VOLUME 1 OF 2

Draft Solid Waste Management Plan

Capital Region Solid Waste Management Partnership Planning Unit

CHA Project #: 19283

Prepared For:

Capital Region Solid Waste Management Partnership
Albany, NY

Prepared by:

CHA
III Winners Circle
Albany, NY 12205

March 2010

TABLE OF CONTENTS

VOLUME 1

ACRONYMS & ABBREVIATION

EXECUTIVE SUMMARY EC-1

Introduction ES-1
Existing Conditions and Future Needs ES-2
Goals and Objectives ES-4
Elements of the SWMP ES-6
Waste Minimization ES-7
Product Stewardship ES-8
Continue to Promote and Expand Local Recycling Infrastructure ES-8
SSOW Collection and Processing ES-9
Additional Mandatory Recyclables ES-10
Solid Waste Treatment Facility ES-11
Land Disposal ES-11
Interim Measures ES-12

SECTION 1.0 INTRODUCTION AND BACKGROUND 1-1

1.1 Planning Unit Description 1-2
1.1.1 Member Municipalities 1-2
1.1.2 Population Trends and Projections 1-2
1.1.3 Significant Features Affecting Solid Waste Management 1-5
1.1.4 Background And Previous Solid Waste Planning Efforts 1-6
1.2 SWMP Steering Committee 1-9
1.3 Goals and Objectives 1-11
1.4 Public Review and Comment 1-11

SECTION 2.O SOLID WASTE QUANTITIES AND CHARACTERISTICS 2-1

2.1 Current Estimates of Solid Waste Generation 2-1
2.1.1 Municipal Solid Waste Generation 2-2
2.1.1.1 Residential MSW 2-2
2.1.1.2 Non Residential MSW 2-3
2.1.1.3 Total MSW Generation 2-4
2.1.2 Construction and Demolition Debris 2-4
2.1.3 Non-Hazardous Industrial Waste Generation 2-7
2.1.4 Total Existing Solid Waste Generation 2-8
2.2 Characterization of Solid Waste 2-9
2.2.1 Field Study Of Solid Waste Characterization 2-9
2.2.2 Construction & Demolition Debris 2-15
2.2.3 Non-Hazardous Industrial Waste 2-17
2.3 Future Solid Waste Quantity and Characteristics 2-18
2.3.1 Projected Solid Waste Quantities 2-18
2.3.2 Future Solid Waste Composition 2-19

SECTION 3.0 EXISTING SOLID WASTE MANAGEMENT PRACTICES 3-1

3.1 MSW Collection Practices 3-1
3.1.1 Residential MSW collection including MSW recycling 3-1
3.1.2 Commercial, Industrial And Institutional (CII) MSW 3-8
3.2 C&D Collection and Management Practices 3-9
3.3 Non-Hazardous Waste Industrial Collection And Management Practices 3-10
3.4 Solid Waste Management Facility Inventory 3-10

SECTION 4.0 MATERIALS RECOVERY ANALYSIS 4-1

4.1 MSW Recovery 4-1
4.1.1 Residential MSW Recycling 4-2
4.1.2 Commercial, Industrial and Institutional MSW Recycling 4-5
4.1.3 Other MSW Recycling 4-7
4.2 Other Solid Waste Recovery 4-8
4.2.1 C&D Recovery 4-8

4.2.2 Non-Hazardous Industrial Waste Recovery 4-10
4.3 Potentially Recoverable Recyclable Materials 4-11
4.4 Markets for Recovered Recyclables 4-23
4.4.1 Existing Recoverable Material Markets 4-23
4.4.2 Market Development Restrictions 4-24
4.5 Recycling and Diversion Rate Goals 4-25

SECTION 5.0 ALTERNATIVES ANALYSIS 5-1
5.1 Introduction 1
5.2 No Action Alternative 1
5.3 Alternative Solid Waste Management Methods 2
5.3.1 Proven Technologies and Practices 2
5.3.1.1 Volume Based User Fees 2
5.3.1.2 Product Stewardship 4
5.3.1.3 Dual Stream Recyclables Collection and MRF 5
5.3.1.4 Single Stream Recyclables Collection and MRF 6
5.3.1.5 Yard Waste Composting 8
5.3.1.6 Mixed MSW Composting 9
5.3.1.7 SSOW Composting 10
5.3.1.8 Conventional Waste -to-Energy 12
5.3.1.9 Transfer Station 15
5.3.1.10 Landfill 17
5.3.2 Emerging Solid Waste Management Technologies 20
5.3.2.1 Thermal Processes 21
5.3.2.2 Biological and Chemical Processes 24
5.3.2.3 Comparison of Emerging Technologies 27
5.4 Institutional Alternatives 30
5.4.1 Expansion of the Planning Unit 30
5.4.2 Implementing Agency Alternatives 31
5.4.3 Flow Control 35
5.5 Alternative Implementation Scenarios 37
5.5.1 Alternative Implementation Scenario #1 38
5.5.2 Alternative Implementation Scenario #2 40
5.5.3 Alternative Implementation Scenario #3 41
5.6 Comparison of Implementation Scenarios 43
5.6.1 Cost Analysis 44
5.6.1.1 Local Solid Waste Management Authority 44
5.6.1.2 Regional Solid Waste Management Authority 45
5.6.1.3 SSOW Collection and Processing 48
5.6.1.4 Regional Solid waste Treatment Facility 50
5.6.1.5 Land Disposal Of Residue And Post-Recyclable Waste 53
5.6.1.6 Cost Analysis Summary of Alternative Implementation Scenarios 56
5.6.2 Facility Sizing Analysis 58
5.6.3 Financial Risk 59
5.6.3.1 Local Or Regional Solid Waste Management Authority 59
5.6.3.2 SSOW Facility 60
5.6.3.3 Regional Solid Waste Treatment Facility 60
5.6.3.4 Land Disposal Of Residue And Post-Recyclable Waste 62
5.6.4 Time to Implement 63
5.6.4.1 Local or Regional Solid Waste Management Authority 63
5.6.4.2 SSOW Facility 64
5.6.4.3 Regional Solid Waste Treatment Facility 65
5.6.4.4 Land Disposal Of Residue And Post-Recyclable Waste 65
5.6.5 Effectiveness 66
5.6.5.1 Local Solid Waste Management Authority 67
5.6.5.2 Regional Solid Waste Management Authority 67
5.6.5.3 SSOW Facility 68
5.6.5.4 Regional Solid Waste Treatment Facility 68
5.6.5.5 Land Disposal of Residue and Post-Recyclable Waste 68
5.6.6 Environmental Impacts 69
5.6.6.1 Land Resources 69
5.6.6.2 Air Resources 71
5.6.7 Impacts on Neighboring Jurisdictions 74

SECTION 6.0 SOLID WASTE MANAGEMENT PLAN 6-1
6.1 Elements of the Preferred Solid Waste Management Plan 6-2
6.1.1 Reduction and Recovery of Materials 6-2
6.1.2 Solid Waste Treatment Facility 6-8
6.1.3 Land Disposal 6-9
6.1.4 Interim Measures 6-10
6.2 Administrative and Legal Structure 6-11
6.2.1 Implementation Model 6-11
6.2.2 New Laws and Regulations 6-12
6.3 Implementation schedule 6-12

SECTION 7.0 REFERENCES 7-1

List of Tables

1-1 Member Communities
1-2 Population and Projections by Municipality
1-3 Housing Data
1-4 Steering Committee Members
2-1 Total MSW Generation
2-2 C&D Recycling Tonnage
2-3 Total Existing Solid Waste Generation
2-4 Field Study of Municipal Solid Waste Composition
2-5 Comparison of DGS and Commercial Waste Composition
2-6 Comparison of MSW Composition with Other Studies
2-7 C&D Waste Composition
2-8 Estimated Future Waste Generation
2-9 Estimated Composition of As-Generated MSW
3-1 Residential SW Collection Practices
3-2 Waste Accepted For Disposal at Rapp Road Landfill
3-3 Existing Solid Waste Management Facilities in the Planning Unit
3-4 Other Solid Waste Management Facilities used by Planning Unit
3-5 Estimated Waste Disposal from the Planning Unit
4-1 Estimated Total Material Recovery and Recycling in 2008
4-2 Residential MSW Recycling Collection Practices
4-3 Municipal Recycling Program Tonnage 2005-2008
4-4 Residential Recyclable Materials Composition Summary
4-5 CII MSW Recycling 2008
4-6 Other Estimated MSW Recycling in 2008
4-7 C&D Recycling in 2008
4-8 Non-Hazardous Industrial Waste Recycling 2008
4-9 Designated Recyclables in MSW Delivered for Disposal
4-10 Estimated Recovery Rate for Designated Recyclables in MSW
4-11 Additional Recovery of Designated Recyclables
4-12 Major Recycling Processors Used by the Planning Unit
5-1 Permitted Waste to Energy Facilities in New York
5-2 Permitted MSW Landfills in New York
5-3 Permitted C&D Landfills in New York
5-4 Alternative Solid Waste Management Technologies
5-5 Local Solid Waste Management Authority Annual Operating Cost
5-6 Regional Solid Waste Management Authority Annual Operating Cost
5-7 SSOW Facility Cost
5-8 Solid Waste Treatment Facility Cost
5-9 Sensitivity Analysis Results
5-10 Transfer Transport and Disposal Cost – Alternative Scenario #1
5-11 Transfer Transport and Disposal Cost – Alternative Scenario #2
5-12 Cost Analysis Summary
5-13 Timeframes to Implement
5-14 Land Resource Impacts
5-15 Greenhouse Gas Emissions
6-1 Waste Diversion and Recycling Goals

List of Figures

1-1 Regional Location
1-2 Planning Unit Communities
1-3 Adjacent Planning Units
3-1 Existing Solid Waste Management Facilities in the Planning Unit
3-2 Other Solid Waste Management facilities used by Planning Unit
6-1 Detailed Implementation Schedule

VOLUME 2

List of Appendices

Appendix A – Steering Committee Comments on the Preliminary Draft SWMP
Appendix B - SEQRA Documentation (Reserved)
Appendix C – Industrial Waste Survey Results
Appendix D – Waste Characterization Field Study
Appendix E – Assessment of Emerging Solid Waste Management Technologies
Appendix F – Cost Estimates of Alternatives

ACRONYMS AND ABBREVIATIONS

ADCM	Alternative Daily Cover Material
ANSWERS	Albany New York Solid Waste Energy Recovery System
ASTM	American Society for Testing and Materials
C&D	Construction and Demolition Debris
CANA	Council of Albany Neighborhood Associations
CHA	Clough Harbour & Associates, Inc.
CH4	Methane
CII	Commercial, Industrial and Institutional
CO2	Carbon Dioxide
CRA	Comprehensive Recycling Analysis
CY	Cubic Yards
DGS	City of Albany Department of General Services
DOT	Department of Transportation
DPW	Department of Public Works
DRFP	Draft Request for Proposals
DSNY	New York City Department of Sanitation
EPR	Extended Product Responsibility
ESD	Empire State Development
GHG	Greenhouse Gas
GML	General Municipal Law
GMP	Glass, Metal, Plastic
HDPE	High Density Polyethylene
HHW	Household Hazardous Waste
IMA	Inter-Municipal Agreement
kWh	Kilowatt Hours
LF	Landfill
MOSA	Montgomery, Otsego, Schoharie Solid Waste Management Authority
MRF	Materials Recovery Facility
MSA	Metropolitan Statistical Area
MSW	Municipal Solid Waste
MTCE	Metric Tons of Carbon Equivalent
MW	Megawatts
MWC	Municipal Waste Combustor
NAICS	North American Industry Classification System
NERC	Northeast Recycling Council
NEWMOA	Northeast Waste Management Officials' Association
NJDEP	New Jersey Department of Environmental Protection
NPV	Net Present Value
NYCRR	New York Codes, Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSOGS	New York State Office of General Services
N2O	Nitrous Oxide
O&M	Operations and Maintenance
OCC	Old Corrugated Container
OCRRA	Onondaga County Resource Recovery Agency
OHCSWA	Oneida Herkimer Solid Waste Management Authority
OMG	Old Magazine
ONP	Old News Print
PAYT	Pay-As-You-Throw
PCS	Petroleum Contaminated Soils
PET	Polyethylene Terephthalate
PSI	Product Stewardship Institute
PURC	Planning Unit Recycling Coordinator
RDF	Refuse Derived Fuel
RFI	Request for Information
RFP	Request for Proposals
RSWMA	Regional Solid Waste Management Authority
SAPA	State Administrative Procedures Act
SEQR	State Environmental Quality Review
SEQRA	State Environmental Quality Review Act
SMART	Save Money and Reduce Trash
SSOW	Source Separated Organic Waste
SUNY	State University of New York
SWMA	Solid Waste Management Authority
SWMP	Solid Waste Management Plan
T&D	Transport and Disposal
TPD	Tons per Day
TPY	Tons per Year
USACE	U.S. Army Corps of Engineers
USEPA	United States Environmental Protection Agency
WMI	Waste Management, Inc.
WTE	Waste-to-Energy
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

Contents

EXECUTIVE SUMMARY ES-1
Introduction ES-1
Existing Conditions and Future Needs ES-2
Goals and Objectives ES-4
Elements of the SWMP ES-6
Waste Minimization ES-7
Product Stewardship ES-8
Continue to Promote and Expand Local Recycling Infrastructure ES-8
SSOW Collection and Processing ES-9
Additional Mandatory Recyclables ES-10
Solid Waste Treatment Facility ES-11
Land Disposal ES-11
Interim Measures ES-12

EXECUTIVE SUMMARY

Introduction

This document is the New Solid Waste Management Plan (SWMP) and presents the long range solid waste strategy for the Capital Region Solid Waste Management Partnership Planning Unit (formerly known as ANSWERS). The City of Albany, on behalf of the of the Capital Region Solid Waste Management Partnership Planning Unit (Planning Unit) is preparing this SWMP to replace the ANSWERS SWMP that was approved by the New York State Department of Environmental Conservation (NYSDEC) in 1992, and as amended by the May 2009 SWMP Modification.

This new SWMP for the Planning Unit defines the key elements of the future solid waste management program for the region, for the years from 2011 through 2030. It includes all the components of a full solid waste management plan as required by NYSDEC regulations.

Currently, the Planning Unit operates as an informal consortium with the City of Albany as the lead participant. As of January 2009, the Planning Unit included 2 cities, 7 towns, and 3 villages in Albany County, as well as the City of Rensselaer and the Town of East Greenbush, in Rensselaer County. Current members of the Planning Unit are shown in Table E-1.

Table E-1
Member Communities of the Capital Region Solid Waste Management Partnership Planning Unit

Municipality		
Cities:	**Towns:**	**Villages:**
Albany	Berne	Altamont
Rensselaer	Bethlehem	Green Island
Watervliet	East Greenbush	Voorheesville
	Guilderland	
	Knox	
	New Scotland	
	Rensselaerville	
	Westerlo	

This SWMP addresses three particular types of non-hazardous solid waste generated by residents, businesses, institutions, and industries within the Planning Unit. These are:

- **Municipal solid waste or MSW**, defined by NYSDEC regulations as combined household, commercial and institutional waste materials generated in a given area;
- **Construction and Demolition Debris or C&D,** defined by NYSDEC as uncontaminated solid waste resulting from the construction, remodeling, repair and demolition of utilities, structures and roads; and uncontaminated solid waste resulting from land clearing; and
- **Non Hazardous Industrial Waste,** not specifically defined in NYSDEC regulations, but meaning solid wastes from manufacturing or industrial processes that are not hazardous, and that are not MSW or C&D.

Existing Conditions and Future Needs

The population of the Planning Unit was approximately 215,000 persons in the year 2000, and is projected to grow to 222,000 and 230,600 by the years 2010 and 2030, respectively.

In the Planning Unit, MSW is generally collected in one of three ways. It can be collected by the local municipality using its own forces, it can be collected by a private waste collection company, or it can be self hauled by the waste generator to an approved disposal or transfer site. The method of MSW collection varies by municipality and by the type of waste generator (e.g. residential, commercial, industrial or institutional). The collection of designated recyclables is mandatory in the Planning Unit and is often carried out by the same party providing MSW collection service. Designated mandatory recyclable materials are specified by each municipality but at this time generally include:

- Paper, including:
    - Newspaper
    - Magazines
    - Corrugated Cardboard
    - Paper Board
    - Office Paper
    - Gable-top Cartons and Drink Boxes
- Plastic, including:
    - PET containers
    - HDPE containers
- Metals, including:
    - Ferrous and bi-metal cans
    - Other ferrous metals
    - Aluminum cans
    - Other non-ferrous metal
- Glass Bottles and containers
- Yard Waste
- Lead Acid Batteries

Estimated Solid Waste Disposal from the Planning Unit is presented in Table E-2. As shown in the table, the Rapp Road disposes of the largest portion of waste from the planning unit, but there are other facilities, both inside and outside of the Planning Unit, that provide disposal capacity.

The table also accounts for waste originating outside of the Planning Unit that is disposed of at the Rapp Road Landfill.

Table E-2 Estimated Waste Disposal from the Planning Unit		
	Tons	
	2007	2008
Reported Waste Disposal in Planning Unit		
Rapp Road Landfill[1]	253,300	239,785
Bethlehem C&D Landfill	1,959	1,873
Waste Originating Outside the Planning Unit disposed at Rapp Road Landfill		
Schenectady Transfer Station[2]	(95,502)	(52,252)
Other waste originating outside the Planning Unit [3]	(16,436)	(53,664)
Waste Exported from Planning Unit		
WMI Boat Street Transfer Station	66,714	55,869
Town of Colonie Landfill	7,100	11,116
Net Waste Disposal from the Planning Unit	**217,135**	**202,727**

Notes:
[1] not including PCS or ADCM tonnage
[2] This is the reported tonnage delivered to the Rapp Road Landfill from the Schenectady Transfer Station. Some of this waste may be generated in the Planning Unit, but this amount has not been determined.
3 This is an estimated value assuming 45% of MSW and 21% of C&D disposed at Rapp Rd. Landfill originates from sources outside of the planning unit, based on an analysis of waste delivery data from July 2009. This value represents that calculated total minus the reported waste delivery from the Schenectady Transfer Station.

Total estimated material recovery and recycling for the Planning Unit in 2008 is presented in Table E-3, below. Using the total of 202,727 tons of waste disposal from the Planning Unit in 2008, the total recyclable material diversion rate for 2008 is 37%.

Table E-3 Estimated Total Material Recovery and Recycling in 2008	
Recycled Material Waste Stream	**2008 quantity (tons)**
Recycled MSW	58,033
Recycled C&D	47,051
Recycled Industrial Waste	13,561
Total Recycled Material	**118,645**

While the existing material diversion rate represents a significant accomplishment for the Planning Unit, there is still a substantial amount of currently designated recyclable material in the waste stream that is delivered for disposal. A waste characterization study undertaken as part of this SWMP found that about 31% of the MSW delivered for disposal during the study period consisted of designated recyclable materials. Increasing the recovery rate for these designated recyclables will result in a reduction of waste disposal tonnage and is one of the objectives of this SWMP.

The materials recovery analysis presented in Chapter 4 of this SWMP identified several organic components of the waste stream which could potentially be recovered through source separation and composting including, food waste (which represented nearly 19% of the MSW disposed during the waste characterization study period), and other paper (11%). Additional recyclable materials that are not currently mandatory included "other plastic containers", "film plastics", and "electronics". These components represented 2.5%, 4.4%, and 2.7%, respectively, of the MSW disposed during the study period.

Projected future quantities of solid waste generation were made by multiplying the projected population of the Planning Unit times the waste generation rate for the applicable waste type. These projected quantities are shown in Table E-4.

Table E-4
Estimated Future Waste Generation in the Planning Unit

	Generation Rate (lb/person/day)	Generated Tonnage (TPY)			
		2010	2015	2020	2030
Projected Population		221,975	224,242	226,509	230,627
Waste Type					
Residential MSW	3.2	129,633	130,957	132,281	134,686
Commercial MSW	1.8	72,919	73,663	74,408	75,761
C&D Debris	3.0	121,531	122,773	124,014	126,268
Non-Hazardous Industrial	2.2	89,123	90,033	90,943	92,597
Estimated Total Waste Generation	10.2	413,200	417,400	421,600	429,300
Note: Estimated Total Waste Generation rounded to the nearest 100 tons.					

As a result of the NYSDEC 's June 2009 approval of the Eastern Expansion of the Rapp Road Landfill, that facility is anticipated to be able to continue to provide disposal capacity for post-recyclable solid waste from the Planning Unit through the year 2016.

The Planning Unit also adopted a SWMP modification in May 2009, approved by the NYSDEC in June 2009, that provides for significant recycling program enhancements. Even with the successful achievement of the goals of the SWMP Modification, there will still be a significant amount of post-recyclable waste that will require disposal after the Rapp Road Landfill reaches capacity in 2016.

Goals and Objectives

The goals and objectives for this SWMP were developed with input from the Solid Waste Management Plan Steering Committee. Each major goal is followed by a series of objectives which help to achieve the goal.

- To continue to provide reliable and reasonably priced solid waste management facilities and services, for MSW, C&D, and non-hazardous industrial waste, for the period from 2011 until 2030, by:
    - Maintaining or expanding the membership of the planning unit;
    - Maintaining and building on existing public sector and private sector solid waste management resources;
    - Identifying new infrastructure and programs that should be developed to meet future needs; and
    - Identifying the administrative structure by which new facilities and programs should be implemented.

- To minimize the amount of solid waste requiring land disposal in the future by:
    - Maintaining and expanding waste reduction, reuse and recycling efforts, as set forth in the SWMP Modification;
    - Increasing the effectiveness of public education and enforcement of existing recycling requirements;
    - Considering more emphasis on material re-use and alternatives such as PAYT, single stream recycling, and food waste composting as mechanisms to achieve future reductions in waste requiring disposal;
    - Considering alternatives which recover energy from waste, including proven technologies as well as new and emerging technologies.

During the formulation of this SWMP, there has been some discussion about whether a "zero waste" goal should be adopted as part of this Plan. While this concept has various definitions in different places, zero waste typically refers to the minimization of waste that must be ultimately disposed of. This concept is not inconsistent with the waste minimization goals of this and will require a process of continuous improvement over the time horizon of this SWMP.

Based on the selected elements of the new SWMP, a waste diversion and recycling goal of 65% has been established for the year 2020. This is reflected in the annual (end of year) diversion and recycling goals, noted below.

- 2010 – 45%
- 2011 – 47%
- 2012 – 48%
- 2013 – 50%
- 2014 – 52%
- 2015 – 54%
- 2016 – 56%
- 2017 – 58%
- 2018 – 60%
- 2019 – 62%
- 2020 – 65%

The above noted waste diversion and recycling goals reflect both the current goals (as set forth in the SWMP Modification) and the maximum expected diversion that is achievable with the implementation of the expanded waste reduction and recycling program, elements that are part of this SWMP. However, implementation of a continuous improvement process in connection with both current and future waste reduction and recycling program efforts could help push beyond these above-noted waste reduction and recycling goals.

Elements of the SWMP

The major elements of the new SWMP are:

- the continued utilization of existing solid waste management facilities and programs in the Planning Unit;
- the expansion of existing waste reduction and recycling programs throughout the Planning Unit;
- the development of new capacity for both recycling and for the treatment of post-recyclable solid waste on a regional basis to provide the necessary economies of scale to support a more fully integrated solid waste management program.

These are presented and discussed in more detail below.

This SWMP also recommends the implementation of a regional solid waste management authority (RSWMA) which would operate an expanded planning unit. This arrangement is believed to represent the best mechanism for meeting the objectives associated with the goal of minimizing the amount of solid waste requiring land disposal in the future. Implementation of RSWMA would also meet the objectives associated with the goal of continued provision of reliable and reasonably priced solid waste management facilities and services. The RSWMA would expand and strengthen the membership of the planning unit and build on existing public sector and private sector solid waste management resources. It would be able to provide for new infrastructure and programs such as expanded mandatory recycling and an SSOW composting facility. The RSWMA would also provide a more effective administrative structure than currently exists to facilitate the implementation of new facilities and programs.

Implementation of the RSWMA will require the enactment of state enabling legislation to create and empower the authority. Before the legislation can be enacted, local or regional consensus will need to be established to provide the basis for enactment. Albany County has proposed to undertake a detailed study to evaluate the feasibility of a regional solid waste management authority for the four-county area (Albany, Rensselaer, Saratoga, and Schenectady) commonly referred to as the Capital

District. The County will receive a grant from the New York State Department of State to conduct this study.

All of these measures are intended to meet the future solid waste management needs of the Planning Unit, the goals and objectives articulated in the SWMP, and will help achieve the goals of New York State's solid waste management hierarchy.

Waste Minimization

Waste minimization in the residential waste generation sector will be promoted with a primary focus on the following:

- The use of back yard composting for both yard waste and food waste will be promoted wherever feasible;
- The use of other waste-reducing methods (except burning) for managing yard waste on-site will be promoted wherever feasible;
- Promote PAYT system implementation;
- Promote the use of reusable grocery bags;
- Educate consumers about how to consider waste reduction and product packaging when they are making purchasing decision;
- Promote the use of existing programs that re-use or redistribute materials in the second-hand marketplace;
- Promote the concept of repair instead of replacement;
- Support product stewardship initiatives;
- Aggressive education and enforcement programs;
- Aggressive waste reduction and recycling programs.

To promote waste minimization in the CII sector, the Planning Unit will seek to form alliances with major employers to increase awareness about the economic and environmental benefits of waste reduction. In addition, if funding can be secured through the NYSDEC Environmental Protection Fund grant program, or other sources, the Planning Unit can also offer waste audits to CII waste generators to help identify specific opportunities for waste reduction (and recycling) at the audited establishment. Such a program can be important either as a first step in developing of a business recycling program or as a way to identify improvements to take an existing program to the next level.

Waste minimization in the construction and demolition sector can be advanced by promoting policies which favor rehabilitation/reconstruction over demolition/new construction, and where building demolition is necessary, policies which favor building deconstruction and material recovery for reuse and recycling over more typical current practices of total teardown.

While the PURC will take the lead with these efforts to promote waste minimization, success will depend on the active participation by the municipal recycling coordinators, as well as a high level of cooperation between the constituent municipalities of the Planning Unit. Member municipalities of the Planning Unit fund the PURC position in proportion to their population share, in accordance with the terms of a 3-year Inter-municipal Agreement which will expire on December 31, 2011.

Product Stewardship

The Planning Unit will work with the NYSDEC, the recently formed New York Product Stewardship Council (currently part of the New York State Association for Solid Waste Management) and others to advance an agenda of product stewardship initiatives that can reduce the amount and toxicity of materials that are left for disposal at the end of their useful lives.

In addition, the Planning Unit will engage local stakeholders (such as major retailers) to raise awareness about product stewardship and to help identify and overcome potential obstacles

Continue to Promote and Expand Local Recycling Infrastructure

The continued expansion of existing waste reduction and recycling programs in the Planning Unit is one of the central themes of this SWMP.

The expansion of these program elements was set forth in the May 2009 SWMP Modification, and will be carried forward as part of this new SWMP. These measures include:

- Increased education and enforcement of mandatory recycling requirements, especially for CII waste generators (including multi-family residential), including:
- Website to publicize Planning unit recycling programs information and information on waste reduction;
- Promote increased recycling in schools;
- Public Space Recycling;

Random inspections are conducted at Rapp Road Landfill for loads with excessive amounts of designated recyclables. Haulers (and the waste generators they service) discovered to be delivering recyclable materials for disposal at the landfill are now and will continue to be subject to follow-up education and enforcement efforts. Failure to comply and repeated delivery of contaminated loads could result in loss of disposal privileges and imposition of fines. Commercial waste haulers are now required to provide annual reports to the City regarding the nature of the recycling and waste recovery programs being implemented by them in each municipality in the Planning Unit.

The PURC will compile information and instructions from each municipality regarding their waste reduction and recycling programs. This information will be made readily accessible to residents and businesses of the Planning Unit by posting it to a new recycling website that is expected to established by the end of the year 2009.

The City of Albany is providing recycling bins to all City public schools and private schools as part of an overall recycling education program. In addition, the PURC will promote increased recycling in the City's schools and will also work with the coordinators from member municipalities to expand this program to include all public and private schools in the Planning Unit.

Another enhancement to the recycling program resulting from the May 2009 SWMP Modification is the public space recycling program. Planning for this program began early in 2009 with the identification of several public space recycling locations. In conjunction with the placement of receptacles, the City will review its recycling ordinance and permit requirements for all public space activities making the provision of recycling, separation and collection of materials a permit requirement. This program will be expanded to member municipalities, with assistance form the PURC and updates to local recycling regulations.

In addition to continuing these programs to promote and expand existing recycling infrastructure, a new element of this SWMP will be the development of one or more drop-off facilities to provide residents and businesses with more complete selection of waste reduction and recycling opportunities. Such a facility would include a one-stop location to accept all designated recyclables, as well as for selected MSW components such as electronics, motor oil, fluorescent light bulbs, a swap shop to promote re-use of second-hand items, as well as a volume-based (PAYT) user charge for solid waste disposal. This facility could be developed as either an expansion of an existing recycling and transfer facility, as a newly developed facility site, or in more than one location. It is envisioned that such a facility would be available for any resident or small business in the Planning Unit.

SSOW Collection and Processing

Another new element of this SWMP is the development of processing and collection capacity for source separated organic waste (SSOW). This SWMP envisions the development of a SSOW facility with a capacity to process up to 40,000 tons per year, sized for the existing Planning Unit. Such a facility would be developed incrementally to account for a ramp-up of SSOW collection programs.

The development of the SSOW facility should also consider sufficient capacity for expansion to provide SSOW capacity for a larger regional planning unit. Alternatively, full SSOW capacity for the larger regional could be provided at two or more different locations throughout an enlarged planning unit.

The development of SSOW processing capacity will also require modifications to existing waste collection infrastructure and operations. This SWMP envisions an initial focus on large CII generators of food waste and other SSOW. These large SSOW generators will need to provide the critical impetus to support the development of initial SSOW processing capacity in the Capital

Region Planning Unit. After that initial SSOW processing capacity is established, incremental expansions into the residential waste sector can be pursued, initially with pilot programs designed to determine the best approach for full scale residential sector implementation.

Capital cost associated with the development of SSOW processing capacity and residential collection equipment may be eligible for grant funding from the NYSDEC Environmental Protection Fund. This grant can provide matching funds for up to 50% of capital cost, and as such provide a significant cost incentive that will be important to the success of this program implementation.

Developing an SSOW facility in the Capital Region also presents a unique opportunity to forge a partnership with the NYSDEC, and other state agencies like the NYSOGS and SUNY Albany who are working to comply with the Governor's Executive Order 4 to increase their recycling and reduce their carbon footprint. These agencies are already participating with the City of Albany, the Planning Unit, and others in an Organics Waste Task Force. In addition, the NYSOGS is already implementing a food waste composting program for its facilities at the Empire State Plaza. Materials collected for composting by OGS are currently delivered to the Agri-Cycle Compost Facility in Washington County.

Additional Mandatory Recyclables

This SWMP envisions the designation of additional mandatory recyclable materials at unspecified dates in the future, when local recovery and recycling opportunities and markets for these materials are more fully established. The following material streams are seen as potential candidates for designation as mandatory recyclables:

- Electronic Waste and HHW
- Plastic Containers #3-7
- Film Plastic
- SSOW, consisting of food waste, miscellaneous paper, and other organic waste

If recycling of electronic waste and HHW were made mandatory, the maximum achievable solid waste diversion rate could increase by 1.3 percentage points. With the addition of plastic containers 3 through 7 and film plastics as designated mandatory recyclables, this maximum achievable diversion rate could be increased by another 2.4 percentage points. The development of a mandatory program for SSOW collection and a facility to process this waste stream could increase the diversion rate by another 11.4 percentage points.

Taken together with the increased recovery of currently designated recyclable materials, an overall waste diversion rate of 65% can be achieved.

Solid Waste Treatment Facility

This SWMP calls for the development of a regional solid waste treatment facility to further minimize landfill disposal requirements for post-recyclable solid waste beyond what would be achievable with the implementation of the waste reduction and recycling programs elements.

Such a facility could recovery additional materials, energy, bio-fuels and other byproducts from the post-recyclable solid waste stream using one of the treatment technologies described in Section 5 of this SWMP. This SWMP does not endorse conventional waste-to-energy technology over any of the other emerging technologies. A facility would need to be sized according to the size of the regional wasteshed. Economies of scale would occur with a larger wasteshed

This SWMP envisions that this facility would be developed by a regional solid waste management authority which would be formed to implement this project as well as other elements of a fully integrated regional solid waste management system. The selection of the appropriate solid waste treatment technology will be made by the regional solid waste management authority. The inclusion of a treatment technology for the post recyclable material is fully consistent with a zero waste policy and goal. The planning units coming closest to zero waste to landfills are those in States and countries with product stewardship legislation, with very aggressive waste reduction, reuse and recycling programs, aggressive education and enforcement, and a treatment technology for the last component of the waste stream, thereby minimizing the fraction that needs to be landfilled.

Implementation of this facility would not occur until after the regional solid waste management authority is formed, and would be expected to occur pursuant to a procurement process described in section 120w of New York General Municipal Law. Under this approach, the project would seek a developer to design build and operate the facility on behalf of the regional planning unit and solid waste management authority. The earliest that such a facility could be ready for operation is 2018.

Land Disposal

The Solid Waste Management Plan includes the continued use of the Rapp Road Landfill, until its capacity is exhausted, currently estimated to occur in the year 2016.

No new landfill capacity in the Planning Unit is envisioned by this SWMP, and after the closure of the Rapp Road Landfill, post-recyclable waste from the Planning Unit that requires landfill disposal will need to be exported to commercially available disposal facilities.

It is possible that with the development of the expanded regional planning unit envisioned by this SWMP, that there will be an opportunity to use another existing landfill facility in the region for the disposal of residue from a regional solid waste management system. This opportunity will need to be

explored as the feasibility of a regional solid waste management authority is subject to further evaluation in the future.

Because waste will not need to be exported for disposal until 2016, it is not practical to secure contractual commitments any of the commercially available facilities at this time. It is expected that any needed capacity can be secured through bid solicitation and contractual commitment within a year of the anticipated closure of the Rapp Road Landfill.

Interim Measures

Because the development of the new institutions and infrastructure called for in this SWMP may take a significant amount of time, it will be necessary for the existing Planning Unit to continue to implement certain the elements of this SWMP until the Regional SWMA is developed.

The existing Planning Unit will provide for continued implementation of most of the waste reduction and recycling elements of the SWMP. This will provide for continued progress in incrementally increasing enforcement and recyclable diversion rates while the other elements of the SWMP are being developed.

The existing Planning Unit will also move forward with the implementation of an SSOW facility prior to the formation of the regional SWMA. The following implementation activities for that facility will be pursued on an interim basis:

- Facility Siting
- Development and Issuance of a Request for Proposals
- Consideration of, and if appropriate, promotion of a privatized or merchant SSOW facility.

Another interim measure will include an evaluation, to be completed by July 2011, to assess progress in establishing the RSWMA which is critical to the successful implementation of this SWMP. If unforeseeable events have occurred which are determined will prevent the implementation of the RWSMA, then it may be necessary to prepare a modification to this SWMP at that time.

Finally, since local landfill capacity at the Rapp Road Landfill may be depleted before the regional solid waste treatment facility can be developed, it may be necessary to be temporarily more reliant on commercial landfill facilities located a long distance from the Planning Unit.

The SWMP Modification included a provision noting that when the Eastern Expansion of the Rapp Road Landfill is approved, the City of Albany intends to acquire land immediately adjacent to the landfill and relocate the existing transfer station structure to that parcel. This existing structure has already been demolished in connection with the construction of the first phase of the Landfill Expansion. This SWMP also acknowledges that the City of Albany would develop a transfer station in the future, if one is needed, at the Rapp Road Landfill site.

SECTION 1.0

INTRODUCTION AND BACKGROUND

Contents

1.0 Introduction and Background 1-1
1.1 Planning Unit Description 1-2
1.1.1 Member Municipalities 1-2
1.1.2 Population Trends and Projections 1-2
1.1.3 Significant Features Affecting Solid Waste Management 1-5
1.1.4 Background And Previous Solid Waste Planning Efforts 1-6
1.2 SWMP Steering Committee 1-9
1.3 Goals and Objectives 1-11
1.4 Public Review and Comment 1-11

1.0 INTRODUCTION AND BACKGROUND

This document is the New Solid Waste Management Plan (SWMP) and presents the long range solid waste strategy for the Capital Region Solid Waste Management Partnership Planning Unit (formerly known as ANSWERS). The City of Albany, on behalf of the of the Capital Region Solid Waste Management Partnership Planning Unit (Planning Unit) is preparing this SWMP to replace the ANSWERS SWMP that was approved by the New York State Department of Environmental Conservation (NYSDEC) in 1992, and as amended by the May 2009 SWMP Modification.

The City of Albany prepared the SWMP Modification to re-evaluate the existing options for the Planning Unit to reduce, re-use and recycle solid waste so that disposal quantities can be minimized through the end of the original planning period (2013). In addition, the SWMP Modification provided an evaluation of short and long term alternatives to the proposed Eastern Expansion of the Rapp Road Landfill. The SWMP Modification was approved by the New York State Department of Environmental Conservation (NYSDEC) on June 12, 2009.

This new SWMP for the Planning Unit defines the key elements of the future solid waste management program for the region, for the years from 2011 through 2030. It includes all the components of a full solid waste management plan as required by subpart 360-15 of the NYSDEC regulations. It also includes the components of a comprehensive recycling analysis in accordance with Section 360-1.9(f) of the regulations.

This chapter provides a general description of the Planning Unit and its member municipalities. It also discusses previous planning efforts, solid waste management challenges and needs, and the objectives of the SWMP. Chapter 2 identifies solid waste characteristics and quantities including waste generation projections for the life of the planning period. Chapter 3 provides data on existing solid waste management practices and includes a facilities inventory. The chapter also discusses collection methods for both the residential and the commercial, industrial and institutional (CII) sectors as well as recycling and composting practices. A materials recovery analysis for the Planning Unit is detailed in Chapter 4. Chapter 5 provides a detailed analysis of alternatives including the no action alternative, alternative waste technologies, emerging technologies, institutional alternatives and alternative implementation scenarios. This evaluation of alternatives was one of the most critical aspects of the process and involved close coordination with the City, the NYSDEC and the SWMP Steering Committee of stakeholders. Chapter 6 presents the Planning Unit's proposed solid waste management system and implementation schedule for the SWMP.

Figure 1-1 shows the overall regional location of the Planning Unit. More detail on the membership and characteristics of the Planning Unit are presented in the following sections.

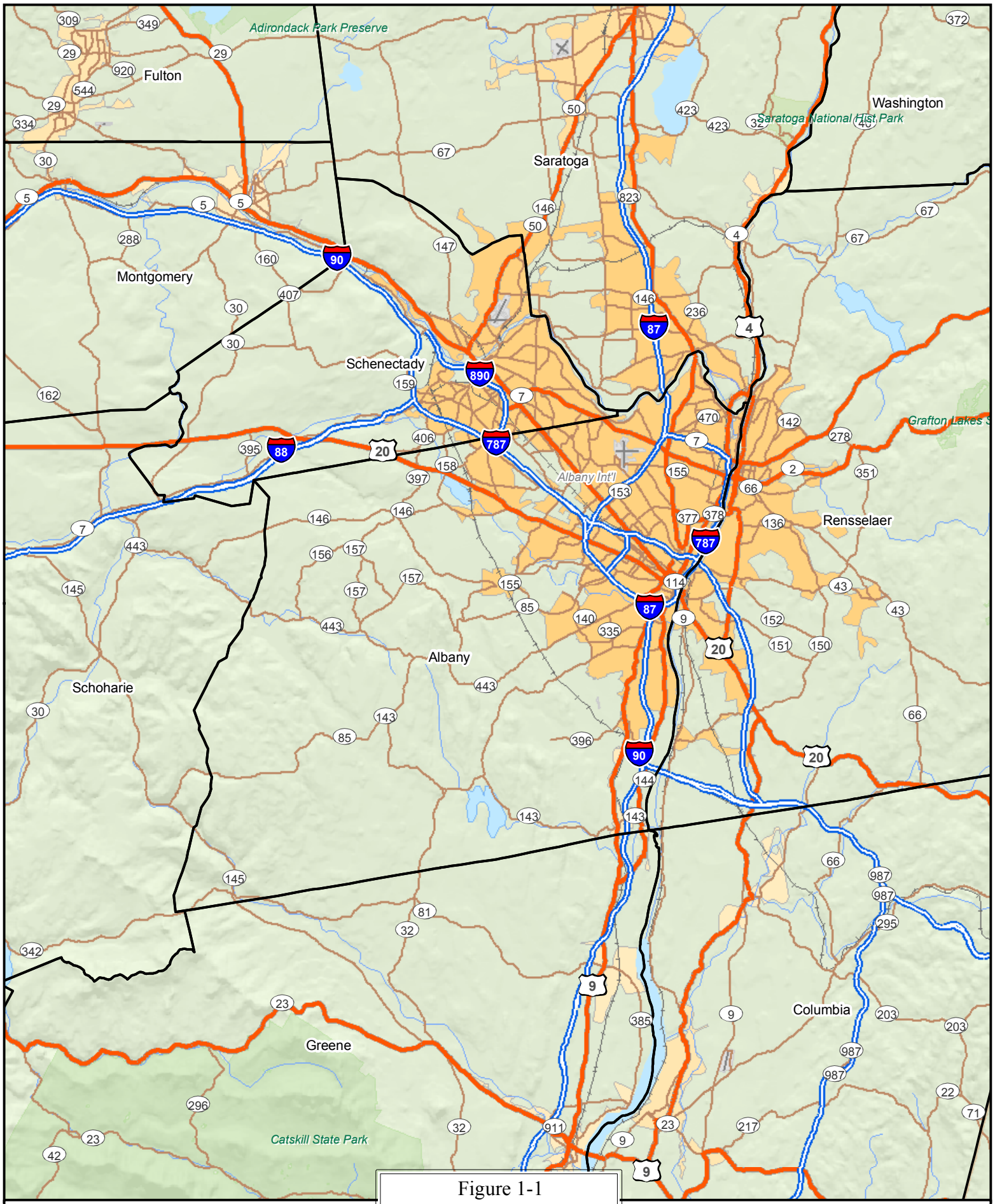


Figure 1-1
Regional Location

Capital Region Solid Waste Management Plan

Drawing Copyright © 2009

CHA
III Winners Circle, P.O. Box 5269 • Albany, NY 12205-0269
Main: (518)453-4500 • www.chacompanies.com

1.1 Planning Unit Description

1.1.1 Member Municipalities

Currently, the Planning Unit operates as an informal consortium with the City of Albany as the lead participant. As of January 2009, the Planning Unit included 2 cities, 7 towns, and 3 villages in Albany County, as well as the City of Rensselaer and the Town of East Greenbush, in Rensselaer County. Current members of the Planning Unit are shown in Table 1-1 and Figure 1-2. As can be seen by Figure 1-2, this Planning Unit of approximately 450 square miles is not contiguous. Currently, the towns of Coeymans and Colonie, and the City of Cohoes all located in Albany County, are not members of the Planning Unit. Surrounding solid waste Planning Units include Schenectady County, the Town of Colonie, Greater Troy Area Solid Waste Management Authority (SWMA), Eastern Rensselaer County SWMA, Saratoga County, Greene County, Columbia County, and the Montgomery, Otsego, Schoharie Solid Waste Management Authority (MOSA). The adjacent Planning Units are shown on Figure 1-3.

When the original SWMP was completed in 1992, the Planning Unit consisted of the municipalities listed in Table 1-1 with the exception of East Greenbush, which joined in 2008. Municipalities which were formerly members at the completion of the original SWMP, but have since left the Planning Unit include the Town of Coeymans, City of Cohoes, and the City of Schenectady.

Table 1-1
Member Communities*
**As of January 2009*

Municipality		
Cities:	**Towns:**	**Villages:**
Albany	Berne	Altamont
Rensselaer	Bethlehem	Green Island
Watervliet	East Greenbush	Voorheesville
	Guilderland	
	Knox	
	New Scotland	
	Rensselaerville	
	Westerlo	

1.1.2 Population Trends and Projections

Table 1-2 provides population data and projections for the various communities within the Planning Unit. Municipalities in the Planning Unit vary from urban to suburban to rural. The City of Albany not only has the highest population and number of households, but is also the most densely populated municipality in the Planning Unit. The small cities of Watervliet and Rensselaer are also densely populated. The towns of Guilderland and Bethlehem are the largest suburban areas although land use within their boundaries varies from high to low density and includes agricultural uses. In addition,

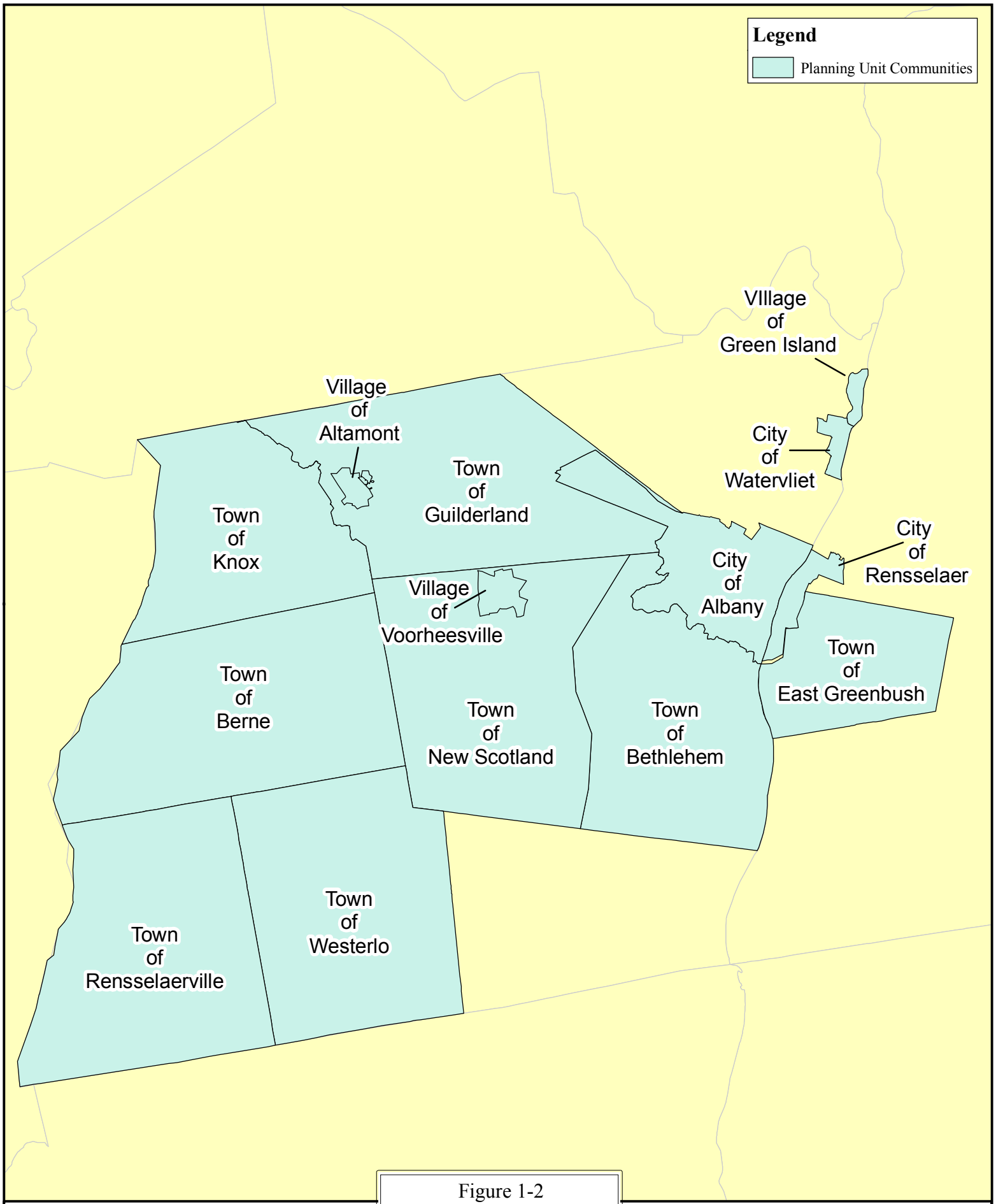


Figure 1-2
Planning Unit Communities

N
W E
S

Capital Region Solid Waste Management Plan

Drawing Copyright © 2009

CHA

III Winners Circle, P.O. Box 5269 • Albany, NY 12205-0269
Main: (518)453-4500 • www.chacompanies.com

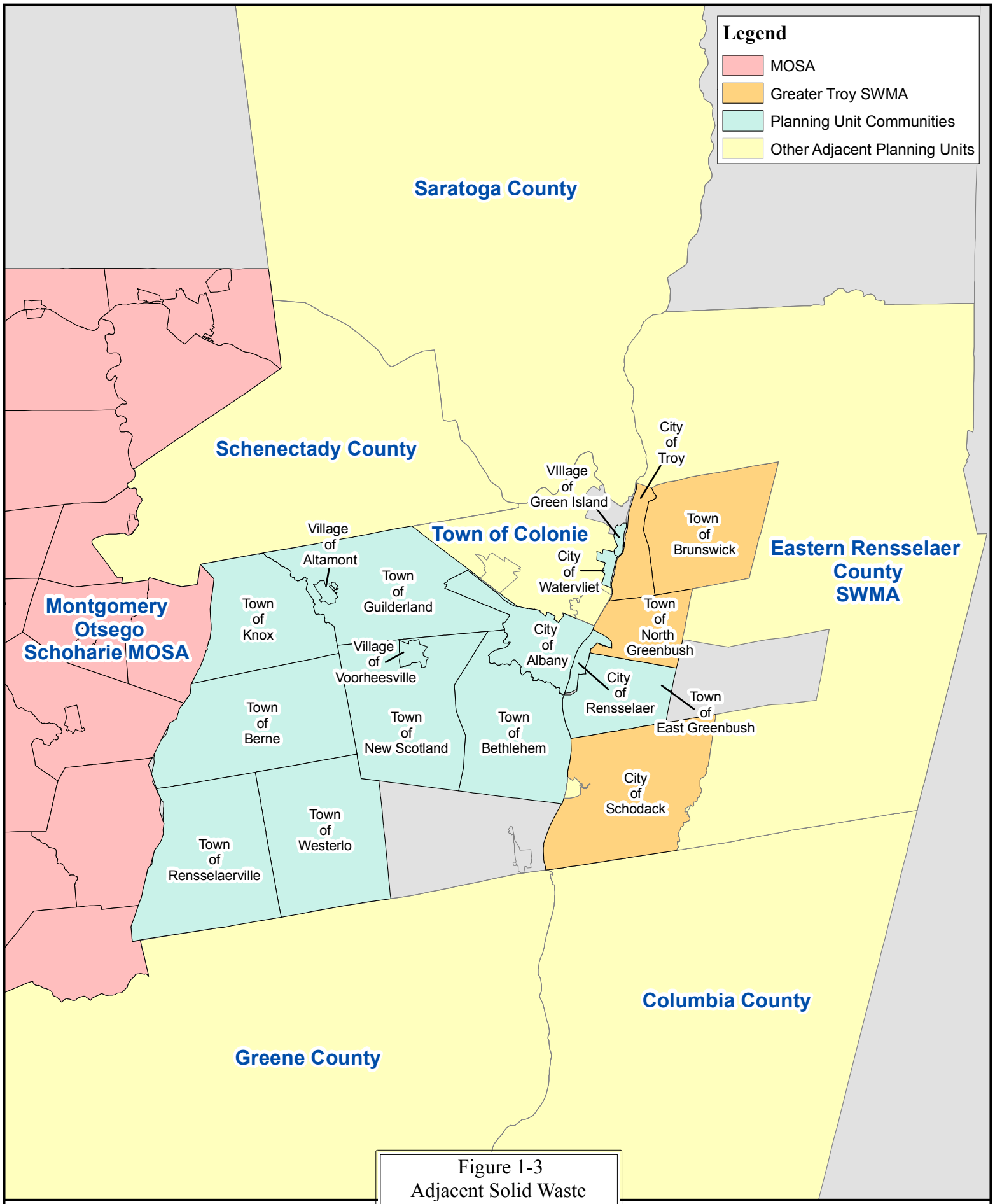


Figure 1-3
Adjacent Solid Waste
Planning Units

Drawing Copyright © 2009

CHA
III Winners Circle, P.O. Box 5269 • Albany, NY 12205-0269
Main: (518)453-4500 • www.chacompanies.com

several communities within the Planning Unit such as Berne, Knox and Westerlo can be classified as rural. Existing and projected population within the Planning Unit is shown in Table 1-2.

Table 1-2
Population & Projections by Municipality

Municipality	YEAR 2000	2010	2020	2030	2040
Cities					
Albany	94,301	94,741	94,740	94,846	94,922
Rensselaer	7,761	8,195	8,064	7,946	7,816
Watervliet	10,207	9,994	9,804	9,665	9,536
Towns					
Berne	2,846	2,811	2,794	2,796	2,808
Bethlehem	31,304	33,922	35,730	37,510	39,296
East Greenbush	15,560	16,708	17,801	18,360	19,105
Guilderland	34,045	36,093	37,715	39,238	40,964
Knox	2,647	2,720	2,779	2,845	2,940
New Scotland	8,626	8,700	8,798	8,925	9,079
Rensselaerville	1,915	1,986	2,047	2,107	2,165
Westerlo	3,466	3,597	3,722	3,867	4,002
Villages					
Altamont *	1,737	1,701	1,670	1,638	1,613
Green Island	2,278	2,508	2,515	2,522	2,540
Voorheesville **	2,775	2,750	2,795	2,844	2,889
Total Population	214,956	221,975	226,509	230,627	235,173

Source: CDRPC, Community Fact Sheets 2007 and US Census, 2000
* Population for the Village of Altamont is also included in the Town of Guilderland
** Population for the Village of Voorheesville is also included in the Town of New Scotland

Overall population in the Planning Unit is expected to change very little through 2040 representing a growth rate of less than 10%. Population in the cities and villages is anticipated to remain nearly flat while much of the growth is predicted in the larger suburban towns of Bethlehem, Guilderland and East Greenbush.

MSW generation and collection is impacted not only by population but by the type of housing. Table 1-3 provides existing housing data for each municipality in the Planning Unit. Many, if not all communities classify multi-family buildings with more than 4 housing units as commercial rather than residential for the purposes of municipal solid waste (MSW) and recyclable collection. This is of particular importance in the City of Albany which provides municipal pick up exclusively for residential units. Residential structures with 5 or more units are considered a commercial use and are not provided with residential waste collection service by the City's Department of General Services (DGS). Based on data from the 2000 Census there were over 11,000 of these multi-family units representing nearly 25% of the City's housing stock. Owners of these structures are responsible not only to contract with a private waste hauler for the removal of MSW and recyclables to appropriate facilities but also to provide residents with adequate facilities for the disposal and storage of MSW and recyclables. Residents of multi-family structures in other Planning Unit communities may also

be considered commercial uses and as such must rely on building owners to make appropriate arrangements for waste removal. More information on waste and recyclable collection practices is presented in Section 3.1.

Table 1-3
Housing Data

Municipality	Housing Type*					Occupancy**					
	Single Family	2-4 Units	5+ Units	Mobile Homes &Other	Total Housing Units	Owner Occupied Units	Renter Occupied Units	Vacant Units	Seasonal Units	Vacancy Rate %	People in Group Quarters
Cities											
Albany	14,375	20,102	11,410	30	45,917	15,306	25,403	4,579	112	10.1	9902
Rensselaer	1,659	1,577	651	9	3,896	1,690	1,707	316	10	8.5	24
Watervliet	1,322	2,949	859	7	5,137	1,926	2,739	451	4	8.8	14
Towns											
Berne	1,264	47	20	125	1,456	931	168	286	216	20.6	0
Bethlehem	10,568	1,707	1,124	157	13,556	9,121	2,991	347	43	2.8	702
East Greenbush	5,257	563	1217	41	7078	4,559	1,525	197	24	3.1	377
Guilderland	10,146	1,161	3,219	147	14,673	8,945	4,477	506	72	3.6	459
Knox	966	31	5	110	1,112	859	94	88	28	8.5	0
New Scotland	3,046	432	50	136	3,664	2,728	613	129	15	3.7	7
Rensselaerville	1,023	46	15	155	1,239	653	126	408	333	34.4	25
Westerlo	1,221	112	23	261	1,671	1,103	223	211	103	13.7	1
Villages											
Altamont	479	114	86	0	679	444	202	28	2	4.2	20
Green Island	294	864	214	0	1,372	469	604	115	2	9.7	0
Voorheeseville	879	209	8	4	1,100	834	208	22	0	2.1	0

* *CDRPC, Community Fact Sheets 2007* ** *US Census, 2000* ****According to US Census seasonal units are counted as vacant units*
Source: CDRPC, Community Fact Sheets and US Census, 2000

Within the Planning Unit there is a specialized multi-family housing type identified as group quarters. Group quarters include dormitories, group homes, nursing homes and correctional and juvenile facilities. The most significant population residing in group quarters (nearly 85%) is located within the City of Albany. These residents are for the most part college students living in dormitories on the campuses of the University of Albany, College of St. Rose, Russell Sage and Albany College of Pharmacy. The 2000 Census for the City of Albany counted 9902 people living in group quarters; 7896 of those were counted as non-institutionalized (college dormitories, military quarters and group homes). MSW generation from some of these sources can be seasonal and cyclical as students leave campus during winter break (mid-December to mid-January) and summer break (mid-May to mid-August). In addition, there are nursing homes and assisted living group quarters located in the

suburbs of Bethlehem, Guilderland and East Greenbush that also account for some of the resident population of the Planning Unit.

Table 1-3 also identifies the number of seasonal units in each municipality. Berne, Rensselaerville and Westerlo have the highest percentage of seasonal units as compared to the total number of housing units. Overall however, seasonal residences represent less than one percent of all housing units and it is anticipated that the occupants of these seasonal housing units will have a limited impact on the overall annual generation of solid waste.

1.1.3 Significant Features Affecting Solid Waste Management

One significant feature of the Planning Unit is that it operates as an informal consortium of 14 municipalities, with the City of Albany as the lead participant. The variation in population and development patterns impacts solid waste management programs within the Planning Unit in a number of ways. Less populous municipalities often have fewer resources to devote to solid waste issues, less leverage in contracting and negotiating with trash haulers, disposal facilities and recycling or waste processing facilities, and less access to resources or programs. Improving and unifying programs in the Planning Unit will result in more efficiency including reductions in MSW and increases in recyclables collections. One recent improvement enacted as a result of the SWMP Modification process was the execution of an Inter-municipal Agreement (IMA) among the participant communities. Through the IMA the member municipalities have agreed to hire and fund a Planning Unit Recycling Coordinator (PURC) and to engage in other cooperative efforts to maximize waste reduction and recycling in the Planning Unit.

Another significant feature of the Planning Unit is the large concentration of state agency employment in and around the City of Albany. The presence of the state government and its agencies represents a critical mass of both direct and indirect employment that likely affect the quantity of commercial waste generated in the Planning Unit. Being the capital of New York also represents an opportunity for waste reduction, reuse and recycling of this waste stream generated at State agencies, as New York State government continues to promote its own policies in this regard.

Government data on employment by sector is not readily available at the municipal level. However, a meaningful discussion can be developed from analysis of the county and regional employment data that are routinely compiled by the New York State Department of Labor, which compiles statistics on employment by sector and place of work. These data show that average total employment in Albany County in 2006 was 226,918, and that over 43,100 jobs (19 percent of total) were with state government. This percentage is much higher than for the state as a whole (less than 3 per cent of total), the Albany-Schenectady-Troy Metropolitan Statistical Area (11.8 per cent in November, 2007), or any of the other constituent counties in the MSA (Capital District Regional Planning Commission, 2007; New York State Department of Labor, November 2007). While some of the employment in state government in Albany County occurs outside of the Planning Unit, for example,

at the DOT building on 50 Wolf Road in the Town of Colonie, most of the state government employment is within of the City of Albany. State government employment data includes all state agencies, state universities and other institutions. The data presented at the county level do not distinguish between these subsets of state government, but the MSA data shows 6,000 state employees in the education subsector and 500 state employees in the state hospital subsector.

The federal government is also a major employer in Albany County. In 2006, the total average employment in this sector was over 5,280 jobs (2.3 percent of total). This percentage is higher than for the state as a whole (less than 1.7 per cent of total), or the Albany-Schenectady-Troy Metropolitan Statistical Area (1.5 per cent in November, 2007).

Local government units, including school districts, account for 7.1 percent of employment in Albany County, or about 16,160 jobs. While this percentage is considerably lower that the surrounding counties, the MSA and the state as a whole, the total number of jobs for the local government sector is of major significance in the regional economy. The reduced percentage of total employment is attributed to the increased proportion of state government employment previously noted.

Among private sector employers, the Service supersector accounts for the largest percentage of employment in Albany County, as it does for the MSA and for the state as a whole. Overall, services represent 64.2 per cent of employment in Albany County (based on 2006 average employment) and 67.1 percent for the MSA (based on November 2007 data). In Albany County, the largest sectors within the Service category include, educational and health services (15.1 percent), professional and business services (12.9 percent), retail trade (10.1 percent) and leisure and hospitality (8.0 percent). Taken together, these 4 sectors of the service economy account for over 46 percent the nearly 227,000 jobs in Albany County.

Finally, Albany is at the intersection of a number of major transportation routes. In the Capital District the major transportation routes include I-90 which runs from east to west and I-87 which runs north and south. Other major roadways that could be an important part of the transportation network as it relates to solid waste transportation and disposal include I-787 and Routes 9, 9W, 32, 85, 20 and 5.

1.1.4 Background And Previous Solid Waste Planning Efforts

Previous solid waste management efforts in the Planning Unit have always consisted of a combination of individual municipal efforts as well as Planning Unit wide efforts. The City and NYS began the joint operation of the ANSWERS facility in 1982.

As part of this arrangement, the City owned and operated several facilities; a refuse derived fuel (RDF) plant, a shredding facility and the Greater Albany Landfill. The ANSWERS RDF plant processed incoming solid waste into RDF, which was used as fuel in the NYSOGS steam plant. This

RDF facility closed to refuse derived fuel in January of 1994 due to concerns associated with air emissions and neighbor complaints. The shredding facility became uneconomical and was closed on June 28, 1996. The City also owned and operated the Greater Albany Landfill which served many of the ANSWERS wasteshed communities who entered into long term contracts for the processing and disposal of residential and commercial waste. These communities retained responsibility for the processing and disposal of other solid waste components such as leaf and yard waste or construction and demolition debris.

The Greater Albany Landfill operated from the 1970's until its closure by NYSDEC consent order in 1991. A permit was issued for an interim landfill (Rapp Road) in 1990. As part of the permit special conditions for the interim landfill, the City was required to join with one or more municipalities or planning units to develop a long-term solid waste management plan. Subsequently, the City prepared the original SWMP which was approved by the NYSDEC in 1992. The original members participating in this process included Albany, Altamont, Berne, Bethlehem, Coeymans, Cohoes, Green Island, Guilderland, Knox, New Scotland, Schenectady, Rensselaer, Rensselaerville, Watervliet, Westerlo, and Voorheeseville. The Original SWMP timeframe extended until 2013 and anticipated that the Planning Unit would operate as an Authority. Legislation was introduced at least twice to the NYS legislature to create an ANSWERS Wasteshed Solid Waste Management Authority beginning in 1989. However, the legislation to create this Authority was never enacted, and as a result, the Planning Unit continues to operate as a loose consortium with the City acting as the lead participant.

The original SWMP called for the development of long term landfill capacity to serve the ANSWERS Wasteshed once capacity at the Rapp Road facility was exhausted, within the ANSWERS Waste shed. The SWMP process initially identified 15 sites within the Wasteshed and after completion of two additional siting studies, Site C-2, in the Town of Coeymans, was identified as the preferred site. The City entered into an option to acquire Site C-2, and on behalf of the ANSWERS Waste shed, submitted a permit application to NYSDEC for the site in the fall of 1994. This process has been unsuccessful to date due to litigation and the presence of extensive federally regulated wetlands on the site.

Due to the litigation, the City, on behalf of ANSWERS applied for and obtained two, 6 NYCRR Part 360 Permits to Construct and Operate a landfill expansion to the Albany Interim Landfill. The first permit, known as the Wedge, was granted in January 1997, and was designed to provide for additional disposal capacity for an estimated 3 years. The Wedge began operation in October 1997. The second permit (referred to as the P4 Project) was granted February 29, 2000 and was designed to provide for an approximately 8 to 10 years of disposal capacity. The P4 expansion began operation on December 4, 2000.

The City was unable to acquire Site C-2 until 2007 and as a result it submitted an application for the Eastern Expansion at Rapp Road. Although the City currently owns site C-2, its role in the future of solid waste management within the Planning Unit is undetermined at this time.

Another component of the original plan included the development of a yard waste composting facility for the City. This facility began operations in 1990. Several other Planning Unit communities also manage their own yard waste program. Household hazardous waste (HHW) collection programs have also been instituted in the City of Albany as required by the original SWMP. Most communities in the Planning Unit also sponsor HHW collection days or have access to collection programs on a regular basis.

In addition, the City attempted to in establish a Materials Recovery Facility (MRF) to process recyclables from the Planning Unit using a procurement process described in Section 120(w) of General Municipal Law. Proposals received from that process were not economically feasible and as a result, in 2007, the City entered into contracts with various commercial recycling operations to accept source separated recyclables collected by the City and the Planning Unit.

As a result of these variations and the extended time frame, the NYSDEC required the preparation of a SWMP Modification to re-evaluate the existing options for the Planning Unit to reduce, re-use and recycle solid waste so that disposal quantities can be minimized through the end of the original planning period (2013). A key implementation item of the SWMP Modification was the execution of Inter-municipal agreements (IMA) between the City and every Planning Unit municipality as a condition of continued use of the Rapp Road Landfill. Another key element was the establishment of the position of Planning Unit Recycling Coordinator (PURC) to be funded by the constituent municipalities in accordance with their proportional population pursuant to the terms of the IMA. The PURC is an area-wide resource to improve communication with and between local recycling program coordinators, and promotes waste reduction and recycling, monitors compliance with the municipal recycling ordinances, provides assistance in applying for available grant funding, and compiles annual information about recycling program achievement in each municipality, including commercial, industrial and institutional recycling program. As a signatory of the IMA, each participating municipality has also agreed to work with the PURC to operate and enforce local recycling laws. In addition, the IMA requires cooperation from each participating municipality in administering the activities outlined in the SWMP Modification. The SWMP Modification also provides mechanisms for increasing the reuse and recycling of solid waste from commercial, industrial and institutional sources.

This SWMP Modification was subsequently subject to SEQR review and approved by the constituent municipalities by execution of the IMA and by resolutions of adoption. The Final SWMP Modification was compiled for submittal to the NYSDEC and was approved on June 12, 2009.

The City of Albany has also enacted additional measures to promote the goals and objectives of the SWMP Modification. On April 22, 2009, Mayor Gerald D. Jennings signed Executive Order No. 422-09 and established the City of Albany Sustainability Agenda. Among others, the agenda contains the following initiatives related to waste management and recycling:

- Initiative 1 – Investigate potential use of a unit-based pricing system for recycling and household waste.
- Initiative 2 – Increase recycling rates citywide through outreach and education.
- Initiative 3 – Strengthen enforcement of recycling by residents and institutions.
- Initiative 4 – Increase access and expand opportunities for recycling.
- Initiative 5 – Reduce use of paper and increase recycling in city offices.
- Initiative 6 – Increase recycling at commercial facilities and in multi-family housing.
- Initiative 7 – Pilot a composting program in city neighborhoods.
- Initiative 8 – Initiate Go Clean Go Green campaign to educate the public and promote individual and community responsibility regarding trash and litter disposal.

1.2 SWMP Steering Committee

The successful development and implementation of a new SWMP will require that a consensus be built among the participant communities and other key stakeholders. A Steering Committee consisting of these key stakeholders has been appointed for purposes of the providing input and guidance assisting in the preparation of the new SWMP.

The SWMP Steering Committee includes a representative from each community that is a member of the Planning Unit. In addition there are other members of the steering committee who represent other stakeholders in the process. A list of committee memberships and affiliations is presented in Table 1-4.

Table 1-4 Capital Region Solid Waste Management Plan Steering Committee Members	
Bruce, Willard (Bill) Committee Chairman	Kernan, Michael CANA
Conway, Robert Mayor, Village of Voorheesville	Larson, Kurt NYSOGS
Crosier, Kevin Supervisor of the Town of Berne	Nickelsberg, Jost Supervisor, Town of Rensselaerville
Cummings, Sally Citizen	O'Brien, Mike Councilman, Albany Common Council
Dimino, Resa A. Special Assistant Commissioner's Policy Office, NYSDEC	Phaff, David CANA
Dolin, Thomas Supervisor, Town of New Scotland	Rapp, Richard Supervisor, Town of Westerlo
Dwyer, Daniel Mayor, City of Rensselaer	Reynolds, Tom/Forgea Dick NYSDEC Region 4
Michael Franchini Commissioner, Albany County Department of Public Works	Runion, Ken Supervisor, Town of Guilderland
Gaughan, James M. Mayor, Village of Altamont	Sagendorph, Gregg Superintendent of Highways, Town of Bethlehem
Gleason, Mark General Manager, City of Watervliet	Sano, Jim Councilman, City of Albany
Griffin, Bob General Manager , Allied Waste Services	Ward, Sean E. Executive Assistant, Mayor of the Village of Green Island
Hammond, Mike Supervisor, Town of Knox	Zeoli, Frank PURC

Once established, the Steering Committee held its first meeting on November 24, 2008. Thereafter, the Committee generally met on a monthly basis from January 2009 through March 2010, to consider significant issues associated with the New SWMP, including the following, among others:

- Formulation of Goals and Objectives;
- Solicitation of Request for Information (RFI);
- Existing Conditions;
- Overview of Proven Waste Management Technologies;
- Waste Reduction, Reuse and Recycling;
- Evaluation of Institutional and Implementation Alternatives;
- Input on the presentation of the SWMP.

Members of the Steering Committee were invited to comment on the Preliminary Draft of the SWMP and several refinements to the Draft SWMP were made as a result of those comments. A compilation of the comments of the Steering Committee along with printed copies of these written comments is provided in Appendix A.

1.3 Goals and Objectives

The following major goals, and the corresponding objectives, for the New SWMP have been presented for consideration by the Steering Committee. Each major goal is followed by a series of objectives which help to achieve the goal.

- To continue to provide reliable and reasonably priced solid waste management facilities and services, for MSW, C&D, and non-hazardous industrial waste, for the period from 2011 until 2030, by:
    - Maintaining or expanding the membership of the planning unit;
    - Maintaining and building on existing public sector and private sector solid waste management resources;
    - Identifying new infrastructure and programs that should be developed to meet future needs; and
    - Identifying the administrative structure by which new facilities and programs should be implemented.
- To minimize the amount of solid waste requiring land disposal in the future by:
    - Maintaining and expanding waste reduction, reuse and recycling efforts, as set forth in the SWMP Modification;
    - Increasing the effectiveness of public education and enforcement of existing recycling requirements;
    - Considering more emphasis on material re-use and alternatives such as PAYT, single stream recycling, and food waste composting as mechanisms to achieve future reductions in waste requiring disposal;
    - Considering alternatives which recover energy from waste, including proven technologies as well as new and emerging technologies.

1.4 Public Review and Comment

The draft SWMP will be issued for public review and comment pursuant to the State Environmental Quality Review Act (SEQRA).

Appendix B has been reserved to present the SEQRA documentation for the SWMP.

SECTION 2.0

SOLID WASTE QUANTITIES AND CHARACTERISTICS

Contents

2.0 SOLID WASTE QUANTITIES AND CHARACTERISTICS 2-1
2.1 Current Estimates of Solid Waste Generation 2-1
2.1.1 Municipal Solid Waste Generation 2-2
2.1.1.1 Residential MSW 2-2
2.1.1.2 Non Residential MSW 2-3
2.1.1.3 Total MSW Generation 2-4
2.1.2 Construction and Demolition Debris 2-4
2.1.3 Non-Hazardous Industrial Waste Generation 2-7
2.1.4 Total Existing Solid Waste Generation 2-8
2.2 Characterization of Solid Waste 2-9
2.2.1 Field Study of Solid Waste Characterization 2-9
2.2.2 Construction & Demolition Debris 2-15
2.2.3 Non-Hazardous Industrial Waste 2-17
2.3 Future Solid Waste Quantity and Characteristics 2-18
2.3.1 Projected Solid Waste Quantities 2-18
2.3.2 Future Solid Waste Composition 2-19

2.0 SOLID WASTE QUANTITIES AND CHARACTERISTICS

This section of the SWMP will identify the types and quantity of solid waste that are generated in the Planning Unit as well as projections of future waste generation. The results of this analysis will be an important component in evaluating the size and type of future solid waste management facilities and programs that might be appropriate in the Planning Unit. The analysis builds on the evaluation of solid waste generation prepared in connection with the SWMP Modification.

Section 2.1 presents an analysis and current estimate of solid waste generation in the Planning Unit for the year 2008, including municipal solid waste (MSW), construction and demolition (C&D) debris, and non-hazardous industrial waste.

Section 2.2 presents an analysis and current estimate of solid waste composition for the Planning Unit for the year 2008. This analysis also includes a field study of the composition of MSW delivered to the Rapp Road Landfill and residential recyclables collected at the curbside by the City of Albany Department of General Services. Section 2.2 also presents an analysis and discussion about the composition of C&D debris and non-hazardous industrial waste.

Section 2.3 presents projections of solid waste generation in 10 year increments, for the years 2010 through 2030. A discussion of future solid waste composition is also presented in that section.

2.1 Current Estimates of Solid Waste Generation

This section of the report is largely based on the discussion and analysis that was prepared as part of the SWMP Modification. At this time, there is no single method of recordkeeping maintained on a regular basis by which the quantity of waste generated for recycling or disposal within the Planning Unit can be definitively determined. Haulers are not generally required to record or report on the origin of the waste or recyclable materials that are collected. As a result, it is necessary to estimate waste generation and recycling from a variety of sources.

The original Solid Waste Management Plan included a solid waste stream evaluation based on US Census data through 1980, ANSWERS scale house records from 1981 through 1988, data collected though a field survey and a municipal survey in 1989, among other sources. These estimates are now out of date. The SWMP Modification utilized more current information available from the same or similar sources, as the basis for preparing this evaluation of solid waste generation.

A simplified estimate of solid waste generation can be made by using statewide solid waste generation data for 2004 published by the New York State Department of Environmental

Conservation (NYSDEC). Dividing this total waste generation by statewide population, CHA estimates an average daily waste generation rate of 10.6 lbs per person per day. This is somewhat less than, but comparable to reported waste generation rates in several neighboring states including Massachusetts (11.9 lbs/person/day) and New Jersey (12.44 lbs/person/day). It is important to note that these per capita generation rates are not limited to MSW, but represent a larger subset of the waste stream including C&D debris and, non-hazardous industrial waste.

A more detailed discussion and estimate of current generation for the major waste stream components is presented below.

2.1.1 Municipal Solid Waste Generation

Municipal solid waste (MSW) is defined in NYSDEC regulations as "combined household, commercial and institutional waste materials generated in a given area."

In the definition provided by the United States Environmental Protection Agency (USEPA), "…MSW—otherwise known as trash or garbage—consists of everyday items such as product packaging, grass clippings, furniture, clothing, bottles, food scraps, newspapers, appliances, and batteries. Not included are materials that also may be disposed in landfills but are not generally considered MSW, such as construction and demolition materials, municipal wastewater treatment sludges, and non-hazardous industrial wastes" (USEPA, 2008).

An often cited source for estimating MSW generation, the USEPA has studied the quantity and quality of the MSW stream since the late 1980s. Based upon its most recent report, USEPA estimates a MSW generation rate of 4.6 pounds per person per day in 2007 (USEPA, November 2008). Because the USEPA estimates are developed based on economic data for the entire United States, and are averaged over urban, suburban and rural populations, these nationwide MSW generation estimates are believed to under-represent the amount of MSW expected to be generated in a major employment center like the City of Albany.

For this waste stream analysis, MSW is estimated as it is generated from both residential and non-residential sources with a methodology used in connection with the preparation of the SWMP Modification, as summarized below.

2.1.1.1 Residential MSW

The residential component of MSW generation was estimated on a per capita basis by adding the quantity of waste and recyclables collected by the City of Albany Department of General Services (DGS) from the residences that it services and dividing by the estimated population served. From

2005 through 2008, the DGS collected an average of 37,700 tons of refuse and recyclable materials annually from an estimated 31,000 residential units. Assuming an average household size of 2.1 persons (from the 2000 Census), multiplied by the number of occupied residential units serviced by the DGS collection program, results in about 65,100 residents and an annual residential MSW generation rate of 0.58 tons per person, or 3.2 lbs per person per day.

2.1.1.2 Non Residential MSW

Based on data tabulated by the New York State Office of General Services (OGS) on waste generation and recycling by the approximately 19,000 state employees occupying the 26 state office buildings in the City of Albany that are managed by OGS, CHA estimates that these operations generate approximately 8,220 tons of waste annually, including both what is disposed and what is recycled. This waste and recycled material is primarily MSW, and the estimate is based on a state-wide average generation rate at OGS facilities of 2.37 lbs per employee per day. As a result of a survey of several large commercial waste generators administered by CHA in 2008 in connection with the SWMP Modification, an average MSW generation rate of 2.39 lbs per employee per day was reported. Based on this evaluation of the available data, CHA believes it is reasonable to use a generation factor of 2.37 lbs per employee per day to represent MSW generated in the commercial, industrial and institutional (CII) sector.

The federal and state governments do not compile detailed employment statistics on a municipal level. The county is the lowest civil division for which comprehensive statistics are provided. Because the Planning Unit does not consist of a single county and consists of municipalities in two separate counties, the per employee MSW generation estimate for the CII sector must be converted into a resident based multiplier. This conversion is explained below.

According to the New York State Department of Labor, average total employment in Albany County in 2006 was 226,918. To estimate the MSW component of the CII waste stream, CHA applied the above-noted 2.37 lb per employee per day MSW generation rate to all employees in Albany County. The resulting estimate is 98,147 tons of MSW generated annually at the workplace. Based on the population of Albany County (297,414 in 2005), this CII component of MSW generation amounts to 1.8 lbs per person per day, not including any residential based MSW generation. While it is recognized that Albany County includes areas that are not part of the Planning Unit, the use of a county-wide average is a reasonable method for estimating per capita generation of CII MSW for the Planning Unit.

2.1.1.3 Total MSW Generation

For purposes of this Waste Stream Analysis, the Total MSW Generation in the Planning Unit is presented in Table 2-1.

Table 2-1 Total MSW Generation	
Residential MSW Generation Rate	3.2 lb/person/day
CII MSW Generation Rate	1.8 lb/ person/day
Total MSW generation rate	5.0 lb/person/day
Estimated Population in 2008	218,728 persons
Total MSW Generation in 2008 (Tons per year)	199,600 tons

Based on this approach, total MSW generation in the Planning Unit is estimated to be approximately 199,600 tons in 2008. This estimate does not include C&D debris, non-hazardous industrial waste, or other non-MSW components of the waste stream. It is also worth noting this 2008 MSW generation estimate includes materials that are recovered from the waste stream for re-use and recycling as well as waste that is delivered for disposal.

2.1.2 Construction and Demolition Debris

Construction and Demolition (C&D) Debris is defined by the NYSDEC as uncontaminated solid waste resulting from the construction, remodeling, repair and demolition of utilities, structures and roads; and uncontaminated solid waste resulting from land clearing.

Several sources of information were examined to prepare an estimate of C&D generation and recycling. According to a 1998 study published by the USEPA the estimated per capita generation rate for building-related C&D debris in 1996 was 2.8 lbs per person per day. This estimate does not include the C&D debris associated with road and bridge construction or land clearing. A second study released in March 2009 by USEPA provides data for the year 2003 to update the previous study. Generation data for C&D materials in 2003 were provided for the following six categories: residential construction, residential renovation, residential demolition, non-residential construction, non-residential renovation, and non-residential demolition. The estimated per capita generation rate for building-related C&D materials in 2003 is 3.2 lbs per capita per day (pcd), an increase from the 1996 value of 2.8 pcd (USEPA 2009). The USEPA studies address estimates of total quantities of materials generated; C&D composition or percentages of various construction material types found in the C&D stream are not addressed.

The Northeast Waste Management Officials' Association (NEWMOA) published a report on the management of C&D waste in the Northeastern States, including New York (NEWMOA, 2005). NEWMOA is a nonprofit, nonpartisan, interstate association composed of state environmental agency directors of the hazardous waste, solid waste, waste site cleanup, pollution prevention and underground storage tank programs in Northeastern states including New York. The study compiled information from state records to estimate the quantities of C&D debris that were generated and delivered to disposal facilities. As such this data does not account for C&D debris that may be reduced, re-used or recycled. Data were presented from calendar years 2001 and 2002 showed that Massachusetts and Connecticut, the two states noted in the report as having the most useful data, indicated average generation and disposal rates on the order of 1.0 lb per person per day. New York data indicated an average C&D generation and disposal rate of 0.8 lb per person per day.

As part of its 2006 SWMP the New York City Department of Sanitation (DSNY) conducted a commercial waste characterization study (DSNY, 2006). This study estimated that New York City generated over 8.6 million tons of C&D debris in 2003, including 2,692,390 of non-putrescible C&D and 5,949,450 tons of clean fill C&D. Non-putrescible C&D was defined as inert waste generated from commercial and residential demolition, new construction and renovation projects. This waste can vary significantly with the volume of construction activity in the City. It is comprised of a range of inert materials, some of which is recycled. Clean fill C&D is defined as is inert waste from non-building construction, comprised of materials such as excavated fill, stone rubble and road millings that are graded into materials such as sand and aggregate and stockpiled for reuse at the City's fill material transfer stations. Almost all fill material is reused in other building projects. Clean fill represented 68.9% of total C&D generation.

Based on the estimated 2003 population of New York City, per capita generation was calculated by CHA for each of these C&D waste components are as follows:

- non-putrescible C&D – 1.8 lb per person per day
- Clean fill C&D – 4 lb per person per day

Taken together, these data show total C&D generation in New York City amounting to about 5.8 lb per person per day.

In 2005, the New Jersey Department of Environmental Protection (NJDEP) estimated that over 4,052,500 tons C&D waste, consisting of asphalt, concrete and masonry, was generated in that state. (http://www.nj.gov/dep/dshw/recycling/stat_links/2005_material_stats.pdf) This amounts to a generation rate of 2.54 lb per person per day. Another 2,328,000 of other bulky waste and C&D, including petroleum contaminated soils were estimated to have been generated in New Jersey in

2005, amounting to another 1.46 lb per person per day. Similar to what is reported by DSNY, NJDEP reports that most of the asphalt, concrete and masonry fraction of C&D is recycled and re-used, as is a significant portion of the other C&D fraction. Taken together, these data show total C&D generation in New Jersey amounting to about 4.0 lb per person per day.

The amount of C&D debris generated is expected to vary significantly based on economic conditions, both nationally and locally. The New York City and New Jersey estimates noted above represent periods of a strong market in housing and commercial construction. Given the significant downturn in construction that have in occurred during the current recession, it is expected that the generation of C&D debris will also be diminished accordingly.

According to recent data from the US Census Bureau, housing starts for single family homes in the Northeast in 2008 were 64% less than starts in the peak year 2005. Construction starts for new multi-family residential units in the Northeast declined by 21% over that same period. (U.S. Census Bureau, 2009). Between 2007 and 2008, all residential construction starts in the Northeast declined by about 15%. Non-residential construction has also been declining in recent years both nationally and regionally. Thus, we would expect to see a decline in the quantity of C&D material delivered for both disposal and recycling.

A comparison of tonnage reported from the largest C&D processing facilities in the region bear this out. The table below compares recycled C&D material tonnages in 2007 vs. 2008 for several facilities in the region. It shows that material tonnages estimated to originate in the Planning Unit have decreased from 80,944 tons in 2007 to 36,180 tons in 2008, a decline of about 55%.

Table 2-2
C&D Recycling Tonnage

Facility Name	2007 Tonnage	2008 Tonnage
Callahan Watervliet	3,762	5,672
Callahan Ravena	19,746	3,191
Kings Road Material	57,436	27,317
Subtotal	**80,944**	**36,180**

These particular recycling facilities listed in Table 2-2 handle and recover primarily asphalt and concrete. Since most of this material is recycled or reused, these statistics are believed to be a good indicator of total waste generation for this subset of the C&D stream.

During the preparation of the SWMP Modification, and based on data from 2007 and earlier, a total C&D generation estimate of 4.0 lb per person per day was determined to be reasonable. However,

based on the more recent construction data cited above, it is estimated that total C&D generation in 2008 has declined by 35 % from 2007 levels, to 2.6 lb per person per day. It is not known when construction activity will resume the pace that was exhibited during the period before this current recession. Given the uncertainty regarding if and when construction levels will return to the previous levels, and the recognition that C&D generation may fluctuate more significantly than other elements of the solid waste stream over the course of the 20 year planning horizon, it is reasonable and prudent to use a value of 3.0 lb per person per day for purposes of projecting future C&D generation rates for this long term SWMP.

2.1.3 Non-Hazardous Industrial Waste Generation

According to data from the U.S. Census Bureau, there were 260 manufacturing facilities in Albany County in 2002, employing a total of more than 9,000 people. Not all of these facilities or employees are located in the Planning Unit communities, but a substantial number are believed to be. In addition there are manufacturing establishments in the City of Rensselaer and the Town of East Greenbush in Rensselaer County.

In order to better understand the waste management practices among these industrial establishments a survey was prepared and distributed to major manufacturing employers in the Planning Unit. The survey included questions regarding current solid waste management and recycling practices, as well as any special problems or issues faced with either solid waste management or recycling. A copy of the Industrial Waste Survey Form and Cover Letter along with a more detailed description of the process and results are presented in Appendix C – Industrial Waste Survey and Results.

Based upon the information provided by the respondents to the Industrial Solid Waste Survey, CHA estimates an average industrial waste generation rate of 2.2 pounds per person per day. Fifteen respondent companies, employing a total of over 1,000 workers provided information that was useful in the determination of an industrial waste generation rate. The methodology used to arrive at this per capita generation rate is explained in the following paragraphs.

The total quantity of waste generated, as reported by the Industrial Waste Survey respondents, was added together to obtain a total. Only industrial waste from manufacturing processes was considered; waste material that would be appropriately classified as MSW was not included in the calculation of total industrial waste generated. This industrial waste generation total includes both waste material that is recycled and waste material that is disposed. The total industrial waste generated (15,539 tons per year for the 15 manufacturers providing information) was divided by the total number of

employees (1,029) at those 15 manufacturers to yield an average industrial waste generation rate of 15.1 tons per employee per year.

Since the government does not compile detailed employment statistics in a way that can be aggregated for the Planning Unit, the per employee industrial waste generation estimate was converted into a resident based multiplier, similar to the conversion used for the MSW from CII sources mentioned earlier. The total industrial waste generated for all of Albany County was obtained by multiplying the 15.1 tons per employee rate by the 7,839 employees of manufacturing establishments in Albany County. The resulting number, 118,369 tons, represents the total estimated industrial waste generation for Albany County in the year 2008. The number of manufacturing employees was obtained from the New York State Department of Labor, based upon NAICS codes for manufacturing. (All of the survey data used in the industrial waste generation calculation was included in the NAICS manufacturing category.) The average employment for the first three quarters of 2008 was used to approximate the number of manufacturing employees.

The total industrial waste generated for Albany County, indicated above, was then divided by the total population of Albany County, to obtain the industrial waste generation rate over the entire population, in tons per person per year. Since population data for 2008 for Albany County was not available from the Capital District Regional Planning Commission in April 2009, when these estimates were prepared, the most recent available estimates (for 2007) were utilized. Finally, conversion factors were then used to convert the generation rate from tons per person per year into 2.2 pounds per person per day.

2.1.4 Total Existing Solid Waste Generation

Multiplying the individual waste generation rate estimates for MSW, C&D, and non-hazardous industrial waste discussed above results, by the estimated Planning Unit population of 218,728 persons in 2008, yields a total existing solid waste generation estimate of 391,200 tons as shown in Table 2-3 below.

Table 2-3
Total Existing Solid Waste Generation

Solid Waste Type	Generation rate (lb/per/day)	2008 Generation
MSW	5.0	199,600 tons
C&D Debris	2.6	103,800 tons
Non-Hazardous Industrial Waste	2.2	87,800 tons
Total	**9.8**	**391,200 tons**

2.2 Characterization of Solid Waste

The composition and characteristics of the solid waste are important elements of Solid Waste Management Plan. These factors influence the types of programs and facilities that can be considered for future implementation.

The original SWMP for the former ANSWERS communities did not include a detailed local waste composition analysis. Since that time, solid waste composition studies have been conducted with varying frequency by many federal, state and other local agencies. While some of these studies may be useful in estimating the overall composition of solid waste in the Capital Region Planning Unit, it was agreed that as part of this new SWMP it was important to have specific local data on MSW. As a result of this agreement, a limited field study of MSW deliveries to the Rapp Road Landfill was undertaken in early 2009. The results of this field study as they relate to MSW composition are summarized in section 2.2.1 below.

Sections 2.2.2 and 2.2.3 present discussions about the composition of C&D debris and non-hazardous industrial waste, respectively.

2.2.1 Field Study of Solid Waste Characterization

As part of the SWMP, a field study was conducted by CHA to characterize the MSW stream delivered to the Rapp Road Landfill and residential recyclables collected by the City of Albany DGS. One important objective of this study was to determine the presence and quantity of any designated recyclables in the waste stream. Another objective was to examine the difference in composition between residential solid waste collected by municipal agencies and the residential waste collected by the private sector. This section 2.2.1 presents a summary of the results of this field study, as they relate to MSW composition. A complete report on the field study is presented in Appendix 4.

A total of 36 randomly selected samples were collected from solid waste vehicles (both DGS and commercial) arriving at the Rapp Road Landfill in Albany over a five-day period from February 23 through February 27, 2009. Each of the representative solid waste samples was then sorted into 39 material categories, and the weight of each material category was recorded.

The sampling and sorting program was generally conducted and analyzed according to the American Society for Testing and Materials (ASTM) Standard Test Method for Determination of the Composition of Unprocessed Municipal Solid Waste, ASTM D5231-92.

The average composition percentages were calculated for each material component for each sample, and then calculated for each material category across multiple samples. Results for the solid waste and recyclable material sampling are presented with the combined total of all samples, as well as separate results for the DGS vehicles only and the commercial vehicles only.

The largest single material component in the solid waste stream as sampled is food waste, at an average of 19% of the total mass sampled. All paper categories combined represent 31% of the waste deliveries, but this includes eight separate categories of paper. The largest single paper category is classified as other paper, at 11% of the total mass sampled. The combined plastics category was the third largest major component of the solid waste stream with approximately 13% of the total mass of the sample. The largest single plastics category was film plastic and plastic bags totaling 4% of the solid waste stream. The proportional share of all of the material components measures are presented in Table 2-4.

The solid waste composition data was also analyzed to compare waste delivered by DGS to waste delivered by commercial haulers. The data for all vehicles, as indicated above, was divided by vehicle operator into subsets to obtain the solid waste composition of the DGS waste stream and commercial hauler stream separately, and determine differences between these two waste streams. For these subsets, the combination of all paper categories is the largest material component category from the commercial waste vehicles at 41% composition by weight, and from the DGS vehicles at 25% by weight. For both the DGS and Commercial waste streams, the largest paper category was other paper, with approximately 7% and 17% of the total mass of the sample, respectively. Food wastes were the largest single material category from both waste streams, with compositions of approximately 23% and 21%, each for DGS and commercial vehicles. As above, film plastic and plastic bags were the largest single plastics category. This material category constituted 6% of the DGS waste stream, and 4.5% of the commercial waste stream. Other significant waste component categories varied between the DGS samples and the commercial samples; these included textiles and leather, disposable diapers, and wood, with the DGS samples, and dirt/fines, and glass, for the commercial samples. Table 2-5 presents the comparison of the composition of the DGS collected waste with the waste delivered in commercial collection vehicles. It should be pointed out that the total composition presented in Table 2-4 is based on a total of 36 samples, whereas, the partial results presented in Table 2-5 representing MSW deliveries from DGS and Commercial Haulers is based on 9 samples and 16 samples, respectively.

Table 2-4 Field Study of MSW Composition	
Material Components	**Average Composition (%)**
PAPER	
Newspaper	2.0%
Magazines	2.1%
Corrugated	4.5%
Gable Top Cartons & Drink Boxes	0.4%
Paper Board	4.2%
Books (including phone directories)	2.8%
Mixed Office Paper	4.1%
Other Paper	11.1%
SUBTOTALS	**31.3%**
PLASTICS	
Plastic Containers (PET) #1 Non-Bottle Bill	1.7%
Plastic #1 (Bottle Bill Containers)	0.3%
Plastic Containers (HDPE) #2	0.8%
Other Plastic Containers	2.5%
Film Plastic & Plastic Bags	4.4%
Other Plastics	2.8%
SUBTOTALS	**12.5%**
FOOD WASTE	**18.7%**
TEXTILES & LEATHER	**5.7%**
RUBBER	**0.5%**
DISPOSABLE DIAPERS	**2.3%**
FERROUS METALS	
Ferrous Metal/Bimetal Cans	0.7%
Aerosol Cans	0.1%
Other Ferrous Metal	1.9%
SUBTOTALS	**2.8%**
NON-FERROUS METALS	
Aluminum Cans (Non-Bottle Bill)	0.2%
Aluminum Cans (Bottle Bill)	0.2%
Other Non-Ferrous Metal	1.0%
SUBTOTALS	**1.3%**
ELECTRONICS	**2.7%**
GLASS	
Glass Bottles (Bottle Bill)	0.5%
Glass Bottle - Clear	1.8%
Glass Bottle - Amber	0.9%
Glass Bottle - Green	0.1%
Flat Glass & Other Glass	1.4%
SUBTOTALS	**4.7%**
WOOD	**3.6%**
RUBBLE	**0.6%**
YARD WASTE	**1.2%**
DIRT/FINES	**7.9%**
HAZARDOUS WASTE	
Household Hazardous Waste (HHW)	0.0%
Lead Acid Batteries	0.0%
Other Batteries	0.0%
SUBTOTALS	0.1%
MEDICAL OR PHARMACEUTICAL WASTE	**0.2%**
MISCELLANEOUS	**3.8%**
TOTAL	**100%**

Table 2-5
Comparison of DGS and Commercial Collection Vehicles Composition

Material Components	DGS Mean Mass Fraction	Commercial Mean Mass Fraction
PAPER		
Newspaper	2.7%	2.1%
Magazines	1.4%	3.5%
Corrugated	3.4%	5.6%
Gable Top Cartons & Drink Boxes	0.3%	0.5%
Paper Board	5.3%	3.9%
Books (including phone directories)	2.5%	2.4%
Mixed Office Paper	2.1%	6.3%
Other Paper	7.4%	16.6%
SUBTOTALS	**25.0%**	**40.8%**
PLASTICS		
Plastic Containers (PET) #1 Non-Bottle Bill	2.0%	2.2%
Plastic #1 (Bottle Bill Containers)	0.3%	0.3%
Plastic Containers (HDPE) #2	1.0%	0.6%
Other Plastic Containers	2.7%	2.6%
Film Plastic & Plastic Bags	6.4%	4.5%
Other Plastics	2.7%	2.0%
SUBTOTALS	**15.2%**	**12.2%**
FOOD WASTE	**23.2%**	**20.5%**
TEXTILES & LEATHER	**6.2%**	**3.4%**
RUBBER	**0.2%**	**0.5%**
DISPOSABLE DIAPERS	**4.9%**	**1.0%**
FERROUS METALS		
Ferrous Metal/Bimetal Cans	0.9%	0.5%
Aerosol Cans	0.1%	0.1%
Other Ferrous Metal	2.4%	1.9%
SUBTOTALS	**3.5%**	**2.5%**
NON-FERROUS METALS		
Aluminum Cans (Non-Bottle Bill)	0.3%	0.1%
Aluminum Cans (Bottle Bill)	0.2%	0.3%
Other Non-Ferrous Metal	1.2%	0.2%
SUBTOTALS	**1.8%**	**0.6%**
ELECTRONICS	**2.6%**	**2.1%**
GLASS		
Glass Bottles (Bottle Bill)	1.5%	0.2%
Glass Bottle - Clear	1.8%	2.6%
Glass Bottle - Amber	0.4%	1.6%
Glass Bottle - Green	0.1%	0.1%
Flat Glass & Other Glass	0.5%	0.5%
SUBTOTALS	**4.3%**	**4.9%**
WOOD	**5.2%**	**0.2%**
RUBBLE	**0.0%**	**0.2%**
YARD WASTE	**0.7%**	**1.0%**
DIRT/FINES	**4.1%**	**6.0%**
HAZARDOUS WASTE		
Household Hazardous Waste (HHW)	0.0%	0.0%
Lead Acid Batteries	0.0%	0.0%
Other Batteries	0.1%	0.0%
SUBTOTALS	**0.1%**	**0.0%**
MEDICAL OR PHARMACEUTICAL WASTE	**0.0%**	**0.5%**
MISCELLANEOUS	**3.4%**	**3.5%**
TOTAL	100.0%	100.0%

The data from the waste characterization field study for the Planning Unit were also compared to data from a similar 2005 study for the Onondaga County Resource Recovery Agency (OCRRA), as well as from national data collected by the United States Environmental Protection Agency (USEPA) for the year 2007. Table 2-6 – Solid Waste Composition in Other Studies presents the Capital Region data alongside the OCRRA and USEPA data. The data are consistent across several material categories such as food wastes, and textiles and leather; however, the waste stream composition of other material categories reflects differences between the solid waste stream of the Capital Region, and the OCRRA and USEPA data. These differences include a higher percentage of paper products, and other material categories such as electronics, and dirt/fines, and lower percentages of categories such as yard waste and rubber. Comparison of the Capital Region results with other studies will also assist in the planning and preparation of the future management of solid waste and recyclable materials.

Yard waste only represented 1.2% of the solid waste discarded during this study. While there are numerous yard waste composting programs in place within the Planning Unit, the waste characterization study was conducted during the low season for yard waste generation. CHA examined the as-discarded yard waste fraction in the context of documented yard waste composting in the Planning Unit, the USEPA estimates of as-generated yard waste and percentage of yard waste generation that is composted, and the comparable yard waste fractions found during the OCRRA waste composition study. This was done to determine whether an upward adjustment might be appropriate to reflect an annual average percentage of yard waste that is discarded.

Over 23,600 tons of yard waste composting was documented in the Planning Unit in 2008. If this were added to an assumed 1.2% fraction of yard waste in the discarded MSW stream, total yard waste generation would total about 25,936 tons, or about 10.3% of the total measured MSW stream (recycled plus discarded) attributed to the Planning Unit. If the total yard waste tonnage is divided by total estimated MSW generation in the Planning Unit in 2008 (as per Table 2-3), yard waste accounts for about 13 % of the total. This is only slightly more than the USEPA estimate of yard waste at 12.7% of total MSW generated in year 2007. Based on these comparisons, it was determined that no adjustment to the as-discarded yard waste fraction observed during the field study is appropriate.

Table 2-6
MSW Composition in Other Studies

Material Components	Capital Region Average Composition 2009 (%)	Onondaga County Waste Characterization Study 2005 - Exhibit 3-1 (%)	USEPA Products Discarded in the Municipal Waste Stream 2007: Tables 14, 17, & 23 (%)
PAPER	-	-	-
Newspaper	2.0%	3.4%	1.4%
Magazines	2.1%	1.6%	0.9%
Corrugated	4.5%	4.6%	4.9%
Gable Top Cartons & Drink Boxes	0.4%	0.2%	0.3%
Paper Board	4.2%	1.7%	4.0%
Books (including phone directories)	2.8%	0.6%	0.9%
Mixed Office Paper	4.1%	3.3%	4.7%
Other Paper	11.1%	12.8%	6.7%
SUBTOTALS	**31.3%**	**28.2%**	**23.8%**
PLASTICS			
Plastic Containers (PET) #1 Non-Bottle Bill	1.7%	1.1%	n/a
Plastic #1 (Bottle Bill Containers)	0.3%	0.3%	n/a
Plastic Containers (HDPE) #2	0.8%	2.1%	0.0%
Other Plastic Containers	2.5%	11.0%	2.6%
Film Plastic & Plastic Bags	4.4%	n/a	3.2%
Other Plastics	2.8%	4.6%	3.1%
SUBTOTALS	**12.5%**	**19.1%**	**8.9%**
FOOD WASTE	**18.7%**	**14.6%**	**18.2%**
TEXTILES & LEATHER	**5.7%**	**5.8%**	**4.7%**
RUBBER	**0.5%**	**1.0%**	**1.9%**
DISPOSABLE DIAPERS	**2.3%**	**2.4%**	**2.2%**
FERROUS METALS			
Ferrous Metal/Bimetal Cans	0.7%	1.0%	0.5%
Aerosol Cans	0.1%	n/a	0.0%
Other Ferrous Metal	1.9%	2.4%	0.0%
SUBTOTALS	**2.8%**	**3.5%**	**0.6%**
NON-FERROUS METALS			
Aluminum Cans (Non-Bottle Bill)	0.2%	0.1%	0.4%
Aluminum Cans (Bottle Bill)	0.2%	0.2%	0.0%
Other Non-Ferrous Metal	1.0%	0.8%	0.2%
SUBTOTALS	**1.3%**	**1.1%**	**0.7%**
ELECTRONICS	**2.7%**	**1.2%**	**1.5%**
GLASS			
Glass Bottles (Bottle Bill)	0.5%	0.3%	3.0%
Glass Bottle - Clear	1.8%	0.7%	n/a
Glass Bottle - Amber	0.9%	0.1%	n/a
Glass Bottle - Green	0.1%	0.2%	n/a
Flat Glass & Other Glass	1.4%	0.5%	1.9%
SUBTOTALS	**4.7%**	**1.8%**	**4.9%**
WOOD	**3.6%**	**3.2%**	**4.3%**
RUBBLE	**0.6%**	**0.6%**	**n/a**
YARD WASTE	**1.2%**	**1.1%**	**6.9%**
DIRT/FINES	**7.9%**	**4.3%**	**n/a**
HAZARDOUS WASTE			
Household Hazardous Waste (HHW)	0.0%	0.4%	n/a
Lead Acid Batteries	0.0%	0.0%	0.0%
Other Batteries	0.0%	0.1%	n/a
SUBTOTALS	0.1%	0.5%	0.0%
MEDICAL OR PHARMACEUTICAL WASTE	**0.2%**	**n/a**	**n/a**
MISCELLANEOUS	**3.8%**	**11.7%**	**21.4%**
TOTAL	**100%**	**100%**	**100%**

OCRRA conducted their MSW composition study during the last week in September 2005. This study indicated an as-discarded yard waste fraction of 1.1% of the MSW. While September is not in the peak season for yard waste generation, it is not in the low season either. Based on the results of this examination of the information summarized in the above paragraphs, CHA believes that the yard waste estimate resulting from the field study of MSW composition is reasonable and does not need to be adjusted.

Food waste is the largest single component of the discarded solid waste stream, totaling almost 19% by weight. When combined with the yard waste and other compostable elements of some of the other waste material categories, the compostable organic waste fraction may equal or exceed 30% of the MSW which is currently being discarded.

Other recyclable components that were observed in the waste stream and the characteristics of the residential curbside recyclables stream collected by the City of Albany are discussed in Section 4 – Materials Recovery Analysis.

2.2.2 Construction & Demolition Debris

The field study conducted in February and March of 2009 to characterize solid waste composition did not include C&D Debris. While there is limited local data specifically related to the composition of C&D debris, some useful information can be discerned by reviewing annual reports submitted by disposal facilities and recycling facilities which manage the C&D debris generated in the Planning Unit. In addition, some recent studies of the C&D waste stream conducted by the USEPA and NEWMOA may also provide some useful insight.

The USEPA has issued two reports regarding C&D generation in the United States. Released in 1998 and 2009, these reports present data for the years 1996 and 2003, respectively. Data for C&D generation is presented across six different categories, comparing residential and non-residential construction, as well as materials generated through construction, renovation, and demolition. The analysis includes only C&D materials from building-related construction; materials from road construction or other types of construction are not included in the study. The data in the report was compiled from statistical C&D data collected by the USEPA from states and other agencies. The USEPA also conducted additional investigations to obtain additional C&D data. These investigations included waste sampling at independent project sites. It is important to note that many states do not collect or report C&D data, so the data may not necessarily represent an accurate cross-sample of the nation due to differences in C&D streams among states. Construction styles and materials also vary

widely across the nation, leading to the potential for additional fluctuations from the national average for a specific geographic region. As indicated previously, the USEPA estimates a generation rate of 3.2 pounds per capita per day (pcd) for C&D waste. However, the material components of C&D waste and the composition of the C&D waste stream are not quantified within the scope of the report. The composition of the C&D waste stream was examined in other studies, including a 2005 report of the Northeast Waste Management Officials' Association (NEWMOA, 2005).

The NEWMOA report, released in 2005, studies the management of the C&D waste stream in 2002 within the NEWMOA states: Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. The report indicates the composition of the C&D waste stream for the following types of construction: residential construction, residential renovation, residential demolition, and non-residential demolition. Data for non-residential construction and non-residential renovation were not provided. The waste composition table includes the primary components of the C&D waste stream; it does not include interior finishing items such as carpet and furniture, or landclearing debris such as tree limbs, brush and stumps. The definitions of C&D waste differ by state, and include multiple methods for classifying and handling landclearing materials. The C&D waste stream composition table from the 2005 NEWMOA study is reproduced here as Table 2-7 below.

Wood makes up the largest fraction of C&D from each of these construction types, except non-residential demolition, where concrete is the largest component. Roofing is a significant component in residential renovations, as is dry wall which is also a large component of C&D generated by new residential construction.

Table 2-7
Construction and Demolition (C&D) Waste Stream Composition
(given as a percent of the waste stream)

Material	Residential Construction	Residential Renovation	Residential Demolition	Non-Residential Demolition
Wood	42	45	42	16
Drywall	27	21		
Brick	6			1
Roofing	6	28		1
Concrete			24	66
Plastics	2			
Metals	2	1	2	5
Miscellaneous**	15	6	32	11

** For construction projects, includes items such as dirt, sweepings, aggregate, and refuse.
Source: (NEWMOA, 2005)

It is important to note that, C&D definitions vary considerably in the NEWMOA states and this report does not include asphalt, brick and concrete, unless it is generated at a facility that processes other C&D materials. These components of the C&D stream are often subject to extensive reuse and recycling and are thought to represent a significant fraction of the total C&D waste stream. Likewise, petroleum contaminated soils can be classified as a C&D debris, as can clean soils resulting from excavations associated with construction, demolition and renovation. These components, which are also often reused or recycled are also not included in the results of the NEWMOA study.

As noted previously in Table 2-2, several C&D processing facilities in the region report recycling of significant quantities of asphalt and concrete. CHA estimates that in 2008, the 3 largest facilities in the region accounted for recycling of approximately 36,180 tons of asphalt from the Planning Unit. Over 8,496 tons of non-contaminated soils were reused as cover material at the Rapp Road Landfill in 2008. Another 49,806 tons of petroleum contaminated soil were also used as cover material in 2008 at the Rapp Road Landfill, but it is not known how much of this material originated in the Planning Unit. The asphalt and clean soil recycled in 2008 represent 35% and 8%, respectively, of the nearly 103,800 tons of C&D debris estimated to be generated in 2008 (see Table 2-3).

During that same period of time, only 7,120 tons of material classified as C&D debris was delivered for disposal at the Rapp Road Landfill and the Town of Bethlehem C&D landfill. Another 1,148 tons of C&D from the Planning Unit were reportedly delivered for disposal to the Town of Colonie Landfill. In total, these C&D disposal quantities represent only 8% of estimated C&D generation in the Planning Unit. Additional C&D material may be accounted for in a portion of the waste characterized at MSW at disposal sites, and there may also be significant quantities of unreported recycling and re-use.

2.2.3 Non-Hazardous Industrial Waste

As part of this SWMP, CHA prepared a survey regarding solid waste management practices to collect information from the large industrial manufacturers within the Planning Unit. Copies of the survey and detailed survey information can be found in the SWMP Appendix C: Industrial Waste Survey Results. Over 150 surveys were mailed, and CHA received 19 responses. Therefore, the composition of the non-hazardous industrial waste reported by the survey results will vary specifically due to the types of products manufactured by the survey respondents. As such, it may not reflect an average or representative cross section of non-hazardous industrial waste in the Planning Unit as a whole.

Nevertheless, it is worth noting the materials in a facility's waste stream, as reported by the survey respondents, included ferrous metals, office paper and corrugated cardboard, oil/oil filters, wooden pallets, food waste, electronics, mixed refuse (cafeteria and office), and other items which are specific to the type of manufacturing at the facility, such as wallboard and concrete components. The specific industrial waste composition is based upon products that the firms manufacture. Firms that were involved in the recycling business or did not manufacture a product were not included in the analysis. Information about material recycling that was reported by the survey respondents is presented later in Section 4.2.

It is also worth noting that some of the materials produced by the respondents to the Industrial Waste Survey, such as gypsum wallboard and concrete materials, might otherwise be considered to be C&D wastes. However, this waste material, which was almost always recycled into the product manufactured at the facility, is properly classified as Non-Hazardous Industrial Waste.

2.3 Future Solid Waste Quantity and Characteristics

2.3.1 Projected Solid Waste Quantities

For purposes of this Solid Waste Management Plan, projected future quantities of solid waste generation were made by multiplying the projected population of the Planning Unit times the waste generation rate for the applicable waste type. These projected quantities are shown in Table 2-8.

Table 2-8
Estimated Future Waste Generation in the Planning Unit

	Generation Rate (lb/person/day)	Generated Tonnage (TPY)			
		2010	2015	2020	2030
Projected Population		221,975	224,242	226,509	230,627
Waste Type					
Residential MSW	3.2	129,633	130,957	132,281	134,686
Commercial MSW	1.8	72,919	73,663	74,408	75,761
C&D Debris	3.0	121,531	122,773	124,014	126,268
Non-Hazardous Industrial	2.2	89,123	90,033	90,943	92,597
Estimated Total Waste Generation	10.6	413,200	417,400	421,600	429,300
Note: Estimated Total Waste Generation rounded to the nearest 100 tons.					

For commercial and residential MSW it is assumed that the currently estimated generation rate of 3.2 lb/person/day and 1.8 lb/person/day, respectively, will not change over the course of the planning period through the year 2030. This is a reasonable assumption considering historical trends presented in the most recent study of MSW published by the Environmental Protection Agency (USEPA,

2008). That study notes that MSW generation rates have been relatively stable between 2000 and 2007, and have grown by only 2.7% in the 17 years between 1990 and 2007.

The generation rate for C&D debris is estimated to average 3.0 lb/person/day throughout the planning period, as discussed previously in Section 2.1.2. This reflects anticipated average conditions over the course of the planning period, recognizing that this component of the waste stream may fluctuate more significantly than other components as a result of local economic condition.

The final waste component, non-hazardous industrial waste, is projected to continue to be generated at the currently estimated rate of 2.2 lb/person/day for the duration of the planning period.

It is worth noting that these estimates reflect total solid waste generation and thus reflect both the quantity of materials that are recovered for re-use and recycling, as well as the quantity that will remain in the waste stream that is collected and delivered for disposal. So for example, if an overall recycling rate of 45% were to be achieved in 2010, then out of the 413,200 tons of waste estimated to be generated, about 185,940 tons of this material would be recycled and only 227,260 tons of waste would be delivered for disposal.

Finally, the reader is cautioned that despite the use of best practices and reasonable assumptions in making these projections, there is no guarantee that the results will accurately reflect future conditions. Changes in any number of conditions can affect both the quantity and composition of solid waste in the future, and it is not possible to accurately predict these changes. Nevertheless, these projections represent a prudent and reasonable basis for preparing the Solid Waste Management Plan through the year 2030.

2.3.2 Future Solid Waste Composition

Estimates of existing composition of MSW delivered for disposal were presented previously in Section 2.2.1 and in Table 2-4, 2-5, and 2-6, based on the results of a field study of waste characterization conducted as part of this SWMP.

This data on the composition of as-disposed waste deliveries were combined with data on MSW recycling to estimate the total quantity of as-generated MSW in the Planning Unit for the year 2008. For purposes of this Solid Waste Management Plan, it is assumed that this overall composition of MSW will continue throughout the planning period. These estimates of future composition are presented in Table 2-9.

As noted previously, there is insufficient information with which to more fully characterize and quantify the composition of C&D debris and Non-hazardous Industrial waste for the Planning Unit.

Table 2-9 Estimated Composition of As-Generated MSW	
Material Components	**Average composition of as - generated MSW**
PAPER	
Newspaper	4.8%
Magazines	2.0%
Corrugated	7.8%
Gable Top Cartons & Drink Boxes	0.3%
Paper Board	3.5%
Books (including phone directories)	2.6%
Mixed Office Paper	5.2%
Other Paper	8.6%
SUBTOTALS	**34.8%**
PLASTICS	
Plastic Containers (PET)	1.7%
Plastic Containers (HDPE) #2	0.8%
Other Plastic Containers	2.0%
Film Plastic & Plastic Bags	3.5%
Other Plastics	2.2%
SUBTOTALS	**10.1%**
FOOD WASTE	**14.4%**
TEXTILES & LEATHER	**4.4%**
RUBBER	**0.5%**
DISPOSABLE DIAPERS	1.8%
FERROUS METALS	
Ferrous Metal/Bimetal Cans	0.8%
Aerosol Cans	0.1%
Other Ferrous Metal	2.2%
SUBTOTALS	**3.1%**
mixed metal	0.0%
NON-FERROUS METALS	
Aluminum Cans	0.3%
Other Non-Ferrous Metal	0.8%
SUBTOTALS	1.1%
ELECTRONICS	**2.1%**
GLASS	
Glass Bottles (Bottle Bill)	0.5%
Glass Bottle - Clear	1.8%
Glass Bottle - Amber	0.8%
Glass Bottle - Green	0.3%
Flat Glass & Other Glass	1.1%
SUBTOTALS	**4.5%**
WOOD	**3.0%**
RUBBLE	**0.5%**
YARD WASTE	**10.3%**
DIRT/FINES	**6.1%**
HAZARDOUS WASTE	
Household Hazardous Waste (HHW)	0.1%
Lead Acid Batteries	0.0%
Other Batteries	0.0%
SUBTOTALS	**0.1%**
MEDICAL OR PHARMACEUTICAL WASTE	**0.2%**
MISCELLANEOUS	**3.1%**
TOTAL	**100.0%**

SECTION 3.0

EXISTING SOLID WASTE MANAGEMENT PRACTICES

Contents

3.0 EXISTING SOLID WASTE MANAGEMENT PRACTICES 3-1
3.1 MSW Collection Practices 3-1
3.1.1 Residential MSW collection including MSW recycling 3-1
3.1.2 Commercial, Industrial And Institutional (CII) MSW 3-8
3.2 C&D Collection and Management Practices.....3-9
3.3 Non-Hazardous Waste Industrial Collection And Management Practices 3-10
3.4 Solid Waste Management Facility Inventory.....3-10

3.0 EXISTING SOLID WASTE MANAGEMENT PRACTICES

This section of the SWMP will present a discussion of existing solid waste management practices and facilities. Section 3.1 summarizes existing MSW collection practices from residential, commercial, industrial and institutional sources. A discussion of collection practices for C&D debris and non-hazardous industrial waste is presented in sections 3.2 and 3.3, respectively. Section 3.4 presents an inventory and discussion of solid waste management facilities in and around the Planning Unit.

3.1 MSW Collection Practices

In the Planning Unit, MSW is generally collected in one of three ways. It can be collected by the local municipality using its own forces, it can be collected by a private waste collection company, or it can be self hauled by the waste generator to an approved disposal or transfer site. The method of MSW collection varies by municipality and by the type of waste generator (e.g. residential, commercial, industrial or institutional).

Because the collection of designated recyclables is mandatory in the Planning Unit and is often carried out by the same party providing MSW collection service, the discussions presented below include both MSW collection and recyclable collection. A listing of designated recyclable materials for each municipality is also presented in the discussion.

It should be noted that most communities categorize multi-family housing containing 5 or more units as commercial for the purposes of MSW and recyclable collection programs. Therefore, communities that provide municipal pick-up for residential units do not include the larger multi-family units. These building owners must provide the appropriate opportunities for MSW disposal and recyclables and arrange for transport to permitted facilities.

3.1.1 Residential MSW collection including MSW recycling

Residential MSW and recyclables are collected by a number of methods including municipal pickup, individual contracts with private haulers, municipal contracts with private haulers, and self-transport to disposal facilities. Municipal pickup occurs in the cities of Albany, Watervliet, Rensselaer and the Village of Green Island. In the majority of municipalities, individuals contract with private disposal companies which provide curbside pickup of both MSW and recyclables. New Scotland and Voorheesville contract with a private hauler to provide collection services to residential units. Collection and disposal practices are outlined in Table 3-1 and are summarized in the paragraphs below. Some municipalities which operate transfer stations and allow residents to “drop-off” MSW and recyclables are also shown in the Table. The Village of Altamont does not operate its own transfer station but utilizes the transfer station in the Town of Guilderland.

More information about residential MSW recycling is presented in Section 4 of this SWMP.

Table 3-1
Residential Solid Waste Collection Practices

	Collection Provider Type-MSW			Collection Method-MSW		Collection Provider Type-Recyclables			Collection Method-Recyclables	
	Municipal Collection	Contract (3)	Private (4)	Curbside	Dropoff (5)	Municipal	Municipal Contract (3)	Private (4)	Curbside	Dropoff (5)
Albany (1)	●		●	●		●		●	●	
Watervliet(1)	●			●		●			●	
Rensselaer(2)	●			●		●			●	
Berne			●	●	●			●	●	●
Bethlehem			●	●	●			●	●	●
East Greenbush			●	●	●			●	●	●
Knox					●					●
Guilderland			●	●	●			●	●	●
Altamont			●	●				●	●	
Rensselaerville					●					●
New Scotland		●		●			●		●	
Voorheesville		●		●			●		●	●
Westerlo			●	●	●			●	●	●
Green Island	●			●		●			●	

Notes: (1) Residential is defined as 4 units or less.
(2) Residential is defined as 6 units or less
(3) Municipality contracts with private hauler to service residential units.
(4) Residents hire private company to transport MSW and/or recyclables.
(5) Residents self-transport to transfer station.

Albany-

The City of Albany Department of General Services (DGS) provides weekly curbside collection of solid waste and designated recyclables to residents living in single family units, and multi-family buildings with up to four units on a weekly basis. All other individuals not covered under these guidelines are required to contract private collection services to pickup waste.

Recyclables accepted by the DGS include, glass, plastics #1 and #2, metal, and mixed paper. Mixed paper includes newspaper, magazines, and phone books. The DGS also accepts cardboard bundled in lengths no larger than 3’ x 2’ and construction debris which must be neatly boxed or bundled for pickup. Curbside pickup for large items such as appliances/white goods, tires and metals can be arranged. The DGS also schedules Neighborhood Spring Cleanup days each year. Residents may place extra non hazardous waste items out curbside for pickup at that time.

Leaf collection is also provided for city residents by the DGS. Leaf pickup and yard waste is collected on the residents regularly scheduled trash collection day and is transported to the City's composting facility. Collection starts on April first and runs through October or early November. Finished compost is made available to residents.

The City offers household hazardous waste (HHW) collection drop off eleven times a year at the City of Albany Rapp Road Landfill to residents. Materials collected include paint, batteries, antifreeze, asbestos, herbicides, and various household cleaning products. In addition, electronic waste, including televisions, computers, and stereos, are collected. The program is free to City residents, with the exception of computer units. Small businesses which produce less than 32 gallons a month of hazardous waste may also participate in the collection program for a small fee.

Altamont-

All waste management services for the Village of Altamont are handled by the Town of Guilderland. A discussion of Guilderland's solid waste management strategies is included later in this section.

Berne-

Residents and businesses may hire a private hauler for MSW and recyclable pick up or self transport their refuse and recyclables to the Berne transfer station. The majority of residents self-transport MSW and recyclables to the Berne transfer station. Residents must have a permit to use the transfer station.

The transfer station accepts newspaper, glass, plastic, tin cans, cardboard, and office paper. The station also accepts four tires per year, per permit. Beginning April 1, 2008 the Town began accepting all electronic items at the transfer station at no cost to residents. These items include computers, monitors, terminals, cathode ray tubes, laptops, printers, fax machines, typewriters, televisions and photocopiers. Appliances are accepted at a cost of $20.00 per item. Items such as furniture and wood are accepted at the transfer station but not recycled. The town encourages the re-use of scrap wood on their website.

Berne offers an annual one day "chip-up" program, and an annual Christmas tree disposal day. Tree limbs and brush are accepted brought to the Berne transfer station are turned into mulch, and provided back to the community at no cost. Grass clippings and leaves are not accepted for composting in Berne. Given the rural nature of the Town, most of the yard waste generated in Berne is managed by residents on their own property.

The Town of Berne provides a coupon for its residents to participate in the Town of Bethlehem HHW collection.

Bethlehem-

Bethlehem residents may hire a private company licensed by the Town to provide MSW and recyclable removal or self transport MSW and recyclables to the Town's transfer station located on Rupert Road. The Town operates a C&D landfill scheduled to close in 2009 and a MSW transfer station and recycling facility at this location.

Residents are mandated to recycle newspaper, corrugated cardboard, kraft paper bags (and all non-shiny paper bags), magazines and catalogs, home, office and school paper, glass bottles and jars, plastic bottles, metal cans, and aluminum trays and foil wrap. Private haulers providing solid waste collection services are also required to provide for the collection of designated recyclables.

In addition, Bethlehem offers many other opportunities to recycle voluntarily including soft cover books, telephone books and paperboard boxes (single layer cardboard, cereal, cracker and shoe boxes). A drop box is available at the Town Clerk's Office for used eyeglasses and sunglasses, and hearing aids collected by the local Lions Club. U.S. Flags, license plates, six-pack rings, non-alkaline household batteries and cell phones can also be dropped at Town Hall or at the Highway Garage all year

The Town provides curbside pick up of yard waste throughout the year as well as spring and fall clean-up days. Collected materials are taken to the Composting Facility in Selkirk. The compost facility closes during the winter months.

The Town offers a HHW collection day annually. Materials collected include hazardous waste, and computers and their components. The Town also provides two drop off collection days in the fall for all electronics at the Town Highway Garage, located at 74 Elm Avenue in East Selkirk. Residents may also participate in the once a year WNYT Earth Day Electronic and Air Conditioner Collection day, held at Taft Furniture in Albany every April.

East Greenbush

Residents of East Greenbush may contract with a private hauler, or personally transport waste to the Town transfer station. Recyclables are collected curbside by the private haulers, or dropped off at the transfer station. Newspapers, corrugated cardboard, magazines, telephone books, glass, plastic, mixed metals, household batteries and yard waste are all accepted at the transfer station as part of the permit system.

Other items accepted at the transfer station requiring an additional fee include: computer equipment, appliances, vehicle batteries, furniture, tires, bikes and yard toys. The transfer station also accepts residential C&D debris on a fee basis which must fit in a 30 gallon container. East Greenbush has plans to schedule a HHW collection day in 2009.

Green Island-

The Village of Green Island DPW provides residential units weekly municipal curbside pick-up. Businesses and large apartment complexes are required to contract private haulers. Newspapers, plastic and glass are collected curbside for recycling.

The Village also collects leaf waste, grass clippings, tree and brush debris curbside once a week. On Saturdays during the month of May, the DPW is open for residents to bring in one truckload of debris related to spring cleanup for disposal. All solid waste, including electronics and other household waste, and yard waste is accepted on these spring cleanup days. The Village of Green Island does not presently provide or participate in a HHW day. Residents can participate in the once a year WNYT Earth Day Electronic and Air Conditioner Collection day, held at Taft Furniture in Albany every April.

Guilderland-

Individual residents in Guilderland must contract with a private hauler, or personally transport waste to the Town of Guilderland Transfer Station. Recyclables are collected curbside by the private haulers, or dropped off at the transfer station. Newspapers, magazines, junk mail, catalogs and office paper, tin, glass, plastic and cardboard of all kinds are accepted. The Town also collects C&D debris. When possible, asphalt is recycled and reused. The Guilderland Highway Department collects yard waste, including leaves, grass clippings and trees and brush curbside year-round. This material is transported to the town transfer station where it is turned into mulch for free distribution to town residence.

The Town offers a HHW day twice a year to its residents. During the HHW day a wide variety of waste is accepted including antifreeze, solid pesticides, fluorescent bulbs, mercury waste, household batteries, dry cell batteries, lead acid batteries, oil, liquid pesticides, oil based paint, and asbestos. Residents may also participate in the once a year WNYT Earth Day Electronic and Air Conditioner Collection day, held at Taft Furniture in Albany every April.

Knox-

Residents and businesses in Knox may contract with a private hauler or self transport their solid waste to the Knox Transfer Station and Recycling Center.

All recyclable material is delivered to the Recycling Center/ Transfer Station and is placed in separate bins. Newspapers, magazines, junk mail, and catalogues, plastic, cans, corrugated cardboard, metal, and tires are accepted. Construction and demolition debris is not accepted at the Transfer Station, and the individual generators are responsible for making arrangements for the disposal of C&D.

Currently, all yard waste that is collected at their transfer station is burned (typically trees/brush). The Town would like to begin a composting program in the near future to provide mulch for use in town parks and other areas throughout the town. The Town does not currently participate in HHW program but plans to implement an electronics recycling program in the future.

New Scotland-

The Town of New Scotland contracts with private hauling company to provide curbside collection of residential solid waste and recyclables. Waste and recyclable materials are collected curbside once a week. The hauler is responsible for transporting the materials to the appropriate processing facilities. New Scotland also operates a drop-off recycling facility for residents.

Materials collected for recycling include newspaper, magazines, phonebooks, catalogues, junk mail, cardboard, glass, cans, and tires. Residents may also transport C&D debris to the Town's recycling drop-off center.

The Town Highway Garage collects leaves, grass clippings, and trees and brush during specific periods in the fall and spring. The Town reports that it transports this material composting facilities in Bethlehem and Guilderland. Residents can also transport their tree limbs and brush to the Highway Garage where it is chipped and made available to residents free of charge.

New Scotland participates in the Town of Bethlehem's HHW collection program. Residents may also participate in the once a year WNYT Earth Day Electronic and Air Conditioner Collection day, held at Taft Furniture in Albany every April.

Rensselaer-

The City of Rensselaer Department of Public Works provides municipal curb side pick up of MSW and recyclables to residential units. The City also collects yard waste and delivers it to the City of Albany's Yard Waste Compost Facility.

Rensselaerville-

Residents may hire a private hauler or self transport their solid waste to the Town transfer station. Tin cans, glass, plastic, cardboard and paper are accepted at the transfer station comingled.

The Town has no formal yard waste program. Given the rural nature of the Town, most of the yard waste generated in Rensselaerville is managed by residents on their own property.

The Town transfer station accepts HHW once a year during the first week in May. The station will accept waste from both residences and businesses. Items accepted include: paint, chemicals and other household items. Electronic waste is currently not accepted at the transfer station.

Voorheesville-

The Village contracts with a private waste hauler to collect residential solid waste and recyclables within the Village. Solid waste and recyclables are collected curbside weekly. Residents are required to recycle newspapers, magazines, junk mail, cardboard, office paper, plastic, tin, glass and aluminum foil. Metal, tires, white goods, batteries, oil and textiles are not picked up curbside, but can be dropped off at the Town of New Scotland transfer station. All recyclables may be transported to the Town of New Scotland drop off recycling facility.

The Village provides weekly pick up of leaf waste, grass clippings, tree and shrub debris that is placed curbside in bags, bundled or piled year-round. Material is transported to several different area businesses for use in composting and tree limbs and brush are chipped for local use.

Voorheesville participates in the Town of Bethlehem's HHW collection program, as described above. Residents may also participate in the once a year WNYT Earth Day Electronic and Air Conditioner Collection day, held at Taft Furniture in Albany every April.

Watervliet-

The City of Watervliet's Department of Refuse and Recycling provides weekly municipal curbside pick up of MSW and recyclables to all residential units. The Department also picks up yard waste and grass clippings weekly between April and November each year, and delivers this material to the City of Albany's Yard Waste Compost Facility. The City also designates a "Bulk Item Pick Up Week" every fall for residents to dispose of larger bulk items.

The City has initiated single stream recycling and as a result has nearly doubled the collection of recyclables to approximately 11 tons weekly. The stream includes paper, glass, and plastic.

Westerlo-

Residents in the Town of Westerlo may contract with private haulers or self transport their solid waste and recyclables to the Town's transfer station. The transfer station accepts plastics, glass, aluminum, tin cans and wax cartons, newspapers, magazines, junk mail, corrugated cardboard, office paper, tires, metal, white goods, textiles, and oil. The station operates three days a week.

The Town does not currently have a yard waste composting program. Given the rural nature of the Town, most of the yard waste generated in Westerlo is managed by residents on their own property. Currently, any yard waste collected at the transfer station is burned (typically trees/brush).

The Town participates in the Bethlehem's annual HHW program. Currently the Town does not participate in an electronic waste program.

3.1.2 Commercial, Industrial and Institutional (CII) MSW

As a result of the completion of the SWMP Modification and its acceptance by members of the members of the Capital Region Solid Waste Management Partnership, all members are required to have laws in place that require source separation from all sectors including commercial waste in accordance with GML 120aa. Commercial waste haulers service not only commercial, industrial and institutional waste generators, but also residential waste generators not served by municipally sponsored programs.

The success of these ordinances will rely on several items:

- stepped up enforcement and oversight in the form of waste audits at City of Albany's solid waste facilities;
- education to bring non-compliant waste haulers and generators into compliance;
- stepped-up enforcement within the Planning Unit at the municipalities' transfer stations or other solid waste collection facilities.

These items will require action by the PURC in concert with the local recycling coordinators, all with the support of their local municipal governments.

With few exceptions, CII collection including recyclables is provided on the basis of contracts between the parties involved such as property owners and lessees'. Collection frequency is arranged with private waste collection companies based on the needs of a particular business (i.e. the quantity of refuse and recyclables generated). Effective January 2009, the City of Albany established new permit conditions for all commercial haulers who utilize the Rapp Road Landfill. Commercial haulers are now required to provide their customers with both refuse and recyclable removal and to report program results to the City annually. As a follow up the City will conduct random commercial waste inspections at the Landfill to determine the presence of excessive quantities of recyclables and will follow up with enforcement and education as necessary. In addition, all commercial property owners in the City will be notified by letter, reminding them of source separation requirements.

During both the preparation of this New SWMP and the SWMP Modification, surveys of major commercial waste generators in the Planning Unit were conducted. Several large employers responded providing information on collection and removal practices. CHA was able to collect additional data regarding collection practices and recycling quantities during the preparation of this document for commercial, industrial and institutional generators.

Large CII waste generators typically have one or more compactor units, roll-offs, or other collection containers to accumulate solid waste and recyclables for collection. Collection frequency will vary depending on the needs of the waste generator. Several medical and healthcare facilities responding

indicated that waste and recyclables are stored on site in designated areas for twice weekly removal. The NYS Office of General Services (OGS) is responsible for the management of state office buildings and indicated that the office buildings use the bin system at each work station for the separation of mixed office paper from general refuse. In addition each floor includes containers for the collection of mixed bottles and cans. This material is moved to the loading dock of each building while awaiting removal. The OGS has also recently undertaken a program to collect food waste and other source separated organic waste from cafeteria and restaurants in its facilities for composting.

Information on MSW generation from CII sources was discussed previously in Section 2.1.1.2. More information about material recovery and recycling of CII MSW is presented in Section 4 of this SWMP.

3.2 C&D Collection and Management Practices

C&D Debris is defined by the DEC as uncontaminated solid waste resulting from the construction, remodeling, repair and demolition of utilities, structures and roads; and uncontaminated solid waste resulting from land clearing. (Refer to http://www.dec.ny.gov/chemical/23686.html for a detailed definition and description of both included and excluded materials.)

The collection of C&D is different than the collection of other types of solid waste in that it is project oriented rather that operations oriented. As such, C&D removal and disposal is normally the responsibility of the generator. In the case of a construction project the site owner or general contractor typically hires a company to provide a container for the on site storage and removal from the site and transport to an appropriate facility such as a transfer station, C&D landfill or C&D processing facility. The DEC regulates processing and disposal facilities. C&D can also be disposed of at an MSW LF such as Rapp Road, but tipping fees are generally more expensive than C&D landfills.

Collection typically occurs at the construction and demolition sites by the placement of open top containers, referred to as roll-offs. They are available in a variety of sizes, up to 40 CY or more. Processing and disposal will depend on available options locally. C&D can be processed to have recyclable material removed. Typical material recovered from C&D includes brick, concrete, asphalt (this can often be source separated at the construction site), iron, steel and other metals. Sometimes wood and brush can be recovered from land clearing operations.

Some C&D material are recovered for use as alternative landfill cover material. This can include soils, contaminated soils, and process screenings (fine materials). Rapp Road LF has used all of these, but at this time the DEC does not consider this material to be recycled. Additionally, use of process screening for alternate cover has been a problem at many landfills because of the presence of

gypsum which often turns to hydrogen sulfide when it gets wet in the landfill. Some C&D processing facilities now recover this component, for example, Taylor Recycling in Montgomery NY.

Based upon information collected for the 2008 Planning Unit Recycling Report, 47,051 tons on C&D debris from the Planning Unit was recycled and 8,268 tons of C&D debris was disposed of at landfills. More information about material recovery and recycling of C&D debris is presented in Section 4.2 of this SWMP.

3.3 Non-Hazardous Waste Industrial Collection And Management Practices

As noted previously in section 2.1.3 as part of this SWMP, a survey was prepared and distributed to major manufacturing employers in the Planning Unit. The survey included questions regarding current solid waste management and recycling practices, as well as any special problems or issues faced with either solid waste management or recycling. A copy of the Industrial Waste Survey Form and Cover Letter along with a more detailed description of the process and results are presented in Appendix C – Industrial Waste Survey and Results.

Based upon the results of this survey, it appears that many of the non-hazardous industrial waste streams are being recovered for re-use and recycling. More information about material recovery and recycling of non-hazardous industrial waste is presented in Section 4.2.2 of this SWMP. Most of the post-recyclable waste stream sent for disposal from these facilities is classified as MSW.

3.4 Solid Waste Management Facility Inventory

There are variety of solid waste management facilities operating in the Planning Unit including the Rapp Road Landfill, transfer stations, C&D facilities, composting facilities and recyclable processing facilities. This network of facilities listed in the Tables 3-3 and 3-4 below represents a combination of municipally owned and privately owned facilities. The locations of these facilities are depicted in Figure 3-1 and Figure 3-2, respectively.

The primary municipal solid waste disposal facility in the Planning Unit is the Rapp Road Landfill. Many private haulers servicing clients within the Planning Unit haul solid waste to this site. Under its currently approved permit, the Rapp Road Landfill is permitted to accept up to 1050 tons per day of non-hazardous solid waste, based on a 30 day rolling average.

Waste acceptance at the Rapp Road Landfill for the years 2003 through 2008 and summarized in Table 3-2. Over that period of time, the landfill has accepted an average of about 246,805 tons per year, over 96% of which is MSW. With the approval of the Part 360 permit for the Eastern Expansion, this facility can continue to operate through the year 2016, based on a waste acceptance rate of 277,200 tons per year (TPY). The NYSDEC permits to construct and operate the Eastern

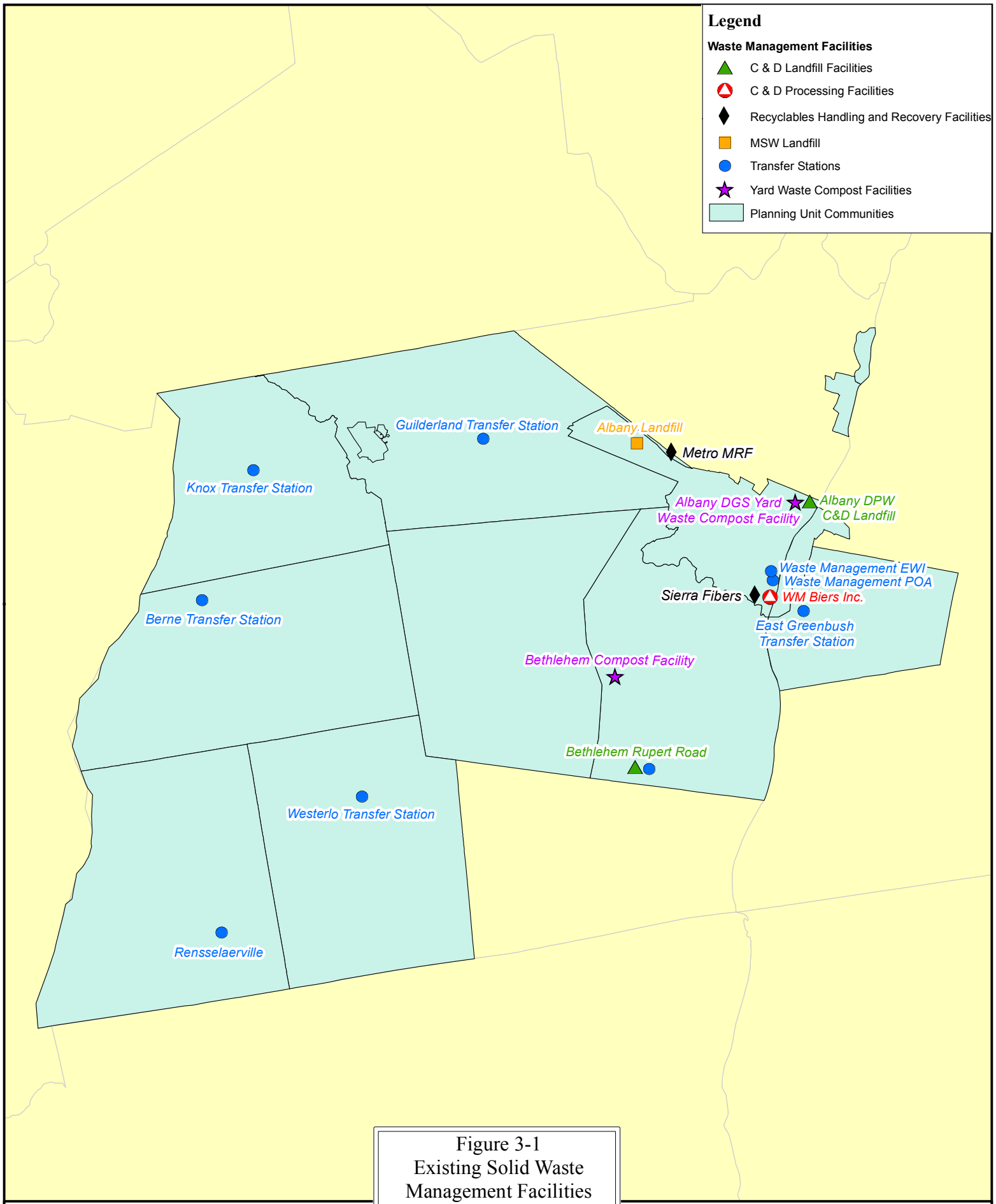


Figure 3-1
Existing Solid Waste
Management Facilities
in Planning Unit

N
W E
S

Capital Region Solid Waste Management Plan

Drawing Copyright © 2009

CHA
III Winners Circle, P.O. Box 5269 • Albany, NY 12205-0269
Main: (518)453-4500 • www.chacompanies.com

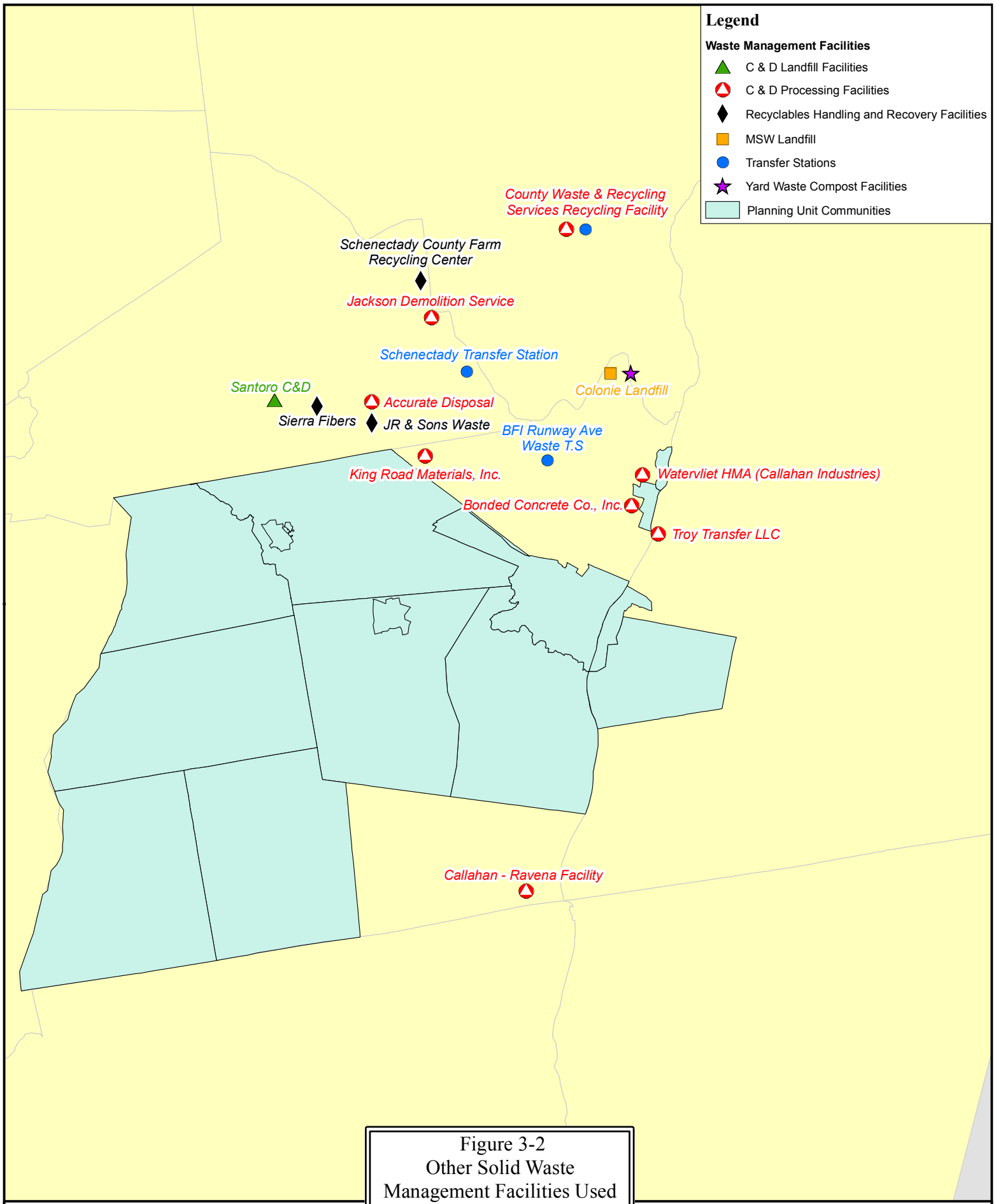


Figure 3-2
Other Solid Waste Management Facilities Used by Planning Unit Communities

N
W E
S

Capital Region Solid Waste Management Plan

Drawing Copyright © 2009

CHA
III Winners Circle, P.O. Box 5269 • Albany, NY 12205-0269
Main: (518)453-4500 • www.chacompanies.com

Expansion were issued on June 25, 2009, with an expiration date of June 25, 2019. After the capacity of the Eastern Expansion is exhausted, there will be no future active landfill operations at the Rapp Road site, and other solid waste management or disposal alternatives will need to be provided. Meeting this anticipated future need for reliable and reasonably priced solid waste management capacity through the year 2030 is one of the two primary goals of this new SWMP. Achievement of the other primary goal of the new SWMP, to minimize the amount of solid waste requiring land disposal, may help to extend the useful life of the Eastern Expansion beyond 2016.

Table 3-2
Waste Acceptance
Disposal at Rapp Road Landfill

Year	MSW (tons)	C&D (tons)	Sludge (tons)	Total (tons)
2008	232,919	5,247	1,619	239,785
2007	246,119	5,595	1,586	253,300
2006	256,918	8,090	3,092	268,101
2005	226,802	6,107	3,248	236,157
2004	221,351	8,323	2,956	232,630
2003	241,323	5,368	4,169	250,860
Average/year	**237,572**	**6,455**	**2,778**	**246,805**

The City of Albany DGS also operates a C&D landfill on Connors Boulevard and is limited to accept uncontaminated concrete, asphalt pavement, brick, soil or stone generated by DGS. This facility operates under a Part 360 permit extended under the provisions of the State Administrative Procedures Act (SAPA). The facility is currently accepting an average of 700 cubic yards per month, but has limited future capacity. With only 11,000 CY of capacity remaining as of May 2009, it could reach capacity as early as August 2010.

C&D landfill operations are governed by separate DEC regulations and are subject to separate regulations/permits and reporting requirements. The Town of Bethlehem currently operates a registered C&D landfill at its Rupert Road site, primarily for use by Town departments and residents. The Town has indicated that they plan to cease operations of the C&D landfill before the end of 2009. There are no other C&D landfills within the Planning Unit.

Transfer stations are regulated or registered by the DEC depending on the quantity of material they handle annually. In 2009 there were two regulated private transfer stations within the Planning Unit (See Table 3-3), both of which are owned and operated by Waste Management of NY.

Table 3-3 Existing Solid Waste Management Facilities in the Planning Unit				
Facility Name	**Location**	**NYSDEC Number**	**Expected Remaining Life**	**Permit Expiration Date**
MSW Landfills				
Albany Rapp Road	Albany	01S02	Through 2016	6/25/2019
C&D Landfills				
Albany DPW C&D LF	Albany	01D02	August 2010	SAPA
Bethlehem Rupert Road	Bethlehem	01D22	Close in 2009	NA
Regulated Transfer Stations				
Waste Management POA	Albany	01T67	NA	9/30/2011
Waste Management EWI	Albany	01T70	NA	5/6/2018
Registered Transfer Stations				
Bethlehem Transfer Station	Bethlehem	01D22	NA	NA
Berne	Berne	01R20	NA	NA
East Greenbush	East Greenbush		NA	NA
Guilderland Transfer Station	Guilderland	01R30	NA	NA
Knox Transfer Station	Knox	01R32	NA	NA
Rensselaerville Transfer Station	Rensselaerville	01R36	NA	NA
Westerlo Transfer Station	Westerlo	01R38	NA	NA
Recyclables Handling and Recovery Facilities				
Sierra Fibers	Albany	01M18	NA	
Metro MRF	Albany	01M21	NA	
Registered C&D Processing Facilities				
WM.Biers, Inc.	Albany	01W10	NA	6/4/2011
Regulated Composting Facilities				
Connors Road Facility	Albany	01C01	NA	6/27/2017
Bethlehem Facility	Bethlehem		NA	2/8/2012

One of these transfer stations is located at 100 Boat Street in Albany and is permitted to accept up to 749 tons per day of non-putrescible waste, recyclable commercial waste, dry commercial waste and C&D debris. This facility's current permit was issued on September 29, 2006 and expires on September 30, 2011. According to its annual report filed with the NYSDEC, this facility accepted a total of 88,755 tons of solid waste in 2008, or approximately 290 tons per day. Most of this waste (83,045 tons) was transferred to the High Acres Landfill in Monroe County for disposal, while 6,488 tons were transferred to the Wheelabrator waste-to-energy facility in Hudson Falls, NY. Over 85,000 tons of solid waste delivered to this facility in 2008, nearly 96%, originated in Albany County. The facility's annual report does not specify the municipality of origin for this local waste. Since the Planning Unit communities represent about 65% of total population of Albany County, it is reasonable to assume that 65% of those waste deliveries originating in Albany County come from Planning Unit communities. Another 781 tons originated in Rensselaer County. The facility also reported that a total of 7,851 tons of material were recycled in 2008.

The other transfer station owned by Waste Management of NY is located at 21 Gansevoort Street in Albany and is permitted to accept up to 250 tons per day of non-putrscible solid waste. This facility's current permit was issued on April 4, 2008 and expires on May 6, 2018. According to its annual report filed with the NYSDEC, this facility only accepted 2.4 tons of solid waste in 2008.
Seven smaller municipal transfer stations are registered with the DEC and provide for waste transfer and recycling services primarily to residents and businesses of the specific municipalities.

The facilities are located in Bethlehem, Berne, East Greenbush, Guilderland, Knox, Rensselaerville, and Westerlo. Both regulated and registered facilities must meet annual DEC reporting requirements. Unlike landfill disposal facilities, these transfer and recycling facilities do not have finite lifetimes and can continue to operate as long as its owner can operate and maintain the facility in accordance with state and local permit requirements.

There are two registered recycling handling and recovery facilities within the Planning Unit. Sierra Fibers operates one of these facilities, located at 877 South Pearl Street in Albany. According to its Annual Report submitted to the NYSDEC, in 2008 the facility accepted over 51,000 tons of recyclable materials from municipal sources of the City of Albany, the Town of Colonie, and Saratoga County, and from County Waste and other private haulers in the Planning Unit and throughout the Capital District. This facility primarily recovers recyclable paper, with nearly 45,750 tons of recyclable paper grades recovered in 2008. Nearly 4,400 tons of commingled recyclable containers that were delivered and recovered at this facility in 2008, and the facility reported about 402 tons of residue delivered for disposal at the Adirondack Resource Recovery Facility in Hudson Falls, NY.

Metro Waste Paper Recovery U.S. Inc operates a recyclables handling and recovery facility at 71 Fuller Road in Albany. According to its Annual Report submitted to the NYSDEC, in 2008 the facility accepted over 21,400 tons of recyclable materials from private sources in Albany, Schenectady, Saratoga, and Orange counties. This facility primarily recovers recyclable paper, with over 20,300 tons of recyclable paper grades recovered in 2008. Nearly 960 tons of other recyclables including metal and plastic containers, mixed plastics, plastic film, PVC, commingled recyclable containers and wooden pallets were delivered to and recovered at this facility in 2008. The facility reported about 155 tons of residue delivered for disposal at an unspecified location.

W.M. Biers, Inc. operates a C&D Debris Processing facility at 100 Port Road in Albany, NY. According to its Annual Report submitted to the NYSDEC, in 2007 the facility accepted 5,220 tons of concrete for recycling from Albany County. This facility's current permit reportedly expires on June 4, 2011.

The City of Albany DGS operates a yard waste compost facility located at One Connors Boulevard, in Albany, New York. This facility's current permit became effective on June 28, 2007 and expires on June 27, 2017. This facility accepts yard waste from the cities of Albany, Rensselaer, Watervliet, and the Village of Green Island. Based on data compiled for the 2008 Recycling Report for the Planning Unit, this facility accepted about 5,625 tons of yard waste deliveries in that year. Of this amount, approximately 4,700 tons was collected and delivered by the DGS, while the remaining tonnage was delivered by the other local facility users.

The Town of Bethlehem operates a yard waste compost facility located at 1244 Feura Bush Road in Selkirk, New York. This facility's current permit became effective on February 8, 2002 and expires on February 8, 2012. This facility is permitted to accept only brush leaves, grass and other yard waste from the Town of Bethlehem. The maximum annual quantities of yard waste permitted for acceptance are 41,000 cubic yards of leaves and grass clippings and 40,000 cubic yards of brush and trees. Based on data compiled for the 2008 Recycling Report for the Planning Unit, this facility accepted over 14,825 tons of yard waste deliveries in that year.

A large part of the MSW management infrastructure relies on private haulers, and, as a result not all MSW and recyclables are disposed of within the Planning Unit. Private haulers are responsible to transport solid waste and recyclables to approved disposal facilities and are responsible to obtain any necessary use permits from these facilities. The economics and logistics of disposal location is generally left up to the haulers. Table 3-4 identifies disposal facilities beyond Planning Unit boundaries that are believed to be used by Planning Unit communities or by haulers that service communities within the Planning Unit.

Based upon the 2008 annual report filed with the NYSDEC, it is estimated that the Town of Colonie Landfill accepted 9,214 tons on MSW, 727 tons of non-hazardous industrial waste, and 1,148 tons of C&D debris from the Planning Unit. This facility has an annual waste acceptance limit of 170,500 tons per year, and at this rate of waste acceptance the facility has approximately 20 years of life remaining. The Santaro C&D landfill has limited disposal capacity. According to its 2008 annual report filed with the NYSDEC, the facility has only 9,350 cubic yards of airspace remaining, with a project life of 3 years and 7 months. That report also noted the facility accepted 500 cubic yards of clean wood debris in 2008, but it did not specify the origin of this material, so it's unknown whether any of it came from the Planning Unit.

Table 3-4 Other Solid Waste Management Facilities used by Planning Unit Communities		
Facility Name	**Location**	**NYSDEC Number**
MSW Landfills		
Colonie Landfill	Colonie	01526
C&D Landfills		
Santoro C&D	Schenectady	47D42
Regulated Transfer Stations		
BFI Runway Avenue	Latham	01T33
Schenectady Transfer Station	Schenectady	47T01
County Waste & Recycling Services	Clifton Park	46D05
Recyclables Handling and Recovery Facilities		
Sierra Processing	Rotterdam	47R02
JR and Sons Waste	Schenectady	47R32
Schenectady County Farm Recycling Center	Glenville	47M04
Permitted Composting Facilities		
Town of Colonie	Colonie	
Regulated C&D Processing Facilities		
Kings Road Materials Inc.	Colonie	01W02
Watervliet HMA (Callahan Industries)	Colonie	01W11
Callahan Ravena Facility	Coeymans	01W50
Troy Transfer LLC	Troy	47W01
Accurate Disposal	Schenectady	47W02
County Waste & Recycling Services Recycling Facility	Clifton Park	46W05
Registered C& D Facilities		
Bonded Concrete	Latham	01W04
Jackson Demolition Service	Schenectady	47W01

Table 3-5 presents a summary of estimated waste disposal from the Planning Unit in the years 2007 and 2008. It includes waste disposed of at both the Rapp Road and Bethlehem C&D Landfill, and makes allowance for waste that is delivered to Rapp Road Landfill from the Schenectady Transfer Station and from other local sources outside of the Planning Unit. The table also accounts for waste that is generated in the Planning Unit, but disposed of outside of the Planning Unit, either at the Town of Colonie Landfill or transferred through the WMI Boat Street transfer Station.

Table 3-5
Estimated Waste Disposal from the Planning Unit

	Tons	
	2007	**2008**
Reported Waste Disposal in Planning Unit		
Rapp Road Landfill[1]	253,300	239,785
Bethlehem C&D Landfill	1,959	1,873
Waste Originating Outside the Planning Unit disposed at Rapp Road Landfill		
Schenectady Transfer Station[2]	(95,502)	(52,252)
Other waste originating outside the Planning Unit [3]	(16,436)	(53,664)
Waste Exported from Planning Unit		
WMI Boat Street Transfer Station	66,714	55,869
Town of Colonie Landfill	7,100	11,116
Net Waste Disposal from the Planning Unit	**217,135**	**202,727**

Notes:
[1] not including PCS or ADCM tonnage
[2] This is the reported tonnage delivered to the Rapp Road Landfill from the Schenectady Transfer Station. Some of this waste may be generated in the Planning Unit, but this amount has not been determined.
3 This is an estimated value assuming 45% of MSW and 21% of C&D disposed at Rapp Rd. Landfill originates from sources outside of the planning unit. This value represents that calculated total minus the reported waste delivery from the Schenectady Transfer Station.

SECTION 4.0

MATERIALS RECOVERY ANALYSIS

Contents

4.0 MATERIALS RECOVERY ANALYSIS 4-1
4.1 MSW Recovery 4-1
4.1.1 Residential MSW Recycling 4-2
4.1.2 Commercial Industrial and Institutional MSW Recycling 4-5
4.1.3 Other MSW Recycling 4-7
4.2 Other Solid Waste Recovery 4-8
4.2.1 C&D Recovery 4-8
4.2.2 Non-Hazardous Industrial Waste Recovery 4-10
4.3 Potentially Recoverable Recyclable Materials 4-11
4.4 Markets for Recovered Recyclables 4-23
4.4.1 Existing Recoverable Material Markets 4-23
4.4.2 Market Development Restrictions 4-24
4.5 Recycling and Diversion Rate Goals 4-25

4.0 MATERIALS RECOVERY ANALYSIS

This section presents information and discussion about material recovery and recycling efforts currently underway in the planning unit, future options for additional material recovery, current and potential markets for recyclable materials. This information and analysis is presented in accordance with the requirements for a Comprehensive Recycling Analysis (CRA) set forth at 6 NYCRR 360-1.9(f). Sections 5 and 6 of this SWMP present other information and analysis required for a CRA.

Total estimated material recovery and recycling for the Planning Unit in 2008 is presented in Table 4-1, below. Using the total of 202,727 tons of waste disposal from the Planning Unit in 2008 (as presented in Table 3-5), the total recyclable material diversion rate for 2008 is 37%.

Table 4-1
Estimated Total Material Recovery and Recycling in 2008

Recycled Material Waste Stream	2008 quantity (tons)
Recycled MSW	58,033
Recycled C&D	47,051
Recycled Industrial Waste	13,561
Total Recycled Material	**118,645**

The details on the various components of the estimate are presented in tables and narratives later in this section of the SWMP. It is worth noting that the estimates do not include the recycling of returned beverage containers, used oil, tires or lead acid batteries recovered and recycled by retail automotive facilities, or any reduction in yard and food waste that may result from the use of mulching lawnmowers and/or backyard composting. The estimate does include approximately 197 tons of household hazardous waste (HHW) collected by municipally operated HHW programs in the planning unit.

4.1 MSW Recovery

As noted in Section 1.1.4, the Planning Unit has adopted a SWMP Modification, approved by the NYSDEC in July 2009, which provides for several enhancements intended to maximize the reduction and recovery of municipal solid waste. While not formally approved by NYSDEC until June 2009, the implementation of several elements of the SWMP modification began during the second half of 2008. In addition, on April 22, 2009 Albany Mayor Gerald Jennings signed Executive Order No. 422-09 which established the City of Albany Sustainability Agenda. It contained the 8 initiatives intended to enhance waste reduction and recycling, which were previously noted in Section 1.1.4.

This section of the SWMP presents an evaluation of existing efforts to recover recyclables from MSW. This evaluation includes the identification of existing municipal, commercial, industrial and

private efforts to recover recyclables from MSW. Data is presented on the quantity and types of recyclables recovered, and a description of recyclables recovery programs used.

4.1.1 Residential MSW Recycling

A discussion of the collection of residential MSW recyclables was presented previously in Section 3.1.1. Table 4-2 summarizes the general information about the residential MSW recycling collection.

Table 4-2
Residential MSW Recycling Collection Practices

	Collection Provider Type-Recyclables			Collection Method-Recyclables	
	Municipal Collection	Municipal Contract (1)	Private (2)	Curbside	Dropoff (3)
Albany (1)	●		●	●	
Watervliet(1)	●			●	
Rensselaer(2)	●			●	
Berne			●	●	●
Bethlehem			●	●	●
East Greenbush			●	●	●
Knox					●
Guilderland			●	●	●
Altamont			●	●	
Rensselaerville					●
New Scotland		●		●	
Voorheesville		●		●	●
Westerlo			●	●	●
Green Island	●			●	

Notes:
(1) Municipality contracts with private hauler to service residential units.
(2) Residents hire private company to transport MSW and/or recyclables.
(3) Residents self-transport to transfer station.

Municipally collected residential recycling program tonnage for the years 2005 through 2008 is presented in Table 4-3. The overall MSW diversion rate for these municipal programs is about 37.8% in 2008.

Table 4-3
Municipal Recycling Program Tonnage for 2005-2008

Solid Waste	2005 Total	2006 Total	2007 Total	2008 Total
Glass				
Clear	0.00	20.00	0.00	0.00
Other / Mixed	321.22	12.07	4.00	59.16
Total Glass	**321.22**	**32.07**	**4.00**	**59.16**
Paper				
ONP	594.99	731.10	527.32	261.55
OCC	293.34	216.27	228.26	337.24
OMG	13.77	17.42	0.00	148.22
Paperboard	77.76	38.70	0.00	0.00
High Grade	3.50	7.00	8.50	7.75
Books (hard/soft)	2.80	4.80	16.00	8.57
Other / Mixed	5,938.49	5,052.32	5,394.91	5,797.26
Total Paper	**6,924.65**	**6,067.61**	**6,174.99**	**6,560.59**
Plastic				
PET	0.00	6.00	0.00	0.00
Other / Mixed	48.37	37.02	192.94	47.6
Total Plastic	**48.37**	**43.02**	**192.94**	**47.6**
Metal				
Aluminum	2.40	4.97	5.08	5.99
White Goods	765.93	815.52	325.30	536.39
Other / Mixed	601.67	399.20	877.03	423.48
Total Metal	**1,370.00**	**1,219.69**	**1,207.41**	**965.86**
Batteries				
Lead Acid	1.65	1.30	16.23	14.15
Dry Cell	16.85	16.47	1.12	0.17
Total Batteries	**18.50**	**17.77**	**17.35**	**14.32**
Misc.				
Yard Waste	19,262.77	20,129.16	19,369.38	23,618.33
Tires	334.25	272.31	173.63	182.12
Oil/Oil Filters	10.19	9.82	12.81	10.76
C & D (Asphalt)	258.00	0.00	246.45	246.1
e-waste and propane tanks	0.00	0.00	51.72	71.62
Textiles	22.90	24.20	23.53	33.25
Commingled	2,045.40	2,252.68	2,240.94	2,736.74
Single Stream	0.00	0.00	0.00	572.00
Other	54.26	6.50	23.73	117.38
Total Misc.	**21,987.77**	**22,694.67**	**22,092.18**	**27,588.30**
Total Recovered	30,670.52	30,074.83	29,688.87	35,235.83
MSW Disposed (4)	60,506.99	60,151.15	60,620.71	57,734.91
HHW Collected	200.92	398.43	331.50	196.95
Total Disposed MSW + HHW	60,707.91	60,549.58	60,952.21	57,931.86
Diversion/ Recycling Rate	33.56%	33.19%	32.75%	37.82%
Diversion Rate Not Including Yard Waste	15.82%	14.11%	14.54%	16.7%

Notes:
(1) East Greenbush was not part of the planning unit in 2005-2007.
(2) The table does not include data for New Scotland and Rensselaer in 2006.
(3) The table does not include data for Green Island, Rensselaer, and Watervliet in 2007.
(4) Total waste delivered for disposal to Rapp Road Landfill from the member municipalities.

Table 4-4 Residential Recyclable Materials Composition Summary		
Material Components	**Paper Composition (%)**	**GMP Composition (%)**
PAPER		
Newspaper	52.7%	2.0%
Magazines	10.8%	0.5%
Corrugated	6.2%	0.2%
Gable Top Cartons & Drink Boxes	0.2%	1.3%
Paper Board	7.5%	1.6%
Books (including phone directories)	12.8%	1.7%
Mixed Office Paper	6.6%	0.2%
Other Paper	1.7%	0.4%
SUBTOTALS	**98.6%**	**7.9%**
PLASTICS		
Plastic Containers (PET) #1 Non-Bottle Bill	0.1%	7.9%
Plastic #1 (Bottle Bill Containers)	0.0%	0.8%
Plastic Containers (HDPE) #2	0.1%	6.1%
Other Plastic Containers	0.1%	2.7%
Film Plastic & Plastic Bags	0.1%	0.4%
Other Plastics	0.1%	1.0%
SUBTOTALS	**0.5%**	**18.9%**
FOOD WASTE	**0.1%**	**0.0%**
TEXTILES & LEATHER	**0.1%**	**0.1%**
RUBBER	**0.0%**	**0.0%**
DISPOSABLE DIAPERS	**0.0%**	**0.0%**
FERROUS METALS		
Ferrous Metal/Bimetal Cans	0.2%	11.5%
Aerosol Cans	0.0%	0.3%
Other Ferrous Metal	0.0%	0.1%
SUBTOTALS	**0.2%**	**12.0%**
NON-FERROUS METALS		
Aluminum Cans (Non-Bottle Bill)	0.0%	0.3%
Aluminum Cans (Bottle Bill)	0.0%	0.6%
Other Non-Ferrous Metal	0.0%	1.2%
SUBTOTALS	**0.0%**	**2.1%**
ELECTRONICS	**0.0%**	**0.0%**
GLASS		
Glass Bottles (Bottle Bill)	0.1%	5.3%
Glass Bottle - Clear	0.4%	29.2%
Glass Bottle - Amber	0.0%	5.9%
Glass Bottle - Green	0.1%	16.9%
Flat Glass & Other Glass	0.0%	1.5%
SUBTOTALS	**0.6%**	**58.8%**
WOOD	**0.0%**	**0.0%**
RUBBLE	**0.0%**	**0.0%**
YARD WASTE	**0.0%**	**0.0%**
DIRT/FINES	**0.0%**	**0.0%**
HAZARDOUS WASTE		
Household Hazardous Waste (HHW)	0.0%	0.0%
Lead Acid Batteries	0.0%	0.0%
Other Batteries	0.0%	0.0%
SUBTOTALS	**0.0%**	**0.0%**
MEDICAL OR PHARMACEUTICAL WASTE	**0.0%**	**0.2%**
MISCELLANEOUS	**0.0%**	**0.0%**
TOTAL	**100.0%**	**100.0%**

The composition of recyclable materials from the City of Albany DGS curbside collection program was examined as part of the waste characterization study described in Section 2.2. The DGS operates a dual stream curbside program, consisting of mixed recyclable paper and co-mingled glass metal and plastic (GMP) containers. The results of that characterization are presented in Table 4-4. Within the paper stream, the largest component of recyclable paper was newspaper at 53%, followed by books (including phone directories) at 13%, and magazines at 11%. Other significant components included paperboard at 8%, mixed office paper at 7%, and corrugated at 6%. The component percentage of gable top cartons and drink boxes was minimal at an average of 0.24%.

Nearly 59% of the GMP stream consisted of glass. Within this material category, the largest components of glass were clear glass bottles and green glass bottles, with these two categories comprising 29% and 17% of the total GMP stream, respectively. The second largest major material category within the GMP stream was plastics at 18.9%. The largest material categories within the plastics family were PET #1 plastic containers at 8% of the total MGP stream, HDPE #2 plastic containers at 6% of the total GMP stream, and other plastic containers at 3%. The third largest GMP component fraction consisted of ferrous metals (12%), of which nearly all were ferrous metal/bimetal cans (11.52%). Aluminum cans and other non-ferrous metal represented approximately 2% of the GMP.

The relative proportions of the mixed paper and the GMP streams can be determined by the DGS' annual tonnage totals for each of these material deliveries. In 2008, DGS recovered 2,639 tons of mixed paper and 1,044 tons of GMP. Using this 2008 data, it can be determined that mixed paper and GMP represent about 72% and 28%, respectively, of the combined paper and GMP tonnage. On a Planning Unit-Wide basis, based on the combined municipal recycling tonnage presented in table 4-3, mixed paper and GMP represent about 68% and 32 % of the combined paper and GMP tonnage in 2008, and about 71% and 29% in 2007.

Other residential MSW recycling may be occurring in the planning unit that is not reported by the member municipalities. Most member municipalities do not report residential recycling that is performed by private collection companies who service residential customer under individual account. Some of this additional residential MSW recycling tonnage may be included with other additional MSW recycling tonnage, as discussed below.

4.1.2 Commercial Industrial and Institutional MSW Recycling

As noted in Section 3.1.2, with the completion of the SWMP Modification and its acceptance by members of the members of the Capital Region Solid Waste Management Partnership, all members are required to have in place laws that require source separation from all sectors including commercial waste in accordance with GML 120aa. Commercial waste haulers service not only commercial, industrial and institutional (CII) waste generators, but also residential waste generators not served by municipally sponsored programs. Information about MSW and recyclables collection from CII generators in the Planning Unit is presented in Section 3.1.2.

Data on MSW recycling from CII generators was gathered in connection with the preparation of the 2008 Recycling Report for the Planning Unit. Recycling data for 2008 were provided by many of the largest employers in the Planning Unit, including, New York State Office of General Services (OGS), New York State DEC Central Office, Albany Medical Center, St Peters Hospital, Albany County, several school districts, and a few large retail centers. Most of this data was developed based on survey data provided by several major CII waste generators. The principal exception to this relates to the recycling documented by the OGS at its facilities located throughout the state. Data from OGS are included based on their annual report for the 12 month period ending March 31, 2009. In addition, some respondents to the industrial waste survey reported recycling components of the MSW stream, and those results are also included here. A summary of this data is presented in Table 4-5.

Table 4-5
CII MSW Recycling in 2008

Recovered Material	2008 quantity (tons)
ONP	0.57
OCC	955.40
OMG	0.45
Mixed Paper	2,506.45
Books	0.06
Mixed Glass	3.01
Aluminum	1.90
White Goods	4.16
Ferrous Metal	493.50
Other/Mixed Metal	417.10
Electronics	4.45
Mixed Plastic	1.04
Other Plastics	2.98
Co-mingled GMP	28.62
Yard Waste	73.96
Rubber Tires	14.50
Wood Pallets	357.36
Used Oil	19.39
Lead Acid Batteries	13.12
Dry Cell Batteries	2.59
Flourescent Bulbs	2.17
Textiles	0.50
Other	237.92
Total	**5,141.20**

Based upon the CII MSW generation rate of 1.8 lb/person/day (see Table 2-1) and estimated population of 218,728 persons, CII MSW generation is estimated at approximately 71,850 tons in 2008. Documented CII MSW recycling tonnage only represents about 6.9% of the estimated MSW generation from the CII sector, and represents an under-reporting due to lack of information. Some additional CII MSW recycling tonnage is likely captured in the recycling facility tonnage discussed in section 4.1.3 below.

4.1.3 Other MSW Recycling

There are several recyclable handling and recovery facilities operating in the Planning Unit or which include the Planning Unit within their service areas. These facilities are required to file annual reports with the NYSDEC, and provide information about the amount and types of materials they recover, as well as information about where the recyclable materials are generated. CHA reviewed the 2008 annual reports from several facilities to estimate recyclable materials generated in the Planning Unit. These facilities included:

- Waste Management Transfer Facility – 100 Boat Street, Albany, NY;
- Sierra Fibers Facility – 877 S. Pearl Street, Albany NY;
- Metro Waste Paper Recovery – 71 Fuller Road, Albany, NY;
- Sierra Processing Facility – 2 Moyer Avenue, Schenectady, NY.

In addition, one respondent to the industrial waste survey is a company that collects and markets recycled paper, but this company is not regulated by the NYSDEC, and it is not required to submit the annual report information referenced above.

Information provided in these facility annual reports and information provided by the one respondent to the industrial waste survey were used to estimate additional MSW recycling attributable to the planning unit. Table 4-6 presents an estimate of additional MSW recycling for 2008. The method used to make this estimate is summarized below.

Table 4-6
Other Estimated MSW Recycling in 2008

Recovered Material	2008 quantity (tons)
ONP	4,274.24
OCC	9,119.34
Office Paper	4,533.68
Mixed Paper	(1,701.54)
Paper Board	63.09
Book Stock	158.66
Mixed Glass	102.60
Metal Containers	103.32
Aluminum	19.83
PET #1	146.47
HDPE #2	90.01
Mixed Plastic	43.82
Other Plastics	209.58
Co-mingled GMP	401.83
Wood Pallets	76.06
Total	**17,640.99**

Because all of these recycling facilities serve regional markets that are larger than the Planning Unit, not all of the recycling tonnage reported by these facilities can be assumed to have originated in the Planning Unit. To estimate the Planning Unit's contribution to these reported recyclables, CHA applied a proportional share, based on the Planning Unit's population as a percentage of the total population of the reported service area. For each facility, a proportional total was calculated for each of the recyclable material stream, and these totals were then aggregated across all facilities.

Because many of the MSW recyclables already identified from both residential and CII sources are delivered to these facilities, an additional adjustment had to be made to avoid double-counting these materials. This adjustment was made by subtracting these previously counted material quantities from the aggregated facility totals. In some cases, certain MSW recycling components, such as mixed paper and co-mingled GMP were disaggregated into their constituent parts prior to the subtraction. These constituent proportions were determined based on the results of the field study of composition of DGS recyclables (as noted in Table 4-3). This adjustment process resulted in the negative value shown for mixed paper in Table 4-5 because most of the municipalities report their recycled paper as mixed paper, while these recycling facilities typically sort the paper into grades that are more valuable for the end-use markets.

4.2 Other Solid Waste Recovery

This section of the SWMP presents an evaluation of existing efforts to recover recyclables from C&D Debris and from the Non-hazardous Industrial Waste stream. Data is presented on the quantity and types of recyclables recovered, and a description of recyclables recovery programs used.

4.2.1 C&D Recovery

The recovery and recycling of C&D debris was estimated by CHA based on reports from Municipal recycling programs, responses to the CII waste generation and recycling surveys, and from annual reports submitted by facilities regulated by NYSDEC. These estimates are presented in Table 4-7.

Table 4-7
C&D Recycling in 2008

Material Category	2008 Quantity (ton)
Asphalt	36,180.00
Concrete, Brick, etc.	1,384.51
Non PCS Soil	8,496.50
ADCM	790.82
Other C&D	199.30
Total C&D Recycling	**47,051.13**

Asphalt and concrete recycling was estimated by CHA based on annual reports submitted by the following regional C&D processing facilities:

- Callahan – Watervliet
- Callahan – Ravena
- Kings Road Material
- Jackson Demolition

The estimates are based on the Planning Unit's proportional share of population in the reported service area of these facilities. The 2008 facility data do not include WM Biers located in the Port of Albany because the annual report for this facility has not been made available to CHA. That facility accounted for nearly 4,000 tons of asphalt recycling from the Planning Unit in the previous year.

Asphalt recycling in 2008 is down by nearly 45,000 tons from the levels reported in 2007. While a small portion of this difference is attributable to the lack of 2008 data from W.M. Biers, most of the reduction occurred in the year over year results reported at the 3 major asphalt recycling facilities, as noted in Table 2-2. As noted previously in section 2.1.2, this reduction in recycling tonnage is due to a reduction in the availability of recyclable materials due to significant reduction in construction and demolition projects in 2008 compared to 2007.

The material category of Non-PCS soil is clean soil resulting from construction projects in the City of Albany that are delivered to the Rapp Road Landfill for beneficial use as cover material. The material category of ADCM is a material that is delivered to the Rapp Road Landfill for beneficial use as an alternative daily cover material (ADCM). Acceptance of ADCM at the Rapp Road Landfill is also down significantly from over 4,076 tons in 2007. Other C&D recycling reported in Table 4-7 is from a survey response submitted by a major CII generator.

The total of over 47,000 tons of C&D recycling shown in Table 4-7 represents over 45% of the estimated 103,800 tons of C&D debris believed to be generated in 2008, as shown in Table 2-3. The actual percentage recovery may be higher than this estimate because of underreporting of C&D recycling as noted above, and because the C&D generation for 2008 may be an overestimate. In 2008 there was on 8,268 tons of documented C&D disposal at the facilities both inside of the Planning Unit and at the Town of Colonie Landfill. Using this disposal tonnage as a basis for determining the percentage of waste that is diverted from disposal by recycling, the 2008 C&D diversion rate is about 85%. The actual percentage of C&D diversion due to recycling is likely somewhere between 45% and 85%.

4.2.2 Non-Hazardous Industrial Waste Recovery

The recovery and recycling of non-hazardous industrial waste was estimated by CHA based on responses to an industrial waste survey. These estimates are presented in Table 4-8.

CHA surveyed industrial manufacturing firms within the Planning Unit to obtain information about their solid waste management practices. Copies of the survey and detailed survey information can be found in the SWMP Appendix C: Industrial Waste Survey Results. Over 150 surveys were mailed, and CHA received 19 responses. Therefore, the quantities and composition of recycling within the non-hazardous industrial waste stream reported by the survey results is very specifically due to the types of products manufactured by the survey respondents, and does not necessarily reflect an average or representative cross section of non-hazardous industrial waste in the Planning Unit as a whole.

Table 4-8 below presents the recycled tonnage of the components of the non-hazardous industrial waste steam as indicated by the survey respondents. Some of the recycled materials reported by these respondents were constituents of the MSW stream, and as such were reported as part of the CII MSW Recycling presented in Table 4-5.

Table 4-8
2008 Non-Hazardous Industrial Solid Waste Recycling within the Planning Unit

Waste Characterization	Recycled (tons)
Office paper	251
Gypsum wallboard	5,550
Wallboard Joint Compound	10
Waste concrete blocks	7,650
Sewage Sludge	100
Total	**13,561**

The office paper recycling is included in this table as non-hazardous industrial waste because it was reported by a printing establishment. The recycling of gypsum wallboard and joint compound are included in this table as non-hazardous industrial waste because they are recovered as off-spec materials and reintroduced into the manufacturing process by a wallboard manufacturer. The waste concrete blocks are included here because they are reused in the manufacture of concrete.

4.3 Potentially Recoverable Recyclable Materials

An analysis of solid waste generation and composition was presented previously in Section 2 of this SWMP. This section of the SWMP more specifically identifies recyclable materials that could potentially be recovered, reflecting the State's solid waste management policy identified in section 27-0106 of the Environmental Conservation Law, the goals and objectives of the New York State Solid Waste Management Plan currently in effect, and the goals and objectives of this SWMP, as stated in Section 1.2.

The State's solid waste management policy is set forth in section 27-0106 of the Environmental Conservation Law, in includes the following solid waste management priorities:

- first, to reduce the amount of solid waste generated;
- second, to reuse material for the purpose for which it was originally intended or to recycle material that cannot be reused;
- third, to recover, in an environmentally acceptable manner, energy from solid waste that can not be economically and technically reused or recycled; and
- fourth, to dispose of solid waste that is not being reused, recycled or from which energy is not being recovered, by land burial or other methods approved by the department.

This policy, after consideration of economic and technical feasibility, is intended to guide the solid waste management programs and decisions of the department and other state agencies and authorities.

As noted earlier in Section 1.2, the goals and objectives of this SWMP include minimizing the amount of solid waste requiring land disposal in the future by:

- Maintaining and expanding waste reduction, reuse and recycling efforts, as set forth in the SWMP Modification;
- Increasing the effectiveness of enforcement of existing recycling requirements;
- Considering more emphasis on material re-use and alternatives such as PAYT, single stream recycling, and food waste composting as mechanisms to achieve future reductions in waste requiring disposal; and
- Considering alternatives which recover energy from waste, including proven technologies as well as new and emerging technologies.

The following materials in the MSW waste stream are currently designated for recycling by the municipalities in the Planning Unit, or are banned from landfill disposal by New York State.

- Paper
  - Newspaper
  - Magazines
  - Old Corrugated Containers
  - Gable Top Cartons and Drink Boxes
  - Paper Board
  - Books and Directories
  - Office Paper
- Plastic Containers
  - PET (#1)
  - HDPE (#2)
- Ferrous Metals
  - Ferrous Metal/Bi-metal Cans
  - Other Ferrous Metal
- Non-ferrous Metals
  - Aluminum Cans
  - Other Non-ferrous Metals
- Glass Bottles
- Yard Waste
- Tires (New York State Mandate)
- Lead Acid Batteries (New York State)

Table 4-9 presents the average composition of these designated recyclables in the MSW stream delivered for disposal, based on the field study of waste composition conducted at the Rapp Road Landfill in February 2009. Applying those percentages to the net amount of MSW disposal from the Planning Unit in 2008 resulted in the estimated quantity of designated recyclables that remain in the MSW stream. The table shows that these designated recyclables represent nearly 62,000 tons, or about 31% of the MSW delivered for disposal. This total is slightly more than the current estimated level of MSW recycling, which is also noted in Table 4-9.

Paper materials constitute the vast majority of the designated recyclables in the MSW stream, at 20.2 percent of the total MSW and almost two-thirds of the recyclables. If all of the nearly 62,000 tons of designated recyclables in the MSW disposal stream could be recovered, the overall waste diversion rate in the Planning Unit could increase from the present level of 37% to a maximum level of 56%.

Table 4-9
Designated Recyclables in MSW Delivered for Disposal

Material Components	Average Composition of MSW delivered for disposal (%) [1]	Estimated Quantity of Designated recyclables in MSW delivered for disposal [2]	Estimated Recyclable Materials recovered from the MSW stream in 2008 (tons)
PAPER	-	-	-
Newspaper	2.0%	3,899.87	8,203.06
Magazines	2.1%	4,060.75	902.72
Corrugated	4.5%	8,784.18	10,843.70
Gable Top Cartons & Drink Boxes	0.4%	745.86	13.46
Paper Board	4.2%	8,194.53	583.73
Books (including phone directories)	2.8%	5,357.28	1,058.23
Mixed Office Paper	4.1%	7,928.09	5,158.69
SUBTOTALS	**20.2%**	**38,970.56**	**26,763.60**
PLASTICS			
Plastic Containers (PET) #1	2.0%	4,737.73	507.50
Plastic Containers (HDPE) #2	0.8%	1,568.08	341.03
SUBTOTALS	**2.8%**	**6,305.81**	**848.53**
FERROUS METALS			
Ferrous Metal/Bimetal Cans	0.7%	1,401.09	498.82
Other Ferrous Metal	1.9%	3,763.04	1,791.92
SUBTOTALS	**2.6%**	**5,164.13**	**2,290.74**
NON-FERROUS METALS			
Aluminum Cans	0.4%	829.69	65.74
Other Non-Ferrous Metal	1.0%	1,881.32	1,881.32
SUBTOTALS	**1.4%**	**2,711.01**	**1,947.07**
GLASS			
Glass Bottles (Bottle Bill)	0.5%	960.45	208.81
Glass Bottle - Clear	1.8%	3,468.22	1,154.03
Glass Bottle - Amber	0.9%	1,696.06	230.65
Glass Bottle - Green	0.1%	199.69	667.42
SUBTOTALS	**3.3%**	**6,324.42**	**2,260.91**
YARD WASTE	**1.2%**	**2,367.26**	**23,618.33**
Lead Acid Batteries	0.0%	-	27.27
TOTAL	**31%**	**61,843.21**	**57,756.44**

Notes:
1. Material component percentages from on Table 2-4.
2. Tonnage calculated based on percentage times 2008 MSW disposal tonnage of 193,188 – Totals may not add due to rounding of percentage composition.

The complete recovery of all of this recyclable material from the MSW stream is not a realistic expectation, however, since some of these materials become contaminated or are otherwise unsuitable for recycling. Furthermore, not every waste generator can be expected to participate in recycling programs all the time. Even the most conscientious recycler may inadvertently discard a recyclable item, or have a relative or house guest who discards a recyclable.

For purposes of this SWMP, 2 primary factors will determine the maximum expected recovery rate for a recyclable material component: maximum anticipated participation rates and the maximum recovery efficiency percentage. The maximum anticipated participation rate is a concept meant to quantify the percent of the population that will participate in recycling. The maximum recovery efficiency will quantify a percentage of the particular material stream that can expected be recovered for recycling. This maximum recovery efficiency accounts for the subtraction of those fractions of the material streams that are deemed unrecyclable due to contamination of other reasons. Taken together, these two concepts will place an upper limit on the percentage of a designated recyclable that can be recovered. For example, if a maximum anticipated participation rate is 90% and the maximum recovery efficiency percentage is 90%, the resultant maximum expected recovery rate is = 0.9 X 0.9 = 0.81 or 81%.

Table 4-10 presents the results of a calculation to determine estimated current recovery rate for each of the mandatory recyclable components. This percentage was calculated as the proportion of material recycled in 2008 divided by the total estimated quantity of that material in the as-generated waste stream. The as-generated composition (by % of MSW) is shown in Table 2-9, and was based on the sum of the tonnage of material recycled plus the estimated tonnage of material disposed based on the proportional results of the field study of MSW composition. Of the estimated recovery rates shown in Table 4-10, most notable are the very high recovery rates for yard waste and lead acid batteries. Table 4-10 also shows that overall, recyclable paper is being recovered at a 41% rate. Within that paper category, ONP is being recovered at a 68% rate, OCC is being recovered at a 55% rate, and mixed office paper is being recovered at a 39% rate. The other recyclable components in the paper category are being recovered at relatively low rates. The estimated recovery rates for the glass, metal and plastic containers are generally lower than many of the major paper components. It is worth noting that while the estimated recovery rate for green glass bottles is 77%, this component also represents the smallest fraction of the glass waste stream, so the overall disposal tonnage reduction as a result of this recovery is not significant.

Table 4-10 Estimated Recovery Rate for Designated Recyclables in MSW	
Material Components	**Estimated Recovery Rate**
PAPER	
Newspaper	67.8%
Magazines	18.2%
Corrugated	55.2%
Gable Top Cartons & Drink Boxes	1.8%
Paper Board	6.6%
Books (including phone directories)	16.5%
Mixed Office Paper	39.4%
SUBTOTALS	**40.7%**
PLASTICS	
Plastic Containers (PET) #1	9.7%
Plastic Containers (HDPE) #2	17.9%
SUBTOTALS	**11.9%**
FERROUS METALS	
Ferrous Metal/Bimetal Cans	26.3%
Other Ferrous Metal	32.3%
SUBTOTALS	**30.7%**
NON-FERROUS METALS	
Aluminum Cans	7.3%
Other Non-Ferrous Metal	50.0%
SUBTOTALS	**41.8%**
GLASS	
Glass Bottles (Bottle Bill)	17.9%
Glass Bottle - Clear	25.0%
Glass Bottle - Amber	12.0%
Glass Bottle - Green	77.0%
SUBTOTALS	**26.3%**
YARD WASTE	**90.9%**
Lead Acid Batteries	**100.0%**
TOTAL	**48.3%**

In order to determine a realistic projection of maximum expected increase in recycling diversion which can occur with these designated recyclables, a maximum expected recovery rate was assumed for each material component. This maximum recovery rate was then multiplied by the total quantity of material in that category (derived by adding together the last two columns from Table 4-9) to yield a maximum recoverable quantity of each material component. Subtracting the estimated recovered material quantities in 2008 from the maximum recoverable quantity, results in a value that represents the maximum increase in material recovery for each material component. This process is presented

in Table 4-11. Since yard waste recovery and lead acid battery recycling are at or near maximum levels presently, they are not included in the table.

Table 4-11
Additional Recovery of Designated Recyclables

Material Components	Maximum Recovery rate (%)	Maximum Recovery (tons)	Estimated Additional Material Recovery
PAPER	-	-	-
Newspaper	80.0%	9,682	1,479
Magazines	75.0%	3,723	2,820
Corrugated	80.0%	15,702	4,859
Gable Top Cartons & Drink Boxes	75.0%	569	556
Paper Board	75.0%	6,584	6,000
Books (including phone directories)	75.0%	4,812	3,753
Mixed Office Paper	80.0%	10,469	5,311
SUBTOTALS		**51,542**	**24,778**
PLASTICS			
Plastic Containers (PET) #1	75.0%	3,934	3,426
Plastic Containers (HDPE) #2	75.0%	1,432	1,091
SUBTOTALS		**5,366**	**4,517**
FERROUS METALS			
Ferrous Metal/Bimetal Cans	75.0%	1,425	926
Other Ferrous Metal	75.0%	4,166	2,374
SUBTOTALS		**5,591**	**3,300**
NON-FERROUS METALS			
Aluminum Cans	75.0%	672	606
Other Non-Ferrous Metal	75.0%	2,822	941
SUBTOTALS		**3,494**	**1,546**
GLASS			
Glass Bottles (Bottle Bill)	80.0%	935	727
Glass Bottle - Clear	80.0%	3,698	2,544
Glass Bottle - Amber	80.0%	1,541	1,311
Glass Bottle - Green	80.0%	694	26
SUBTOTALS		**6,868**	**4,607**
TOTAL		**72,860**	**38,750**

Table 4-11 shows that about 38,750 tons of additional designated recyclables could be recovered under conditions of maximized recovery. The maximum expected recovery rate for most materials is 75%, which is approximately equivalent to a maximum participation rate of 85% and a maximum recovery efficiency of 90%. Several material components are assumed to have maximum expected recovery rates of 80%, which is roughly equivalent to rates of 90% for both participation and recovery efficiency. These higher participation rates were applied to newspaper, corrugated, mixed office paper, and glass bottles, because these materials are already experiencing relatively high

recovery rates. With this maximum additional material recovery as shown in Table 4-11, the overall waste diversion rate in the Planning Unit could increase from the present level of 37% to a maximum level of 49%.

Achieving these maximized levels of diversion for currently designated recyclables may require consideration of the use of single stream recyclable collection and a program of volume based user fees, sometimes referred to as Pay-as-You-Throw (PAYT) or Save Money and Reduce Trash (SMART) programs. Additional recovery of #1 plastic water bottles may also occur as a result of the eventually implementation of the recent revisions to the New York State Bottle Bill, which provided for return deposits to be levied on containers of bottled water. However, this provision of the new Bottle Bill is currently on hold pending a legal challenge.

In order to achieve a maximum diversion or recycling level beyond the above noted 49% maximum, it will be necessary to increase or maximize diversion of other waste stream component which are not among the mandatory designated MSW components. There are currently MSW component that are recovered and recycled on a voluntary basis, which could be made part of a mandatory program. These could include the following:

- Household Hazardous Waste
- Dry Cell Batteries
- Electronic Waste

While recycling of these components might become mandatory on its own merit, on a percentage by weight basis these materials are relatively insignificant components of the waste stream, in total constituting only 2.2 % on an as-generated basis (see Table 2-9) or 2.8 % on an as-delivered basis. Of the three, electronic waste is the most significant component which by itself comprises 2.7% of the as delivered MSW. With continued anticipated growth in the market for consumer electronics, conventional wisdom would expect to see an increase in the percentage of this MSW constituent as time goes on. However, there have been increasingly successful uses of producer responsibility/product stewardship legislation to shift the burden of end of life management of consumer electronics from the waste management sector to the product manufacturers. While product stewardship legislation may not reduce the amount of electronic and other targeted waste streams that will need to be managed in the future, the legislation should result in the increased recovery for reuse and recycling of these waste stream components. Assuming a maximum expected recovery rate for these materials, an additional 4,050 tons of material could be recovered from the MSW stream and this would increase the maximum recyclable recovery rate about 1.3 percentage points.

Another alternative to be considered is to add plastic containers #3 through #7 to the list of mandatory recyclables. As shown in Table 2-4, the categories of Other Plastic Containers (which include #3 thru #7) and Film Plastic (which includes plastic bags) represented 2.5% and 4.4%,

respectively, of the MSW stream delivered for disposal. On an as-generated basis, the Other Plastic Containers and Film Plastic represent about 2.0% and 3.5 %, respectively. It is assumed that local markets would exist for these plastics and that a 75% maximum expected material recovery rate for the Other Plastic Containers and a 50% maximum expected recovery rate on the Film Plastic. The lower maximum recovery rate for the Film Plastic is due to the fact that this category includes the plastic garbage bags which are used to collect and store solid waste. If mandatory recycling were to result in these maximum recovery rates, an additional 7,850 tons of material recovered from the MSW stream and would increase in the maximum recyclable recovery rate by 2.4 percentage points.

Another potentially effective mechanism for increasing diversion would be the addition programs and facilities to provide for the composting of source separated organic waste (SSOW) material components. Cities like Toronto ON, Portland OR, and Seattle WA have implemented SSOW collection and processing for CII MSW, residential solid waste, or both.

Toronto's program is called the Green Bin program and provides currently services 510,000 single-family households (http://www.toronto.ca/greenbin/index.htm, June 4, 2009). After a successful pilot program in 30 multi-unit residential buildings, the Green Bin Program is now being initiated at 5,000 apartments, condos and co-op buildings.

The following list of materials is included in the program:

- Fruits, vegetable scraps
- Meat, shellfish, fish products
- Pasta, bread, cereal
- Dairy products, egg shells
- Coffee grounds, filters, tea bags
- Soiled paper towels, tissues
- Soiled paper food packaging: fast food paper packaging, ice cream boxes, muffin paper, flour and sugar bags
- Paper plates
- Candies, cookies, cake
- Baking ingredients, herbs, spices
- Household plants, including soil
- Diapers, sanitary products
- Animal waste, bedding (e.g. from bird/hamster cages), kitty litter
- Pet food

In the City of Seattle program, food and yard waste collection service is required for all single-family households and is provided weekly.

(http://www.seattle.gov/util/Services/Yard/Yard_Waste_Collection/ManageFoodYardWasteService/index.htm, June 4, 2009)

Allowable materials include:

- Food scraps
- Food-soiled paper
- Yard waste

Items not collected with food and yard waste include:

- Dirty coated paper cups & plates (clean ones can be recycled)
- Grease and fats
- Facial or toilet tissue
- Diapers \
- Pet waste and litter
- Loose soil, rocks/gravel

Since 2005, businesses in Portland Oregon have been able to contract with waste haulers to collect food scraps and food soiled paper for composting through the voluntary Portland Composts! Program (City of Portland, 2009). The City's Office of Sustainable Development provides technical assistance, training for employees and communications and marketing materials. Participating haulers deliver food scraps to a waste transfer station operated by Metro, for reloading and shipping to a private processor located 150 miles away. The tip fee for food scarps was reported to be $47.50 per ton, after a Metro subsidy of $7.50 per ton. This compares favorably with tipping fees for solid waste disposal, which was reported at $71.14 per ton plus a transaction fee of $8.50 per ton. Local haulers deliver solid waste to transfer stations, most of which is delivered to the Columbia Ridge Landfill, located 150 miles away, and operated by Waste Management under a contract with Metro.

An analysis conducted for Office of Sustainable Development prior to the implementation of the Portland Composts! program, examined how much food waste is disposed of by certain business sectors in the city (City of Portland, 2003). That study reported the following percentages of food waste in the solid waste streams from the following sector, based on local studies undertaken in 2001:

- Food Stores – 82% Organics
- Restaurants – 74%
- Higher Education – 62%

That study also reported food waste percentages for other sectors based on a business waste composition study published by the California Integrated Waste Management Board in 2000, including:

- Health and Hospitals – 40% Organics
- Hotels – 37%

The findings of this analysis from Portland are consistent with the results of the MSW composition study for the Planning Unit that was conducted as part of this SWMP. As will be noted below, several of the waste samples collected as part of this MSW composition study were from supermarkets, higher education and health care facilities.

Two of the 36 waste delivery vehicles randomly selected for solid waste sampling originated at local supermarkets. One of these waste deliveries totaled 11 tons and its sample was characterized at over 78% food waste. The other waste delivery from a supermarket consisted of weighed over 5 tons and its sample was over 79% food waste. The study did not provide any information on the proportion of the commercial MSW stream which originates at the large supermarkets, but it is clear that waste streams from these food markets would be prime targets for SSOW collection and composting.

One of the 36 waste delivery vehicles randomly selected for solid waste sampling originated at SUNY Albany. That waste delivery totaled over 4 tons and its sample was characterized as over 49% food waste. Conversations with SUNY Albany's Sustainability Coordinator Mary Ellen Mallia indicated that this proportion was likely typical. Based on the waste origin survey that was conducted at the Rapp Road landfill during a 5 day period in winter of 2008, SUNY Albany delivered 9 loads of solid waste totaling over 64 tons per week for disposal. Based on a more recent waste origin data examined by CHA for the month of July 2009, SUNY Albany delivered almost 94 tons of waste for disposal at the Rapp Road Landfill, an average of about 23.5 tons per week. This considerable reduction in weekly average disposal is believed to be due to seasonal variation due to summer recess. Assuming that waste is generated for disposal at a rate of 60 tons per week for 8 months out of the year and at 24 tons for 4 months out of the year, average annual waste delivery would be about 2,500 tons per year from SUNY Albany. At the 49% fraction noted earlier, this source will generate almost 1,250 tons of food waste annually. Source separation might be able to recover a significant portion of this food waste stream for composting. The other institutions of higher education in the planning unit are expected to have similar composition with potential for increased recovery.

Another one of the 36 waste delivery vehicles randomly selected for solid waste sampling originated at one of the hospitals in the City of Albany. That waste delivery totaled nearly 9 tons and its sample was characterized as over 27% food waste. While this observed proportion of food waste is lower than the 40% reported in the Portland study, it is significant because the medical facilities in the City of Albany are among the largest employers and waste generators in the Planning Unit. Taken together, these medical facilities generate significant quantities of food and other organic compostable waste and as such are prime targets for SSOW collection and composting.

Based on the field study of MSW composition conducted as part of this SWMP, SSOW components constitute a significant fraction of the post-recycled MSW stream currently delivered for disposal. It is assumed that these components would include all or part of the following waste stream components:

- Food waste – 18.7%
- Other Paper – 11.1%
- Yard waste – 1.2%

These proportions are for the total MSW stream delivered for disposal, as noted in Table 2-4. While in total these materials represent 31% of the MSW delivered for disposal, only a fraction of the "other paper" component would be likely be suitable for SSOW collection. For purposes of this analysis, it is assumed that half of the other paper, or 5.5% of the MSW stream, would be suitable for collection as SSOW. Based on this assumption, total materials suitable for SSOW collection represents 25.4% of the MSW stream, but this fraction does not account for concepts of maximum participation rate and maximum recovery efficiency discussed previously in connection with the currently designated recyclable materials. Applying these concepts to the SSOW stream is also necessary to determine the maximum recovery rate.

While the City of Portland is targeting a recovery of between 40% to 60% of available organics to be collected as part of its commercial SSOW recovery program, this material recovery analysis for SWMP will consider a more aggressive assumption to determine the maximum recovery rate. Using the same maximum expected recovery rate as used for currently designated recyclables (75%) yields a maximum SSOW recovery representing about 19 % of the MSW stream currently delivered for disposal. This would represent a maximum of an additional 36,700 tons of SSOW collected for processing from the Planning Unit, and would increase the waste diversion rate by about 11.4 percentage points. Coupled with the maximum recovery of currently designated recyclables, the maximum recovery of available SSOW is expected to increase the total diversion rate from 49% to 60%.

This maximum SSOW recovery would need to be achieved incrementally with the development of infrastructure and programs collect SSOW from selected commercial and institutional generators who will generate sufficient volume of SSOW, followed by targeted residential SSOW programs. Responses received from the RFI regarding the composting of SSOW indicated a preference for an initial facility sized to process 20,000 TPY. Such a facility is reportedly expandable in increments of 10,000 TPY, as necessary.

As noted previously in Table 4-7, over 47,000 tons of C&D recycling was estimated for the Planning Unit in 2008. This represents between 45% and 85% of the C&D debris generated in the Planning Unit. Asphalt and concrete, are the two primary constituents of the C&D waste stream that are currently recycled. Soils from excavations can be reused and recycled and contaminated soils are also recyclable as an alternate daily cover material if delivered to a lined landfill. Documented C&D recycling tonnage in 2008 was down significantly from the nearly 96,000 tons estimated in 2007. At the three major facilities that recycle asphalt and concrete from the planning unit, shown previously in Table 2-2, total estimated C&D recycling tonnage from the Planning Unit declined from 80,944 tons in 2007 to 36,180 tons in 2008; a reduction of 44,764 tons or over 55%. This reduction is believed to be due to the slowdown in construction projects and C&D debris generation as a result of the current economic recession.

If C&D recycling returns to the 2007 levels in the future, another 50,000 tons of C&D would be generated and recycled annually from the planning unit, and this would represent increase the existing total diversion rate from 37% to 50%.

There may be other opportunities for waste reduction and recycling in the other elements of the C&D stream, such as those noted in Table 2-7. Government and corporate policies have been developed to promote green building and demolition practices. Local governments in the Planning Unit could also consider enacting local laws or ordinances that would require the separation and recycling of C&D debris. The City of Seattle Washington requires that construction job sites contain separate containers for recyclable and non-recyclable C&D debris, and specifies that collection containers for recyclable C&D contain no more than 10% non-recyclable material. The implementation of Seattle's policy is facilitated by a single franchise granted to one private company which is authorized to collect all C&D debris throughout the City.

As noted in the previous paragraph, the majority of C&D material recycling in the Planning Unit consists of concrete and asphalt, and this is expected to continue to be the case. Numerous privately operated facilities operate in and around the Planning Unit, and these were previously detailed in Section 3 of this SWMP. These facilities may be able to recovery additional recyclable components of the C&D stream, such as wood, metal and corrugated cardboard. Based on data from the 2007 Annual Report for the Taylor Recycling Facility in Montgomery, NY, CHA estimates that the following material percentages were recovered from a mixed C&D stream accepted at that facility:

- Alternate Daily Cover Material – 62%
- Wood for mulch – 19%
- Bulk metal - 5.5%
- Aluminum and copper – 0.3%
- Cardboard -1.5%
- Gypsum – 0.8%
- Topsoil - 2.5%

The balance of the material, about 8.4 % is estimated to be process residue not included in the ADCM. While it should not be assumed that this mixed C&D material stream is representative of the 8,268 tons of C&D that was generated in the Planning Unit and disposed of in landfills in 2008, these percentages can be used to create a comparative estimate of potentially recovered tonnage. Excluding the potential ADCM recovery, estimated potential material recovery associated with the recycling of 75% of the above noted mixed C&D stream is as follows:

- Wood for Mulch – 1,178 tons
- Bulk Metal – 341 tons
- Aluminum and Copper – 19 tons
- Cardboard – 93 tons
- Gypsum – 50 tons
- Topsoil – 155 tons

Under this comparative estimate, an additional 1,836 tons of recovered material, and would increase the total recycling diversion rate by 0.6 percentage points. This small marginal increase in the diversion rate along with the relatively small quantity recovered tonnages, suggests that in order for an enhanced C&D processing and recovery facility to be economically feasible, a waste stream from a larger regional area may be required.

4.4 Markets for Recovered Recyclables

This section identifies existing available and potential markets for recovered recyclables. It includes a review of available information about existing and potential markets that have been identified by the City of Albany and the member municipalities of the Planning Unit. This section also presents a discussion about market development restrictions which inhibit current or future recycling of certain materials.

4.4.1 Existing Recoverable Material Markets

The primary recovered material processors and recovered material markets presently utilized by the municipalities in the Planning Unit are shown in Table 4-12. A few of these facilities are end use markets, but most are intermediate processors who add value to material deliveries before shipping to the ultimate end use markets.

Table 4-12
Major Recycling Processors Used by Planning Unit Communities

Facility Name& Location	Recycled Material
Sierra Fibers Albany, NY	Plastic, tin, co-mingled containers, aluminum. Paper, corrugated cardboard, newsprint, mixed office paper
Hudson Metal Albany, NY	Scrap metal- ferrous and non ferrous metals.
Sierra Containers Schenectady, NY	Plastic, tin, co-mingled containers, aluminum. Paper, corrugated cardboard, newsprint, mixed office paper
Metro Waste Paper Recovery Albany, NY	Newspaper, junk mail, cardboard
Bennington Paperboard Hoosick, NY	Kraft paper, corrugated cardboard, newspaper.
Ash Trading Albany, NY	Paper and paper products & books.
Galivan Corporation . Troy, NY	Wood-non treated or painted. Leaf waste, grass clippings, tree and brush debris, non treated.
Rensselaer Iron & Steel Renssalaer, NY	Scrap metal
Troy Transfer LLC Troy, NY	C&D
Oneida Lake Energy Products West Monroe, NY 10950	Old propane tanks
WM Biers Inc. Albany, NY 12202	Wood waste: pallet, construction wood, brush, leaves, grass, logs, stumps. Mixed aggregate, concrete, stone, soil, bricks, glass or ceramic.

Empire State Development (ESD) serves as the repository for recycling markets information for all of New York State and maintains an on-lone database to help users locate outlets for materials that can be reused recycled or composted. The database can be accessed at the following location: www.nylovesbiz.com/Manufactring_&_Environment/Recycle/secondary_markets.asb. The City of Albany DGS has used this database to develop a list a potential recovered material markets for distribution to commercial property owners and others.

The ESD database also provides exposure to recycling and reuse businesses and helps end markets for recovered materials in and around New York State access the raw materials they need for production. This database allows the user to search for brokers, processors/recyclers, manufacturers, compost operations, re-use organizations, re-manufacturers, and other recycling-related service providers, by material type within specified geographic regions. The database was compiled and is maintained by the Northeast Recycling Council, Inc. (NERC) under the direction of ESD's Environmental Services Unit.

4.4.2 Market Development Restrictions

In the 25 years since the enactment of the Solid Waste Management Act, markets for recyclables materials have expanded significantly. Paper, plastic and metals recovered for recycling are now commodities in the global market place.

With respect to this Solid Waste Management Plan, the most significant market challenges that are expected to have a bearing on the selected programs include:

- Development of Sustainable Markets for Plastics #3-7;
- Expansion of markets for composted SSOW and other organic wastes.

At the present time there are limited domestic markets for recycling plastics #3 through #7. In 2007, a minimum of 325.44 million pounds of non-bottle rigid plastics was collected for recycling in the United States. While some of this material is plastic grades # 1 (PET) and #2 (HDPE), it primarily includes other grades of rigid plastic. Approximately two-thirds of the material was exported, primarily to China, and the remainder was used to manufacture new products such as pallets, crates, composite lumber and gardening products in the U.S. or Canada (American Chemistry Council, 2009). The potential domestic end market is very large, but there are several barriers to realizing the potential domestic market demand. The primary barrier in 2007 and most of 2008 was the willingness of Chinese buyers to accept low quality, mixed resin bales at relatively strong prices. These barriers include the significant variations in the current collection and processing infrastructure in the U.S.

Improved sorting capabilities at single stream MRFs may help to recover better quality resin and in turn may enhance domestic demand for plastics #3 through #7. In addition, programs designed to

collect and recycle film plastic bags, (like New York State's Plastic Bag Reduction, Reuse and Recycling Act, which took effect in January 2009) may help fuel more domestic markets for this component of the solid waste stream. It is unlikely that activities undertaken by the Planning Unit by itself will help to enhance markets for plastics #3 through #7, but working together with the NYSDEC, and other organizations the Planning Unit can continue its participation in statewide and regional efforts to enhance these markets.

Markets for compost are primarily local, and while well-established, need to be expanded to account for the increasing quantities of the material that are expected to be available as more and more communities, businesses, and institutions begin to compost larger fractions of their organic waste stream. Current compost markets rely primarily on composts produced at the yard waste compost facilities in the Capital Region. Current prices for compost range from $10 per yard for the compost derived from sewage sludge and MSW in Delaware County, NY, $35 to $43 per yard for screened organic waste compost produced at two facilities in New Hampshire and Vermont.

New markets need to be developed for the SSOW compost products to ensure an appropriate balance of supply and demand to maintain and enhance current pricing. New or enhanced markets would include golf courses, horticultural nurseries, and increased consumption by residential consumers and gardeners. Another important market could be developed by the federal state and locals governments, who could promote more compost consumption by building contractors working on government sponsored project.

Because the use of a compost facility as an alternative to landfill disposal of SSOW results in a reduction in greenhouse gas emissions, it is possible the operation of such facilities would become eligible to generate carbon credits which would have trading value in commodity markets. If this were to occur, revenue derived from the sale of these carbon credits would also enhance the value of compost products and help ensure the economic viability and competitiveness of composting operations. Action by the state and or federal government may be necessary in order for local compost markets to benefit from the monetization of these carbon credits.

4.5 Recycling and Diversion Rate Goals

The SWMP Modification presented Recycling and Diversion Rate goals for the years 2009 through 2011. These end-of-year goals are as follows:

- 2009 – 40% including: 20.5% for Municipal MSW; 38.5% for Municipal MSW w/ Yard waste; and 30% for commercial MSW.
- 2010 – 45% including: 25.5% for Municipal MSW; 45% for Municipal MSW w/ Yard waste; and 46% for commercial MSW.
- 2011 – 47% including: 29% for Municipal MSW; 49% for Municipal MSW w/ Yard waste; and 50.5% for commercial MSW.

These goals were presented and established prior to the performance of the detailed waste characterization field study and the materials recovery analysis that is part of this new Solid Waste Management Plan. These more detailed analyses will be used as a basis for establishing new recycling and diversion goals as part of this new SWMP.

The analysis presented above in Section 4.3 shows that with the maximized recovery of currently designated recyclables, the maximum achievable diversion rate of 49%. In addition, if C&D recycling were to return to 2007 levels in the future, another 50,000 tons of C&D could be generated and recycled in the Planning Unit, resulting in an increase in the maximum diversion rate of 13.5 percentage point.

If recycling of electronic waste and HHW were made mandatory, the maximum achievable diversion rate could increase by 1.3 percentage points. With the addition of plastic containers 3 through 7 and film plastics as designated mandatory recyclables, this maximum achievable diversion rate could be increased by another 2.4 percentage points. The development of a mandatory program for SSOW collection and a facility to process this waste stream could increase the diversion rate by another 11.4 percentage points. Recovery of additional elements of the C&D debris stream could increase the diversion rate another 0.6 percentage points.

Based on the estimated maximized recovery from all of these programs, the overall maximum achievable diversion rate would be approximately 65 % and 78%. The long term recycling and waste reduction goals for this new SWMP, along with the time frame for achieving them, are presented in Section 6.1.

SECTION 5.0
ALTERNATIVES ANALYSIS

Contents

5.0 ALTERNATIVES ANALYSIS 5-1
5.1 Introduction 5-1
5.2 No Action Alternative 5-1
5.3 Alternative Solid Waste Management Methods 5-2
5.3.1 Proven Technologies and Practices 5-2
5.3.1.1 Volume Based User Fees 5-2
5.3.1.2 Product Stewardship 5-4
5.3.1.3 Dual Stream Recyclables Collection and MRF 5-5
5.3.1.4 Single Stream Recyclables Collection and MRF 5-6
5.3.1.5 Yard Waste Composting 5-8
5.3.1.6 Mixed MSW Composting 5-8
5.3.1.7 SSOW Composting 5-10
5.3.1.8 Conventional Waste –to-Energy 5-12
5.3.1.9 Transfer Station 5-15
5.3.1.10 Landfill 5-16
5.3.2 Emerging Solid Waste Management Technologies 5-20
5.3.2.1 Thermal Processes 5-21
5.3.2.2 Biological and Chemical Processes 5-24
5.3.2.3 Comparison of Emerging Technologies 5-27
5.4 Institutional Alternatives 5-30
5.4.1 Expansion of the Planning Unit 5-30
5.4.2 Implementing Agency Alternatives 5-31
5.4.3 Flow Control 5-35
5.5 Alternative Implementation Scenarios 5-37
5.5.1 Alternative Implementation Scenario #1 5-38
5.5.2 Alternative Implementation Scenario #2 5-40
5.5.3 Alternative Implementation Scenario #3 5-41
5.6 Comparison of Implementation Scenarios 5-43
5.6.1 Cost Analysis 5-44
5.6.1.1 Local Solid Waste Management Authority 5-44
5.6.1.2 Regional Solid Waste Management Authority 5-45
5.6.1.3 SSOW Collection and Processing 5-47
5.6.1.4 Regional Solid waste Treatment Facility 5-49
5.6.1.5 Land Disposal Of Residue And Post-Recyclable Waste 5-53
5.6.1.6 Cost Analysis Summary of Alternative Implementation Scenarios 5-56
5.6.2 Facility Sizing Analysis 5-57
5.6.3 Financial Risk 5-59
5.6.3.1 Local Or Regional Solid Waste Management Authority 5-59
5.6.3.2 SSOW Facility 5-59
5.6.3.3 Regional Solid Waste Treatment Facility 5-60
5.6.3.4 Land Disposal Of Residue And Post-Recyclable Waste 5-61
5.6.4 Time to Implement 5-62
5.6.4.1 Local or Regional Solid Waste Management Authority 5-63
5.6.4.2 SSOW Facility 5-63
5.6.4.3 Regional Solid Waste Treatment Facility 5-64
5.6.4.4 Land Disposal Of Residue And Post-Recyclable Waste 5-65
5.6.5 Effectiveness 5-65
5.6.5.1 Local Solid Waste Management Authority 5-66
5.6.5.2 Regional Solid Waste Management Authority 5-67
5.6.5.3 SSOW Facility 5-67
5.6.5.4 Regional Solid Waste Treatment Facility 5-68
5.6.5.5 Land Disposal of Residue and Post-Recyclable Waste 5-68
5.6.6 Environmental Impacts 5-68
5.6.6.1 Land Resources 5-69
5.6.6.2 Air Resources 5-70
5.6.7 Impacts on Neighboring Jurisdictions 5-73

5.0 ALTERNATIVES ANALYSIS

5.1 Introduction

This section identifies and examines various alternative approaches to solid waste management which are being considered in the process of formulating the New SWMP. Alternative solid waste management methods that are commercially proven are discussed in detail in Section 5.2. A discussion of emerging solid waste management technologies is presented in Section 5.3. Institutional alternatives, such as expansion of the Planning Unit, the establishment of a solid waste management authority, and the implementation of waste flow control, are discussed in Section 5.4.

Three different Alternative Implementation Scenarios are identified in Section 5.5. These scenarios are evaluated in Section 5.6 based on a series of factors including cost, facility sizing, financial risk, time to implement, effectiveness in meeting the goals and objectives of the SWMP, environmental impacts, and impacts on neighboring jurisdictions.

The results of this analysis were used to determine the elements of the SWMP that are presented in Section 6.

5.2 No Action Alternative

The No Action Alternative would involve not developing and implementing a new SWMP. Under this alternative, after the Eastern Expansion of the Rapp Road Landfill is filled to capacity, the planning unit would dissolve and the constituent members would form their own planning units or join another one. Communities would need to make their own arrangements for solid waste management programs and facilities in the future.

Under this alternative the following outcomes are anticipated:

- Some municipal waste streams could be delivered to disposal at local transfer stations or landfills which have available capacity. Local transfer stations may use commercially available landfills in New York or other available disposal facilities.
- Municipal recycling programs would continue, but no coordinated recycling efforts would occur through the existing planning unit structure.
- Individual municipalities may join another Planning Unit.

This alternative would not meet the goals and objectives of this Solid Waste Management Plan, particularly the objective related to maintaining and expanding the Planning Unit. As a result, this No-Action Alternative will not be considered further.

5.3 Alternative Solid Waste Management Methods

This section will present a discussion of both commercially proven and emerging waste management technologies and practices, and their potential for application or continued use in the planning unit. This section will also include a comparative assessment of impacts associated with these alternative solid waste management methods.

5.3.1 Proven Technologies and Practices

Proven waste management technologies and practices include those currently being employed in the Planning Unit, such as dual stream collection and MRF for recyclables, yard waste composting, transfer stations and landfill disposal. Other potentially feasible proven technologies and practices include: single stream recyclables collection and MRF, mixed MSW composting, source separated organic waste composting facilities, mass burn waste-to-energy (WTE) facilities, volume based user fees (also known as Pay as You Throw, or PAYT) and expanded application of Product Stewardship. In the case of transfer station and landfill facilities, there are multiple alternatives that need may be considered, particularly if waste disposal will take place at a landfill located a long distance from the Planning Unit.

A description of each of these alternatives is presented in the sections below.

5.3.1.1 Volume Based User Fees

Volume based user residential waste collection programs are also known as Pay as You Throw (PAYT) or Save Money and Reduce Trash (SMART). These programs are designed to create direct economic incentives for residents to reduce the amount of waste that they dispose by creating a pricing structure similar to other utility services like electricity and gas (USEPA, 2009). PAYT programs can have the very positive impacts of decreasing the MSW stream and increasing recycling rates. Often there are both political and community opposition to such a program particularly if solid waste collection is a service provided by a municipality and is often viewed as “free” by residents. It is important to conduct adequate public education programs for both customers and haulers to ensure adequate understanding of the program in that customers can have a direct impact on their solid waste disposal costs by choosing to reduce and recycle. Once implemented and operational for a period of time communities and residents have reacted very positively to these programs; recycling rates tend to increase, while MSW disposal quantities decrease. Successful programs can be found across the county from large cities to small urban areas. Some communities that have successfully implemented these programs include: Dover, New Hampshire; Falmouth, Massachusetts; Fort Collins, Colorado; Gainesville, Florida; Poquoson, Virginia; San Jose, California; South Kingston, Rhode Island and Vancouver, Washington. All of these communities use the PAYT system in concert with strong recycling programs.

Several communities have reported recycling rates of 50% once these systems were implemented. Perhaps more importantly, municipalities have significantly decreased the quantity of MSW directed to landfills, extending the life of disposal sites and reducing costs related to tipping fees. More information regarding these programs lessons learned can be found on the EPA's website at http://www.epa.gov/epaoswer/non-hw/payt/tools/success.htm.

One example of a successful PAYT program in New York State is operated in the City of Utica through the Oneida Herkimer Solid Waste Management Authority (OHCSWA). This program was initiated in 1990 or 1991. Residents pay an annual user fee and purchase "blue" 15 or 30 gallon bags for MSW which are available at more than 30 retail outlets within the City. Trash and recyclables are collected once a week on the same day. The City's residential set out requirements are as follows:

- Unlimited blue bags
- One cubic yard trash/construction and demolition debris per single family
- One automobile battery
- One bulk item (appliance, couch, mattress)
- Unlimited recyclables- (orange bins provided)
- Green Waste
- Two tires

Nine other communities within the (OHCSWA) have also instituted PAYT systems. Records indicate that recycling rates for these communities including Utica are between 23-31%. Recycling rates for non PAYT communities within the Authority area have been documented as low as 10-13%. The City of Binghamton has also been operating PAYT and recycling programs since 1991. With the onset of recycling, the City eliminated the tipping fee tax from all property tax bills. A bag system was instituted and residents purchase bags, thereby only paying for the amount of garbage they generate. The City estimates that over 130,000 tons of material has been diverted from the County Landfill due to this system; saving over $5,000,000 in tipping fees since 1991.

The City of Albany DGS had previously informally evaluated (PAYT), but did not elect to implement the program at that time. As part of the SWMP Modification, the City of Albany committed to explore the potential effectiveness of PAYT programs and the feasibility of implementing such a program in the City.

A contractor working through the USEPA is conducting a PAYT study for the City. After that study is completed, the City will determine the feasibility of such a program including identifying any necessary changes to collection, billing and administration. In addition, the SWMP modification also commits the PURC will take the lead in educating the member communities in the Planning Unit about the benefits and challenges of instituting PAYT systems and will work with the communities which have an interest in PAYT.

As part of its new state-wide Solid Waste Management Plan, the NYSDEC intends to pursue policy, legislation and regulations which will promote the expanded use of PAYT and SMART programs as an important mechanism for waste reduction.

5.3.1.2 Product Stewardship

Product stewardship is a product-centered approach that is gaining increasing attention in public policy as an effective mechanism for solid waste management. Also known as extended product responsibility (EPR), product stewardship calls on manufacturers, retailers, users, and disposers to share responsibility for reducing the environmental impacts of products (USEPA, 2009). With product stewardship manufacturers must take on new responsibilities to reduce the environmental footprint of their products, but consumers, waste generators and government agencies must also be involved.

Consumer engagement is critical in product stewardship because it is the consumer who makes the choice between competing products and who must use and dispose of products responsibly. State and local governments are essential to fostering product stewardship as it relates to waste management, because solid waste and recycling programs are administered by local governments pursuant to state regulation and policy. The federal government also shares responsibility for increasing product stewardship as well, but federal statutory authority in this area is limited. The USEPA does facilitate coordination and collaboration among states, local governments, industry, and non-governmental organizations on end-of-life considerations as one means of encouraging more environmentally conscious design and greater resource conservation (USEPA, 2009).

A national non-profit organization called the Product Stewardship Institute (PSI) was formed in 2001 to work with state and local governments to partner with manufacturers, retailers, environmental groups, federal agencies and other key stakeholders to reduce the health and environmental impacts of consumer products (PSI, 2009). Currently, PSI is involved in the following product categories:

- Carpet
- Electronics
- Fluorescent Lighting
- Gas Cylinders
- Medical Sharps
- Mercury Products
- Paint
- Pesticides
- Pharmaceuticals
- Phone Books
- Radioactive Devices
- Thermostats
- Tires

Many of these items are already part of the mandatory recycling or voluntary HHW collection and recycling programs that are currently in effect in the Planning Unit. Extending end of life management responsibility for these products to their manufacturers and distributors will reduce the costs that local governments incur in managing these materials and will foster more widespread consumer participation in reuse, reduction and recycling programs for these materials.

Tires management is also covered under the Waste Tire Management and Recycling Act of 2003 which was enacted to ensure the proper management of waste tires in New York State. Among other things, this law resulted in the establishment of the Waste Tire Management and Recycling Fund and enactment of a waste tire management and recycling fee of $2.50 per new tire sold, including tires on new motor vehicles. Tire services must collect the waste tire management and recycling fee from the purchaser at the time of the sale and remit such fee to the Department of Taxation and Finance. The law also provides for mandatory acceptance of used tires from customers by tire service centers. Customers may return tires in approximately the same size and in a quantity equal to the number of new tires purchased or installed. Sign posting requirements are also included for tire service centers. These provisions of the law reportedly expire on December 31, 2010, so they will need to be extended or amended by the State Legislature before that time.

As part of its new state-wide Solid Waste Management Plan, the NYSDEC intends to pursue product stewardship for several individual product categories. The initial high priority targets are likely to include electronics, pharmaceuticals, household hazardous waste (HHW) and packaging and printed products.

The Planning Unit can work with the NYSDEC, the recently formed New York Product Stewardship Council (currently part of the New York State Association for Solid Waste Management) and others to advance an agenda of product stewardship initiatives that can reduce the amount and toxicity of these materials that are left for disposal at the end of their useful lives.

5.3.1.3 Dual Stream Recyclables Collection and MRF

Most communities in the Planning Unit that collect recyclables from the curbside allow residents to co-mingle all recyclable paper in one container, and all recyclable glass, metal, and plastic bottles and cans (GMP) in another container. This is referred to as dual- stream recyclables collection. These collected recyclables are then delivered to one or more material recovery facilities (MRFs) where the dual stream recyclables are sorted into their constituent marketable commodities.

There are several existing MRFs that accept dual stream recyclables from the Planning Unit communities. These include:

- Sierra Fibers – Albany, NY
- Metro Waste Paper Recovery – Albany, NY

These dual stream recycling systems evolved out of earlier efforts where materials were source separated into their constituent commodities such as newspaper, office paper, glass, etc. Dual stream systems proved to be more efficient from a collection standpoint and more convenient for program participants. Over time these systems have become the norm for the collection and processing of residential recyclables, although as noted below, a new single stream approach is becoming increasingly more popular.

5.3.1.4 Single Stream Recyclables Collection and MRF

Single stream recycling refers to a system in which all paper fibers and containers are mixed together in a collection truck, instead of being sorted into separate categories or commodities by the resident and handled separately throughout the collection process. In single stream recycling, both the collection and processing systems must be designed to handle this fully commingled mixture of recyclables. (Wisconsin Department of Natural Resources, 2004)

Proponents of single stream note several advantages:

- reduced sorting effort by residents may mean more recyclables are placed at the curb and more residents may participate in recycling;
- reduced collection costs because single-compartment trucks are cheaper to purchase and operate, collection can be automated, and collection routes can be serviced more efficiently;
- greater fleet flexibility which allows single compartment vehicles to be used for refuse or recycling, providing greater fleet flexibility and reducing the number of reserve vehicles needed. (To avoid confusing customers, a large sign/banner can be used to distinguish when a refuse truck is being used for recycling);
- participation and volume per household may increase and worker injuries may decrease because the switch to single stream is often accompanied by a switch from bins to cart-based collection;
- changing to single stream may provide an opportunity to update the collection and processing system and to add new materials to the list of recyclables accepted; and
- more paper grades may be collected, including junk mail, telephone books and mixed residential paper.

Potential disadvantages of single stream recycling may include:

- Initial capital cost for
  - new carts,
  - different collection vehicles,
  - upgrading of processing facility, and
  - education of residents;
- processing costs may increase compared to multiple stream systems
- possible reduced commodity prices due to contamination of paper;
- increased "downcycling" of paper, i.e., use of high quality fibers for low-end uses like boxboard due to presence of contaminants;
- possible increase in residual rates after processing (due chiefly to increased breakage of glass); and
- potential for diminished public confidence if more recyclables are destined for landfill disposal due to contamination or unmarketability.

Many of the nation's largest waste companies are developing single stream collection and recycling capabilities. One of North America's top recycling companies, Waste Management nearly tripled the volume of material processed in its single-stream recycling facilities, from about 722,000 tons in 2002 to more than 2 million tons in 2006. (Waste Management, 2008) Allied Waste Industries is reported to be spending $ 2 million to upgrade its recycling facility in Buffalo New York to a single stream system. (Waste News, 2008) Casella Waste Systems, Inc. operates a single stream MRF facility in Ontario County, NY and in the Chittenden Solid Waste District in the Burlington Vermont area. Casella also submitted a response to the RFI which included a single-stream MRF with a capacity of 65,000 tons per year.

Waste Management, Inc. recently invested $11 million to build a single stream recycling facility in the Syracuse suburb of in Liverpool NY. The 94,000 square feet facility is able to process up to 20 tons of recyclables per hour, and is among the largest single-stream recycling facilities in the country. This facility was visited by a group from the SWMP Steering Committee on June 19, 2009, and is contractually utilized by OCRRA. In addition to material delivered on OCRRA account, other single stream recyclables are also accepted. According to the facility representative, this single stream MRF can process 400 tons per day of single stream recyclables, and recover multiple grades of paper, glass, metal and plastic. As of June 2009, such a facility would be expected to cost approximately $12 million to construct and equip, including the building.

In January 2010 County Waste announced its intention to develop a single stream MRF at its existing dual stream MRF on South Pearl Street in Albany (Sierra Fibers) and that it has begun to provide single stream recyclables collection to all of its residential customers in the Capital District. The single stream facility is expected to be operation by August 2010.

5.3.1.5 Yard Waste Composting

Yard waste can represent a significant portion of the solid waste stream and typically consists of leaves, grass clippings, and tree and shrub cuttings. Many municipalities operate yard waste composting facilities where the collected yard waste is formed into windrows which are periodically turned and processed until the composting process is complete. Compost is then either sold to bulk users or given to local residents for their use. Brush and tree trimmings are sometimes chipped for use as mulch rather than composted.

Composting is a natural aerobic digestion process, where organic material is metabolized by microorganisms in the presence of oxygen. During the process, temperature and pH increase, carbon dioxide and water are liberated (reducing the mass of material), and pathogens are destroyed. The finished compost is an excellent soil amendment which enhances the fertility and natural health of the soil.

The NYSDEC regulates composting facilities under the solid waste management regulations at 6 NYCRR Part 360. Subpart 360-5 specifically regulates the construction and operation of composting and other organic waste processing facilities for mixed solid waste, source separated organic waste (SSOW), biosolids, septage, yard waste and other solid waste. Certain types of facilities, with limited waste acceptance thresholds, are exempted from regulation, while other facilities, again based on size thresholds, are eligible for the less rigorous registration requirements in lieu of a permit. These exemption and registration eligibility requirements are specified in Subpart 360-5.

In general, there are three different types of composting facilities that are specified in the NYSDEC regulations: yard waste composting facilities; SSOW composting facilities; and organic waste processing facilities for biosolids, mixed solid waste, septage and other sludges. Generally speaking, yard waste composting facilities have the least stringent design and operational requirements, while the most stringent requirements apply to the biosolids facility.

There are two Part 360 permitted yard waste composting facility in the Planning Unit, one operated by the City of Albany DGS and one operated by the Town of Bethlehem. These were discussed previously in Section 3.4. In addition there are several public and private yard waste management facilities in the Planning Unit that are not regulated by NYSDEC because they are below the regulatory size thresholds. The Town of Knox is reportedly planning to develop a yard waste composting facility operation.

5.3.1.6 Mixed MSW Composting

Recyclable materials are typically removed from a MSW waste stream through source-separation recycling programs, and mixed MSW composting requires additional pre- and post-processing to

remove inert materials such as plastic or glass, which diminish the quality of compost products. Some MSW composting facilities accept biosolids or other types of solid waste. Wastes are typically loaded into a rotating bioreactor drum for a few days. Screening processes are used to separate unacceptable wastes, which is landfilled as process residue, from the raw compost which is stored in a maturation area for approximately one month to allow biological decomposition to occur.

Advantages of mixed MSW composting include the ease of collection and limited separation required by waste generators. The process provides environmental benefits relative to landfilling or WTE, and produces a usable compost byproduct. However, mixed MSW composting requires the separation and disposal of process residuals, and the quality of compost products may be impacted by small contaminant materials, such as glass shards, or from unwanted chemical constituents in the mixed MSW. .

There are 13 mixed MSW composting facilities in the U.S., and Delaware County operates the only facility in New York State. Delaware County is located in the watershed that supplies drinking water to New York City, and a combination of economic considerations and desire to preserve the rural area's pristine character led the county to construct a mixed MSW composting facility. Delaware County first issued an RFP for the composting facility in 1996, and it took nearly 10 years before the facility began operations.

The Delaware County co-composting facility accepts MSW, dewatered wastewater treatment plant sludge as well as smaller quantities of solids and liquids from industrial dairy processors in the County. According to their Annual report to DEC, the following quantities were accepted at the co-composting facility in 2008:

- Mixed MSW – 24,712 TPY
- WWTP sludge – 5,113 TPY
- Industrial solids – 4.11 TPY
- Industrial liquids – 4.83 TPY

During that year, 17,676 tons of compost was produced, and 14,511 tons of compost facility residue was disposed of at the landfill facility located on the same site. The residue disposal represents almost 59% of the incoming MSW processed at the co-composting facility.

CHA visited this facility with the Chairman and several members of the SWMP Steering Committee on September 2, 2009. During that visit the following information about the cost of facility operation was provided:

- Facility Construction Cost was approximately $20 million, not including the cost of land which the County already owned.

- Some significant elements of Facility Construction, such as the site improvements and concrete, were performed directly by County DPW.
- $2 million in Grant funding was provided by the NYSDEC.
- $11.4 million on low interest project financing was provided by the NYS Environmental Facilities Corporation at an interest rate 2.25% over a term of 25 years.
- Operating and Maintenance cost, exclusive of debt service, is about $55 per ton. Labor cost and electricity consumption are the two biggest cost elements.
- The facility electricity charges are approximately $400,000 per year, and reflect significant use of blowers to move air to maintain compost process aeration and negative air pressure in a three acre building.
- The facility is actively operated on one shift per day, 7 days per week with a staff of 12 consisting of 1 plant manager, 3 maintenance staff and 8 operators.
- Bulk sales of finished compost are made primarily to landscape contractors and currently are netting about $10/CY for loads picked up at the facility. The Plant manager reported an average density of about 700 lb/CY. Price may increase because demand is outstripping their supply. Because of the compost is derived from MSW and WWTP sludge, NYSDEC does not allow this material to be marketed for use on food crops or vegetable gardens. This limitation has a negative effect on the pricing of this compost.

None of the RFI respondents proposed the use of a mixed MSW Composting Facility to manage waste from the Planning Unit.

5.3.1.7 SSOW Composting

As the name implies, Source Separated Organic Waste (SSOW) composting involves the separation, collection and processing of certain organic components MSW as feedstock to make compost products for reuse. As noted above, Subpart 360-5 specifically regulates the construction and operation of composting and other organic waste processing facilities for source separated organic waste. As defined in these regulations, SSOW means “readily degradable organic material that has been separated from non-compostable material at the point of generation, including but not limited to food waste, soiled or unrecyclable paper and yard waste in combination with any of the former materials.” Generators of SSOW are not directly regulated under Part 360.

There are currently no municipal SSOW composting programs in New York State. Cayuga Compost is a small-scale private SSOW composting operation located in Tompkins County, and is the only business of its kind in the state. SSOW is collected from major generators including Ithaca College dining facilities and the Ithaca Farmers’ Market, and compost products are marketed for wholesale or retail.

Capital Compost was a private SSOW composting operation that opened in 1997 in the Albany region. The facility had a 50 TPD capacity and was located at a transfer station. Waste materials were dumped on a tipping floor of the transfer station, and personnel separated organic waste from other MSW. Organic materials were directed to a composting process and the remaining MSW was transferred and transported for landfill disposal. Capital Compost was unable to remain cost competitive in the industry, and was eventually forced to cease operations.

The New York State OGS recently began a project, conducted with Sodexo, the state's contract food vendor, to capture and divert for composting the kitchen food scraps and biodegradable dining room waste from facilities in the Empire State Plaza in Albany (NYSOGS, 2009). The process will significantly reduce the amount of trash hauled to a landfill. Sodexo's kitchens began collection on April 1, and its dining room application will begin on April 20. During the project's six-month first phase, the Pastabilities cafeteria will serve as the pilot site for the dining area part of the program. Patrons will be guided through simple self-sorting procedures, dividing their waste into three categories: compostable, recyclable (i.e., glass, metal and plastic), and trash. Following collection and compaction, the compostable material will be transported to CTI Agricycle LLC, a permitted facility located in the Town of Cambridge (Washington County). OGS and Sodexo estimate that approximately two tons of material (about half of all waste generated) will be collected and diverted for composting each month when the program is extended to all nine Plaza food service venues.

As noted in Section 4, cities like Toronto and Seattle have implemented SSOW collection and processing for residential solid waste. Toronto's program is called the Green Bin program and provides currently services 510,000 single-family households and is now being initiated at 5,000 apartments, condos and co-op buildings. In the City of Seattle program, food and yard waste collection service is required for all single-family households and is provided weekly.

The materials targeted for collection and composting in an SSOW program vary from place to place. In addition to yard waste such as grass clippings, leaves and brush, household food waste represents an accessible waste stream that can be captured and processed by SSOW composting. Collection of SSOW may target households throughout a jurisdiction, or may be limited to heavy generators such as restaurants, produce retailers and wholesalers, schools and other institutions.

One company, Norterra New York, responded to the RFI with information on this process, and their submittal indicated that feedstock would be limited to SSOW. The minimum facility size was noted as 20,000 tons per year, with potential expansion in 10,000 TPY increments. Minimum site size is 6 acres and up to 20 acres for a 75,000 TPY facility. This respondent suggested that a SSOW compost operation would initially focus on:

- Yard waste
- Institutional cafeteria waste

- Food processing waste
- Manures
- Low grade papers and similar fibers
- Restaurant waste
- Grease and oils
- Waxed corrugated cardboard
- Woody waste

As a second stage, organic waste collection could be expanded to include residential SSOW.

SSOW composting offers several potential advantages over mixed waste composting, and other MSW management alternatives, including:

- The tipping area and pre-processing equipment are not sized for a large residual fraction, thereby saving capital and operating costs;
- May be somewhat less capital intensive than other MSW management technologies;
- Resulting compost is lower in heavy metals and visible paper and plastics, and may be more desirable as an end-use product. A smaller quantity of compost is produced, which may simplify the marketing of products.

The following disadvantages have been identified:

- Source separation of organics from commercial and institutional generators would necessitate a change in waste collection and storage practices;
- Residential SSOW collection programs will necessitate separate collection which may result in additional costs;
- Storage at the source is potentially odorous and requires additional space;
- An urban location for a SSOW Facility may be constrained due to buffer requirements for odor control.

5.3.1.8 Conventional Waste –to-Energy

For purposes of this SWMP a Conventional Waste-to-Energy (WTE) is defined as a solid waste management facility that combusts wastes to generate steam or electricity and reduces the volume of municipal solid waste (MSW) that would otherwise need to be disposed of by approximately 80-90 percent. These facilities are also sometimes referred to as resource recovery facilities, Municipal Waste Combustors (MWC) or solid waste incinerators. As of July 2008, there were 10 active WTE facilities in New York State. In 2007, these facilities processed approximately 3.8 million tons of solid waste and generated approximately 2.2 million megawatt hours of electricity. Additionally, approximately 88,000 tons of ferrous metals were recovered by magnetic separators for recycling. (NYSDEC, 2008). A listing of these 10 facilities is presented in Table 5-1.

Stricter emission standards and numerous emission controls (which include fabric filters, dry scrubbers, carbon injectors, nitrogen oxide controls, spray dry absorbers, lime injection, selective non-catalytic reduction, acid gas/particulate matter control and electrostatic precipitators) being used in all active waste-to-energy facilities in New York State have resulted in a reduction in waste-to-energy air emissions and have significantly contributed to a cleaner state environment. Barring certain waste from entering the waste-to-energy facility waste stream (e.g., batteries and fluorescent light bulbs to reduce mercury emissions) has also resulted in less harmful stack emissions and a cleaner environment. Ash generated at WTE facilities is not hazardous, and is often beneficially re-used as an alternative daily cover at lined solid waste landfills in New York.

Table 5-1
Permitted Waste-to Energy Facilities in New York

Facility Name	Location (County)	Annual Tonnage Limit	Actual Waste Acceptance 2008 (tons)
Town of Hempstead	Nassau	975,000	969,328
Town of Islip	Suffolk	177,025	172,361
Town of Babylon	Suffolk	254,588	219,899
Town of Huntington	Suffolk	350,400	332,720
Dutchess County	Dutchess	166,440	142,844
Charles Point	Westchester	674,730	692,923
Hudson Falls	Washington	152,500	170,333
Onondaga County	Onondaga	361,350	348,613
Oswego County	Oswego	61,000	62,424
American Ref-Fuel Niagara	Niagara	821,250	801,455

Source: NYSDEC, 2009

The Capital Region Planning Unit had previously utilized waste-to-energy technology involving the production of refuse derived fuel (RDF) at the Rapp Road Landfill site, followed by combustion in a dedicated boiler owned by the New York State Office of General Services at Sheridan Avenue in the City of Albany. The Sheridan Avenue facility was closed to refuse-derived fuel on January 26, 1994 due to potential environmental concerns associated with air emissions and in response to neighbor complaints.

Currently operating facilities nearest in New York to the Planning Unit include Wheelabrator's Resource Recovery Facility in Hudson Falls, the Dutchess County Resource Recovery Facility in Poughkeepsie, NY and the Onondaga County Resource Recovery Agency (OCRRA) Facility in Syracuse, NY. The Wheelabrator facility is permitted to accept 152,500 tons per year and in 2007 operated near its permit limit. Some of the waste delivered to the Waste Management Transfer Station in Albany was delivered to this Hudson Falls Facility in 2007. According to NYSDEC, the

Dutchess County facility is permitted to accept 166,440 tons per year and in 2007 accepted about 144,500 tons (NYSDEC, 2008a).

The OCRRA facility was visited by a group from the SWMP Steering Committee on June 19, 2009, and the following information about the facility was provided during that visit. The three-train Mass Burn WTE facility has been operating since 1995. In 2008, over 348,000 tons of non- recyclable solid waste was processed at this facility. Only waste from the OCRRA service area is accepted at the facility. The facility was designed, built and operated by Covanta Energy (formerly Ogden Martin Systems) and generates electricity for sale to National Grid. In 2008 the facility generated over 252,000 MWh, enough electricity to supply the plants needs and power over 36,000 homes. Ferrous and non-ferrous metal are recovered from bottom ash. Ash residue is about 25% by weight or 10% by volume of the incoming waste, is non-hazardous, and is currently sent to Seneca Meadows Landfill where it is disposed of or used for alternative daily cover. In 1992 OCRRA issued more than $178 million in bonds for the purpose of underwriting the construction costs of this facility.

OCRRA's annual reports provide detailed information on its WTE operations (OCRRA, 2008). In 2008, the OCRRA facility processed 343,263 tons of MSW and generated 252,149 MWh of electricity, enough to power 36,580 homes. Tipping fee revenues were $19,996,019 and electric revenues were $13,505,510 in 2008. WTE operations expenses and landfill disposal costs were $27,650,099 in 2008, or 74% of the Agency's total operating expenses. Dividing this WTE operations expense and landfill disposal cost by annual processed tonnage yields an average cost of $80.55 per ton. If electricity revenues are subtracted from the total cost, net average cost is reduced to $41.21per ton.

One currently operating facility on Long Island has proposed an expansion; the Hempstead Resource Recovery Facility, located at the intersection of the Meadowbrook Parkway and Merchants Concourse, Town of Hempstead, New York (AECOM Environment, 2009). This facility has operated for over 20 years, and its primary function has been to provide environmentally sound and cost-effective disposal of MSW generated in the Town of Hempstead. The existing facility, comprised of three identical units, is currently permitted to combust up to 975,000 TPY of MSW and has also provided for the environmentally sound and cost-effective disposal of MSW generated in the Town of Brookhaven under an inter-municipal agreement between the towns of Hempstead and Brookhaven. The facility's owner (Covanta) is proposing to expand the facility by adding a fourth unit and supporting ancillary equipment. The Expansion Project would generate up to approximately 35 MW of additional non-fossil fuel based electricity (net of in-Facility consumption) to the grid by combusting up to 420,000 TPY of additional MSW from the primary and secondary service areas. It is anticipated the expanded Facility would continue to principally serve the Towns of Hempstead and Brookhaven as it has for the past 20-years.

The first new greenfield conventional WTE facility in more than a decade is under development in Maryland, under the sponsorship of the Northeast Maryland Waste Disposal Authority and Frederick County, MD (Waste Management, 2009). The facility, to be developed by a Wheelabrator project company, will have a design capacity 1,500 TPD and be located at an industrial site in Frederick County. Carroll County, MD is also expected to participate in the project.

Several RFI respondents submitted information about technologies or systems that would be classified as conventional WTE facilities. One company, Green Conversion Systems, LLC, responded to the RFI with information about an Advanced Thermal Recovery (ATR) system from Germany that combines the proven economics and reliability of mass burn facilities, with the most sophisticated air emissions control, and enhanced capabilities for the recovery of by-products such as ferrous and non-ferrous metals, hydrochloric acid, and gypsum. This company suggested a minimum facility size of 700 TPD, which translates into an annual throughput of about 230,000 tons per year. This facility would reportedly be capable of generating between 16 and 17 MW of electricity (net of in-plant consumption) and would require a minimum site size is 8 acres.

Several other RFI respondents supplied information on technologies which would process MSW and create a refuse derived fuel (RDF). One respondent presented information about a facility that would include an on-site dedicated boiler to combust the RDF and generate electricity, while several other respondents presented information about facilities that would manufacture solid fuel pellets which would then be sold to energy consumers off-site for use in their solid fuel combustion facilities.

5.3.1.9 Transfer Station

A transfer station is a facility where solid waste is consolidated from smaller loads into larger loads for more efficient transport to another solid waste management facility for processing or disposal. There is no need for a transfer station if locally collected waste can be delivered to local disposal or processing facilities. Transfers stations have become increasingly necessary, however, as the distance to waste disposal facilities increases.

The passage of new Part 360 Regulations in the late 1980's resulted in the need to close most old unlined municipal waste landfills in the state. Over the years, the number of MSW landfills in New York has diminished significantly, from 206 in 1988 to 28 in 2001 and 27 in 2007. The more stringent environmental regulations that resulted in the closure of many small unlined landfills also resulted in the development of a network of fewer but larger regional landfills. Because of the greater distance between waste sources and disposal sites many more transfer stations have been developed in order to more efficiently transport waste from its source to its disposal destination.

As of July 2008, there were 166 regulated (permitted) transfer stations and 364 registered transfer stations operating in New York State. (NYSDEC, 2008b) Transfer stations are governed by subpart 360-11 of the solid waste regulations. Registered transfer stations each receive less than 12,500 tons (50,000 cubic yards) of household waste per year. All the remaining transfer stations require a permit to construct and operate. In 2007, the regulated transfer stations handled approximately 10 million tons of solid waste. Both the registered and the regulated transfer stations are required to submit annual operating reports. Transfer stations authorized to process construction and demolition debris must also comply with the operational requirements of 6 NYCRR 360-16.4.

Several municipalities in the planning unit operate small transfer stations that are primarily used by local residents and businesses who self haul their waste. Most of these small municipal transfer stations also serve as recycling centers to collect designated recyclable materials from local residents. Municipalities which currently operate these small transfer stations include:

- Town of Berne;
- Town of Bethlehem;
- Town of East Greenbush
- Town of Guilderland;
- Town of Knox;
- Town of Rensselaerville;
- Town of Westerlo.

The original 1992 SWMP noted that the Rapp Road facility will be the central location for transferring solid waste to disposal locations outside the City of Albany. The September 2008 SWMP Modification includes the development of the final expansion of the Rapp Road Landfill. If the expansion is approved, the City intends to acquire land immediately adjacent to the existing Rapp Road landfill and relocate the transfer station to that parcel.

There are several privately owned and operated transfer stations located in the Planning Unit, as noted previously in Table 3-3 and Figure 3-1. In addition, there are several other transfer stations located near the Planning Unit that may accept local waste, as noted previously in Table 3-4 and Figure 3-2.

5.3.1.10 Landfill

Landfills are used for the disposal of solid waste that is not reused, recycled or combusted for energy recovery. The NYSDEC regulates Ash Monofill Landfills, Construction & Demolition (C&D) Debris Landfills, Industrial Landfills, and Municipal Solid Waste (MSW) landfills. In October 2007, there were 27 active municipal solid waste landfills, 13 active industrial/commercial waste landfills, 20 construction and demolition (C&D) landfills, and 3 active ash monofill landfills (NYSDEC,

2008c). The construction and operation of landfills is governed by strict environmental regulations administered by the NYSDEC (see 6 NYCRR Part 360) which require that these facilities be designed, constructed and operated in a manner that minimizes adverse environmental impacts.

Despite these design and operational safeguards to the environment, new landfill sites are extremely difficult to find and most new landfill capacity created in New York State has been through the expansion of existing sites. The Oneida Herkimer Solid Waste Authority Landfill in the Town of Ava New York is the most recent new landfill site. This site started operation in October 2006 and was the result of a 15 year process of siting and permitting that began in 1991.

In July 2009 the DEC approved the Eastern Expansion of the City of Albany's Rapp Road Landfill. This facility is expected to provide disposal capacity for the Planning Unit and other local communities through the year 2016. The City has committed to no further expansions of the Rapp Road Landfill, so after the capacity of the Eastern Expansion is fully utilized this landfill site will no longer be operational and available for use by the Planning Unit.

A multi-phased site evaluation and selection process was developed as part of the original SWMP in 1992. The siting criteria were established in the SWMP, after public review, and were largely driven by requirements in the 6 NYCRR Part 360 regulations (Part 360), as well as by environmental and planning guidelines. Initially, the siting study identified fifteen potential sites that satisfied the criteria established in the SWMP. Of those sites, three were located in Guilderland, nine in Bethlehem, and three in Coeymans. The second phase report, which was issued in 1992, recommended three of the fifteen initial sites for further study.

Following a detailed investigation of the three sites in accordance with the criteria established in the SWMP, Part 360 and environmental and planning guidelines, a third report was prepared in August, 1994, selecting Site C-2 as the preferred site for the landfill. An option for purchase of the site was negotiated with the property owners and detailed site investigations ensued. As a result, the site was found to contain over 100 acres of wetlands and water courses, approximately 80 acres of which would be impacted by the landfill. Many of these wetland areas were the result of the abandonment of the drainage structures previously installed to support the agricultural use of the site. Given the extent of State and federal wetland impact associated with the Site C-2 project, it will be difficult for project to meet the standards for permit issuance. While staff at the U.S. Army Corps of Engineers (USACE) had noted verbally to CHA that it would be reasonable to assume that a permit could be issued for an initial phase of the landfill encompassing only the lands containing the poorer quality, previously farmed wetlands and old fields, this ACOE staff is no longer assigned to the project, and even this more limited wetland disturbance likely would have difficulty in meeting the standards of avoidance and minimized disturbance required for permit issuance. Moreover, this initial phase would only provide about 30 acres of landfill footprint and about 2.6 million tons of landfill capacity.

This amounts to between 12 and 17 years of landfill capacity for the Planning Unit. This limited amount of landfill capacity is insufficient to justify the significant investment in new infrastructure that would be needed to establish this new landfill at this location. While it may be possible for this site to be developed for one or more of the other waste management facility components that may be proposed by this SWMP, the widespread presence of wetlands and requirement of significant investment in new infrastructure will also make this difficult. Further study will be needed if one of these uses is contemplated at this site in the future.

Including the City of Albany Landfill on Rapp Road, there are there are 27 permitted MSW landfills operating in the State of New York. Moreover there are 11 C&D landfills permitted by the NYSDEC. These facilities (excluding the City of Albany Landfill) are listed in Tables 5-2 and 5-3, respectively.

As shown in Table 5-2, there is almost 228 million tons of permitted MSW landfill capacity in New York State as of December 31, 2008. Not all of this capacity is designed and constructed at the present time, but permit approvals have been issued for this airspace. This approved landfill airspace is referred to as entitled capacity. Based on the Annual Permit Limits at these landfills, capacity at these landfills can be depleted by up 10.2 million tons per year, although in 2008 only 7.9 million tons of waste was delivered to these landfills. This represents an overall capacity utilization of 77%. The difference between the annual permit limits and actual waste deliveries is proportionally less at the privately owned landfills, where overall capacity utilization is 81%. Privately operated landfills that are publicly owned had a 84% capacity utilization, whereas landfills that are publicly owned and operated had a 68% Capacity Utilization in 2008. It is worth noting that some of the publicly owned and operated landfills may not be able to accept waste originating outside of their jurisdiction, so they have limited ability to increase their capacity utilization.

By dividing the 228 million tons of permitted and entitled capacity, by the total maximum annual permit limits of 10.2 million tons per year, an average of about 22 years of landfill capacity remains in New York. While this is a simplified measure, it does suggest that there is significant available MSW disposal capacity in New York, and there are many large private landfills with capacity to accept MSW requiring disposal from the Planning Unit. However, most of this capacity is located at facilities in central and western New York that are hundreds of miles away from the Capital Region.

Table 5-2
Permitted Municipal Solid Waste Landfills in New York

Facility Name	County	Ownership Status	2008 Solid Waste Accepted	Annual permit limit	Remaining Capacity Under Permit (12/31/08)
Niagara Recycling	Niagara	Private	504,215	800,000	9,242,609
Seneca Meadows	Seneca	Private	1,750,075	1,866,000	37,611,560
High Acres (WMNY)	Monroe	Private	765,180	1,074,500	44,400,000
CID	Erie	Private	308,071	600,000	6,084,000
Modern	Niagara	Private	802,094	815,000	29,697,906
Hyland MSW	Allegany	Private	281,195	312,000	7,708,367
Sullivan County	Sullivan	Public	62,795	226,000	140,130
Greater Albany	Albany	Public	239,785	275,100	478,351
Colonie	Albany	Public	164,083	170,500	3,362,215
Delaware County	Delaware	Public	19,337	52,800	508,111
Clinton County [1]	Clinton	Public	170,237	175,000	7,644,201
Franklin County	Franklin	Public	51,610	125,000	574,861
Saratoga County [2]	Saratoga	Public	N/A	106,000	1,425,000
Fulton County	Fulton	Public	86,873	134,000	9,450,845
DANC	Jefferson	Public	272,593	346,320	3,505,060
Broome County	Broome	Public	187,000	232,000	10,554,066
City of Auburn	Cayuga	Public	72,014	96,000	761,301
Chenango County	Chenango	Public	26,184	41,400	1,104,009
Cortland County	Cortland	Public	22,676	44,500	709,513
Madison County	Madison	Public	62,845	61,000	7,769,992
Bristol Hill	Oswego	Public	39,165	100,000	3,352,607
Chemung County	Chemung	Public	118,356	120,000	1,243,383
Mill Seat [1]	Monroe	Public	556,047	598,650	6,893,846
Ontario County [1]	Ontario	Public	673,096	900,000	7,349,795
Steuben County Bath	Steuben	Public	104,179	151,000	2,422,279
Allegany County	Allegany	Public	34,212	56,680	249,600
Chautauqua County	Chautauqua	Public	270,881	408,000	2,243,724
Ava (Oneida-Herkimer SWA)	Oneida	Public	253,261	312,000	21,388,497
Totals			**7,898,059**	**10,199,450**	**227,875,828**

Source: NYSDEC, 2009
Notes:
1. Privately operated landfill
2. Saratoga County landfill was constructed but is not operated.

The Town of Colonie Landfill has significant entitled capacity and is located just outside the Planning Unit. However, this facility is already operating at a high level of capacity utilization, so would not be able to accommodate additional waste from the Planning Unit without an increase in its annual permit limit. This facility also reportedly has potential to expand further.

As of June 2009, there were 11 permitted Construction and Demolition Debris Landfills noted in the NYSDEC list of Active C&D Landfills (NYSDEC, 2009). These are listed in Table 5-3 below. The permitted C&D landfills are generally greater than three acres and are required, at a minimum, to have a single composite liner with a leachate collection and removal system. The only permitted C&D Landfill within the Capital Region is the Santaro C&D Landfill and this facility reportedly has limited remaining capacity.

Table 5-3
Permitted C&D Landfills in New York

Facility Name	Location	DEC Permit #	Expiration Date
Burton Clark C&D	Delhi, NY	4-1228-00043/00004	4/30/2008
Delaware County SWMF	Walton, NY	4-1256-00040/00004	6/01/2009
Santaro C&D Landfill	Schenectady, NY	4-4228-00086/000020	6/30/2009
North Elba C&D Landfill	Lake Placid, NY	5-1540-00136/00001	9/15/2005
Lake George C&D Debris Landfill	Lake George, NY	5-5222-00140/00004	7/31/2005
Thurman C&D Debris Landfill	Thurman, NY	5-5238-00010/000002	2/29/2012
Chemung County Area 3 C&D Landfill	Chemung, NY	8-0728-00004/000070	9/26/2005
Hakes C&D Disposal Inc.	Painted Post, NY	8-4630-00010/00001-0	1/20/2004
L.C. Whitford Co. C&D Landfill	Scio, NY	9-0266-00011/00004	2/26/2018
Southern Tier Kleen Fill	Wellsville, NY	9-0270-00035/00003	9/01/2010
Niagara Co. Refuse Disposal District C&D Landfill	Lockport, NY	9-2926-00007/00002	3/19/2012

Source: NYSDEC, 2009

5.3.2 Emerging Solid Waste Management Technologies

As part of the SWMP, an assessment of emerging solid waste management technologies was prepared. That assessment was not intended to result in the selection of any particular technology or any particular company. Rather, it was intended to facilitate a conclusion about whether continued consideration of one or more of these technologies is appropriate as an on-going element of the new SWMP.

For the purposes of this evaluation, "emerging" solid waste management technologies are defined as technologies with the potential to provide commercial-scale, effective means of municipal solid waste processing and disposal, but which currently have little or no commercial application in the United States. Technologies that have only recently been introduced to the U.S. in a demonstration or commercial capacity qualify as emerging. Emerging technologies with existing commercial applications in other countries, but which have not been implemented in the U.S, are also included in this analysis. These emerging technologies can be broadly characterized as follows:

- Thermal processes, including:
    - Pyrolysis;
    - Gasification;
    - Plasma arc gasification;
- Biological and Chemical processes
    - Mechanical/Biological treatment
        - Aerobic processing (biodrying)
        - Anaerobic digestion
    - Ethanol production

This section presents a summary assessment of emerging solid waste technologies. A more detailed discussion of this topic is presented in Appendix E of this SWMP.

5.3.2.1 Thermal Processes

Thermal processing technologies encompass a variety of processes that use or produce heat, under controlled conditions, to convert MSW to usable products such as recyclable materials and/or electrical output. The organic content of MSW is converted to energy, and the inorganic content is recovered as products such as metals. Many thermal technologies require no MSW size reduction or separation by component, although some do require waste to be shredded prior to processing. While recyclables such as metals can be recovered in a pre-processing step, many thermal technologies recover recyclable metals after the thermal conversion process.

Thermal technologies can potentially convert all organic components of MSW into energy (i.e., all carbon and hydrogen-based materials, including plastic, rubber, textiles, and other organic materials that are not converted in biological processes). Thermal processing occurs in a high-temperature reaction vessel; reactor temperatures vary among technologies, but can range from approximately 800°F to as high as 8,000°F.

Pyrolysis systems use a vessel which is heated to temperatures of 750°F to 1,650°F, *in the absence or near absence of free oxygen*. The temperature, pressure, reaction rates, and internal heat transfer rates are used to control pyrolytic reactions in order to produce specific products. Syngas products are composed primarily of hydrogen (H_2), carbon monoxide (CO), carbon dioxide (CO_2), and methane (CH_4). The syngas can be utilized in boilers, gas turbines, or internal combustion engines to generate electricity, or alternatively can be used in the production of chemicals. Some of the volatile components of MSW form tar and oil, and can be removed for reuse as a fuel. The balance of the organic materials that are not volatile, or liquid that is left as a char material, can be further processed or used for its adsorption properties (activated carbon). Inorganic materials form a bottom ash that requires disposal, although it is reported that some pyrolysis ash can be used for manufacturing brick materials.

Most pyrolysis systems are closed systems, and there are no waste gases or air emission sources. However, subsequent power generation using syngas does have air emissions that can be filtered through a stack and air emission control system. The volume of MSW feedstock entering a pyrolysis reactor reportedly can be reduced by as much as 90%.

Four of the RFI respondents have developed or are developing thermal processing facilities utilizing pyrolysis. These respondents are Carbon Diversion, Inc., Casella Waste Systems, Inc., Nature's Fuel, and Organic Waste Remediation, LLC. Nature's Fuel operates an 86,000 TPY facility in Atwood, Indiana which has been in operation since 2007. This facility does not accept MSW, but does accepts wood waste, C&D waste, and other waste streams (plastics, waste oils, etc.) to produce sulfur-free bio-oil, high quality bio-char, and to generate electricity. Nature's Fuel is in the process of developing a new facility in Huntington, Indiana that will accept MSW as feed stock. That facility will have an anticipated waste throughput of 400,000 TPY at full scale operation.

Gasification involves the thermal conversion of organic carbon-based materials in the presence of internally produced heat, typically at temperatures of 1,400°F to 2,500°F, and *in a limited supply of air/oxygen* to produce a syngas composed primarily of H_2 and CO. Inorganic materials are converted either to bottom ash or to a solid, vitreous slag, depending on the conditions materials are processed under. Most gasification systems are closed systems and do not generate waste gases or air emission sources during the gasification phase. After cooling and cleaning in emission control systems, the syngas can be utilized in boilers, gas turbines, or internal combustion engines to generate electricity, or to make chemicals. Subsequent power generation using syngas does have air emissions that can be filtered through a stack and air emission control system.

Gasification has reportedly been used to process MSW since the 1980s, primarily in Europe and Japan (City of Los Angeles 2005). Existing gasification systems operate at throughputs up to 1,000 tpd; gasifiers and the pre-processing, emission control, and power generation systems can be installed in parallel to increase throughput and power generation. Gasification and pyrolysis technologies are sometimes coupled, with char products resulting from pyrolysis used as feedstock for the follow-up gasification process.

Three of the RFI respondents, have developed or are developing thermal processing facilities utilizing this type of gasification technology. These respondents are BioGold Fuels Corporation, Powers Energy of America, Inc., and Taylor Biomass Energy, LLC.

Plasma arc gasification technology uses an electrical discharge to heat gas, typically air, oxygen, nitrogen, hydrogen, or argon, or combinations of these gases, to temperatures above 7,000°F. The heated gas, or plasma, can then be used for welding, cutting, melting, or treating waste materials. Most past uses of plasma arc technology have been for melting incinerator ash or for thermally decomposing hazardous or medical wastes, and only recently has plasma technology integrated with gasification technologies to process MSW. This technology has potential to convert MSW to electricity more efficiently than conventional pyrolysis and gasification systems, due to its high heat flux, high temperature, almost complete conversion of carbon-based materials to syngas, and conversion of inorganic materials to a glassy, non-hazardous slag. Existing systems operate at throughputs of up to 83 tpd on MSW/auto shredder residue combination; plasma torches can be added to the reactors, and multiple reactors can be included to increase total capacity.

Plasma arc gasification typically occurs in a closed, pressurized reactor. Following pre-processing, the feedstock enters the reactor and comes into contact with the hot plasma gas. This system converts MSW and other organic carbon-based materials, including tar, oil, and char, to a syngas composed primarily of H_2 and CO. Inorganic materials are converted to a solid, vitreous slag. Like pyrolysis and conventional gasification, plasma arc gasification is a closed system; therefore there are no waste gases and no emission sources in the plasma gasification conversion process. After cooling and cleaning in emission control systems, the syngas produced by plasma arc gasification can either be burned immediately in a close-coupled combustion chamber or boiler, or can be cleaned of contaminants and used in a reciprocating engine or gas turbine to generate electricity.

Two of the RFI respondents have developed, or are developing, thermal processing facilities utilizing plasma arc gasification technology. These respondents are Plasco Energy Group and Startech Environmental Corporation. Plasco has reportedly built and is operating a commercial scale demonstration facility (110 TPD capacity) in the City of Ottawa, Ontario. The Ottawa City Council has reportedly issued a letter of intent for Plasco to build, own, and operate a 440 TPD facility and the Central Waste Management Commission of Red Deer, Alberta has signed a contract for a 220 TPD Plasco facility.

5.3.2.2 Biological and Chemical Processes

Biological and chemical technologies operate at lower temperatures and lower reaction rates than thermal technologies. Biological technologies can convert only the biodegradable organic content of MSW, and chemical processes can potentially convert any organic content. Neither type of technology can be used to effectively process inorganic waste materials. Some technologies involve the multiple stages of biochemical processing; byproducts vary among technologies but can include electricity, compost and chemicals.

Several of these technologies also include one or more mechanical processing components to remove inorganic materials from the feed stock or the residue stream. These are often referred to a **Mechanical -Biological Treatment** facilities, or **MBT** facilities. The biological treatment can be either aerobic or anaerobic, as will be described further below. MSW composting facilities, such as the facility that operates in Delaware County NY, can be considered an MBT facility. But because the are 13 MSW composting facilities operating in the United States, its is not considered among the emerging technologies that are being evaluated here.

Motivated by European Union mandates that limit the amount of organic waste that may be landfilled, many MBT facilities have been developed in Europe which utilize an aerobic process to dry the organic fraction of the waste. Aerobic MBT reduces the mass and volume of wastes, due to the removal of materials for recycling and both carbon and moisture losses. The amount of reduction is very dependent on the design and characteristics of each plant. For every ton of input to a bio-stabilization MBT facility, around 0.6 tons will be left as residue (Friends of the Earth, 2008).

There are two main outputs for MBT residues, with the output type determining how the plant is operated:

- As a low quality soil, or to landfill, also known as ‘biostabilization’, or
- As a refuse derived fuel (RDF), for burning (sometimes called ‘biodrying’)

One respondent to the RFI, ECODECO, has developed an MBT technology that uses both biological (biodrying) and mechanical processes to recover recyclable materials and produce a refuse derived fuel. ECODECO is an international company with headquarters in Italy that has developed the Biocubi Process, an aerobic biological treatment method, to remove moisture and improve the heating efficiency of products to be used as fuel inputs for subsequent processes. The putrescible fraction of MSW undergoes an aerobic treatment, and the released heat is used to dry and thermally hygienize the feedstock. Separation occurs following the bio-drying phase, and recyclable materials are removed from the feedstock. The bio-dried material is then mechanically refined to produce a solid fuel which can be used to generate electricity or as a fuel source by cement kilns.

ECODECO's technology has reportedly been successfully implemented in Europe for more than a decade. The company has identified several reference facilities in Italy, Spain and England, and report that there are 17 facilities in total throughout the world. The RFI response noted a capital cost of $56.7 million for a facility capable of serving the Capital Region Planning Unit and processing 230,000 TPY. At that meeting with the Steering Committee on July 21, 2009, representatives of ECODECO provided an estimated capital cost of $64 million and an estimated operating cost of $38 per ton were noted. Tipping fees of €95 to €125 (euros) per ton were noted for some European facilities. At an exchange rate of $1.36264 per euro, this translates to a tipping fee of between $129 per ton and $170 per ton.

Anaerobic digestion is a biological process by which microorganisms digest organic material in the absence of oxygen, producing a solid byproduct (digestate) and a gas (biogas). In the past, anaerobic digestion has been used extensively to stabilize sewage sludge, but has been adapted more recently to process the organic fraction of MSW. In anaerobic digestion, biodegradable material is converted by a series of bacterial groups into methane and CO_2. In a primary step called hydrolysis, a first bacterial group breaks down large organic molecules into small units like sugars. In the acidification process, another group of bacteria converts the resulting smaller molecules into volatile fatty acids, mainly acetate, but also hydrogen (H_2) and CO_2. A third group of bacteria, the methane producers or methanogens, produce a medium-Btu biogas consisting of 50-70% methane, as well as CO_2.

This biogas can be used to fuel boilers or reciprocating engines to generate electricity, and requires minimal pretreatment. It can also be upgraded to pipeline quality and used as compressed natural gas (CNG), a vehicular fuel. In addition to biogas, anaerobic bioconversion generates a residue consisting of inorganics, non-degradable organics, non-degraded biodegradables, and bacterial biomass. If the

feedstock entering the process is sufficiently free of materials like colored plastics, this residue can have market value as a compost material. Anaerobic digestion facilities are reportedly able to process up to 800 tpd of MSW.

None of the respondents to the RFI proposed the use of anaerobic digestion technology. This technology has been employed with MSW feedstock in Europe by companies that have responded to recent solicitations by other jurisdictions, such as New York City and Los Angeles. NorthEast Biogas, a New York based company, is seeking to develop projects using anaerobic digestion, but this company did not respond to the RFI. Discussions with representatives of this company indicated their interest in projects with organic waste feedstock, but not MSW feedstock.

Ethanol Production

Various ethanol production processes have been developed at pilot scales, and some at demonstration scales, to generate ethanol from paper and vegetative matter in the MSW stream. In these processes, a purified lignocellulosic material – which is able to break cellulose-based plant material down to its component sugar molecules – is chopped up and introduced into a hydrolysis reactor. The effluent of this reactor is mostly a sugar solution, which is prepared for fermentation. This solution is detoxified and introduced to a fermenter, in which microorganisms convert the sugar to ethanol and CO_2. Next, the solution is introduced into an energy-intensive, combined distillation and dehydration process to bring the ethanol concentration up to fuel grade (99%) ethanol. A solid residue of unfermented solids and microbial biomass is recovered through the anaerobic digestion process, and its marketability as a compost material depends on the purity of feedstock as well as its visual quality. Solid residues can be burned or gasified if alternative methods of reuse are not feasible.

A commercial scale facility had been permitted for development in Middletown NY. The $285-million waste-to-ethanol processing plant is said to be capable of processing and converting up to 960 tpd of MSW to ethanol for commercial sale and use. The facility has been in the development stages since 1996, and received its required permits from the NYSDEC. However the facility has never been developed (news archive from the Middletown Times Herald-Record at http://archive.recordonline.com/news/masada/masada_list.htm), and given the delays and reported legal issues, is believed to be unlikely to move forward.

At its September 2009 meeting, the SWMP Steering Committee heard a presentation from a representative of Enerkem, a Canadian company which has a contract with the City of Edmonton,

Alberta to develop a waste-to-biofuels facility. The City of Edmonton will supply 100,000 metric tons of post recyclable waste to the facility, which will produce approximately 9.5 million gallons of ethanol and has an expected construction cost of CDN$70 million. The company has operated a pilot plant in Sherbrooke Quebec since 2003 and has also built a commercial scale facility in Westbury, Quebec.

5.3.2.3 Comparison of Emerging Technologies

Of the emerging technologies, only the MBT facilities have been successfully developed for the management of MSW at multiple locations in industrialized countries in Europe or in Canada. These include both MBT facilities utilizing and aerobic treatment process, such as that used by RFI respondent ECODECO, as well as MBT facilities that utilize a process of anaerobic digestion.

Several of the RFI respondents and other companies with gasification technologies have reportedly developed demonstration facilities in the U.S. or Canada. However, only one of these demonstration facilities routinely operates with MSW feedstock at a daily volume on the same order of magnitude as is needed to service the needs of the Planning Unit. Several of the companies are in the process of developing commercial scale facilities in the U.S. or are in the advanced stages of a procurement process to develop a commercial facility on behalf of a municipality or other local or regional solid waste agency in the United States.

All of the emerging technologies have potentially negative attributes, when compared to conventional technologies for solid waste management. These include:

- Lack of well-established performance history creates risk in several categories as noted below. These negative attributes are not necessarily applicable to MBT technologies that have established performance histories in Europe.
    - True cost of construction and operation are not yet known. As a result these costs may be initially underestimated, and if so, the resulting financial distress of higher than expected costs may cause the project to fail.
    - Environmental performance and impacts of full scale operations may not be fully examined. This may result in extended review time to secure facility permits, delaying project implementation and increasing the cost of the project. Further, compared to conventional technologies, the risk of unexpected environmental contamination is greater.
- Marketability of recovered materials, bio-fuels, and byproducts presents a financial risk to the projects. This risk occurs as a result of uncertainty with the technical efficacy of the process (at full commercial scale) as well as because of potential fluctuations in market prices for the commodities being recovered and produced. This is especially true with respect to the

anticipated use of byproducts, such as the vitreous slag produced by the plasma gasification technology, or the residues from other gasification technologies. Since widespread markets for these materials may not currently exist, stable long-term markets may need to be developed. If these efforts are not successful, and the material is not marketable, it will need to be disposed of, and this unanticipated cost will result in a negative financial impact on the project and its sponsors.

These potentially negative attributes can be overcome by a company with sufficient financial resources to assure successful completion and operation of facilities utilizing one of these emerging technologies.

In addition, most of the emerging technologies have potentially positive attributes which make them attractive for further consideration. These potentially positive attributes include:

- Significantly less residue for disposal than conventional waste-to-energy technology;
- Lower emissions and higher level of material recovery than conventional waste-to-energy technology;
- Lower capital and operating costs than conventional waste-to-energy technology;

Table 5-4 presents a comparison of the potential environmental impacts of the emerging technologies along with several of the established commercial methods, including MSW, conventional WTE and SSOW composting. Because environmental impacts associated with solid waste management facilities are typically site specific, the potential environmental impact noted in the table are qualitative, and should be considered only for general comparative purposes. Moreover, the development and operation of any of these solid waste facilities will be subject to extensive regulation by the NYSDEC, which require that any potentially significant environmental impacts be mitigated. The potential impacts from GHG and other air emission and odors is based on the potential to emit, and does not represent actual expected emissions after required mitigation measures are employed. The potential impacts to water quality, water use, land area, electric utilities, fossil fuel, and residuals are generally based on estimated discharge or consumption per ton of waste processed, as reported by RFI respondents or from other available information sources.

Table 5-4
Alternative Solid Waste Management Technologies
Comparison of Potential Environmental Impacts

Alternative Solid Waste Management Technology	Potential Environmental Impacts [1]								
	GHG Emissions	Other Air Emissions	Odors	Water Quality Impacts	Water Use	Land Area	Electric Utilities	Fossil Fuel	Residuals
MSW Landfill	High	Low	High	High	Low	High	Low	High	High
Conventional WTE	Medium	Medium	Low	Low	High	Low	Medium	Low	Low
Advanced Thermal Recovery	Medium	Medium	Low	Low	Medium	Low	Medium	Low	Low to very low
Low Temperature gasification (pyrolysis)[2]	Medium	Medium	Low	Low	High	Low	Medium	Low	Low
High temperature gasification[2]	Medium	Medium	Low	Low	High	Low	Medium	Low	Low
Plasma Arc Gasification[2]	Medium	Medium	Low	Low	No Data	Low	High	Very Low	Low to very low
Mechanical processing w/ RDF[2]	Medium	Medium	Low	Low	High	Low	Medium	Low	Low
Mechanical & Biological processing w/ RDF[2]	Medium	Medium	Low	Low	High	Low	Medium	Low	Low to medium
Anaerobic Digestion[2]	Medium	Medium	Medium	Low	High	Low	Medium	Low	Medium to low
Ethanol Production[2]	Medium	Medium	Medium	Low	High	Medium	Medium	Low	Medium to low
SSOW Composting	Low	Low	High	Medium	Low	High	Low	Low	Low

Notes:
1. The potential environmental impact ratings are for comparative purposes only, and for purposes of air pollutant and water pollutant emission represent emission potential,
2. GHG and other air emissions, as well as resource consumption, are low for the initial process but are rated as medium or high when considering combustion of fuel product.

Because several of these technologies are still emerging, these potentially positive attributes remain to be proven through commercial operations at a scale similar to what would be required to service the Planning Unit. While MBT technologies for MSW have been developed in many European countries, they are relatively expensive, and their use in Europe is prompted by national policies which limit the amount of organic material that can be landfilled. The lack of such policy in the United States could put these technologies at an economic disadvantage.

Nevertheless, all of these emerging technologies will warrant continued attention during the course of the review process for the SWMP, as it is possible that more of these technologies will establish widespread full-scale commercial operations, either in the United States or elsewhere, by the time the new SWMP is formally adopted and approved and it is time to commence procurement of new facilities.

5.4 Institutional Alternatives

The Capital Region Partnership Planning Unit operates as an informal consortium of 13 municipalities with a jurisdiction of approximately 450 square miles in the Albany, New York region. Planning Unit participants currently include 3 cities, 7 towns, and 3 villages located in Albany and Rensselaer Counties. The City of Albany acts as the lead participant. The total population of Planning Unit communities is approximately 220,000 persons. Current members of the Planning Unit have signed an Inter-municipal Agreement (IMA) which, among other things, provides for cost sharing related to the Planning Unit Recycling Coordinator (PURC) and commits the member municipalities to implement waste reduction and recycling programs consistent with the approved SWMP Modification. The current IMA will expire on December 31, 2011.

This section presents a discussion of different institutional mechanisms for implementation of this solid waste management plan. These alternatives, which are not mutually exclusive, include the expansion of planning unit, the establishment of an authority or similar public benefit corporation, and the establishment of waste flow control.

5.4.1 Expansion of the Planning Unit

As noted above the Planning Unit currently consists of 13 municipalities with a population of about 220,000 and an area of about 450 square miles. As shown in Figure 1-2, there are 8 other active planning units which border the Capital Region Partnership Planning Unit. These include:

- The Town of Colonie
- Schenectady County
- Saratoga County
- Greater Troy Area Solid Waste Management Authority
- Eastern Rensselaer County Solid Waste Management Authority
- Columbia County
- Greene County
- Montgomery Otsego Schoharie Solid Waste Management Authority (MOSA)

In order to foster discussion between these Planning Units, Albany Mayor Gerald Jennings invited the leaders from Albany, Rensselaer, Saratoga and Schenectady counties, along with representatives from MOSA, to a meeting to discuss regional cooperation on future solid waste management issues. The first of these meetings was held on September 24, 2009 at which there was an agreement to continue discussions on this issue. In addition, Albany County is applying for a grant to the New York State Department of State to conduct a feasibility study to evaluate a regional solid waste management authority for this four-county region. Five of these eight adjacent planning units are within the four county area (Albany, Rensselaer, Saratoga, and Schenectady) commonly referred to as the Capital District. If grant funding for this study is approved, it is expected to be conducted during the year 2010.

The projected 2010 population of this four-county region is over 841,000, or almost 4 times as large as the existing Planning Unit. The idea of Planning Unit consolidation had also been raised by representatives of MOSA at a SWMP Steering Committee meeting on April 23, 2009. These representatives expressed interest in considering consolidation with the Capital Region Partnership Planning Unit, and in being included in the previously noted multi-county regional study with Albany County. The representatives noted that the MOSA communities could contribute up to 100,000 TPY of solid waste into a regional system. Based on estimates from the U.S. Census Bureau, the three counties which constitute MOSA have a combined July 2007 population of about 143,150.

5.4.2 Implementing Agency Alternatives

Throughout New York, there are currently 64 solid waste management planning units. In NYSDEC Regions 1 and 2 (Long Island and New York City) most of the 16 planning units are led by the Towns and by the City of New York. In the remainder of the state, the most common planning unit is the county government, with 32 county government planning units, or two-thirds of the remaining planning units. Statewide there are 12 planning units (2 on Long Island) that are managed by public authorities created for the expressed purpose of solid waste management.

These are 6 current planning units which include a consortium of municipalities or counties, which may or may not be organized through an IMA. In addition to the Capital Region Solid Waste Management Partnership, these other planning units include:

- Town of Colonie
- Warren and Washington counties
- GLOW Region Solid Waste Management Committee – Genesee Livingston and Wyoming counties
- NEST Solid Waste Management Board – some municipalities in Erie County
- Northwest Communities Solid Waste Management Board – some municipalities in Erie County

Based on the current membership and organization of the Planning Unit, an alternative institutional arrangement could be the formation of a solid waste management authority.

At the March 17, 2009 meeting of the SWMP Steering Committee, Ruth Leistensnider, Esq. of Nixon Peabody, LLP, special environmental counsel to the City of Albany, presented a discussion on Institutional and Implementation Options with a focus on Flow Control and Special Purpose Authority or Agency Legislation. Parts of this discussion have been excerpted from that presentation.

Public Authorities are often created to implement facilities and programs that require long-term commitments in a manner that is insulated from short term political pressures. Over the years various interest groups and elected representatives have raised concerns about the accountability and management of public authorities in New York. In response to these concerns, the Public Authorities Accountability Act was enacted in 2005. The Act established an Authority Budget Office to oversee authorities, and has elevated oversight of authorities and made them subject to many more requirements for transparency and good government practices. Additional requirements were enacted in the 2009 amendments to the Public Authorities Accountability Act, but these additional requirements generally are directed at the largest public authorities, like the New York Power Authority or the New York Thruway Authority, and not a local or regional solid waste management authority.

One example of a successful authority in the Capital District is the Albany County Airport Authority. This Authority was created in 1993 to oversee the Airport's operation and in 1996 undertook a major renovation project that included a new terminal, parking garage, air traffic control tower and cargo facility. These projects were successfully completed and resulted in the airport becoming a major transportation hub and engine for economic development in the entire region. The authority governing body consists of 7 members who are appointed by either the County Executive or the Chairman of the County Legislature, and subject to confirmation by the full County Legislature.

Statewide there are 12 existing public authorities created for the expressed purpose of solid waste management. These include:

- Babylon / North Hempstead Solid Waste Management Authority
- Islip Resource Recovery Agency
- Dutchess County Resource Recovery Agency
- Rockland County Solid Waste Management Authority
- Ulster County Resource Recovery Agency
- Eastern Rensselaer County Solid Waste Management Authority
- Greater Troy Area Solid Waste Management Authority
- Montgomery-Otsego-Schoharie Solid Waste Management Authority (MOSA)
- Franklin County Solid Waste Management Authority
- Oneida-Herkimer Solid Waste Management Authority (OHSWMA)
- Onondaga County Resource Recovery Agency (OCRRA)
- Western Finger Lakes Solid Waste Management Authority

The creation of an Authority or Special Purpose Agency for the management of solid waste would require:

- An act of the State Legislature
- A municipal home rule message from each municipality within the boundary of the authority

Such action typically requires each municipality to agree to power sharing. This may become a politically charged issue, and which has defeated authority legislation in the past. The special state legislation would grant to the Authority the responsibility for managing all solid waste within the municipal boundaries of the specified area. The special state legislation also typically grants powers to municipalities within the authority that are not otherwise authorized by the State Constitution or other acts of the state legislature (such as the municipal home rule law, County Law, General City Law, Second Class Cities Law, Town Law or Village Law).

The establishment of an Authority facilitates the kind of "flow control" legislation upheld by the Supreme Court, but only if the Authority owns all of the facilities encompassed within the authority. Once established, dissolution of an authority is not allowed if there are bonds outstanding. In authorities that are formed to consist of multiple municipalities, individual municipalities cannot unilaterally withdraw, as it requires an act of the state legislature.

There are several potential benefits to the establishment of a solid waste management authority. These are:

- Provides a legislatively-blessed mechanism for municipalities to exert more control over the management of solid waste within its boundaries;
- Concomitantly, if municipalities adopt the appropriate legislation, and cede control to the authority, could result in increased funding for recycling and other environmentally beneficial options for solid waste management, not burdened by local politics;
- Could relieve municipalities of the burden of having recycling coordinators and removing that line item from tax burdens of its municipal residents.

The disadvantages of an Authority would include:

- Cedes local control of solid waste management to another layer of government;
- Potentially increases costs through this additional layer;
- Municipalities subject to shortfalls in Authority budget
- Financing of facilities is complex and more costly because Authority facilities cannot be financed through general obligation bonds – to be credit-worthy, Authority would likely need to do facility revenue bonds with the municipalities agreeing to guarantee any shortfall.

The CHA project team and members of the SWMP steering committee also visited facilities and spoke with the executive directors of the Oneida Herkimer Solid Waste Management Authority (OHSWMA) and the Onondaga County Resource Recovery Agency (OCRRA) about the administrative structure of their agencies. As a result of these meetings it was clear that one of the more significant advantages of these authorities' structure is their ability to provide consistent and reliable solid waste management facilities and programs, including robust waste reduction and recycling efforts, and ensure adequate staffing and funding for these efforts.

Similarly successful authorities (or authority-like organizations) with very effective waste reduction and recyclig programs have been identified in other states. For example, during a Steering Committee Meeting in May 2009, Albany Common Council President Shawn Morris, made a presentation about the Chittenden County Solid Waste District (CSWD) in Vermont, based on a recent visit she made there with Councilmember Cathy Fahey and several environmental advocates from the Capital Region. Ms Morris reported very favorably on the waste reduction and recycling programs undertaken by this agency, which is structured similar to a public authority in New York, and is able to subsidize much of its waste reduction and recycling program with revenue derived from a $22 per ton tipping fee surcharge on all solid waste for disposal which originates in the District.

Information on Berkeley California was circulated to the Steering Committee by one of the Committee members to point out that Berkeley had a goal of 75% diversion by 2010, and a goal of zero waste with 100% diversion from landfilling, by 2020. While Berkeley is not yet meeting its 2010 goal, it current 66% diversion is still noteworthy. Contact with City of Berkeley staff revealed that part of their success was due to strict State mandates. California required communities to achieve 50% diversion by 2000, with significant financial penalties if communities didn't comply. Secondly, California has several product stewardship laws so that local governments can have very aggressive recovery programs for things covered, like electronics, knowing that they will be reimbursed for 100% of their program costs. New York has not had such strict mandates, nor has any product stewardship legislation been adopted in New York. Most importantly, it was pointed out that the City of Berkeley is part of the Alameda County Waste Authority. The Authority has a surcharge of $6 dollars imposed on all tonnage going to landfills. These funds are distributed to communities for recycling and organic recovery programs. Albany, California is also a member of the Alameda County Waste Management Authority.

Based on recent data from NYSDEC on per capita MSW recycling for the year 2008, many of the New York State's solid waste authorities are among the top performers in waste reduction and recycling. Excluding scrap metal recycling (and excluding 3 planning units on Long Island which are seasonal summer resorts and have skewed per capita recycling data), OCRRA has the best per

capita MSW recycling in the state, and OHSWMA is ranked 3rd. The towns of Smithtown and Huntington on Long Island and Tompkins County are ranked 2nd, 5th, and 4th in per capita MSW recycling both OCRRA and OHSWMA fund their waste reduction and recycling programs out of revenue derived from tipping fees. The towns of Smithtown and Huntington have created solid waste districts and exercises contractual flow control to ensure that waste is delivered to designated facilities and that reduction and recycling programs are fully funded.

By contrast, Tompkins County derives a significant portion of its revenues from an annual solid waste fee that is levied on residents, businesses, and institutions in the County. According to its 2010 budget, about 46% of the County's anticipated solid waste revenue of $6,233,000, will be derived from the annual fee. This amounts to about $2.9 million in 2010, and when added to revenue derived from the sale of recyclable materials is sufficient to fund this County's aggressive waste reduction and recycling program. While this may be a feasible mechanism for funding the implementation of a County-wide solid waste management program, it would not be a practical approach for the existing Planning Unit structure because every municipality would need to agree on an annual fee assessment and the mechanism for collecting it.

5.4.3 Flow Control

This discussion was also excerpted from the March 17, 2009 presentation at the SWMP Steering Committee meeting referenced above.

From a historical perspective, it is important to note that the Commerce Clause of the U.S. Constitution reserves to Congress the right to regulate interstate commerce. In the 1978 Supreme Court Decision (City of Philadelphia v. NJ) the Court found that solid waste was an "article of commerce" and that a New Jersey law discriminated against out-of-state interests with no sacrifice by NJ interests. The City of Philadelphia challenged the New Jersey law that banned the disposal of out-of-state waste and reserved landfills in New Jersey for in-state waste only.

Before 1994 many municipalities would contract with private entities to manage solid waste for their residents, and in order to ensure that there was adequate revenue to support financing of these private facilities, municipalities would adopt local laws stating that all non-hazardous waste generated within the municipality was required to be processed at designated facilities. In a 1994 Supreme Court Decision (C&A Carbone v. Town of Clarkstown) the Court found that such ordinances discriminated against interstate commerce by excluding out-of-state processors from the local market. Health, safety and financial concerns can be addressed with nondiscriminatory alternatives.

As a result of this decision, between 1994-2007 New York municipalities and authorities operating solid waste management and disposal facilities saw a marked decrease in revenues at their facilities. As a result, there were several years of chaos in the municipal solid waste management area.

The Towns of Babylon and Smithtown on Long Island created residential and commercial waste districts, taking control/ownership over all solid waste generated within the district. The districts bid out for the right to collect solid waste, and required as a condition in the contract with the successful bidders, that the waste be disposed of at designated facilities. The U.S Court of Appeals Second Circuit found that in these cases, the Towns were acting as "market participants" instead of "market regulators", and that the burdens on interstate commerce where the Towns act as market participants was incidental. It is important to note that these Towns had the ability to create Town-wide districts – due to quirks in state law. Other Towns (mainly those not on Long Island), Cities and Villages have limits imposed through the Town Law, General City Law, and Village Law. All Counties have the power to create county-wide districts. Municipalities are constrained in that they only have the powers granted to them by the state Constitution and the state legislature. Counties considered creating county-wide districts, but the logistics of billing made this difficult to implement. The implementation of county-wide districts was also constrained politically because many viewed it as a tax increase if charges appeared on tax rolls.

Alternative mechanisms for flow control were also considered, including the creation of franchises. However, the problem with this mechanism is that franchises can only be granted for municipal property, such as streets, highways and public places. No express power is granted under state law to franchise solid waste collection. Another alternative mechanism is to undertake collection of solid waste as a municipal function, but this often represents an extreme change in historic solid waste collection mechanisms.

Conditions can be placed in permits for right to collect and/or dispose of solid waste within the municipalities. Local Laws such as the Town of Bethlehem, require permit for right to collect within the Town, and require haulers to account for the waste that is collected. Onondaga County required all haulers to obtain a permit, and a condition of the permit required the use of OCRRA's facility. Tip fee at OCRRA facility covers not just cost of disposal, but all solid waste disposal and recycling activities throughout the County.

In Oneida and Herkimer counties a two-county authority was created by act of the state legislature. Both counties adopted ordinances essentially stating that once solid waste and recyclables were set out on the curb for disposal, they had to be delivered to a facility designated by the Authority pursuant to contract with the County. The authority legislation authorized the Authority to collect, process and dispose of solid waste generated in the Counties, and authorized the Counties to impose appropriate and reasonable limitations on competition by adopting local laws requiring that all solid waste to be delivered to specified facilities. The Authority entered into contracts with the Counties which allowed for haulers to pick up trash from the curb, but the Authority would take over management from there, and agreed to purchase and develop facilities for management of solid waste

(including recyclables). The authority collected tipping fees to cover its operating and maintenance costs for the facilities which exceeded disposal costs on the open market, but provided for recycling and other costs. If the Authority's tip fee was insufficient to cover the costs, the Counties agreed to make up the difference. This arrangement was challenged by local haulers, but was eventually upheld by a 2007 decision of the United States Supreme Court.

United Haulers Association challenged the Oneida/Herkimer solution as an impermissible burden on interstate commerce, arguing that since they could take their waste to out-of-authority (and out-of-state) facilities at a much lower tip fee, the system was unconstitutional. The Supreme Court found (550 U.S. 330) that because of the history associated with the system (closing unlined landfills) the benefits to the residents and the Counties (the tip fee covered recycling costs, etc.), that Congress, through the Resource Conservation and Recovery Act explicitly stated that management of solid waste was primarily an issue of local concern, and most importantly, the fact that the designated facilities were publicly owned and all private actors were treated alike, there was no unconstitutional burden on interstate commerce.

5.5 Alternative Implementation Scenarios

This section will identify the range of feasible implementation scenarios that will be subject to evaluation in the next section. Three alternative implementation scenarios were developed and will be subject to a comparative evaluation in Section 5.6. All of these alternatives involve the continued implementation of the enhanced waste reduction and recycling initiatives identified in the 2009 SWMP Modification as well as continued use of the Rapp Road Landfill, until its capacity is exhausted. Alternative scenarios # 2 and #3 also include additional program enhancements which will reduce the amount of waste that ultimately requires landfill disposal.

These three alternative implementation scenarios are summarized below.

- Alternative Scenario #1 including the following key features:
  - Retain current size of existing planning unit:
  - Support State Implementation of Product Stewardship Legislation;
  - Maximize recovery of currently designated recyclables;
  - No new landfill disposal capacity will be developed within the Planning Unit. After Rapp Road Landfill capacity is exhausted, post-recyclable solid waste requiring disposal will be exported to commercially available disposal facilities outside of the planning unit.

- Alternative Scenario #2, including the following key features:
  - Retain current size of existing planning unit:
  - Establish a mechanism for flow control;
  - Support State Implementation of Product Stewardship Legislation;
  - Maximize recovery of currently designated recyclables;
  - Designate additional mandatory recyclable materials such as source separated organic waste (SSOW) and Plastics #3 through 7;
  - Develop SSOW processing capabilities for both CII and residential SSOW;
  - No new landfill disposal capacity will be developed within the planning Unit. After Rapp Road Landfill capacity is exhausted, post-recyclable solid waste requiring disposal will be exported to commercially available disposal facilities out side of the planning unit.
- Alternative Scenario #3, including the following key features:
  - Expand the size of the existing planning unit and develop a regional solid waste management authority;
  - Establish a mechanism for waste flow control by the members of the regional solid waste management authority;
  - Support State Implementation of Product Stewardship Legislation;
  - Maximize recovery of currently designated recyclables;
  - Designate additional mandatory recyclable materials such as source separated organic waste (SSOW) and Plastics #3 through 7;
  - Develop SSOW processing capabilities for both CII and residential SSOW;
  - Develop a regional facility utilizing a mixed solid waste treatment technology to further minimize landfill disposal requirements for post recyclable solid waste.
  - Landfill disposal of any treatment technology residue and other non-processible post recyclable solid waste will be directed to available disposal facilities either inside or outside the planning unit.

More information on each of these three alternative implementation scenarios is presented in Sections 5.5.1 through 5.5.3, below.

5.5.1 Alternative Implementation Scenario #1

Alternative Implementation Scenario #1 is basically the continued implementation of the enhanced waste reduction and recycling initiatives identified in the 2009 SWMP Modification. Under this alternative, the Planning Unit will remain at its current size, and will continue to utilize its current administrative structure as an affiliation of municipal subdivisions. There would be no newly

established legal mechanism for waste flow control. The Planning Unit and its municipal members would support New York State's implementation of Product Stewardship Legislation, as described previously in Section 5.2.1.2.

The recovery of currently designated recyclable materials would be maximized, based on the implementation of the measures outlined in the SWMP Modification. These measures include the establishment of the position of Planning Unit Recycling Coordinator (PURC) in January 2009 to be funded by the constituent municipalities in accordance with their proportional population pursuant to the terms of an Inter-Municipal Agreement (IMA). The PURC is an area-wide resource to improve communication with and between local recycling program coordinators, and promotes waste reduction and recycling, monitors compliance with the municipal recycling ordinances, provides assistance in applying for available grant funding, and compiles annual information about recycling program achievement in each municipality, including commercial, industrial and institutional recycling program. The SWMP Modification also provides mechanisms for increasing the reuse and recycling of solid waste from commercial, industrial and institutional sources.

Maximizing the recovery of currently designated recyclables will also include the implementation of single stream recyclables collection along with a local MRF which can accommodate and process the single stream recyclables. This alternative scenario assumes that the single stream MRF would be developed by the private sector as a commercial venture. While a single stream MRF would be available, communities would be free to continue their use dual stream recycling if they believe that method is maximizing material recovery and recycling. In addition, this alternative will also include the implementation of volume based user fees, known as pay-as-you-throw (PAYT) for residential waste collection and for the residential waste drop off centers operated by many of the municipalities in the planning unit. This PAYT system would be adopted in each municipality whenever feasible.

Post-recyclable waste from the Planning Unit can continue to be delivered to the Rapp Road Landfill for disposal until such time as capacity at that facility is exhausted. Based on previous projections made in connection with the July 2009 approval of the Eastern Expansion, the facility is expect to reach capacity in 2016. After the Eastern Expansion is filled to capacity, no further landfilling of solid waste will occur at the Rapp Road site and post-recyclable solid waste from the Planning Unit will be delivered to solid waste disposal facilities located outside of the Planning Unit. This scenario assumes that it will be necessary to utilize a transfer station to consolidate waste prior to transport and disposal at a landfill facility in Central New York and that a new transfer station will be developed for this purpose on designated property adjacent to the Rapp Road Landfill site.

This alternative implementation scenario has several potential advantages. Future capital expenditures by the Planning Unit and constituent municipalities will be minimized compared to the other alternatives because, with the exception of a new transfer station facility, no new facilities

would need to be developed. No new solid waste disposal facility sites would need to be sited or acquired, and the significant expense associated with this activity would also be avoided. After the Rapp Road Landfill is at capacity, it is anticipated that disposal cost will increase, perhaps significantly, due to the need for waste exportation. While this cost increase is by itself a disadvantage, it will create a greater avoided cost incentive to increase recycling and waste reduction even further.

Other potential disadvantages of this alternative implementation scenario include a future dependence on solid waste disposal capacity owned by others and outside the control of any of the constituent municipalities of the Planning Unit. This dependence on disposal capacity outside of the planning unit is likely to involve long distance transport to the disposal site with the attendant risk of fuel price escalation. In addition, the use of disposal sites owned by others will subject the Planning Unit communities to unknown environmental liabilities.

A more detailed discussion of these advantages and disadvantages is presented later in Section 5.6.

5.5.2 Alternative Implementation Scenario #2

Alternative Implementation Scenario #2 will have several elements in common with Scenario #1, including:

- Retain current size of existing Planning Unit:
- Support State Implementation of Product Stewardship Legislation;
- Maximize recovery of currently designated recyclables;
- No new landfill disposal capacity will be developed within the Planning Unit. After Rapp Road Landfill capacity is exhausted, post-recyclable solid waste requiring disposal will be exported to commercially available disposal facilities outside of the planning unit.

Scenario #2 also includes the following elements which are not part of Alternative Scenario #1. These are:

- Establish a legal mechanism for waste flow control;
- Designate additional mandatory recyclable materials such as source separated organic waste (SSOW) and Plastics #3 through 7;
- Develop SSOW processing capabilities for both CII and residential SSOW;

A new legal mechanism for flow control is included in this alternative because the development of a SSOW processing facility may need waste flow commitments from the Planning Unit. In addition, if a new transfer station for post recyclable waste from the Planning Unit is developed after the Rapp Road Landfill reaches capacity, it may also be necessary to secure a waste stream for that facility. In this scenario, it is assumed that an Authority will be created for the communities constituting the

Planning Unit, and that in the authority enabling legislation, the power to legislate flow control will be granted to the municipal jurisdictions. It is also assumed that the Authority would be appropriately staffed and funded to administer its responsibilities.

This scenario would designate additional materials for mandatory recycling including Plastics #3 though #7 and the fraction of the organic waste stream that is designated suitable for processing at an SSOW processing facility that would be developed. This alternative scenario assumes that the SSOW processing facility would be developed by or on behalf of the Planning Unit rather than as a commercial venture. This scenario would also involve the collection of residential SSOW as well as SSOW from CII generators who would be expected to generate significant quantities of SSOW (e.g. restaurants, groceries, and institutions with residential and dining activities).

The advantages and disadvantages of this alternative implementation scenario are similar to, but somewhat different from those mentioned previously for Scenario #1. This alternative implementation scenario will require more capital expenditures than Scenario #1 but less than Scenario #3. In this alternative implementation scenario, no new solid waste disposal facility sites would need to be sited or acquired or developed in the Planning Unit, and like scenario #1, the significant expense associated with this activity would also be avoided. However, this alternative scenario would require the siting, development and operation of an SSOW composting facility, and the expenditures associated with that. After the Rapp Road Landfill is at capacity, disposal cost will increase, perhaps significantly, due to the need to for waste exportation. While this cost increase is by itself a disadvantage, it will create a greater avoided cost incentive to increase recycling and waste reduction even further.

Other potential disadvantages of this alternative implementation scenario include a future dependence on solid waste disposal capacity owned by others and outside the control of any of the constituent municipalities of the Planning Unit. This dependence on disposal capacity outside of the planning unit is likely to involve long distance transport to the disposal site with the attendant risk of fuel price escalation. Finally, like scenario #1, the reliance on the use of disposal sites owned by others will subject the Planning Unit communities to unknown environmental liabilities.

A more detailed discussion of these advantages and disadvantages is presented later in Section 5.6.

5.5.3 Alternative Implementation Scenario #3

Alternative Implementation Scenario #3 will have several elements in common with both Scenarios #1 and #2, including:

- Support State Implementation of Product Stewardship Legislation;
- Maximize recovery of currently designated recyclables.

In addition, the following elements are common to Alternative Scenario #2:

- Establish a legal mechanism for waste flow control;
- Designate additional mandatory recyclable materials such as source separated organic waste (SSOW) and Plastics #3 through 7;
- Develop SSOW processing capabilities for both CII and residential SSOW.

Finally, Alternative Implementation Scenario #3 also includes the following elements which are not part of either Alternative Scenario #1 or #2. These are:

- Expand the size of the existing Planning Unit and develop a regional solid waste management authority;
- Establish a mechanism for flow control by the members of the regional solid waste management authority;
- Develop a regional facility utilizing a mixed solid waste treatment technology to further minimize landfill disposal requirements for post recyclable solid waste.
- Landfill disposal of any treatment technology residue and other non-processible post recyclable solid waste will be directed to available disposal facilities either inside or outside the planning unit.

This Alternative Implementation Scenario #3 includes the expansion of the Planning Unit into a larger unit which would provide the economy of scale necessary to support the development of a regional facility utilizing a mixed solid waste treatment technology to further minimize landfill disposal requirements for post recyclable solid waste beyond what would be achievable with either of the other alternative scenarios. This analysis assumes that the size of Planning Unit would be increased to a level that would support the development of a facility with a nominal design capacity of 1,500 tons per day (TPD). This is approximately 2 to 2.5 times the size of a facility that could be supported by post recyclable waste from the Planning Unit.

A regional solid waste management authority would be established to implement the facilities and regional program elements of this scenario, including waste reduction and recycling program education and coordination, SSOW facility development, the mixed MSW treatment facility development. It is also envisioned that the regional authority would be responsible for providing capacity for the disposal of any non-recyclable waste material and treatment process residue. This would be accomplished either through acquisition of an existing landfill or developing a new landfill site somewhere within the boundaries of the expanded planning unit, or by contractually arranging for this disposal capacity at a commercially available facility outside of the expanded planning unit boundaries.

The primary advantage of this alternative implementation scenario is that it maintains a locally sponsored and controlled solution to most of the solid waste management system, with a more predictable cost. As such, the region's dependence on disposal capacity controlled by other would be minimized, as would the need to transport waste long distances and the attendant risk of future fuel price escalation compared to the other two alternative implementation scenarios. With the formation of a regional authority, this alternative would also have advantages compared with a smaller solid waste authority which was included as part of scenario #2 because of efficiencies achieved by spreading fixed administration costs and authority overhead over a larger customer base.

The primary disadvantage of this alternative implementation scenario relates to the extensive capital cost requirements associated with program implementation, compared to the other alternatives. Another disadvantage relates to the increased complexity and extended time frame for implementation, compared with the other alternatives.

A more detailed comparative discussion of these advantages and disadvantages is presented in Section 5.6 which follows.

5.6 Comparison of Implementation Scenarios

This section of the SWMP will present an evaluation of the three Alternative Implementation Scenarios based on a series of criteria that were presented to the SWMP committee at the very outset of the planning process. These criteria include cost, facility sizing, financial risk, time to implement, effectiveness in meeting the goals and objectives of the SWMP, environmental impacts, and impacts on neighboring jurisdictions.

For purposes of this comparative analysis, the elements that are common to all the scenarios will not be included. These common elements are:

- Support State Implementation of Product Stewardship Legislation;
- Maximize recovery of currently designated recyclables.

The specific elements of this analysis will include:

- Local solid waste management authority (Scenario #2);
- Regional solid waste management authority (Scenario #3);
- Develop and operate source separated organic waste (SSOW) collection and processing capacity (Scenario #2 and # 3);
- Develop and operate a regional facility utilizing a mixed solid waste treatment technology to further minimize landfill disposal requirements for post recyclable solid waste(Scenario #3);

- Landfill disposal of any treatment technology residue and other non-processible post recyclable solid waste will be directed to available disposal facilities either inside or outside the planning unit. While this element is common to all scenarios, the costs will be different under each, so they will be included in this analysis.

With respect to the concept of a regional solid waste management authority, an element of alternative scenario # 3, discussions have just recently been initiated with surrounding counties to explore and advance this concept. For purposes of this comparative evaluation, it is assumed that the area serviced by such a regional solid waste management authority would have a total resident population of about 700,000 people in the year 2015. The actual area serviced by such a regional solid waste management authority, if one is formed, will be determined at a later date, after the completion of this Solid Waste Management Plan.

5.6.1 Cost Analysis

This section will include an analysis of the anticipated costs associated with the specific elements of each Alternative Implementation Scenario. All of the elements of the different Alternative Scenarios could be implemented in the future at different times. To make the results comparable, in this analysis costs are presented in 2009 $.

5.6.1.1 Local Solid Waste Management Authority

Implementation of a local solid waste management authority for the existing Planning Unit is part of Alternative Scenario #2. It will require the enactment of state enabling legislation to create and empower the authority. This section includes the estimated cost associated with the ongoing administrative operations of a local solid waste management authority. The costs associated with the enactment or initial establishment of an authority are not included here.

Estimated Annual Operating Costs, in 2009 dollars, is estimated at $875,000, as shown in Table 5-5. This estimate is limited to costs associated with the administration and financial management of the authority. While the estimated annual operating costs includes the provision of a Director of Operations, it does not include other costs associated with recycling program implementation, which would be common across all of the alternative scenarios, or the other costs associated with construction and operation of solid waste management facilities.

Table 5-5 Local Solid Waste Management Authority Annual Operating Cost			
Staff		**Annual Salary Cost**	
Executive Director	1	$	110,000.00
Director of Finance	1	$	85,000.00
Director of Operations	1	$	80,000.00
Confidential Secretary	1	$	35,000.00
Account Clerks	2	$	50,000.00
Administrative Staff	6	$	360,000.00
Fringe Benefits	30%	$	108,000.00
Office Rent and Utlilities		$	12,000.00
Office equipment		$	11,000.00
Office Supplies		$	25,000.00
Professional services		$	250,000.00
Other miscellaneous expenses		$	109,000.00
Total Finance and Administration	2009$	$	875,000.00
Inflated at 3% annually to	2015$	$	1,045,000.00

Averaging these estimated annual operating costs over the estimated population in the Planning Unit, 221,975 persons in 2010, yields an average annual cost of $3.94 per person.

Since operating revenue for a local solid waste management authority is likely to be derived from tipping fees, it may be more appropriate to averaging these estimated annual operating costs over the estimated solid waste tonnage expected to be delivered for disposal or processing. This tonnage would not typically include materials that are delivered for source separation or recycling. With the implementation of Alternative Scenario #2, a maximum recyclable diversion rate of 65% is expected. Assuming the achievement of this maximum diversion rate, and total waste generation of 421,600 tons in year 2020 (as per Table 2-8), it is expected that there will be about 147,560 tons of waste expected to be delivered for disposal and another 40,000 tons of SSOW for processing. Using this total of 187,560 tons in the denominator, the average estimated annual operating costs for the local solid waste management authority will amount to about $4.67 per ton.

5.6.1.2 Regional Solid Waste Management Authority

Implementation of a regional solid waste management authority for the existing Planning Unit is part of Alternative Scenario #3. It will also require the enactment of state enabling legislation to create and empower the authority. This section includes the estimated cost associated with the ongoing

administrative operations of a regional solid waste management authority. The costs associated with the enactment or initial establishment of an authority are not included here.

Estimated Annual Operating Costs, in 2009 dollars, is estimated at $1,370,000, as shown in Table 5-6. This estimate is limited to costs associated with the administration and financial management of the authority. While the estimated annual operating costs includes the provision of a Director of Operations, it does not include other costs associated with recycling program implementation, which would be common across all of the alternative scenarios, or the other costs associated with construction and operation of solid waste management facilities. While the administration and financial management functions of the regional solid waste management authority are similar to those that would occur with a local authority, the estimate includes allowance for additional employees because there will be an increased volume of work. It is estimated that a regional solid waste management authority would require a staff of 14 whereas the local solid waste management authority would only require a staff of 6.

Table 5-6
Regional Solid Waste Management Authority
Annual Operating Cost

Staff		**Annual Salary Cost**	
Executive Director	1	$	120,000.00
Director of Finance	1	$	90,000.00
Deputy Finance Director	1	$	70,000.00
Director of Operations	1	$	85,000.00
Duputy Ops Director	1	$	70,000.00
Confidential Secretary	1	$	40,000.00
Account Clerks	4	$	100,000.00
Other	4	$	100,000.00
Administrative Staff	14	$	675,000.00
Fringe Benefits	30%	$	202,500.00
Office Rent and Utlilities		$	24,000.00
Office equipment		$	25,000.00
Office Supplies		$	45,000.00
Professional services		$	250,000.00
Other miscellaneous expenses		$	148,500.00
Total Finance and Administration	2009$	$	1,370,000.00
Inflated at 3% annually to	2015$	$	1,636,000.00

Assuming an expanded regional planning unit population of 700,000 persons the average annual operating cost for a regional solid waste management authority would be $1.96 per person, over 42%

less than the similar cost for the local solid waste management authority serving only the existing planning unit communities.

Similar to Alternative Scenario #2, with the implementation of Alternative Scenario #3, a maximum recyclable diversion rate of 65% is expected. The additional reduction in land disposal that will occur as a result of Alternative Scenario#3 will occur as a result of development and operation of a mixed solid waste treatment facility, but tipping fees from waste delivered to that facility would also be used to fund the operation and administration of the regional solid waste authority. Using the total waste generation rate of 10.6 lb/person/day (as per Table 2-8) and an estimated population of 700,000, and the 65% diversion rate, it is expected that there will be about 474,200 tons of waste is expected to be delivered for treatment disposal and 120,000 tons of SSOW for processing in the year 2020. Using the totals of 594,200 in the denominator, the average estimated annual operating costs for the regional solid waste management authority will amount to about $2.31 per ton. This is about 50% less than the similar cost for the local solid waste management authority serving only the existing planning unit communities

5.6.1.3 SSOW Collection and Processing

The implementation of a facility(ies) and programs for the collection and processing of Source Separated Organic Waste (SSOW) is a common element of both alternative scenario #2 and alternative scenario #3.

Based upon the analysis of potentially recoverable recyclable materials presented previously in Section 4.3, it is estimated that SSOW could be applicable for the following MSW components and their respective proportions of current MSW delivered for disposal:

- Food waste – 18.7%
- Other paper (non-recyclable) waste – 11.1 %
- Yard waste not currently captured though source separation programs – 1.2%

As explained in Section 4.3, not all of this MSW will be recoverable as SSOW, and an estimated maximum of 19% of the MSW stream currently delivered for disposal could be diverted as SSOW. Using 2008 MSW disposal tonnages for the Planning Unit, this would amount to a maximum of 36,700 tons of material that could be collected and processed as SSOW.

For purpose of this comparative cost analysis, it is assumed that an SSOW facility will be developed with a capacity to process 40,000 tons per year. The estimated cost of a local solid waste management authority owning and operating a SSOW facility is presented in Table 5-6.

While such a facility will take several years to develop and construct, for purposes of consistent comparison the cost values in Table 5-7 are shown in 2009$. For this facility cost estimate, it was assumed that the SSOW facility would begin operation in the year 2012. Estimated operating costs

for the year 2012 are shown as 2009$, based upon use of an annual discount rate of 3%. The estimates shown in this table are also based on a variety of other assumptions, including the following:

Table 5-7 SSOW Facility Cost (2009$)	
SSOW Processed (tpy)	40,000
Net compost Generated (tpy)	19,000
Compost revenue ($)	$570,000
Interest on Debt Service Reserve Account	$35,700
Total SSOW Facility Revenue	**$605,700**
Residue for disposal (tons)	2,000
Landfill Disposal Cost	$136,700
Annual Operating Cost	$1,010,000
Debt Service (Discounted to 2009$)	$892,000
Total SSOW Facility Expenses	**$2,038,700**
Net SSOW Facility Expenses	**$1,433,000**
Net Expenses per ton of Waste Input (2009$)	$35.83

- Compost quantity = 50% of processed SSOW minus a 5% allowance for residue. This reflects the anticipated mass loss that will occur during the compost process.
- Compost revenue = $30 per ton in 2009$
- Annual Facility Operating Cost estimated at approximately $1,010,000 in 2009$
- Facility Construction price of $6,000,000 in 2009$. This facility construction price is based on a $3,000,000 estimate provided by Nortera for a facility similar to the 20,000 TPY plant in Joyceville ON. An SSOW facility developed by a municipality, county or a public authority would be eligible for grant funding from the NYSDEC under the Environmental Protection Fund program. This program could provide grant funding for 50% of eligible project costs, up to a maximum of $2 million. Securing such a grant for this facility would reduce the debt service component of the cost shown in Table 5-6 by about $266,000 per year or about $6.65 per ton. For purposes of the debt service calculation, the facility construction price was inflated by 3% annually until 2012, which is the earliest the facility construction could proceed.
- Property acquisition of 15 acres at $1,125,000.
- Project development expenses, such as siting studies, preliminary environmental review, RFP preparation, review, negotiations of project agreements, at 15% of the facility construction price.
- Total Project Construction Cost total approximately $9,500,000.
- Facility to be financed with Revenue Bonds with 20 year term and 6% annual interest.
- Total Bond issuance approximately $11,515,000 to cover project construction costs, costs of issuance such as underwriters fees, capitalized interest, 12 month debt service reserve account, interest during construction.

- One year (12 month) construction period.
- Annual cost to amortize debt of approximately $1,004,000.

For purpose of this Solid Waste Management Plan, it is assumed the provision of SSOW capacity in the larger expanded planning unit will be accomplished at a single facility, but with higher throughput capacity or at multiple facilities with similar throughput capacity. As such, the net expense per ton of SSOW input is expected to be similar to the value shown in Table 5-6 above.

There will also be a cost element associated with the separate collection of the SSOW. Given the significant difference between the net per ton expense for operating the SSOW compost facility compared with transfer and/or disposal and other post-recyclable waste processing approaches, it is expected that there will be a net avoided cost benefit associated collection of SSOW and delivery to a local SSOW processing facility sponsored by the Planning Unit. These savings will likely accrue to both the waste generators and the parties responsible for waste collection, be they public or private.

5.6.1.4 Regional Solid waste Treatment Facility

This Alternative Implementation Scenario #3 includes the development of a regional facility utilizing a mixed solid waste treatment technology to further minimize landfill disposal requirements for post recyclable solid waste beyond what would be achievable with either of the other alternative scenarios.

Because there is limited data available on the construction and operating costs associated with the new and emerging solid waste treatment technology, this cost analysis will be based on the development and operation of a conventional mass burn waste to energy facility with a nominal design capacity of 1,500 tons per day (TPD). A new WTE facility of this same size is in the advanced stages of procurement in Frederick County Maryland, and the estimated costs for that facility provide useful insight into this cost analysis.

The estimated cost of a regional solid waste management authority owning and operating the facility for an expanded Planning Unit around the Capital Region is presented in Table 5-8. Like the SSOW facility cost estimate shown in Table 5-7, the solid waste treatment facility will take several years to develop and construct, for purposes of consistent comparison the cost values in Table 5-8 are also shown in 2009$. For this facility cost estimate, it was assumed that the solid waste treatment facility would begin operation in the year 2015. Estimated operating costs for the year 2015 are shown as 2009$, based upon use of an annual discount rate of 3%. The estimates shown in this table are also based on a variety of other assumptions, including the following:

- Facility Throughput and Annual Waste Delivery = 510,000 TPY representing approximately 93% of daily design capacity.

- Annual Solid Waste Processed = 494,700 TPY, allowing for the delivery of 3% non-processible waste.
- Net Electricity output = 635 kWh per ton of solid waste processed, based on the proposed agreement for Frederick County MD facility.
- Electricity sales revenue based on $0.07/kWh (2009$) and capacity payment of $25.80/kWh/yr (2009$).
- All energy revenue is credited to the project.
- Process residue is generated at 32% of solid waste processed.
- O&M costs of approximately $30/ton (2009$) exclusive of residue disposal and debt service.
- Residue and non-processible transport and disposal fee at $58 and 68/ton, respectively (2009$).
- Ferrous recovery @ 2% of solid waste processed and ferrous sales @ $60/ton (2009$).
- Non-ferrous recovery @ 0.5% of solid waste processed and ferrous sales @ $120/ton (2009$).
- All recovered material revenue is credited to the project.
- Unit prices for energy and recovered material revenue increase at an annual inflation rate of 3%.
- Unit prices for residue disposal, operating and pass through costs increase at an annual inflation rate of 3%.
- Facility Construction price of $332,000,000 in 2009$. This facility construction price is based on proposed fixed price agreement for the Frederick County MD facility. .
- Project development expenses, such as siting studies, property acquisition, preliminary environmental review, RFP preparation, review, negotiations of project agreements, at 7.5% of the facility construction price, or $24,900,000 in 2009$.
- Contingency at 10% of Facility Construction Price to cover unforeseen expenditures.
- Total Project Construction Cost total approximately $420,885,000 in 2012$.
- Facility to be financed with Revenue Bonds with 30 year term and 6% annual interest.
- Total Bond issuance approximately $553,858,000 to cover project construction costs, costs of issuance such as underwriter's fees, capitalized interest, 39 month debt service reserve account, interest during construction and start-up period.
- 39 month construction and start-up period.
- Annual cost to amortize debt of approximately $40,237,000.

The cost data presented in Table 5-8 used reasonably conservative assumptions so as not to underestimate the anticipated costs and is referred to as the Base Case. Nevertheless, a sensitivity analysis was performed to examine how the 20 year average net present value (NPV) cost per ton would change if certain assumptions were altered and made less conservative. The use of NPV to normalize anticipated future expenditures is a common practice in cost/benefit analysis. Evaluating 20 year average NPV allows for the appropriate comparison of alternatives that might have differing cost trends over the useful life of the project. While the present value of estimated 2015$ costs for the project is $66.68/ton as shown in Table 5-8, the 20 year average NPV of this facility is $51.85. This is primarily due to the relative balance between variable cost of operation and variable revenue elements, so that inflationary escalation of operating costs are offset by the inflationary escalation of project revenue (under the assumptions as noted). This leaves the future net cost of facility operations substantially equivalent from year to year. The calculation of NPV discounts the present value of future expenditures, and if future values are relatively constant, the present value in today's dollar will decline year over year into the future.

Table 5-8
Solid Waste Treatment Facility Costs (2009$)

Solid Waste Delivered (TPY)	510,000	
Waste Processed (TPY)	494,700	
Non-processible or bypass waste	15,300	
Net electricity generated (mWh)	314,134.5	
Ferrous metal recovery (TPY)	9,894	
Non-ferrous metal recovery (TPY)	2,474	
Electric Revenue	$22,914,600	
Metal Recovery Revenue	$890,500	
Interest on Debt Service Reserve Account	$1,347,900	
Revenue Subtotal		**$25,153,000**
Total residue and non-processible waste (TPY)	173,604	
Landfill Disposal Costs	$10,279,300	
Facility O&M Cost	$15,181,400	
Debt Service (discounted to 2009$)	$33,698,000	
Expense Subtotal		**$59,158,700**
Net Facility Cost (2009$)		**$34,005,700**
Net Cost (2009$/ton)		**$66.68**

The results of this sensitivity analysis are presented in Table 5-9 below. Case 2 changed the assumption regarding the percentage of residue from the 32% used in the Base Case, to 25%, the residue percentage reported for the OCRRA facility. This reduction in residue percentage results in a $3.96/ton reduction in the 20 year average NPV cost, compared to the Base Case.

Case 3 includes the reduced residue fraction at 25% as well as a reduction in the cost of transport and disposal that would occur if a local landfill was available. Under Case 3, the T&D fee is reduced by about $18/ton (2009$) compared to the Base Case to account for reduced transportation cost and disposal at a more local landfill. Under these Case 3 assumptions, there is a reduction of $8.96/ton in the 20 year average NPV cost compared to the Base Case.

Case 4 is the same as the Base Case with respect to residue percentage and residue disposal cost, but assumes that the all of the 510,000 TPY of facility capacity is utilized for waste processing. Under the Base Case, only 97% of this facility capacity is utilized and 494,700 TPY is processed while 15,300 TPY is bypassed. Case 4 results in a $7.77/ton reduction in the 20 year average NPV cost, compared to the Base Case.

Case 5 combines the changed assumptions from Cases 2, 3 and 4 and results in a $11.60/ton reduction in the 20 year average NPV cost, compared to the Base Case. Case 6 is the same as the Base Case, except that the Electric Energy price is increase by 10% to $0.077 from $0.07 (2009$). Case 6 results in a $4.31/ton reduction in the 20 year average NPV cost, compared to the Base Case.

Table 5-9
Sensitivity Analysis Results

Case Name/number	20 year average NPV in $/ton (2009$)	Difference from Base Case
Base Case	$51.85	$-
Case 2 - 25% Residue	$47.89	$3.96
Case 3 - 25% Residue and Local Disposal	$42.89	$8.96
Case 4 - Full Plant Capacity Utilization	$44.08	$7.77
Case 5 - Full Utilization w/ 25% residue and local disposal	$40.25	$11.60
Case 6 - 10% Increase in Electricity Rate	$47.54	$4.31
Case 7 - 10% Reduction in Waste Delivery	$59.49	$(7.64)

Finally, Case 7 was developed to examine the sensitivity of net cost to a reduction in waste deliveries to below the capacity of the facility. Case 7 is the same as the Base Case except that 10% less waste, or a total of 459,000 TPY, is delivered to the facility from an enlarged regional planning unit. Case 7 will result in an increase of $7.64/ton in the 20 year average NPV cost of operation compared to the Base Case. This is because the fixed cost of capital and operations will be spread over a smaller base

of incoming waste tonnage and because less energy and recyclable materials will be recovered, and less revenue will be derived from these sources. For purposes of this sensitivity analysis it is assumed that the facility capacity remains unused, although in reality the excess facility capacity would likely become available to users from outside the expanded planning unit, albeit at a tipping fee that be less than is paid by the sponsoring planning unit. This is the situation that occurred at many waste to energy facilities after the 1994 U.S. Supreme Court decision of C.A. Carbone v. Town of Clarkstown invalidated certain flow control laws.

5.6.1.5 Land Disposal Of Residue And Post-Recyclable Waste

The use of landfills for the disposal of process residue and post-recyclable waste is a common feature of each of the three Alternative Implementation Scenarios. The landfill disposal requirements under each of the three Alternative Implementation Scenarios will be different.

Under Alternative Scenario #1, the recently approved Eastern Expansion of the Rapp Road Landfill is expected to provide disposal capacity to the Planning Unit until the year 2016. At the end of the active life of the Rapp Road Landfill, it will be necessary to utilize commercially available landfill located outside the boundaries of the Planning Unit. As shown previously in Table 5-2, most of the currently permitted landfill capacity in New York is located at privately owned facilities in central or western New York. It is also worth noting that based on the information shown in Table 5-2, the Town of Colonie Landfill has about 20 years of currently permitted disposal capacity remaining, assuming that waste acceptance were to continue at its current limit of 170,000 tons per year. However, since the Town of Colonie Landfill is already operating at or near its annual limit, without a permit modification, it may not have sufficient capacity to accept additional waste from the Planning Unit after the Rapp Road Landfill is filled to capacity. Therefore the cost analysis of landfill disposal for Alternative Scenario #1 will include the transfer and transport of waste to a privately owned or operated landfill, such as Seneca Meadows or High Acres, in Seneca County and Monroe County, respectively.

Under Alternative Scenario #1, it is assumed that an overall recycling and a maximum diversion rate of 49% is achieved. With achievement of this diversion rate, approximately 213,000 tons of solid waste would need to be transferred and transported to a distant landfill for disposal in the year 2016. This scenario would involve the construction of a new transfer station facility capable of accommodating the annual tonnage. Once delivered to the transfer station, this material would be loaded into transfer trailers for transport to a disposal site. These costs are shown in Table 5-10, but for comparison with other elements of the alternative scenarios, are presented in 2015$. The estimated values included in this table are also based on a variety of assumptions, including the following:

- Landfill Disposal Fee at $25 per ton in 2009$, inflated by 3% annually.

- Annual Transfer Facility Operating Cost estimated at approximately $1,520,000 in 2009$ and inflated at an annual rate of 3%.
- Transfer Facility Construction price of $10,240,000 in 2009$, and inflated to 2015$ at an annual rate of 3%.
- Facility construction price includes property acquisition of 5 acres at $75,000 per acre (2009$).
- Project development expenses, such as siting studies, preliminary environmental review, preparation of plans and specs, review of submittals, etc. at 15% of the facility construction price.
- Total Project Construction Cost total approximately $15,140,000 in 2015$.
- Facility to be financed with General Obligation Bonds with 20 year term and 6% annual interest.
- Total Bond issuance for the Transfer Facility approximately $16,536,000 to cover project construction costs, costs of issuance such as underwriter's fees, capitalized interest, and interest during construction.
- One year (12 month) construction period.
- Transportation O&M Cost based on one daily round trip to disposal site in Central of Western New York with diesel fuel cost at $3.00 per gallon.
- Approximately $2,563,000 (2009$) in capital cost of transportation equipment for 40 tractors and trailers, spare parts and contingency. This was inflated to 2015$ at 3% annually and then amortized for 5 years at 5% interest rate.
- Debt service payments discounted from 2015$ to 2009$ using a 3% annual discount rate.

Table 5-10
Transfer Transport and Disposal Cost
Alternative Scenario #1 - 2009$

Annual Tonnage Throughput (TPY)	213,000
Landfill Disposal Cost	$ 5,325,000
Facility Operating Cost	$ 1,519,400
Transportation O&M Cost	$ 7,083,400
Facility Debt Service	$ 1,207,400
Transportation Debt Service	$ 2,146,200
Total Facility Operating and Debt Service	$ 2,726,800
Facility Operating and Debt Service per ton	**$ 12.80**
Total Transportation O&M, Debt Service & Disposal	$14,554,600
Total T&D per ton	**$ 68.33**
Total Facility ,Transport &Disposal Cost (2009$)	$17,281,400
Total Facility ,Transport &Disposal Cost ($/ton)	**$ 81.13**

For price comparison, CHA contacted MOSA in July 2009 and learned that their current contract for transport and disposal (T&D) establishes a 2009 price of $62.47/ton. This does not compare unfavorably with the total estimated T&D cost of $68.33 per ton presented in Table 5-10, especially since the hauling distance from a transfer station developed in the Planning Unit would be longer than the distance travelled from the MOSA transfer stations.

While the size of the Planning Unit for Alternative Scenario #2 will remain the same as Alternative Scenario #1, the Planning Unit will be managed by a local solid waste management authority and will expand mandatory recycling to include source separated organic waste. Under this Alternative Scenario #2, it is assumed that an overall recycling and a maximum diversion rate of 65% is achieved. Although unlikely to be fully achieved by the year 2016, if it were, this diversion rate would result in approximately 148,000 tons of solid waste requiring transfer transport and disposal at a distant landfill in the year 2016. Like Alternative Scenario #1, this scenario would also involve the construction of a new transfer station facility capable of accommodating the annual tonnage, but the facility would be financed out of revenue bonds issued by the authority. There would be no difference in the cost of construction or operation of the transfer station because it is only marginally smaller in size than the transfer station required for Alternative Scenario#1. Once delivered to the transfer station, this material would be loaded into transfer trailers for transport to a disposal site. These costs are shown in Table 5-11.

Table 5-11
Transfer Transport and Disposal Cost

Alternative Scenario #2 - 2009$	
Annual Tonnage Throughput (TPY)	148,000
Landfill Disposal Cost	$ 3,700,000
Facility Operating Cost	$ 1,519,400
Transportation O&M Cost	$ 4,763,500
Facility Debt Service	$ 1,328,000
Transportation Debt Service	$ 1,609,700
Total Facility Operating and Debt Service	$ 2,847,400
Facility Operating and Debt Service per ton	**$ 19.24**
Total Transportation O&M, Debt Service & Disposal	$10,073,200
Total T&D per ton	**$ 68.06**
Total Facility ,Transport &Disposal Cost (2015$)	$12,920,600
Total Facility ,Transport &Disposal Cost ($/ton)	**$ 87.30**

Under Alternative Implementation Scenario #3, it is assumed that no new transfer station capacity would be required, because non-processible, by-pass waste, and residue from the solid waste

treatment facility would be transported to the available landfill sites either directly or through existing transfer station capacity in the Capital region. The cost of transporting and disposing of process residue and non-processible and by-pass waste is already included in the cost analysis presented earlier for the solid waste treatment facility.

5.6.1.6 Cost Analysis Summary of Alternative Implementation Scenarios

This section will present a discussion of the results of the analysis of the individual elements presented in the subsections above. Total program cost elements for each Alternative Implementation Scenario are presented in Table 5-12 (in 2009$) and these costs are divided by total tonnage delivered for disposal or processing to arrive at an average cost per alternative. As explained further below, this comparison shows that Alternative Scenario #3 has the lowest program cost at $67 per ton, followed by Alternative Scenario #1 at $81 per ton and Scenario #2 at $82 per ton.

Table 5-12
Cost Analysis Summary

	Alternative Implementation Scenario		
Program Element	**#1**	**#2**	**#3**
Local Solid Waste Management Authority [1]	NA	$875,000	NA
Regional Solid Waste Management Authority [2]	NA	NA	$1,370,000
SSOW Facility [3]	NA	$1,433,000	$4,299,000
Solid Waste Treatment Facility [4]	NA	NA	$34,005,700
Landfill Disposal including transfer and transport [5]	$17,281,400	$12,920,600	NA
Total Cost of Program Elements (2009$)	$17,281,400	$15,228,600	$39,674,700
Total Waste Generation in 2015 [6]	417,400	417,400	1,355,000
Maximum Recycling Achievement	49%	65.00%	65.00%
Maximum Waste Recycled or Composted -TPY 2015	204,500	271,300	880,800
Minimum Waste remaining for treatment or Disposal - TPY 2015	212,900	146,100	474,200
SSOW Processed - TPY 2015	0	40,000	120,000
Total Tonnage for Average Cost [7]	212,900	186,100	594,200
Average Cost of Program Elements ($2009 per ton)	**$81**	**$82**	**$67**

Notes:
1. Total Finance and Administration Cost in 2009$ as per Table 5-3
2. Total Finance and Administration Cost in 2009$ as per Table 5-4
3. For Alternative 2, Net SSOW Facility Expenses in 2009$ as per Table 5-6 for a 40,000 TPY Facility. For Alternative 3 cost for facility capacity of 120,000 TPY facility is assumed at the same unit cost.
4. Net Facility Cost in 2009$ as per Table 5-7
5. Total Facility ,Transport & Disposal Cost in 2009$ as per Table 5-9, for Alternative 1 and Table 5-10 for Alternative 2. Disposal included in solid waste treatment facility cost for Alternative 3.
6. Alternatives 1 and 2 for Planning Unit only, as per Table 2-8. Alternative 3 assumes expanded planning Unit population of 700,000.
7. Total tonnage for average fee includes waste remaining for treatment and disposal and SSOW processed.

The total cost of program elements for Alternative Scenario #1 is estimated to be $17,281,400 in 2009$. Total waste generation for the Planning Unit in year 2015 is estimated at 417,400 tons per year, as per previous Table 2-8. The materials recovery analysis presented in Section 4 of this SWMP estimated that the maximum recovery of currently designated recyclables would yield a maximum recycling diversion rate of 49%. This is the maximum diversion rate that would be achievable under this Alternative Implementation Scenario, and for the comparison in Table 5-12, it is assumed that this diversion rate will be achieved by the year 2015. Therefore, the estimated minimum amount of waste that will remain for disposal in 2015 is 212,900 tons, or 51% of the waste generation. It is this tonnage that is used as the denominator in the fraction used to determine an average program cost of $81 per ton for Alternative Implementation Scenario#1.

Program cost for Alternative Scenario #2 is similar to Alternative #1, except that Alternative #2 has additional costs for the administration by a local Solid Waste Management Authority and additional costs associated with the development and operation of an SSOW facility. However, under this Alternative, maximum recycling diversion of 65% can be achieved, including diversion associated with the recovery of SSOW. Assuming this is achieved by the year 2015, an estimated 146,700 tons of waste would remain for disposal and would result in a transfer transport and disposal total of about $12,920,600, an avoided cost of over $4.3 million compared to Alternative #1. This avoided disposal cost more than offsets the additional program costs associated with the administration of the local Solid Waste Management Authority and the operation of the SSOW facility. However, because there is less combined tonnage delivered for SSOW and disposal (due to greater amounts of non-SSOW tonnage being recycled) the average program cost per ton for Alternative Scenario #2 is $82 per ton, slightly higher than Alternative 1.

Program costs for Alternative Scenario #3 include the administration of a regional Solid Waste Management Authority, SSOW processing capacity for up to 120,000 TPY, and the development and operation of a solid waste treatment facility for a service area population assumed to be 700,000. Under this Alternative #3, maximum recycling diversion would also be 65% and for purposes of this comparison is assumed to be achieved in the year 2015. Total cost of Alternative #3 programs are estimated at about $39,674,700 and when averaged over 594,200 tons yields an average program cost of $67 per ton.

5.6.2 Facility Sizing Analysis

The NYSDEC regulations for the content of a solid waste management plan specify that as part of the evaluation of the various technologies include a determination of appropriate sizing of solid waste management facilities, based on projected quantities and composition of the solid waste after considering the effects of waste reduction and recyclable recovery efforts.

This section of the alternatives analysis will focus on the sizing of alternative solid waste management facilities that will be required to process and or dispose of post-recyclable solid waste. As such, it will be limited to a discussion of a regional solid waste treatment facility and landfill disposal requirements.

With respect to the solid waste treatment facility, this analysis assumes the development of a regional facility with the nominal capacity of 1,500 tons per day. Assuming an average availability factor of 93%, such a facility would be capable of processing about 510,000 TPY.

Assuming a regional planning unit population of approximately 700,000, a per capita waste generation rate of 10.6 lb/person/day as noted in Table 2-8, and a maximum recyclable diversion of 65%, it is expected that about 474,000 TPY of waste would be available the regional planning unit. This is approximately 93% of the available capacity of the facility. Given that the four county Capital District will have an estimated population of about 837,000 in 2015, a conceptual design capacity of 1,500 TPD is reasonable. However, this sizing analysis may need to be revisited in connection with detailed feasibility studies that would be required for the implementation of a facility of this type.

Regarding landfill capacity, no new landfill facilities are proposed for development as part of this alternatives analysis. Rather, Alternatives #1 and # 2 are expected to rely on commercially available landfill capacity for the post-recyclable waste that will require disposal. Alternative # 3 will use a waste treatment facility to reduce the amount of post-recyclable waste requiring land disposal. Using the comparison year of 2015, the following quantities of waste are anticipated to require landfill disposal after achievement of the maximum waste diversion.

- Alternative Scenario # 1 – 212,900 tons per year – 100% of post-recyclable waste stream or 51% of total waste generation.
- Alternative Scenario #2 – 146,100 tons per year - 100% of post recyclable waste stream or 35% of total waste generation.
- Alternative Scenario #3 – 173,600 TPY – 34% of post recyclable waste stream or 12% of total waste generation.

It is noted that the Town of Colonie Landfill has a current annual permit limit of 170,500 tons per year. Assuming that the Town was a participant in Alternative Scenario #3, the Colonie Landfill would be able to provide most of the landfill capacity needed to support this regional solid waste management alternative.

5.6.3 Financial Risk

There is financial risk associated with undertaking any of the Alternative Implementation Scenarios, and the individual elements that comprise them. This section will include an analysis of the financial risks associated with the specific elements

5.6.3.1 Local Or Regional Solid Waste Management Authority

Implementation of a solid waste management authority for the existing Planning Unit will require the enactment of state enabling legislation to create and empower the authority. Once established, there will be costs associated with the ongoing administrative operations of a local or regional solid waste management authority, but there is no inherent financial risk in this arrangement because this cost reflects necessary administrative functions that must be performed regardless of the formation of an authority.

Solid waste authorities are typically established to develop programs and facilities on behalf of their constituent communities. The financing of capital facilities developed by a solid waste authority would likely be accomplished with revenue bonds and may bear a slightly higher interest rate than general obligation bonds. However, this again is more of a cost consideration than a financial risk, since the revenue bonds will be backed by project revenue and not the taxing power of a local government.

When an authority's facilities are financed with revenue bonds, project revenues must typically support the facilities' debt service and the operational costs. These costs are equitably spread over facility users, but there is the risk that the facility is not fully utilized and there are shortfalls in revenue. The risk of revenue shortfall is typically mitigated with the establishment of waste flow control, waste supply agreements with counties or municipalities and/or with contractual commitments with waste haulers.

There is always the risk that after an authority is formed, it is unsuccessful in developing the facilities and programs as originally envisioned. It is possible in these cases that the constituent municipalities may need to bear the cost of the development expenses for a project or program that is unsuccessful. However, this risk is as likely to occur without the formation of an authority, so it is not an additional financial risk.

5.6.3.2 SSOW Facility

There several financial risks associated with the development and operation of an SSOW. The construction of such a facility could cost more than anticipated, or the operation of the facility could be more expensive. Most of this risk can be mitigated by structuring a fixed price construction contract and a fixed price operating agreement with a qualified vendor.

There is also risk that waste deliveries to the SSOW facility do not fully utilize the operating capacity of the plant. This risk can be partially mitigated by undersizing the initial construction of the facility so that it can be incrementally expanded in stages to meet waste delivery needs.

Finally, all direct financial risk for an SSOW project can be mitigated by allowing one or more private companies to develop and operate the SSOW facility(ies) at their own expense. Under this type of arrangement, the local or regional solid waste management authority would cede control over the facility operations. Using this approach it may still be possible for a solid waste management authority or local government to secure favorable contractual arrangements for the acceptance and processing of SSOW.

5.6.3.3 Regional Solid Waste Treatment Facility

The financial risks associated with the development and operation of a regional solid waste treatment facility are similar to those associated with the development of an SSOW facility. Most of these risks can be mitigated by structuring a fixed price construction contract and a fixed price operating agreement with a qualified vendor. However, the costs associated with the construction of a regional solid waste treatment facility will be an order of magnitude higher that the cost for developing comparable regional SSOW capacity.

There is also financial risk associated with project cancellation. While this is a risk on any capital project, the large capital cost and longer project development time frames associated with projects of this type can increase the probability of project cancellation. In addition, the up-front project development expenses incurred by the authority or local government seeking to sponsor the project are likely to be significantly higher than for an SSOW facility.

In New York State, projects of this type are most often structured under the sponsorship of a municipality or authority, but with a qualified vendor responsible for constructing and operating the facility, and the sponsoring agency responsible for securing waste delivery and residue disposal. Waste delivery risk can be mitigated with waste flow control ordinances, waste delivery and service agreements with the government agencies in the service area, and waste delivery agreements with private haulers.

For some facilities of this type, revenue generated from the sale of electricity can be significant. For facilities developed under public sponsorship, most of this electric revenue will accrue to the sponsoring agency. This can be a significant offset to debt service and operational expenses, and will result in lower tipping fees. The vendor developing and operating such a facility will typically provide performance guarantees, one of which will be a specified amount of electricity generated per ton of processible waste. The vendor cannot however control the value of the electricity in the market place, so the sponsoring agency typically assumes most of the financial risk associated

changes in the unit value of the electricity. This risk of energy price decline is mitigated by benefits that would be enjoyed with an increase in energy pricing. The cost analysis presented previously examined the sensitivity of net project cost to a 10% increase in initial electricity price assumption and found that such an increase would result in a about a $5.00 per ton reduction in net facility cost.

Other privatized arrangements for the development of a solid waste treatment facility may be possible as a mechanism to minimize financial risk for the sponsoring authority and local communities in the service area. As mentioned under the discussion of SSOW facility financial risk, under this type of arrangement, the local or regional solid waste management authority would cede control over the facility operations. Properly structured, this approach could also be a mechanism for a solid waste management authority or local government to secure favorable contractual arrangements for the acceptance and processing of post-recyclable solid waste.

5.6.3.4 Land Disposal Of Residue And Post-Recyclable Waste

The use of landfills for the disposal of process residue and post-recyclable waste is a common feature of each of the three Alternative Implementation Scenarios. The landfill disposal requirements under each of the three Alternative Implementation Scenarios will be different.

Under all the Alternative Implementation Scenarios, the recently approved Eastern Expansion of the Rapp Road Landfill will continue to provide disposal capacity to the Planning Unit until the year 2016. At the end of the active life of the Rapp Road Landfill, it will be necessary to utilize commercially available landfill located outside the boundaries of the Planning Unit. For Alternative Scenario #1 this will include the transfer and transport of waste to a privately owned or operated landfill. This Alternative Scenario assumes the construction of a transfer station, nominally sized at 1000 TPD, to be developed by the City of Albany on behalf of the Planning Unit communities. This arrangement will represent a financial risk to the City if the transfer facility is built but not fully utilized. This risk can be minimized through the use of contractual arrangements for waste delivery and by contracting for transport and disposal services together, and thereby avoiding the capital expense of buying tractors and trailers.

This Alternative also has risk associated with excessive fuel price escalation, which will have a negative effect on long distance waste transport by truck. Based on the cost estimates developed and presented in Section 5.6.1 of this SWMP, CHA estimates that transport cost will increase by about $2.75/ton for each $1.00 per gallon increase in the price of diesel fuel, all in 2009$. There will be limited opportunities to mitigate this risk of excessive fuel price escalation, although the resultant transport price increases, if permanent, will create incentives for additional waste reduction and recycling which might otherwise not have been economically feasible.

While Alternative Scenario #2 will have similar financial risks, but there will be some important differences regarding the magnitude of the risk and the party exposed to them. Since Alternative Scenario #2 will eventually result in less post-recyclable waste which will require disposal, the financial risk associated with excess transfer station capacity and excessive fuel price escalation will be proportionally less. Since this alternative contemplates that the transfer station would be developed by a local solid waste authority, waste delivery risk can be mitigated with waste flow control as well as with the other measures mentioned for Alternative #1. Moreover, any financial risk would be shared by the constituent members of the planning unit, though the local solid waste management authority.

Finally, Alternative Scenario #3 has the least amount of financial risk relative to waste transfer transport and disposal because it requires the least proportion (only 13 % of the waste generation) of the waste stream to require land disposal. It may also be possible to reduce this disposal percentage further with if one of the new or emerging technologies for solid waste treatment (with claims of minimal residue disposal) is proven to be feasible and is developed.

5.6.4 Time to Implement

This section will include an analysis of the ability to implement the specific elements of each Alternative Implementation Scenario in terms of the time frame required for procurement, permitting, financing, construction, and start-up operations. A summary of the time frames to implement is shown in Table 5-13.

Table 5-13
Time Frames to Implement

Element and Activity	Estimated Completion date
Local or Regional SWMA	
Complete feasibility study & consensus building	Q1-2011
Enact enabling legislation	Q3-2011
Establish Authority and appoint directors	Q1-2012
Hire staff and commence operations	Q3-2012
SSOW Facility	
Complete facility procurement	Q2 - 2013
Permits issued	Q2 - 2014
Construction completed	Q4 - 2014
Full-scale operations	Q1-2015
Solid Waste Treatment Facility	
Complete facility procurement	Q2 - 2013
Permits issued	Q1 - 2016
Construction completed	Q1 - 2018
Full-scale operations	Q3 - 2018

The time frames presented herein represent reasonable and achievable time frames, but are optimistic in the sense that there is no allowance for significant delay. For example, time frames for permit review and SEQR review will be largely outside of the control of the project developer and sponsor. Therefore, in most cases the implementation time frames presented in this section should be viewed as the earliest that are likely to occur. The exception to this is the element of transfer and disposal, which is not expected to be required until the permitted capacity at the Rapp Road landfill is exhausted sometime during the year 2016.

5.6.4.1 Local or Regional Solid Waste Management Authority

Implementation of a solid waste management authority for the existing Planning Unit will require the enactment of state enabling legislation to create and empower the authority. Before the legislation can be enacted, local or regional consensus will need to be established to provide the basis for enactment. Considering the County's schedule to conduct the feasibility study for the regional solid waste management authority, it will take at least until the end of 2010 to develop the necessary local and regional consensus. Using this assumption, the enabling legislation for either the local or the regional solid waste management authority can be enacted during the 2011 legislative session. Once established in Public Authorities law, it is assumed that at least 3 months will be required to have the authority formally established through the appointment of its board of directors, and at least another 3 months will be required to hire executive and administrative staff necessary to begin functional operation. Under the most optimistic assumption, either the local or regional authority could be functionally operating by January 2012, although it will be more realistic to assume that its functional operations of a local or regional solid waste management authority could begin in mid 2012.

5.6.4.2 SSOW Facility

Alternative Scenario #2 assumes that an SSOW facility will be built and operated on behalf of the local solid waste management authority. Facility procurement pursuant to the requirements of Section 120w of General municipal law will require at least 6 months from the issuance of a Draft Request for Proposal (DRFP) for to design construction and operation of until the selection of a preferred vendor for the project. Before the RFP could be issued a preferred site would need to be selected for the facility, adding another 3 months to this process. Assuming that these activities do not begin until the local authority is functionally operating in mid 2012, the vendor selection process can be completed within 9 months, or by the end of the first quarter of 2013. Assuming 3 months will be needed to conclude contract negotiations with the preferred vendor, facility design and permitting can begin by mid year of 2013.

Based on information provided by the RFI respondent who proposed an SSOW system approximately 6 months will be required for facility design and permitting. This is a reasonable time frame for the preparation of a permit application, but does not include the time necessary for the regulatory agency

and lead agency under SEQR to provide their respective reviews. A minimum of another 6 months must be provided for these regulatory reviews, so under these assumptions the SSOW facility would be permitted and ready to commence construction by mid-2014. Given a 6 month construction period provided by the RFI respondent, the facility would be completed and ready to begin acceptance testing by the end of the year 2014.

Full facility operation could commence in early 2015, after successful completion of acceptance testing.

The SSOW component of Alternative Scenario # 3 could be developed on a similar timeframe, although construction of a larger facility may take an additional 3 to 6 months to construct. If multiple SSOW facilities are developed instead of a single site with a larger facility, than additional time (estimated at 9 to 12 months beyond the Alternative #2 timeframes) will be needed before all the facilities could be completed and ready for waste acceptance. However, since it will likely be beneficial to open the SSOW facility capacity sequentially rather than all at once, it is assumed that the initial capacity for the Alternative #3 SSOW facility can also commence operation by early 2015.

5.6.4.3 Regional Solid Waste Treatment Facility

Alternative Scenario #3 assumes that a regional solid waste treatment facility will be built and operated on behalf of the Regional Solid Waste Management Authority. Facility procurement pursuant to the requirements of Section 120w of General municipal law will require at least 6 months from the issuance of a Draft Request for Proposal (DRFP) for to design construction and operation of until the selection of a preferred vendor for the project. Before the RFP could be issued a preferred site would need to be selected for the facility, adding another 3 months to this process. Assuming that these activities do not begin until the regional authority is functionally operating in mid 2012, the vendor selection process can be completed within 9 months, or by the end of the first quarter of 2013. Because this project will be more complex that the SSOW project, its is assumed that 6 months will be needed to conclude contract negotiations with the preferred vendor, facility design and permitting can begin by the end of Q3 in the year of 2013.

Based on information provided by several RFI respondents who proposed solid waste conversion technologies approximately 18 months will be required for facility design. A minimum of 12 months should be provided for these regulatory and SEQR reviews, so under these assumptions the solid waste treatment facility would be permitted and ready to commence construction by the end of Q1 2016. Given a 24 month construction period, the facility would be completed and ready to begin acceptance testing by the end of Q1 2018. Allowing for a 6 month start-up and acceptance testing period, the facility could be expected to achieve full scale operation by the end of Q3 2018.

5.6.4.4 Land Disposal Of Residue And Post-Recyclable Waste

Under all the Alternative Implementation Scenarios, the recently approved Eastern Expansion of the Rapp Road Landfill will continue to provide disposal capacity to the Planning Unit until the year 2016. At the end of the active life of the Rapp Road Landfill, it will be necessary to utilize commercially available landfill located outside the boundaries of the Planning Unit. For Alternative Scenario #1 this will include the transfer and transport of waste to a privately owned or operated landfill. This Alternative Scenario #1 assumes the construction of a transfer station, nominally sized at 1000 TPD, to be developed by the City of Albany on behalf of the Planning Unit communities. Initial process for this facility would involve preliminary design (6 months) followed by permitting and regulatory review (6 months) at the transfer station site currently designated in the Rapp Road Landfill permit. This will be followed by the development of detailed plans and specifications, solicitation of bids, and contract award, which together will take another 6 months. Construction will require another 6 months, and the facility will be ready for operation within 24 months of commencing the preliminary design. Contractual arrangement for transport and disposal can be made concurrently during this same time frame.

In order to have this transfer facility available by Q1 of 2016, it would be necessary to commence preliminary design no later than Q1 of 2014.

Under Alternative Scenario #2 the transfer station would be conducted by the local solid waste management authority. The procurement process and time frames for this facility will be similar to the transfer station developed under Alternative #1, and would need to commence preliminary design no later than Q1 of 2014.

Alternative Scenario #3 does not have a transfer station component associated with its final disposal element. The timeframes for the implementation of the solid waste treatment facility show its earliest likely operation date as the end of Q3 of 2018, which is after the anticipated closure date of the Rapp Road landfill. Therefore a supplemental plan for the transfer and disposal of solid waste during this interim period would need to be developed if this alternative scenario is selected for implementation as part of the SWMP.

5.6.5 Effectiveness

This section will include an analysis of the effectiveness of the specific elements of each Alternative Implementation Scenario in meeting the goals and objectives of this Solid Waste Management Plan, as stated in Section 1.2. These goals and objectives are re-stated here:

- To continue to provide reliable and reasonably priced solid waste management facilities and services, for MSW, C&D, and non-hazardous industrial waste, for the period from 2011 until 2030, by:
    - Maintaining or expanding the membership of the planning unit;

  - Maintaining and building on existing public sector and private sector solid waste management resources;
  - Identifying new infrastructure and programs that should be developed to meet future needs; and
  - Identifying the administrative structure by which new facilities and programs should be implemented.
- To minimize the amount of solid waste requiring land disposal in the future by:
  - Maintaining and expanding waste reduction, reuse and recycling efforts, as set forth in the SWMP Modification;
  - Increasing the effectiveness of enforcement of existing recycling requirements;
  - Considering more emphasis on material re-use and alternatives such as PAYT, single stream recycling, and food waste composting as mechanisms to achieve future reductions in waste requiring disposal;
  - Considering alternatives which recover energy from waste, including proven technologies as well as new and emerging technologies.

5.6.5.1 Local Solid Waste Management Authority

Implementation of a local Solid Waste Management Authority would meet all of the objectives associated with the goal of continued provision of reliable and reasonably priced solid waste management facilities and services. The local Solid Waste Management Authority would maintain and strengthen the membership of the planning unit and maintain and build on existing public sector and private sector solid waste management resources. It would be able to provide for new infrastructure and programs such as expanded mandatory recycling and an SSOW composting facility. It would also provide a more effective administrative structure than currently exists to facilitate the implementation of new facilities and programs.

Implementation of a local Solid Waste Management Authority would meet most of the objectives associated with the goal of minimizing the amount of solid waste requiring land disposal in the future. It would maintain and expanding waste reduction, reuse and recycling efforts, and increase the effectiveness of enforcement of existing recycling requirements. It would also be more effective providing the administrative structure to place more emphasis on material re-use and alternatives such as PAYT, single stream recycling, and be able to provide for new infrastructure for SSOW and food waste composting as mechanisms to achieve future reductions in waste requiring disposal.

Under the Alternative Implementation Scenario #2, the Local Solid Waste Management Authority would not develop a solid waste treatment facility. Such a facility would be more appropriately developed over the larger population base as part of a Regional Solid Waste Management Authority.

Alternative Scenario #2 could also be developed by the existing planning unit as currently organized, without a local Solid Waste Management Authority. The existing inter-municipal agreement (IMA) between the member communities would need to be strengthened and lengthened to cover the period of debt over any new capital facilities. Even assuming that the IMA could be amended to provide for more definitive long term commitment, the use of the IMA as the administrative structure would still require that one of the participating municipalities take the lead role in developing the new facilities and programs. At this time no individual municipality has stepped forward to assume this obligation for the existing Planning Unit after the City of Albany Landfill reaches capacity. Finally, this variation of Alternative Scenario #2 would be less effective because the Planning Unit would not have flow control jurisdiction, and this could adversely affect its ability to finance the more aggressive waste reduction and recycling programs that are also part of this alternative.

5.6.5.2 Regional Solid Waste Management Authority

Implementation of a regional Solid Waste Management Authority would meet all of the objectives associated with the goal of continued provision of reliable and reasonably priced solid waste management facilities and services. The regional Solid Waste Management Authority would expand and strengthen the membership of the planning unit and build on existing public sector and private sector solid waste management resources. It would be able to provide for new infrastructure and programs such as expanded mandatory recycling and an SSOW composting facility. A regional Solid Waste Management Authority would also provide a more effective administrative structure than currently exists to facilitate the implementation of new facilities and programs.

Implementation of a regional Solid Waste Management Authority would also meet all of the objectives associated with the goal of minimizing the amount of solid waste requiring land disposal in the future. Like a local solid waste management authority, it would maintain and expanding waste reduction, reuse and recycling efforts, and increase the effectiveness of enforcement of existing recycling requirements. It would also provide an effective administrative structure to place more emphasis on material re-use and alternatives such as PAYT, single stream recycling, and be able to provide for new infrastructure for SSOW and food waste composting as mechanisms to achieve future reductions in waste requiring disposal. Finally, the implementation of a regional Solid Waste Management Authority would also provide the economy of scale necessary to develop a facility to recover energy from waste.

5.6.5.3 SSOW Facility

The development of and SSOW facility, under either Alternative Scenario #2 or #3 would be consistent with the goal of continuing to provide reliable and reasonably priced solid waste management facilities and services. It would also be consistent with the goal of minimizing the amount of solid waste requiring land disposal in the future.

5.6.5.4 Regional Solid Waste Treatment Facility

The development of and regional solid waste treatment facility, under Alternative Scenario #3 would be consistent with the goal of continuing to provide reliable and reasonably priced solid waste management facilities and services. It would also be consistent with the goal of minimizing the amount of solid waste requiring land disposal in the future.

5.6.5.5 Land Disposal of Residue and Post-Recyclable Waste

Under all the Alternative Implementation Scenarios, the recently approved Eastern Expansion of the Rapp Road Landfill will continue to provide disposal capacity to the Planning Unit until the year 2016. At the end of the active life of the Rapp Road Landfill, it will be necessary to utilize commercially available landfill located outside the boundaries of the Planning Unit.

Each of the Alternative Scenarios involve different levels of land disposal requirement, but all would be consistent with the goal of continuing to provide reliable and reasonably priced solid waste management facilities and services. Regarding the goal of minimizing the amount of solid waste requiring land disposal in the future, this is best achieved elements of Alternative Scenario #3 which would ultimately result in the requirement to dispose of only 13.5% of total waste generation. Alternative Scenario #2 which would ultimately result in the disposal of 39.5% of total waste generation, while Alternative Scenario #1 will require the disposal of 51.5% of total waste generation.

5.6.6 Environmental Impacts

This section will include an analysis of the environmental impacts of the specific elements of each Alternative Implementation Scenario. The specific elements of this analysis will include:

- Develop and operate source separated organic waste (SSOW) collection and processing capacity (Scenario #2 and # 3);
- Develop and operate a regional facility utilizing a mixed solid waste treatment technology to further minimize landfill disposal requirements for post recyclable solid waste(Scenario #3);
- Landfill disposal of any treatment technology residue and other non-processible post recyclable solid waste will be directed to available disposal facilities either inside or outside the planning unit. New transfer station facilities may be necessary to facilitate long distance transport to disposal facilities outside of the Planning Unit.

Neither a local or regional solid waste management authority is discussed in this section because neither of these elements is expected to result in any direct environmental impacts.

Environmental impacts associated with an SSOW facility, a regional waste treatment facility, or a transfer station with long distance transport for disposal cannot be quantified because these impacts will be site specific, and no specific sites have been identified. Moreover, the development and operation of any of these solid waste facilities will be subject to extensive regulation by the NYSDEC, which require that any potentially significant environmental impacts be mitigated. As a result, this discussion will be generally limited to a very general quantitative factors as well as qualitative factors, and will be focused in the topical areas of land resources, and air resources.

5.6.6.1 Land Resources

The development and operation of an SSOW facility for Alternative Scenario #2 will require the development of a 15-acre site, and most of the site acreage would be developed with impervious surfaces for building area, internal road network, parking, and paved areas for compost windrows. For purposes of this analysis, the SSOW facility element of Alternative Scenario #3 is expected to require 3 times the area, or a total of 45 acres.

Development and operation of the regional solid waste treatment element of Alternative Scenario #3 is expected to require an approximately 15 acre site. Most of the site acreage would be developed with impervious surfaces for building area, internal road network, parking, and other paved areas.

Development and operation of the new transfer station element of Alternative Scenarios # 1 and #2 is each expected to require an approximately 5 acre site, with most of this site acreage developed with building areas and other impervious surfaces.

Each of these Alternative Scenarios will consume a corresponding amount of landfill volume. The landfill disposal element of Alternative Scenarios # 1 and #2 is expected to consume an annual landfill volume 284,000 CY and 214,300 CY, respectively after waste reduction and recycling program achievements are fully met. This landfill volume is based on an average net density factor of 1,500 lb/CY. The landfill disposal element of Alternative Scenarios # 3 is expected to consume an annual landfill volume 120,800 CY after waste reduction and recycling program achievements are fully met and a solid waste treatment facility is operating. This facility would generate residue at 32% of the waste processed, along with a small amount of bypass and non-processible waste. Because of the increased density of the process residue, under this Alternative Scenario #3, the landfill volume is based on an average net density factor of 2,750 lb/CY.

A comparison of these land resource impacts are presented in Table 5-14. In addition to the values presented in the discussion above, the table also standardizes land area and landfill disposal volume over the annual tonnage of waste managed by the major program elements. This was necessary to account for the larger regional tonnage base that is part of Alternative Scenario #3.

Table 5-14
Land Resource Impacts

Alternative and Program Element	Waste Managed TPY	Facility Land Area (acres)	Land Area per ton managed (square feet./ton)	Annual Landfill Space[1] (CY/yr)	Landfill Space per ton managed (CY/ton)	Annual Landfill Space per person [2] (CY/person)
Alternative Scenario #1						
Landfill Disposal	212,900	NA		283,867		
Transfer Station	212,900	5				
Subtotal	***212,900***	***5***	***1.02***	***283,867***	***1.33***	**1.25**
Alternative Scenario #2						
Landfill Disposal	146,100	NA		194,800		
Transfer Station	146,100	5				
SSOW Facility	40,000	15				
Subtotal	***186,100***	***20***	***4.68***	***194,800***	***1.05***	**0.86**
Alternative Scenario #3						
Landfill Disposal of Residue Bypass, etc.	173,600	NA		126,255		
Transfer Station	NA	5				
SSOW Facility	120,000	45				
Solid Waste Treatment Facility	474,200	15				
Subtotal [3]	***594,200***	***65***	***4.77***	***126,255***	***0.21***	**0.18**

Notes
1. Landfill space for alternatives 1 and 2 determined with net airspace density factor of 1500 lb/CY.
   Landfill space for alternative 3 determined with net airspace density factor of 2750 lb/CY.
2. 2020 Population for Scenario#1 and #2 is 226,500. Scenario #3 Population is 700,000.
3. For Alternative 3, only includes SSOW and SW Treatment facility Tonnage, which includes residue tonnage.

5.6.6.2 Air Resources

Each of the facility components of the Alternative Scenarios will have some direct air emissions as a result of facility operations. These emissions cannot be quantified without facility specific information that is not available at this time. For comparative purposes, it is possible to estimate greenhouse gas (GHG) emissions of each facility component, using GHG emission factors developed by the USEPA in its 3rd edition of Solid Waste Management and Greenhouse Gases – A Life Cycle Assessment of Emissions and Sinks (USEPA, 2006). This report was developed to provide a method to quantify the GHG emissions (or reduction) resulting from waste reduction. recycling, and various other solid waste management methods. Using emission factors presented in that report, as explained below, CHA prepared Table 5-15 to compare the GHG emissions from each of the Alternative Implementation Scenarios.

Table 5-15
Greenhouse Gas Emissions

	Alternative Scenario #1	Alternative Scenario #2	Alternative Scenario #3
SSOW Facility			
Annual Facility Throughput	-	40,000	120,000
Net Facility Emissions (MTCE) [1]	-	(1,900)	(5,700)
Facility Residue (TPY)	-	2,000	6,000
Avoided Landfill Disposal (TPY)	-	38,000	114,000
Avoided Landfill Emissions (MTCE) [2]	-	(1,900)	(5,700)
Avoided Transportation Emissions (MTCE) [3]		(247)	(741)
SSOW Facility Emission Subtotal (MTCE)	**-**	***(4,047)***	***(12,141)***
Solid Waste Treatment Facility			
Annual Facility Throughput	-	-	494,700
Net Facility Emissions (MTCE) [4]	-	-	(14,841)
Facility Residue (TPY)	-	-	173,604
Avoided Landfill Disposal (TPY)	-	-	321,096
Avoided Landfill Emissions (MTCE) [5]	-	-	25,688
Avoided Transportation Emissions (MTCE) [3]	-	-	(2,087)
Solid Waste Treatment Facility Emission Subtotal (MTCE)	**-**	**-**	***8,760***
Transfer and Landfill Disposal			
Annual Transfer and Disposal Tonnage	212,900	146,100	173,600
Landfill Emissions (MTCE) [5]	(17,032)	(11,688)	(13,888)
Transportation Emissions (MTCE) [3]	1,384	950	1,128
Transfer and Landfill Disposal Emission Subtotal (MTCE)	***(15,648)***	***(10,738)***	***(12,760)***
Net GHG Emission by Alternative Scenario (MTCE)	**(15,648)**	**(14,785)**	**(16,141)**
Total waste processed and disposed (TPY) [6]	**212,900**	**186,100**	**614,700**
Net GHG Emissions per ton (MTCE/ton)	**(0.07)**	**(0.08)**	**(0.026)**

Notes:
Values in parentheses indicate negative numbers.
1. Net GHG emissions from composting calculated as -0.05 MTCE per ton of SSOW as per Exhibit 4-6 in (USEPA, 2006) MTCE = Metric Tons of Carbon Equivalent. A metric ton = 1000 kilograms or approximately 2,200 pounds.
2. Net GHG emissions of Food Scraps from Landfill w/ LFG recovered for energy calculated as 0.05 MTCE per ton as per Exhibit 6-8 in (USEPA, 2006)
3. Net GHG from transportation calculated as 0.0065 MTCE per ton, calculated from Exhibit 2-1 in (USEPA, 2006) Calculation assumes 415 mile round trip to landfill site and 25 ton payload at 7 miles per gallon of diesel fuel.
4. Net GHG emissions from combustion at WTE facility calculated as -0.03 MTCE per ton combusted from Exhibit 5-6 in (USEPA, 2006)
5. Net GHG emissions from Landfill w/ LFG recovered for energy calculated as -0.08 MTCE per ton as per Exhibit 6-8 in (USEPA, 2006) Avoided Landfill emissions are shown as positive values because net GHG emissions factor is negative.
6. For Alternative 3, only includes SSOW and Solid Waste Treatment facility Tonnage, which includes residue tonnage.

GHG emissions are typically expressed in units of carbon equivalents, and the USEPA report uses metric measurements for this. The most typical GHG emission factor is presented in units of MTCE/ton, or metric tons of carbon equivalent per wet ton of waste or material. A metric ton is equal to 1,000 kilograms, or approximately 2,200 pounds. The USEPA report estimated net GHG emissions, including emissions during material acquisition and manufacturing (to determine decreases due to source reduction and recycling), changes in forest or soil carbon storage, fossil fuel combustion associated with waste collection, processing and transportation, emission of non-biogenic carbon dioxide (CO2) and nitrous oxide (N2O) from waste combustion, and emissions of methane (CH4)from landfills. In determining the net emission factors, credits are also provided for avoided utility emissions for projects that generate energy and/or electricity, for long-term carbon storage for landfills.

The net GHG emissions for transportation and disposal are negative as shown in Table 5-15. Landfill emissions are based on an emission factor of -0.08MTCE per ton of mixed waste. This emission factor assumes that the landfill has a landfill gas recovery system with electricity generation, which would be applicable for the Rapp Road Landfill and most of the large privately owned landfills in New York. This negative emission factor is the result of the net carbon storage factor for mixed MSW, which more than offsets the methane emissions that are recovered for electricity generation. As a result, Alternative Scenario #1 shows the least amount of GHG emissions from landfill disposal, because it has the greatest tonnage of landfill disposal.

Transportation related GHG emissions were calculated at a rate of 0.0065 MTCE per ton, based on the assumption of a 415 mile round trip to the landfill site, a payload of 25 tons per trip and a fuel economy of 7 miles per gallon. As a result, Alternative Scenario #1 shows the greatest amount of GHG emissions from transportation, because it results in the greatest number of vehicle miles travelled and fuel consumption associated with the transportation of waste to a distant disposal site.

Net emissions of GHG from SSOW operations are also negative, due to soil carbon restoration and humus formation that occurs when the compost is applied to the soil. The net emission factor for GHG from SSOW facility operations is -0.05 MTCE per ton of SSOW input. With an annual throughput of 40,000 TPY, and subtracting the 2,000 TPY of process residue, the net GHG emissions from the SSOW facility component of Alternative Scenario #2 is -1,900 MTCE. The operation of the SSOW facility of Alternative Scenario #2 will also avoid the transportation and disposal of 38,000 TPY of food waste. This results in a reduction of transportation emissions of 0.0065 MTCE per ton, or 247 MTCE per year, and another reduction 0.05 MTCE per ton of food waste landfilled, or 1,900 MTCE per year in avoided landfill emission. Overall the SSOW facility component of Alternative Scenario #2 would result in net GHG reductions of 4,047 MTCE per year. The SSOW facility component of Alternative Scenario #3, being three times as large, would result in three times the net GHG reductions, or a total of 12,141 MTCE per year.

The GHG emissions from Solid Waste Treatment facility component of Alternative Scenario #3 were estimated using the estimates for a WTE facility generating electricity and a net emission factor of -0.03 MTCE per ton of waste processed. This negative emission factor is primarily due to the offsetting credit provided in the USEPA study to account for the avoided utility emissions. Subtracting the facility residue from the annual facility throughput results in the over 321,000 tons of avoided landfill disposal and transportation. Because landfilling of mixed MSW results in a net GHG reduction of 0.08 MTCE per ton, as explained previously, avoided landfill disposal exhibits a positive GHG emission under this facility alternative. The avoided transportation of waste for disposal at a distant landfill results in a GHG reduction of 2,087 MTCE per year. All together the net GHG emissions from Solid Waste Treatment facility component of Alternative Scenario #3 (assuming it is a WTE facility) is 8,760 MTCE per year.

Table 5-15 also presents the total net GHG emissions for each Alternative Scenario. All of the Alternative Scenarios show net reductions in GHG emissions, between 14,785 and 16,141 MTCE per year. Because each Alternative Scenario results in a different total amount of waste processed and disposed, the net GHG emissions are standardized by dividing by the respective tonnages. This value of net GHG emissions per ton shows that Alternative Scenario #2 has the greatest emission reduction among the alternatives.

5.6.7 Impacts on Neighboring Jurisdictions

This section will include an analysis of the potential impacts on neighboring jurisdictions of the specific elements of each Alternative Implementation Scenario.

Alternative Scenario #1 is not expected to have any direct impact on any adjacent planning units. There could be indirect impacts related to the following:

- After the closure of the Rapp Road Landfill, transportation of exported waste through an adjacent planning unit to a more distant disposal facility;
- After the closure of the Rapp Road Landfill, the reduction in local solid waste disposal capacity may cause solid waste disposal prices to rise in surrounding jurisdictions;
- After the closure of the Rapp Road Landfill, new commercial solid waste disposal facilities could be developed in adjacent planning to help meet the future needs of the Capital Region Planning Unit.

Alternative Scenario #2 is not expected to have any direct impact on any adjacent planning units.

There could be indirect impacts related to the following:

- After the closure of the Rapp Road Landfill, transportation of exported waste through an adjacent planning unit to a more distant disposal facility;

- After the closure of the Rapp Road Landfill, the reduction in local solid waste disposal capacity may cause solid waste disposal prices to rise in surrounding jurisdictions;
- After the closure of the Rapp Road Landfill, new commercial solid waste disposal facilities could be developed in adjacent planning to help meet the future needs of the Capital Region Planning Unit.
- The development of an SSOW processing facility in the Planning Unit could make any excess capacity available to SSOW from adjacent planning units.

Alternative Scenario #3 would have a direct impact on any adjacent planning unit that elected to join the Planning Unit of a larger regional authority. Those communities and/or planning units would receive the positive economic benefits associated with this Alternative Scenario.

SECTION 6.0

SOLID WASTE MANAGEMENT PLAN

Contents

6.0 SOLID WASTE MANAGEMENT PLAN 6-1
6.1 Elements of the Preferred Solid Waste Management Plan 6-2
6.1.1 Reduction and Recovery of Materials 6-2
6.1.2 Solid Waste Treatment Facility 6-8
6.1.3 Land Disposal 6-9
6.1.4 Interim Measures 6-10
6.2 Administrative and Legal Structure 6-11
6.2.1 Implementation Model 6-11
6.2.2 New Laws and Regulations 6-12
6.3 Implementation schedule 6-12

6.0 SOLID WASTE MANAGEMENT PLAN

This chapter presents the details of the new SWMP, developed based on consideration of the existing solid waste management program, anticipated future needs for solid waste management, the goals and objectives of the Planning Unit, and an assessment of alternatives solid waste management facilities and programs.

The goals and objectives listed below have been formulated for the SWMP. Each major goal is followed by a series of objectives which help to achieve the goal.

- To continue to provide reliable and reasonably priced solid waste management facilities and services, for MSW, C&D, and non-hazardous industrial waste, for the period from 2011 until 2030, by:
    - Maintaining or expanding the membership of the planning unit;
    - Maintaining and building on existing public sector and private sector solid waste management resources;
    - Identifying new infrastructure and programs that should be developed to meet future needs; and
    - Identifying the administrative structure by which new facilities and programs should be implemented.
- To minimize the amount of solid waste requiring land disposal in the future by:
    - Maintaining and expanding waste reduction, reuse and recycling efforts, as set forth in the SWMP Modification;
    - Increasing the effectiveness of public education and enforcement of existing recycling requirements;
    - Considering more emphasis on material re-use and alternatives such as PAYT, single stream recycling, and food waste composting as mechanisms to achieve future reductions in waste requiring disposal;
    - Considering alternatives which recover energy from waste, including proven technologies as well as new and emerging technologies.

During the formulation of this SWMP, there has been some discussion about whether a “zero waste” goal should be adopted as part of this Plan. While this concept has various definitions in different places, zero waste typically refers to the minimization of waste that must be ultimately disposed of. This concept is not inconsistent with the waste minimization goals of this Plan and will require a process of continuous improvement over the time horizon of this SWMP.

The major elements of the proposed SWMP, a model for program implementation, and an implementation schedule are presented below.

6.1 Elements of the Preferred Solid Waste Management Plan

The major elements of the proposed solid waste management system are:

- the continued utilization of existing solid waste management facilities and programs in the Planning Unit;
- the expansion of existing waste reduction and recycling programs throughout the Planning Unit;
- the development of new capacity for both recycling and for the treatment of post-recyclable solid waste on a regional basis to provide the necessary economies of scale to support a more fully integrated solid waste management program.

These are presented and discussed in more detail below. All of these measures are intended to meet the future solid waste management needs of the Planning Unit, the goals and objectives articulated in the SWMP, and will help achieve the goals of New York State's solid waste management hierarchy.

6.1.1 Reduction and Recovery of Materials

The continued expansion of existing waste reduction and recycling programs is one of the central themes of this SWMP. It will include the following major elements:

- Promote waste minimization among all sectors: residential, commercial, industrial, and institutional;
- Support Product Stewardship initiatives at the state and federal levels;
- Continue to promote and expand local recycling infrastructure;
- Develop capacity for separate collection and processing of SSOW;
- Designate additional mandatory recyclables.

Based on the selected elements of the new SWMP, a waste diversion and recycling goal of 65% has been established for the year 2020. This is reflected in the annual (end of year) diversion and recycling goals, noted below.

- 2010 – 45%
- 2011 – 47%
- 2012 – 48%
- 2013 – 50%
- 2014 – 52%
- 2015 – 54%
- 2016 – 56%
- 2017 – 58%
- 2018 – 60%
- 2019 – 62%
- 2020 – 65%

The above noted waste diversion and recycling goals reflect both the current goals (as set forth in the SWMP Modification) and the maximum expected diversion that is achievable with the implementation of the expanded waste reduction and recycling program, elements that are part of this SWMP. However, implementation of a continuous improvement process in connection with both current and future waste reduction and recycling program efforts could help push beyond these above-noted waste reduction and recycling goals.

The new state-wide SWMP being prepared for public comment by the NYSDEC (Beyond Waste) is expected to include a change in the way diversion and recycling are measured. Rather than measure the percent of waste diversion and recycled as noted above, the new metric would look at both waste disposal and recycling tonnage on a per capita basis, and measure annual increases and decreases in per capita recycling and disposal.

For purposes of comparison using this new method of measurement. Table 6-1 presents the above noted diversion and recycling goals with projected disposal and recycling rates.

Table 6-1
Waste Diversion and Recycling Goals

Year	Year End Waste Diversion Goal	Projected Disposal and Recycling Rates		
		Waste Disposal Per Capita (tons/person/year)	Total Recycling Per Capita (tons/person/year)	MSW Recycling Per Capita (tons/person/year)
2010	45%	1.02	0.84	0.41
2011	47%	0.99	0.87	0.45
2012	48%	0.97	0.89	0.47
2013	50%	0.93	0.93	0.48
2014	52%	0.89	0.97	0.49
2015	54%	0.86	1.01	0.51
2016	56%	0.82	1.04	0.54
2017	58%	0.78	1.08	0.56
2018	60%	0.74	1.12	0.58
2019	62%	0.71	1.15	0.61
2020	65%	0.65	1.21	0.64

6.1.1.1 Waste Minimization

Waste minimization in the residential waste generation sector will be promoted with a primary focus on the following:

- The use of back yard composting for both yard waste and food waste will be promoted wherever feasible;

- The use of other waste-reducing methods (except burning) for managing yard waste on-site will be promoted wherever feasible;
- Promote PAYT system implementation;
- Promote the use of reusable grocery bags;
- Educate consumers about how to consider waste reduction and product packaging when they are making purchasing decision;
- Promote the use of existing programs that re-use or redistribute materials in the second-hand marketplace;
- Promote the concept of repair instead of replacement.
- Support product stewardship initiatives;
- Aggressive education and enforcement programs;
- Aggressive waste reduction and recycling programs.

This promotion can take place through a number of platforms including the use of educational materials and brochures which can made available at the Planning Unit's waste reduction and recycling website, public service announcements, advertisement and sponsorship at selected community events. The Planning Unit will also seek to partner with other local organizations engaged in consumer education (like Cornell Cooperative Extension) to secure their participation in this education and promotion effort.

Regarding PAYT, a contractor working through the USEPA is conducting a PAYT study for the City. After that study is completed, the City will determine the feasibility of such a program including identifying any necessary changes to collection, billing and administration. In addition, as per the SWMP modification, the Planning Unit Recycling Coordinator (PURC) will take the lead in educating the member communities in the Planning Unit about the benefits and challenges of instituting PAYT systems and will work with the communities which have an interest in PAYT. In addition, as part of its new state-wide Solid Waste Management Plan, the NYSDEC intends to pursue policy, legislation and regulations which will promote the expanded use of PAYT and SMART programs as an important mechanism for waste reduction.

Regarding the promotion of waste minimization in the CII sector, the Planning Unit will seek to form alliances with major employers to increase awareness about the economic and environmental benefits of waste reduction. Many of the major institutions and private employers in the Planning Unit already have comprehensive waste reduction and recycling programs in place, and forming alliances with these entities will provide a way to transfer their knowledge, expertise and success stories to those other businesses and institutions that would like to do more. In addition, if funding can be secured through the NYSDEC Environmental Protection Fund grant program, or other sources, the Planning Unit can also offer waste audits to CII waste generators to help identify specific

opportunities for waste reduction (and recycling) at the audited establishment. Such a program can be important either as a first step in developing of a business program or as a way to identify improvements to take an existing program to the next level.

Waste minimization in the construction and demolition sector can be advanced by promoting policies which favor rehabilitation/reconstruction over demolition/new construction, and where building demolition is necessary, policies which favor building deconstruction and material recovery for reuse and recycling over more typical current practices of total teardown.

While the PURC will take the lead with these efforts to promote waste minimization, success will depend on the active participation by the municipal recycling coordinators, as well as a high level of cooperation between the constituent municipalities of the Planning Unit. The PURC position was established filled as of January 2009, and will be an ongoing position. Member municipalities of the Planning Unit fund the PURC position in proportion to their population share, in accordance with the terms of a 3-year Inter-municipal Agreement which will expire on December 31, 2011.

6.1.1.2 Product Stewardship

The Planning Unit will work with the NYSDEC, the recently formed New York Product Stewardship Council (currently part of the New York State Association for Solid Waste Management) and others to advance an agenda of product stewardship initiatives that can reduce the amount and toxicity of materials that are left for disposal at the end of their useful lives.

In addition, the Planning Unit will engage local stakeholders (such as major retailers) to raise awareness about product stewardship and to help identify and overcome potential obstacles

6.1.1.3 Continue to Promote and Expand Local Recycling Infrastructure

As noted previously, the continued expansion of existing waste reduction and recycling programs in the Planning Unit is one of the central themes of this SWMP. These program expansion elements were set forth in the May 2009 SWMP Modification, and will be carried forward as part of this new SWMP. These measures include:

- Increased education and enforcement of mandatory recycling requirements, especially for CII waste generators (including multi-family residential), including:
- Website to publicize Planning unit recycling programs information and information on waste reduction;
- Promote increased recycling in schools;
- Public Space Recycling;

As part of the effort to increase the education and enforcement of mandatory recycling requirements, those Planning Unit municipalities which did not mandate recycling by CII facilities were required to amend their local laws and ordinances to include this requirement. Random inspections are conducted at Rapp Road Landfill for loads with excessive amounts of designated recyclables. Haulers (and the waste generators they service) discovered to be delivering recyclable materials for disposal at the landfill are subject to follow-up education and enforcement efforts. Failure to comply and repeated delivery of contaminated loads could result in loss of disposal privileges and imposition of fines. While City of Albany staff may discover these deliveries at the landfill, and make initial contacts, follow-up contact with non-participating waste generators is undertaken by the PURC, in conjunction with the recycling coordinators of the various municipalities in the Planning Unit, who will initiate education efforts intended at bringing these generators into compliance. Commercial waste haulers will be required to provide annual reports to the City regarding the nature of the recycling and waste recovery programs being implemented by them in each municipality in the Planning Unit.

The PURC will compile information and instructions from each municipality regarding their waste reduction and recycling programs. This information will be made readily accessible to residents and businesses of the Planning Unit by posting it to a new recycling website that is expected to be established by the end of 2009.

To reach a wide audience of “life long” recyclers, the City of Albany is providing recycling bins to all City public schools and private schools as part of an overall recycling education program. In addition, the PURC will promote increased recycling in the City’s schools and will also work with the coordinators from member municipalities to expand this program to include all public and private schools in the Planning Unit. As part of this effort, the PURC and local recycling coordinators will work with the schools to ensure their collection service providers not only provide recycling collection but also assist the schools with proper structuring of their collection contracts to ensure they receive the associated cost benefit for recycling additional materials.

Another enhancement to the recycling program resulting from the May 2009 SWMP Modification is the public space recycling program. Planning for this program began early in 2009 with the identification of several public space recycling locations. A three month pilot program will be initiated at several locations throughout the City (such as Washington Park and Corning preserve). Upon the evaluation of the success rate at these locations the City will expand the program to additional locations. In conjunction with the placement of receptacles, the City will review its recycling ordinance and permit requirements for all public space activities making the provision of recycling, separation and collection of materials a permit requirement. This program will be expanded to member municipalities, with assistance form the PURC and updates to local recycling regulations.

In addition to continuing these programs to promote and expand existing recycling infrastructure, a new element of this SWMP will be the development of one or more drop-off facilities to provide residents and businesses with more complete selection of waste reduction and recycling opportunities. Such a facility would include a one-stop location to accept all designated recyclables, as well as for selected MSW components such as electronics, motor oil, fluorescent light bulbs, a swap shop to promote re-use of second-hand items, as well as a volume-based (PAYT) user charge for solid waste disposal. This facility could be developed as either an expansion of an existing recycling and transfer facility, as a newly developed facility site, or in more than one location. It is envisioned that such a facility would be available for any resident or small business in the Planning Unit.

6.1.1.4 SSOW Processing and Collection

Another new element of this SWMP is the development of processing and collection capacity for source separated organic waste (SSOW). Based on the economic analysis of an SSOW facility examined in chapter 5 of this SWMP, such a facility is economically feasible. Moreover, as part of its new state-wide Solid Waste Management Plan, the NYSDEC intends to pursue policy, legislation and regulations which will promote the expanded use of SSOW recycling facilities.

This SWMP envisions the development of a SSOW facility with a capacity to process up to 40,000 tons per year, sized for the existing Planning Unit. This sizing is based on the maximum estimated quantity of 36,700 tons per year of food waste, other paper, and additional yard waste that could be recovered from the as-delivered solid waste stream, as previously discussed in Section 4.3 and Section 5.7.1 of the SWMP. This SWMP assumes that such a facility would be developed incrementally to account for a ramp-up of SSOW collection programs.

The development of the SSOW facility should also consider sufficient capacity for expansion to provide SSOW capacity for a larger regional planning unit. Alternatively, full SSOW capacity for the larger regional could be provided at two or more different locations throughout an enlarged planning unit.

The development of SSOW processing capacity will also require modifications to existing waste collection infrastructure and operations. This SWMP envisions an initial focus on large CII generators of food waste and other SSOW. These large SSOW generators will need to provide the critical impetus to support the development of initial SSOW processing capacity in the Capital Region Planning Unit. After that initial SSOW processing capacity is established, incremental expansions into the residential waste sector can be pursued, initially with pilot programs designed to determine the best approach for full scale residential sector implementation.

Capital cost associated with the development of SSOW processing capacity and residential collection equipment may be eligible for grant funding from the NYSDEC Environmental Protection Fund. This grant can provide matching funds for up to 50% of capital cost, and as such provide a significant cost incentive that will be important to the success of this program implementation.

Developing an SSOW facility in the Capital Region also presents a unique opportunity to forge a partnership with the NYSDEC, and other state agencies like the NYSOGS and SUNY Albany who are working to comply with the Governor's Executive Order 4 to increase their recycling and reduce their carbon footprint. These agencies are already participating with the City of Albany, the Planning Unit, and others in an Organics Waste Task Force. In addition, the NYSOGS is already implementing a food waste composting program for its facilities in the Empire State Plaza. Material collected for composting by OGS is currently delivered to the Agri-Cycle Compost Facility in Washington County.

6.1.1.5 Designate Additional Mandatory Recyclables

This SWMP envisions the designation of additional mandatory recyclable materials at unspecified dates in the future, when local recovery and recycling opportunities and markets for these materials are more fully established. The following material streams are seen as potential candidates for designation as mandatory recyclables:

- Electronic Waste and HHW
- Plastic Containers #3-7
- Film Plastic
- SSOW, consisting of food waste, miscellaneous paper, and other organic waste

As noted previously in section 4.5, if recycling of electronic waste and HHW were made mandatory, the maximum achievable solid waste diversion rate could increase by 1.3 percentage points. With the addition of plastic containers 3 through 7 and film plastics as designated mandatory recyclables, this maximum achievable diversion rate could be increased by another 2.4 percentage points. The development of a mandatory program for SSOW collection and a facility to process this waste stream could increase the diversion rate by another 11.4 percentage points.

Taken together with the increased recovery of currently designated recyclable materials, an overall waste diversion rate of 65% can be achieved.

6.1.2 Solid Waste Treatment Facility

This SWMP calls for the development of a regional solid waste treatment facility to further minimize landfill disposal requirements for post recyclable solid waste beyond what would be achievable with the implementation of expanded and aggressive waste reduction and recycling programs elements.

Such a facility could recovery additional materials, energy, bio-fuels and other byproducts from the post-recyclable solid waste stream using one of the treatment technologies described in Section 5.3.1.8 or one of the emerging technologies, described in Section 5.3.2. This SWMP does not endorse conventional WTE over any of the other emerging technologies. A facility would need to be sized according to the size of the regional wasteshed. Economies of scale would occur with a larger wasteshed.

This SWMP envisions that this facility would be developed by a regional solid waste management authority which would be formed to implement this project as well as other elements of a fully integrated regional solid waste management system. The selection of the appropriate solid waste treatment technology will be made by the regional solid waste management authority. The inclusion of a treatment technology for the post recyclable material is fully consistent with a zero waste policy and goal. The planning units coming closest to zero waste to landfills are those in States and countries with product stewardship legislation, with very aggressive waste reduction, reuse and recycling programs, aggressive education and enforcement, and a treatment technology for the last component of the waste stream, thereby minimizing the fraction that needs to be landfilled.

Implementation of this facility is expected to occur pursuant to a procurement process described in section 120w of New York General Municipal Law. Under this approach, the project would seek a developer to design build and operate the facility on behalf of the regional planning unit and solid waste management authority. As noted in Section 6.3, 2018 is the earliest that such a facility could be ready to start up operation.

6.1.3 Land Disposal

The Solid Waste Management Plan envisions the continued use of the Rapp Road Landfill, until its capacity is exhausted, currently estimated to occur in the year 2016.

No new landfill capacity in the Planning Unit is envisioned by this SWMP, and after the closure of the Rapp Road Landfill, post-recyclable waste from the Planning Unit that requires landfill disposal will need to be exported to commercially available disposal facilities.

It is possible that with the development of the expanded regional planning unit envisioned by this SWMP, that there will be an opportunity to use another existing landfill facility in the region for the disposal of residue from a regional solid waste management system. This opportunity will need to be explored as the feasibility of a regional solid waste management authority is subject to further evaluation in the future.

Because waste will not need to be exported for disposal until 2016, it is not practical to secure contractual commitments any of the commercially available facilities at this time. It is expected that any needed capacity can be secured through bid solicitation and contractual commitment within a year of the anticipated closure of the Rapp Road landfill.

6.1.4 Interim Measures

Because the development of the new institutions and infrastructure called for in this SWMP may take a significant amount of time, it will be necessary for the existing Planning Unit to continue to implement certain the elements of this SWMP until the Regional SWMA is developed.

The existing Planning Unit will provide for continued implementation of most of the waste reduction and recycling elements of the SWMP. This will provide for continued progress in incrementally increasing enforcement and recyclable diversion rates while the other elements of the SWMP are being developed.

The existing Planning Unit will also move forward with the implementation of an SSOW facility prior to the formation of the regional SWMA. The following implementation activities for that facility will be pursued on an interim basis:

- Facility Siting;
- Development and Issuance of a Request for Proposals;
- Consideration of, and if appropriate, promotion of a privatized or merchant SSOW facility.

Another interim measure will include an evaluation, to be completed by July 2011, to assess progress in establishing the RSWMA which is critical to the successful implementation of this SWMP. If unforeseeable events have occurred which are determined will prevent the implementation of the RWSMA, then it may be necessary to prepare a modification to this SWMP at that time.

Finally, since local landfill capacity at Rapp Road may be depleted before the regional solid waste treatment facility can be developed, it may be necessary to be temporarily more reliant on commercial landfill facilities located a long distance from the Planning Unit.

The SWMP Modification included a provision noting that when the Eastern Expansion of the Rapp Road Landfill is approved, the City of Albany intends to acquire land immediately adjacent to the landfill and relocate the existing transfer station structure to that parcel. This existing structure has already been demolished in connection with the construction of the first phase of the Landfill Expansion. This SWMP also acknowledges that the City of Albany would develop a transfer station in the future, if one is needed, at the Rapp Road Landfill site.

6.2 Administrative and Legal Structure

6.2.1 Implementation Model

A key element of this SWMP is the implementation of a regional solid waste management authority (RSWMA) which would operate an expanded planning unit. This arrangement is believed to represent the best mechanism for meeting the objectives associated with the goal of minimizing the amount of solid waste requiring land disposal in the future. Implementation of RSWMA would also meet the objectives associated with the goal of continued provision of reliable and reasonably priced solid waste management facilities and services. The RSWMA would expand and strengthen the membership of the planning unit and build on existing public sector and private sector solid waste management resources. It would be able to provide for new infrastructure and programs such as expanded mandatory recycling and an SSOW composting facility. The RSWMA would also provide a more effective administrative structure than currently exists to facilitate the implementation of new facilities and programs.

The RSWMA would provide a stable platform from which to expand waste reduction, reuse and recycling efforts, and increase the effectiveness of enforcement of existing recycling requirements. It will also provide an effective administrative structure to place more emphasis on material re-use and alternatives such as PAYT, single stream recycling. Finally, the implementation of the RSWMA for an expanded planning unit will provide the administrative mechanism and economy of scale necessary to develop a solid waste treatment facility to recover additional materials, energy and/or bio-fuels, and other byproducts from the post-recyclable solid waste stream.

Implementation of the RSWMA will require the enactment of state enabling legislation to create and empower the authority. Before the legislation can be enacted, local or regional consensus will need to be established to provide the basis for enactment. Albany County has proposed to undertake a detailed study to evaluate the feasibility of a regional solid waste management authority for the four-county area (Albany, Rensselaer, Saratoga, and Schenectady) commonly referred to as the Capital District. The County will receive a grant from the New York State Department of State to conduct this study, which it is expected to be undertaken during the year 2010.

Considering the anticipated schedule to conduct this feasibility study, it will take at least until the end of 2010 to develop the local and regional consensus necessary to more fully define the participants in an expanded Planning Unit begin to draft the necessary enabling legislation.

Local governments will continue to play a vital role in the implementation of the new SWMP as they will retain their current jurisdiction over local solid waste and recycling programs. Local governments are also expected to have a voice in the management of a new RSWMA through both formal and informal mechanisms. Appointment to the Board of Directors of the RSWMA will likely

be made by one or several of the local governments for which the RSWMA was created. This creates a formal mechanism for accountability between an authority and the populations it services. Once established, the RSWMA may wish to set up advisory committees or other more informal mechanisms for incorporating input from local governments and citizens to ensure that it is providing its services in a manner which is both cost-effective and protective of the environment.

6.2.2 New Laws and Regulations

The following new laws are expected to be required to fully implement the facilities and program elements of this SWMP.

- New York State Legislature to enact enabling legislation to create the RSWMA;
- Local governments enact flow control and other measures needed to empower the RSWMA pursuant to the enabling legislation;
- Local governments amend mandatory source separation and recycling ordinances/laws to designate additional mandatory recyclable materials;
- State or Federal Legislatures enact Product Stewardship Legislation.

Solid waste management regulations (6 NYCRR 360 1.9(f)(6)) require that a Comprehensive Recycling Analysis include a discussion of any laws, rules, regulations or ordinances that could cause potential constraint to the selected recyclables recovery program. It is anticipated that any enabling legislation to create the RSWMA and local flow control laws will be crafted in a way such that they do not constrain the future achievement of the waste reduction and recycling programs that are part of this SWMP.

6.3 Implementation Schedule

A detailed implementation schedule for the SWMP is presented in Figure 6-1, through the year 2020. While it contains a detailed listing of activities, and allows for functional dependencies between tasks, the schedule is intended to be a generalized representation of SWMP implementation. The start dates and finish dates are not intended to be actual dates or deadlines, and all dates should be considered approximate.

Many of the components of the existing SWMP components related to waste reduction and recycling will be ongoing activities throughout this period. Many of these activities will be conducted periodically rather than continuously, but for ease of presentation all are shown as a continuous line. The July 1, 2009 start date is used for certain activities which may have actually commenced previously pursuant to the SWMP Modification, again for ease of presentation.

Elements of the new SWMP, including the review and comment period on the draft SWMP, implementation of the RSWMA, Local Laws and Ordinances, and implementation of the SSOW Facility and the Solid Waste Treatment Facility.

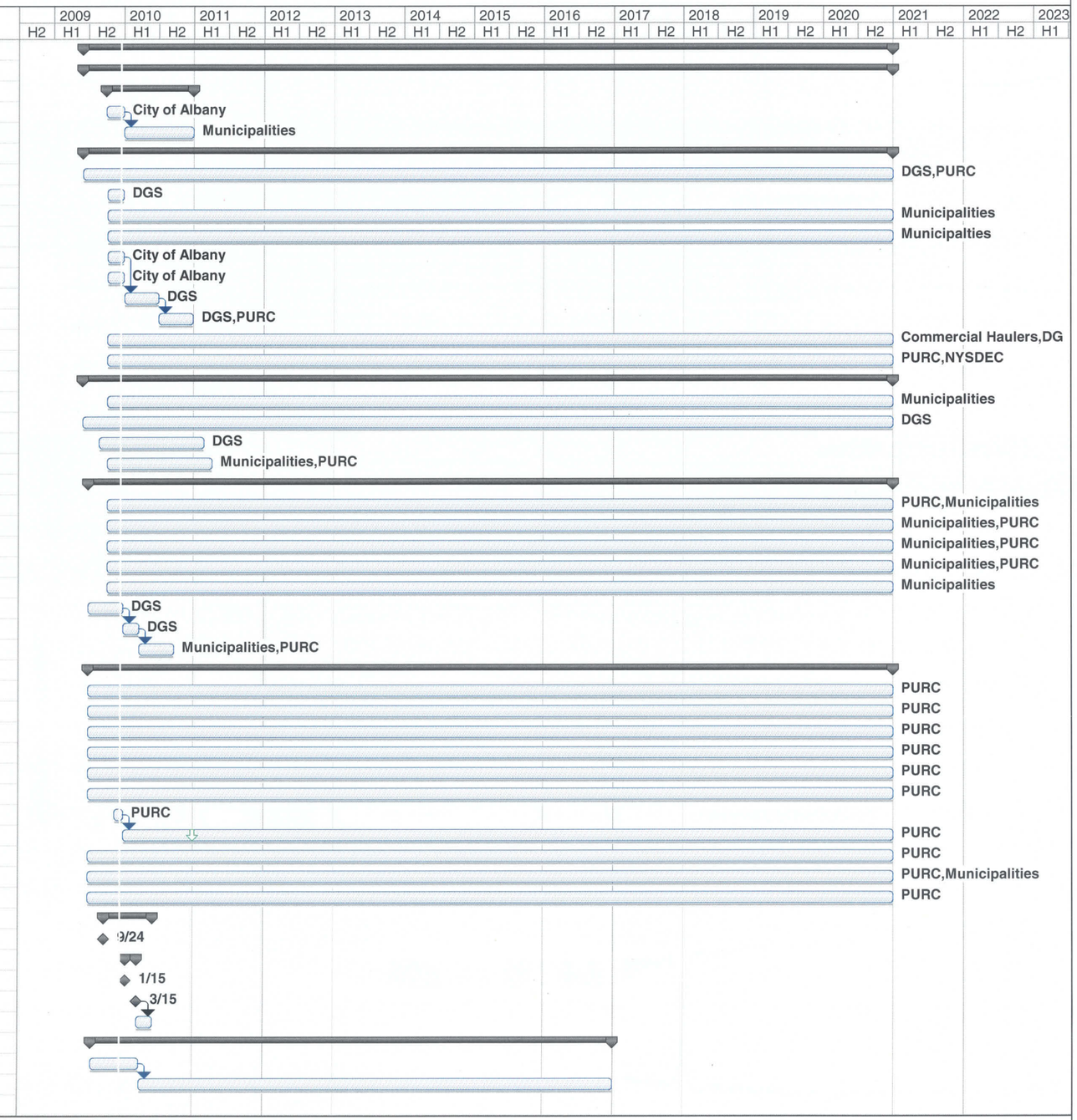
It is worth noting here that the implementation of an SSOW facility will be commenced by the Planning Unit upon completion of the public review and comment period on the SWMP. By not waiting until the RSWMA becomes operational to commence the procurement of this facility, the implementation of this important element will be accelerated by about two years.

Considering the anticipated schedule to conduct the RSWMA feasibility study, it will take at least until early 2011 to develop the local and regional consensus necessary to more fully define the participants in an expanded Planning Unit begin to draft the necessary enabling legislation for the RSWMA. Using this assumption, the enabling legislation RSWMA can be enacted during the 2011 legislative session. Once established in Public Authorities law, the RSWMA will need to be formally established through the appointment of its board of directors, and will need to hire executive and administrative staff in order to begin functional operation. For purposes of this SWMP, it is assumed that the RSWMA could be a functionally operating entity in the summer of 2012.

If the enabling legislation for the RSWMA is not enacted by the end of calendar year 2011 due to lack of regional consensus, then a modification to this SWMP will be developed to account for this change in circumstance.

Figure 6-1
Capital Region Solid Waste Management Plan
Detailed Implementation Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
1	**Continue Existing SWMP Components**	**3024 days?**	**Mon 6/1/09**	**Thu 12/31/20**	
2	**Waste Reduction and Recycling**	**3024 days?**	**Mon 6/1/09**	**Thu 12/31/20**	
3	**Legislative Actions**	**326 days?**	**Thu 10/1/09**	**Thu 12/30/10**	
4	Revise Ordinance to require public space Recycling	66 days?	Thu 10/1/09	Thu 12/31/09	
5	Public Space Recycling Ordinances	260 days	Fri 1/1/10	Thu 12/30/10	4
6	**Education and Enforcement**	**3024 days**	**Mon 6/1/09**	**Thu 12/31/20**	
7	Conduct Random Commercial waste inspections	3024 days	Mon 6/1/09	Thu 12/31/20	
8	Update Recycling Website	60 days	Thu 10/8/09	Wed 12/30/09	
9	Publicize municipal recycling programs	2931 days	Thu 10/8/09	Thu 12/31/20	
10	Enforce municipal recycling programs	2931 days	Thu 10/8/09	Thu 12/31/20	
11	Letter to notify commercial properties in City	60 days	Fri 10/9/09	Thu 12/31/09	
12	Distribute commercial recyclable brochure and maintain	60 days	Fri 10/9/09	Thu 12/31/09	
13	Commercial property owners survey	128 days	Mon 1/4/10	Wed 6/30/10	11
14	Assemble report of commercial survey and hauler report	128 days	Thu 7/1/10	Mon 12/27/10	13
15	Enforce commercial hauler recycling requirement	2931 days	Thu 10/8/09	Thu 12/31/20	
16	Backyard Composting promotion	2931 days	Thu 10/8/09	Thu 12/31/20	
17	**Local recycling Program Implementation**	**3024 days**	**Mon 6/1/09**	**Thu 12/31/20**	
18	Municipal recycling program operation	2931 days	Thu 10/8/09	Thu 12/31/20	
19	Public Space Recycling Program	3024 days	Mon 6/1/09	Thu 12/31/20	
20	Albany provides Blue Bins to schools	390 days	Wed 8/26/09	Tue 2/22/11	
21	School District Program Evaluations	390 days	Thu 10/8/09	Wed 4/6/11	
22	**Develop recycling program improvements**	**3002 days**	**Wed 7/1/09**	**Thu 12/31/20**	
23	Assess local programs	2931 days	Thu 10/8/09	Thu 12/31/20	
24	Consider additional materials for recovery	2931 days	Thu 10/8/09	Thu 12/31/20	
25	Consider ways to increase collection efficiency	2931 days	Thu 10/8/09	Thu 12/31/20	
26	Consider new incentives for reduction and recycling	2931 days	Thu 10/8/09	Thu 12/31/20	
27	Implement selected program improvements	2931 days	Thu 10/8/09	Thu 12/31/20	
28	City of Albany PAYT Study	130 days	Wed 7/1/09	Tue 12/29/09	
29	PAYT Recommendations	60 days	Wed 12/30/09	Tue 3/23/10	28
30	Implement PAYT if acceptable	130 days	Wed 3/24/10	Tue 9/21/10	29
31	**Local Program Coordination**	**3002 days**	**Wed 7/1/09**	**Thu 12/31/20**	
32	Recycling Coordinator Meetings	3002 days	Wed 7/1/09	Thu 12/31/20	
33	Develop Data and Prepare annual reports	3002 days	Wed 7/1/09	Thu 12/31/20	
34	Promotional materials for local programs	3002 days	Wed 7/1/09	Thu 12/31/20	
35	Promotional materials for Schools	3002 days	Wed 7/1/09	Thu 12/31/20	
36	Coordinate local programs w/ local schools	3002 days	Wed 7/1/09	Thu 12/31/20	
37	Identify and Pursue Grant Funding opportunities	3002 days	Wed 7/1/09	Thu 12/31/20	
38	Establish Regional Recycling Website	34 days	Mon 11/16/09	Thu 12/31/09	
39	Maintain Regional Recycling Website	2870 days	Fri 1/1/10	Thu 12/31/20	38
40	Promote shared use of existing yard waste compost facil	3002 days	Wed 7/1/09	Thu 12/31/20	
41	Set out Rate Analysis for municipal programs	3002 days	Wed 7/1/09	Thu 12/31/20	
42	Make PAYT Info available to local programs	3002 days	Wed 7/1/09	Thu 12/31/20	
43	**SSOW Composting**	**182 days**	**Thu 9/24/09**	**Fri 6/4/10**	
44	Convene Organic Waste Task Force meeting	0 days	Thu 9/24/09	Thu 9/24/09	
45	**Task Force meetings**	**41 days**	**Fri 1/15/10**	**Mon 3/15/10**	
46	Meeting #2	0 days	Fri 1/15/10	Fri 1/15/10	
47	Meeting #3	0 days	Mon 3/15/10	Mon 3/15/10	
48	Initiate SSOW Pilot Programs	60 days	Mon 3/15/10	Fri 6/4/10	47
49	**Current Solid Waste Disposal System**	**1945 days**	**Mon 7/20/09**	**Fri 12/30/16**	
50	Construction of Eastern Expansion	180 days	Mon 7/20/09	Fri 3/26/10	
51	Operation of Eastern Expansion	1765 days	Mon 3/29/10	Fri 12/30/16	50
52					

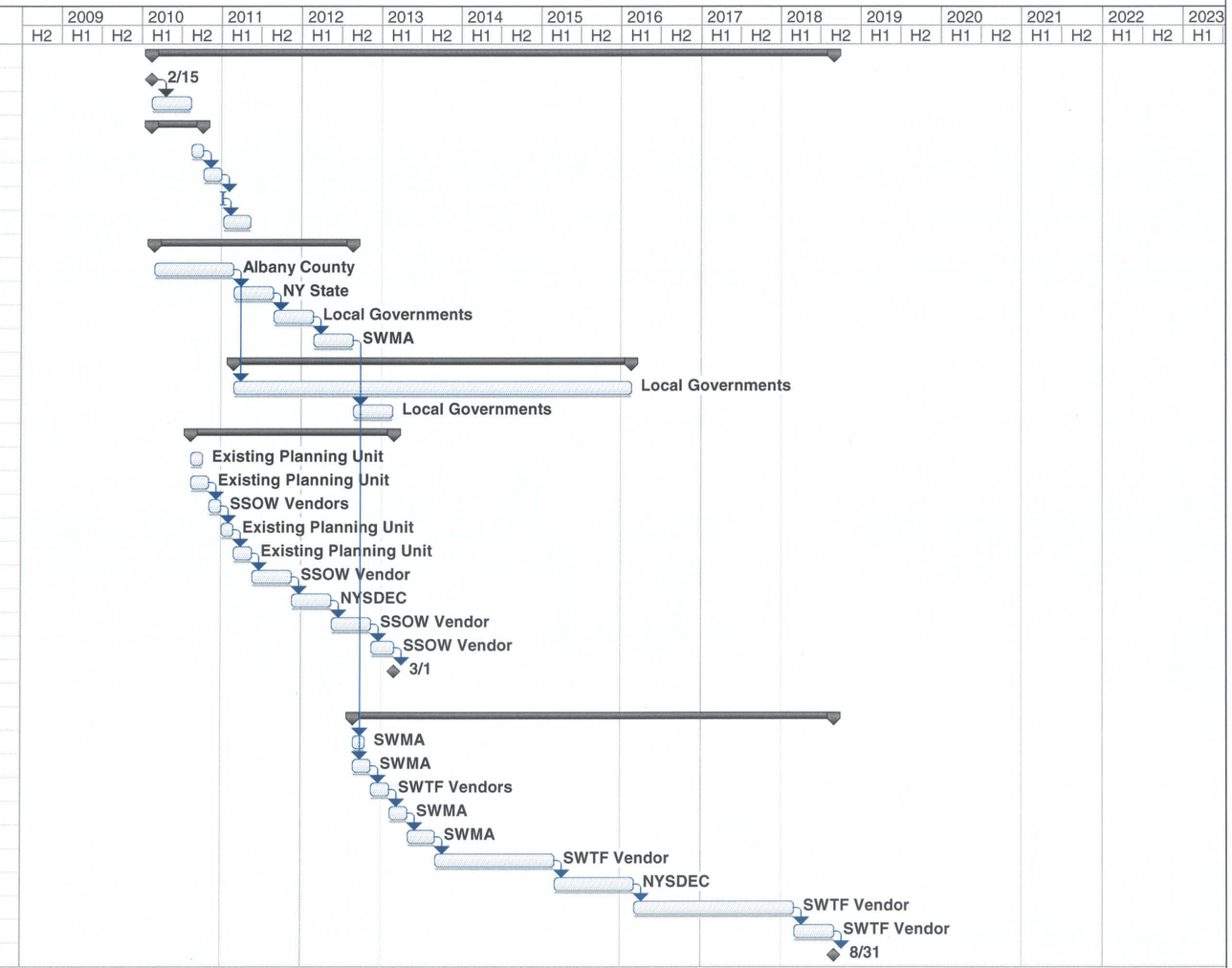


Project: SWMP Schedule for Section (
Date: Mon 12/14/09

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

Figure 6-1
Capital Region Solid Waste Management Plan
Detailed Implementation Schedule

ID	Task Name	Duration	Start	Finish	Predecessors
53	**New SWMP Elements**	**2230 days?**	**Mon 2/15/10**	**Fri 8/31/18**	
54	Issue Draft SWMP for Review and Comment	0 days?	Mon 2/15/10	Mon 2/15/10	
55	Public Review and Comment Period	130 days	Mon 2/15/10	Fri 8/13/10	54,60FF
56	**SEQR Review**	**170 days**	**Mon 2/15/10**	**Fri 10/8/10**	
63	Prepare Final SWMP	40 days	Mon 8/16/10	Fri 10/8/10	60
64	Secure Municipal Endoresement Resolutions	60 days	Mon 10/11/10	Fri 12/31/10	63
65	Submit Final SWMP for DEC approval	5 days	Mon 1/3/11	Fri 1/7/11	64
66	NYSDEC Review and Approval	90 days	Mon 1/10/11	Fri 5/13/11	65
67	**Institutional Measures**	**650 days**	**Mon 3/1/10**	**Fri 8/24/12**	
68	Regional SWMA feasibility Study and Consensus Building	260 days	Mon 3/1/10	Fri 2/25/11	
69	Enact Enabling Legislation for Regional SWMA	130 days	Mon 2/28/11	Fri 8/26/11	68
70	Establish SWMA and Appoint directors	130 days	Mon 8/29/11	Fri 2/24/12	69
71	Hire SWMA Staff and commence operations	130 days	Mon 2/27/12	Fri 8/24/12	70
72	**Local laws and Ordinances**	**1300 days?**	**Mon 2/28/11**	**Fri 2/19/16**	
73	Designate additional Items for Mandatory Recycling	1300 days?	Mon 2/28/11	Fri 2/19/16	68
74	Enact Local Flow Control Laws as per SWMA	130 days	Mon 8/27/12	Fri 2/22/13	71
75	**SSOW Facility Implementation**	**665 days**	**Mon 8/16/10**	**Fri 3/1/13**	
76	Preliminary Facility Site Determination	40 days	Mon 8/16/10	Fri 10/8/10	60
77	Prepare and Issue RFP	60 days	Mon 8/16/10	Fri 11/5/10	60
78	Vendors prepare and submit proposals	40 days	Mon 11/8/10	Fri 12/31/10	77
79	Evaluate Proposals and select prefered vendor	40 days	Mon 1/3/11	Fri 2/25/11	78
80	Negotiate agreements with preferred vendor	60 days	Mon 2/28/11	Fri 5/20/11	79
81	Prepare and submit permit applications	130 days	Mon 5/23/11	Fri 11/18/11	80
82	Permits issued and construction commenced	130 days	Mon 11/21/11	Fri 5/18/12	81
83	Construction period	130 days	Mon 5/21/12	Fri 11/16/12	82
84	Start-up and Acceptance testing	75 days	Mon 11/19/12	Fri 3/1/13	83
85	Commence Full Scale Operations	0 days	Fri 3/1/13	Fri 3/1/13	84
86					
87	**SW Treatment Facility Implementation**	**1570 days**	**Mon 8/27/12**	**Fri 8/31/18**	
88	Preliminary Facility Site Determination	40 days	Mon 8/27/12	Fri 10/19/12	71
89	Prepare and Issue RFP	60 days	Mon 8/27/12	Fri 11/16/12	71
90	Vendors prepare and submit proposals	60 days	Mon 11/19/12	Fri 2/8/13	89
91	Evaluate Proposals and select prefered vendor	60 days	Mon 2/11/13	Fri 5/3/13	90
92	Negotiate agreements with preferred vendor	90 days	Mon 5/6/13	Fri 9/6/13	91
93	Prepare and submit permit applications	390 days	Mon 9/9/13	Fri 3/6/15	92
94	Permits issued and construction commenced	260 days	Mon 3/9/15	Fri 3/4/16	93
95	Construction period	520 days	Mon 3/7/16	Fri 3/2/18	94
96	Start-up and Acceptance testing	130 days	Mon 3/5/18	Fri 8/31/18	95
97	Commence Full Scale Operations	0 days	Fri 8/31/18	Fri 8/31/18	96



Project: SWMP Schedule for Section
Date: Mon 12/14/09

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone

SECTION 7.0

REFERENCES

Contents

7.0 REFERENCES **7-1**

7.0 REFERENCES

AECOM Environment. Draft Environmental Impact Statement for the Covanta Hempstead Energy-from-Waste Expansion Project. June 24, 2009.

American Chemistry Council. *2007 United States National Post-Consumer Report on Non-Bottle Rigid Plastics Recycling.* Arlington, VA. 2009. Reviewed on September 28, 2009 at http://www.americanchemistry.com/s_plastics/sec_content.asp?CID=1593&DID=9167

City of Albany. Rapp Road Landfill Eastern Expansion, Fourth Supplemental Environmental Impact Statement. Clough, Harbour & Associates, LLP. Albany, NY. September 2008.

City of Albany. Draft Solid Waste Management Plan Modification. Clough, Harbour & Associates, LLP. Albany, NY. September 2008.

City of Portland. *2007 Recycling Program Summary*. Portland, OR. May 29, 2009. Reviewed on August 31, 2009 from http://www.portlandonline.com/bps/index.cfm?c=41792&a=174961

City of Portland. *Commercial Food Waste Composting Analysis: Portland Oregon.* Jennifer F. Porter, Portland State University School of Urban Studies and Planning. May 2003. Reviewed on August 31, 2009 from http://www.portlandonline.com/bps/index.cfm?c=41789&a=111056

Capital District Regional Planning Commission. Capital District 2000 Census Demographic Profiles for Political Subdivisions, Community Fact Sheet City of Albany, August 2008, December 9, 2008 < http://www.cdrpc.org/CFS/CFS-AlbCo_City_of_Albany.pdf>

Department of Sanitation of New York City (DSNY). *New York City Waste Characterization Study*. R.W. Beck. New York, NY. 2005. Reviewed on October 28, 2008, from http://www.nyc.gov/html/nycwasteless/html/recycling/waste_char_study.shtml#selectresults

_____. *Comprehensive Solid Waste Management Plan*. September 2006.

NYSDEC Division of Solid & Hazardous Waste Materials Solid Waste Management Facilities Active Registered Transfer Stations SWIMS as of July 2008 http://www.dec.ny.gov/docs/materials_minerals_pdf/tslistregist.pdf

NYSDEC Division of Solid & Hazardous Waste Materials Solid Waste Management Facilities Active Regulated Transfer Stations SWIMS as of July 2008 http://www.dec.ny.gov/docs/materials_minerals_pdf/tslist.pdf

_____ Annual facility reports ftp://ftp.dec.state.ny.us/dshm/Region4/ February 3, 2009

_____ *Capacity Data for Landfills and Waste to Energy Facilities.* SWIMS July 2009. accessed on August 3, 2009 at ftp://ftp.dec.state.ny.us/dshm/NY%202008%20Capacity%20SWIMS.XLS

_____. *Waste to Energy Facilities in New York State*. 2008 Retrieved at http://www.dec.ny.gov/chemical/23683.html on November 4, 2008.

_____. *Construction and Demolition Debris Landfills.* Retrieved at http://www.dec.ny.gov/chemical/23700.html. on September 14, 2009.

_____. *List of Active Construction and Demolition Debris Landfills.* Retreived from http://www.dec.ny.gov/docs/materials_minerals_pdf/cdlist.pdf on September 14, 2009.

New York State Department of Environmental Conservation. *2007 Waste to Energy Facility Capacity Chart*. 2008a Retrieved at http://www.dec.ny.gov/chemical/40047.html on November 4, 2008.

New York State Department of Environmental Conservation. *Transfer Stations*. 2008b Retrieved at http://www.dec.ny.gov/chemical/23678.html on November 4, 2008.

New York State Department of Environmental Conservation. *Solid Waste Landfills*. 2008c Retrieved at http://www.dec.ny.gov/chemical/23681.html on November 4, 2008.

New York State Office of General Services. 2009. *State To Reduce Empire State Plaza's Solid Waste Stream By Diverting Cafeteria Waste For Composting* – Press Release dated April 19, 2009. Retrieved on June 11, 2009 at http://www.ogs.state.ny.us/aboutogs/pressreleases/2009/CafeterriaComposting.pdf.

Northeast Waste Management Officials Association (NEWMOA). *Interstate Flow of Construction & Demolition Waste Among the NEWMOA States in 2002.* January 20, 2005.

Onondaga County Resource Recovery Agency (OCRRA). *2005 Onondaga County Waste Quantification and Characterization Study.* Dvirka and Bartilucci Consulting Engineers. Syracuse, NY. 2005

Onondaga County Resource Recovery Agency (OCRRA). 2008. *OCRRA Annual Report 2008.* Syracuse, NY. 2005

Pennsylvania Department of Environmental Protection (PADEP). *Statewide Waste Composition Study, Pennsylvania Department of Environmental Protection.* R.W. Beck. Harrisburg, PA. April 2003. Reviewed on November 4, 2008, from http://www.dep.state.pa.us/dep/deputate/airwaste/wm/Recycle/Waste_Comp/Study.htm

Product Stewardship Institute. Reviewed on October 2 2009 from http://www.productstewardship.us/index.cfm

United States Environmental Protection Agency (USEPA). *Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2007.* EPA-530-F-08-018. 2008. Reviewed on November 13, 2008, from http://www.epa.gov/osw/nonhaz/municipal/msw99.htm

USEPA. *Characterization of Building Related Construction and Demolition Debris In The United States.* June 1998.

USEPA. *Estimating 2003 Building-Related Construction and Demolition Materials Amounts.* EPA530-R-09-002. March 2009 http://www.epa.gov/epawaste/conserve/rrr/imr/cdm/pubs.htm

USEPA. *Product Stewardship* . Reviewed on October 2, 2009 from http://www.epa.gov/epawaste/partnerships/stewardship/basic.htm.

USEPA. *Pay as you Throw (PAYT).* Reviewed on October 2, 2009 from http://www.epa.gov/epawaste/conserve/tools/payt/index.htm.

USEPA. *Solid Waste Management and Greenhouse Gases – A Life-Cycle Assessment of Emissions and Sinks*. 3rd Edition. September 2006.

U. S. Census. 2009. *New Residential Construction. Quarterly starts and completions by purpose and Design*. Reviewed on April 24, 2009 from http://www.census.gov/const/www/newresconstindex.html

Vermont Department of Environmental Conservation (VTDEC). *Vermont Waste Composition Study.* DSM Environmental Services, Inc. and Chittenden Solid Waste District. Waterbury, VT. June 2002. Reviewed on November 11, 2008, from http://www.anr.state.vt.us/dec/wastediv/solid/pubs/VT%20WASTE%20COMP.pdf

Waste Management. *Single Stream Recycling*. Retrieved from http://www.wm.com/WM/ThinkGreen/recycling/singlestream.asp on November 4, 2008.

Waste Management. *Waste Management's Wheelabrator Technologies Selected As Prefered Vendor To Build And Operate New Waste-To-Energy Facility In Frederick County, MD.* Press Release. New Hampton, NH. February 3, 2009.

Waste News. *Allied to spend $2 million upgrading recycling facility*. October 31, 2008. Retrieved from www.wastenews.com on October 31, 2008.

Wisconsin Department of Natural Resources. *Frequently Asked Questions About Single Stream Recycling In Wisconsin. February2004*. Retrieved on November 4, 2008 from http://dnr.wi.gov/org/aw/wm/recycle/issues/singlestream.pdf .