northern Landfill, located in Westminster, Maryland. The Refuse Disposal Permit has been amended to reflect the construction and opening of Cell 3.

4.6.3.2 HOODS MILL LANDFILL

The Hoods Mill landfill site is located in southern Carroll County, near the intersection of Hoods Mill Road and Maryland Route 97. The site is divided into two sections; the first of which, comprised of approximately 22 acres of landfill, is closed and capped. The second parcel of approximately 15 acres of usable cell, lies to the west of the first and is currently unused. The entire property is approved for use as a landfill. If, in the future, more landfill space is needed, only the design would have to be approved. Currently, 30+ acres of the west cell is being leased to a private company who produces compost and mulch.

4.6.4 THE DEVELOPMENT OF NEW LANDFILLS

It is Carroll County's intent to continue using Northern Landfill well into the 21st century. There is no intention of developing additional space at other than Northern or Hoods Mill.

4.7 SELECTING A SITE FOR NEW SOLID WASTE ACCEPTANCE FACILITIES

A critical decision in the development of any solid waste acceptance facility is the selection of its site. The decision-making process for selecting a facility site involves the interaction and consideration of many factors. These factors include environmental, technical, economic, and socio-economic, and sociopolitical considerations. The site selection process results in a hierarchy of factors influencing the decision and incorporates objective (quantitative) and subjective (value judgments) considerations into the evaluation of sites through a multi-level screening process.

- Environmental concerns deal with the effect that the facility will have on the ecosystem of the site and surrounding area and permitting requirements. It includes impacts on wetlands, ground-water, surface water, endangered species, archaeological sites, historical sites, and environmentally-sensitive areas.
- Technical concerns involve the physical location and daily operational requirements such as access to roads, buffers, size and type of facility, soils, easements, sediment erosion controls, storm water management, and site utilization.
- Economic and Socio-economic concerns involve costs incurred to establish the site and the financial impact on nearby neighbors of the facility.
- Socio-political concerns deal with the reaction of local citizens, industry, and others to the siting process and final decision.

In order for the siting process to be effective, the methodology must consider the future impacts of the decision, involve the public, take conflicting views into consideration, and provide a usable tool with which county decision makers may make the final decision. Site selection for a solid waste acceptance facility is one of the most politically volatile issues that local governments face. Public attitudes and concerns are an integral part of the process of siting a new waste management facility. A sound framework for establishing a site is essential to providing the decision makers with a solid foundation from which to arrive at a decision. Once the site decision is made, the County may continue forward to provide the community with an integrated solid waste management system. The siting process for both disposal and processing facilities involves a multi-level screening process, as described in Table 4-7.

The site evaluation can be carried out in a number of stages relative to the type of facility in

question, i.e., landfill or combustion plant, and the number of sites to be evaluated. Every evaluation will, however, have certain parameters in common. The parameters necessary for consideration are grouped into three main categories:

- Environmental
- Socio-Economic
- Engineering

Examples of the environmental parameters are: impact to surface and groundwater resources, air quality, floodplains, wetlands and habitat. Socio-Economic parameters included impact to adjacent land use, zoning and traffic. Examples of engineering parameters include soils limitations, hauling cost, and usable area. Specific parameters would also be designed to meet the MDE licensing process specific to the facility to be located (see Section 2.0). The first phase of any screening analysis would delineate exclusion zones, such as sensitive areas that would not be under consideration.

After the parameters are established and the initial screening is complete, more site specific data would be collected. Sources are numerous and varied and will include reports and maps from government offices and regulatory agencies. A site evaluation committee would generally then be assembled to perform the ranking and evaluation after the information gathering and preparation phases are completed. All members of the evaluation committee would visit the sites being considered and would be knowledgeable of information assembled on each site.

In order to thoroughly and objectively evaluate, compare, and rank potential sites, a matrix evaluation would then be conducted. The purpose of the matrix is to develop a numerical analysis of the suitability of each considered site for the construction and operation of the facility. Licensing of the selected site would require further site specific investigation and analysts to satisfy both design and permitting sufficiency. At this time and at current fill rate, approximately 50 years of life remains in the Northern Landfill, located in Reese, Maryland.

4.7.1 CONSTRAINTS ON THE SITING OF SOLID WASTE MANAGEMENT FACILITIES

Existing physical features and existing and planned uses of the land within Carroll County affect the siting of waste management facilities. Solid waste management facility siting should be planned to minimize impacts on the citizens of Carroll County and the environment. A brief description of the constraints imposed on solid waste acceptance facilities, based on technical, environmental and land use concerns, follows.

4.7.1.1 TOPOGRAPHY

Topography in Carroll County is somewhat varied, with elevations ranging from 397 feet on the County's western boundary along Route 75, south of Union Bridge to 1,096 feet at a point northwest of Manchester just south of the Pennsylvania state line. The topography ranges from low, wide flat stream valleys to high, steep slopes.

Landfill sites are generally located in ravines, topographic sinks, broad flat plateau areas, and areas which do not have steep slopes. Land that has slopes greater than 15% is not considered acceptable for landfills due to excessive site grading required to develop the landfill. Other waste management facilities are not as constrained by the slope of the land; however, cost factors associated with site work must be considered.

Low lying areas along rivers and waterways are also not desirable and are regulated by federal, State, and local resource protection laws. Low lying areas within the 100-year floodplain are also not acceptable for development as land disposal facilities. Other waste management facilities may be sited on areas of steeper slopes, provided the land is developable and appropriate for the facility.

4.7.1.2 SOILS

Soil types of Carroll County are varied. In most locations, the porous nature of the unconsolidated soils does not provide the impervious layer needed to contain leachate within the waste fill area. However, measures such as geomembranes, leachate collection and treatment systems, and monitoring systems aid in reducing the potential for migration of leachate into the environment.

The *Carroll County Soil Survey* provides more detailed information on the types and locations of soils within the County which should be used for the initial stages of siting a landfill. However, this survey is somewhat limited as it is primarily concerned with the first five feet of the soil profile and more information is required before the final site selection decision can be made.

The properties of the soils on which a landfill is sited should be considered in planning, design, construction, operation, closure, and post-closure of the landfill. Soil characteristics such as soil texture, erodibility, load-bearing capacity, resistance to slide, permeability, water table elevation, and quantity, should be addressed during the site selection process.

Clayey, impermeable soils are desirable soils for the base of the landfill; however, landfill operations require a loamy or silty soil which is easily spread and compacted for cover material. Soil types for other waste management facilities are those which can provide adequate support for the building, structure or concrete pad.

4.7.1.3 GEOLOGY AND GEOHYDROLOGY

Carroll County is underlain by rocks of the easternmost Appalachian Mountain system. Sedimentary, igneous, and metamorphic rocks of diverse lithology, complex structure, and ages ranging from Precambrian to Triassic are found here. Occasional thin, unconsolidated recent streambed deposits are also found in a number of streams. Although Coastal Plain sediments underlie counties adjacent to Carroll County, they do not extend into Carroll County.

The majority of Carroll County is underlain by metamorphosed sedimentary and volcanic rocks overlain by a thick mantle of unconsolidated weathered material (saprolite). The general structural "grain" of Carroll County is northeast to southwest. The grade of metamorphism, that is the general grain size of the rocks, increases across this "grain", from northwest to southeast. Slates and phyllites are exposed near the north westernmost outcrop area of the Piedmont Uplands near the Pennsylvania state line and Black Corner. These phyllites and slates (very fine to fine-grained metamorphic rocks) grade gradually to phyllites and fine-grained schists in the central portion of Carroll County, and finally to coarser schists and gneisses in the southeastern portion of the County near Sykesville, as the core of the Ancient Appalachians is approached. The Precambrian Baltimore gneiss is the oldest rock type found in Carroll County, and is generally interpreted as representing the central core of the Appalachian system.

These rocks are tightly folded into anticlines and synclines, with beds ranging in dip from horizontal to vertical. Faults are probably very numerous, but the paucity of outcrops limits the mapping of them. Joints and fractures are common throughout the metamorphic rocks of Carroll County.

The remainder of Carroll County, the north westernmost corner, is underlain by much younger Triassic-aged sedimentary rocks, which form the Triassic Uplands. These are alluvial deposits of the New Oxford Formation. They gradually become of coarser texture east and southeastward from the Carroll County/Frederick County line, grading from shale to siltstone, and sandstone, to the ancient metamorphic rocks. These Triassic rock strata have a gentle west and northwest dip, and generally strike northeast just north of Union Bridge, then gradually bend to the north as the Pennsylvania line is approached. These beds are cut by a few large and numerous small high-angle normal faults, and have well developed joint and fracture systems.

Triassic-aged diabase dikes cut all rock types of Carroll County and have a general north-south trend with a vertical to near vertical dip. These dikes are extremely dense and impermeable, and generally form relatively high topographic areas. The general geology of Carroll County is illustrated on Figure 4-1.

Presently, more than half of the potable water used in Carroll County has groundwater as its source. With the exception of Westminster and the Freedom/Sykesville District, all of the community planning areas in Carroll County rely solely on groundwater from the aquifers in Carroll County.

Within Carroll County, three basic aquifer types exist. These are the saprolite aquifer (including metavolcanic, phyllite, and schist parent rock materials), carbonate rock aquifer, and Triassic rock aquifer. Their areal distribution is shown on Figure 4-2. Table 4-8 illustrates recharge rates in the various aquifers.

4.7.1.4 WETLANDS

All of the wetlands within Carroll County are designated as non-tidal (See Figure 4-4). These areas are primarily due to low-relief, high water table and surface runoff. Wetland areas are considered valuable for water quality and unsuitable for siting waste management facilities and should be avoided.

4.7.1.5 SURFACE WATER AND FLOODPLAINS

Rivers, streams, and smaller tributaries are present in Carroll County (See Figure 4-5). The three main drainage basins within the County are the Patapsco, Gunpowder and Monocacy rivers. Several municipalities in the Patapsco basin obtain drinking water from surface water sources. Therefore, it is not recommended that the sub-basins associated with the respective watersheds of these water sources be considered suitable for waste management facility development.

Along these rivers, streams, and tributaries are areas associated with the 100-year floodplain. Facilities located within the 100-year floodplain may hinder the flow, reduce the temporary storage capacity of the floodplain, or wash out the waste within the landfill and endanger human health and the environment.

Floodplains are not suitable for siting solid waste management facilities within Carroll County. Federal regulations (40 CFR 257/258) contain provisions banning the location

of solid waste facilities within 100-year floodplains.

4.7.1.6 LAND USE COMPATIBILITY

It is important that solid waste management facilities are sited in areas appropriate for such land uses. Adjacent incompatible land uses for solid waste management facilities include airports, hospitals and residential areas.

The U.S. Department of Transportation Federal Aviation Authority Order 5200.5, *FAA Guidance Concerning Sanitary Landfills on or Near Airports*, stipulates the following criteria for sanitary landfills:

- Waste disposal sites may not be located within 10,000 feet of any runway end (used or proposed) to be used by a turbine powered aircraft.
- Waste disposal sites may not be located within 5,000 feet of any runway end used only by piston-powered aircraft.
- Waste disposal site may not be located within a 5-mile radius of a runway end that attracts or sustains hazardous bird movements from feeding, watering or roosting areas, into or across the runways and/or approach and departure patterns of aircraft.

The Environment Article, Section 9-225, prohibits the location of any landfill within a ½ mile radius of any hospital.

Solid waste management facilities have the potential to create odor, noise, dust, and/or adverse traffic impacts for adjacent land users. Carroll County is aware of the problems and nuisances which may be created by solid waste management facilities. The Carroll County Zoning Ordinance, comprehensive land-use plan, and process for public notification of potential new solid waste management facility locations will aid the County in reducing the possibility of adjacent incompatible land uses.

Similarly, new developments or land uses adjacent to existing solid waste management facilities must consider potential impacts due to any existing solid waste facility.

4.8 SOLID WASTE MANAGEMENT PLANNING

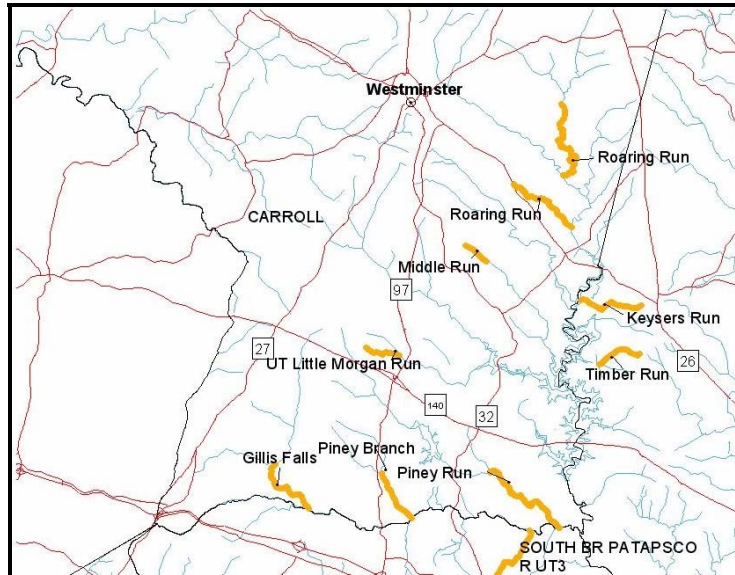
Solid waste management planning in Carroll County is directly tied to implementation of the adopted comprehensive plan. The need for newly planned waste management facilities is based on the historic per capita waste generation rate. This rate is further based on a ratio between the recorded yearly waste generation rates ratio to a set of multiple year population projections. The population projections are developed by the Department of Planning and are themselves based on the adopted comprehensive plan. That process allows for more effective waste management planning based on the principles in the adopted comprehensive plan. Carroll County is currently updating its comprehensive plan and changes in development projects may result. Based on the outcome of that process, waste generation projections may be amended.

The location of new facilities, when needed are based on a site selection process

that utilizes a process using weighted decision criteria inclusive of applicable environmental, engineering, economic and social factors. The siting of new waste management facilities is also subject to the County's development review process that includes a review of environmental sensitivity as functional service and operational characteristics.

One such code is focused on the protection of the County's water resources. In such a review standards would be measured that consider the sensitivity of the resources, including any areas of critical state concern. There are two such areas in Carroll County: Alesia Swamp near Lineboro and Hoods Mill, south of Woodbine. There are also a number of designated Tier II waters in the County. Those are illustrated on the figure below.

Tier II Waters in Maryland



In addition to sites being reviewed for their proximity to sensitive resources, facility designs are also required to include design elements specifically intended to manage and mitigate impact and to protect environmental resources. Elements of the County Code such as Water Resource Management, Stormwater Management, and Forest Conservation apply to public facilities as well as private.

New facilities are also subject to review and approval by the Maryland Department of the Environment that are based on the design of new facilities being consistent with both COMAR and Federal Subtitle D criteria. Lastly, new waste management facilities are subject to an

extensive public review not only through MDE processes, but also through Carroll County's. Facilities such as these are funded through the County's capital budget process and as such, must go through the review of the Carroll County Planning Commission.

4.9 SPECIAL WASTE MANAGEMENT

Special waste management requirements for asbestos, special medical waste and hazardous waste will be discussed in this section.

4.9.1 ASBESTOS

Asbestos may be disposed of by landfilling, provided that the disposal site is permitted by MDE, has State and local health department approval, and is authorized by MDE to accept asbestos. Asbestos disposed at the site must be packaged and labeled in accordance with COMAR 26.11.15.04. Procedures for disposal are as specified in COMAR 02.04.07.13.

- A minimum of 24-hour notice to the landfill supervisor to provide to following information: delivery time, source and quantity.
- Personnel handling the asbestos wear disposal-protective clothing and respirators.
- The asbestos is handled with care to reduce the emission of fibers into the air. Asbestos is delivered to a separate area of the landfill for disposal.
 - The asbestos is placed in a trench and completely covered with soil.

The Solid Waste Ordinance (see Appendix D) outlines the procedures required by Carroll County for asbestos disposal.

4.9.2 SPECIAL MEDICAL WASTE

The County landfill will not accept medical wastes, including infectious and/or bio-hazardous medical waste. Currently, special medical waste generated at the Carroll County General Hospital, Springfield Hospital, and at doctors' offices, clinics, and nursing homes is handled by licensed haulers prior to treatment (incineration).

The management of special medical waste is not under the jurisdiction of the County and will not be addressed in this Plan; management of these wastes is strictly regulated by the MDE under specific medical waste regulations. However, the County reserves the right to address the management of special medical waste under a separate plan.

4.9.3 HAZARDOUS WASTES

Carroll County landfills do not accept hazardous substances for disposal, other than small quantities of household hazardous wastes. Currently, hazardous waste generators within the County contract with a licensed hauler of hazardous waste for collection and disposal.

The management of hazardous waste is not under the jurisdiction of the County and will not be addressed in this Plan. Hazardous waste storage, transport, and disposal is strictly regulated by the MDE.

4.9.4 HAZARDOUS MATERIALS RESPONSE

Hazardous materials response in Carroll County is generally handled through the Emergency

Operations Center. All of the individual fire companies have had training in the identification of hazardous materials incidents and at least basic response techniques. The Local Emergency Planning Committee has authored and maintains a Hazardous Materials Response Plan in the County Emergency Operations Plan document. That plan establishes the individual fire companies as the incident commanders. The Carroll County Health Department is also a responder to Haz-Mat incidents, and in most cases, the Maryland Department of the Environment is also called. Additional response assistance is also arranged with the Baltimore County Hazardous Materials Response team as well as the team located at Fort Detrick in Frederick County, depending on the location of the incident. Carroll County, through the LEPC, has also established a volunteer hazardous materials team made up of individual fire service volunteers that have hazardous materials response experience and, in some cases, are working response personnel in other jurisdictions. That team is notified on the occasion of an incident and is generally available on the scene to provide assistance and expertise.

4.9.4.1 CONTAMINATED SOILS

The disposal method for soil contaminated with petroleum, or petroleum products which are generated within Carroll County, is dependent on test results indicating the level of toxicity and contamination. The following information is required before the contaminated soil may be disposed in the County landfill.

- A statement from the generator certifying that the soil is non-hazardous waste as defined by federal regulations under Subtitle C, Resource Conservation and Recovery Act.
- The amount of petroleum contaminated soil to be disposed.
- A description of the sampling protocol and a copy of all laboratory analyses.

A minimum of one composite sample shall be analyzed for each required test for every 100 cubic yards of soil to be disposed. In the case of soil reclaimed by thermal treatment, a minimum of one sample shall be analyzed for every production day, composted hourly.