

# **EXHIBIT M**



# SOLID WASTE MASTER PLAN:

## *Achieving Zero Waste*

EXECUTIVE SUMMARY

August 2019



METROPOLITAN NASHVILLE AND DAVIDSON COUNTY

## Acknowledgements

This Metropolitan Nashville and Davidson County (Metro) Solid Waste Master Plan has been developed in partnership with organizations, companies and individuals who have contributed their expertise and time throughout the plan development. CDM Smith would like to recognize and thank the following Metro Government leadership and Department staff, project team members, and community stakeholders who have been actively involved throughout the process:

### ***Metropolitan Government of Nashville and Davidson County Office of the Mayor***

#### ***Metropolitan Council Public Works Committee***

#### ***Metro Nashville Public Works***

#### ***Davidson County Solid Waste Region Board***

#### ***Solid Waste Master Plan Task Force***

### ***Tennessee Department of Environmental and Conservation***

#### ***Project Team Partners:***

Resource Recycling Systems (RRS)  
Skumatz Economic Research Associates (SERA)  
Wilmot, Inc.  
LDA Engineering

#### ***Bring Urban Recycling to Nashville Today***

#### ***Recycling Advocates of Middle Tennessee***

#### ***Natural Resources Defense Council***

## Introduction

### Purpose of the Solid Waste Master Plan



In June 2017, the Metro Public Works Department and the Davidson County Solid Waste Regional Board began working on a Solid Waste Master Plan that will serve as a roadmap to achieving Zero Waste over the next 30 years. **The primary objective of Zero Waste is to minimize waste generation and maximize the diversion of materials from landfills by implementing sustainable solid waste management practices.** Simply put, Zero

Waste is moving from disposing of waste to managing waste as a resource.

Zero Waste necessitates a change in mindset and philosophy. Only then can the current reliance on landfilling be replaced with resource management practices such as waste minimization, reuse, recycling, composting, digestion, and waste-to-fuels technologies.

As Davidson County advances along the path toward Zero Waste, it will establish a sustainable local market economy that will provide new employment and other benefits for the residents of the County.

The Plan has been developed to provide general direction for achieving diversion goals with the key to success driven by the timely and successful implementation of the strategies. The Plan's strategies are organized into three scenarios—conservative, moderate, and aggressive with implementation to occur in phases over 20-30 years. The aggressive

### SOLID WASTE MASTER PLAN PRIORITIES



Reach Zero Waste—defined as 90% diversion from landfill disposal



Increase recycling, food waste reduction and recovery, and composting programs throughout Davidson County



Adopt recycling and recovery programs targeted toward Nashville's growing construction and demolition waste stream



Strengthen public education and outreach programs



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scenario includes all the strategies required to achieve 90% diversion while the moderate and conservative scenarios omit specific programs that are considered more difficult to implement but still allow for modest improvement in diversion.

Because buy-in from a diverse group of stakeholders and building momentum for the plan is vital in the beginning, the Plan allows for flexibility in the implementation schedule. Implementation of the Plan can be adjusted to account for changing priorities, funding, or preferences. Recognizing the potential for change, the Plan includes an extended schedule that allows more time in the early years for establishing policies, authority, and funding to support the Plan strategies.



**THE MASTER PLAN**



*Evaluates the deficiencies and successes of the existing waste management system*



*Analyzes the financial, environmental, and social impacts (Triple Bottom Line) of existing and proposed strategies*



*Develops diversion goals that meet or exceed the State of Tennessee 2025 Material Management Plan*



*Recommends strategies that have been proven to be effective in existing zero waste communities*



*Provides the framework for measuring progress towards meeting the Zero Waste goal.*



*Understanding the Solid Waste Master Plan*

**Municipal Solid Waste (MSW)** includes discarded materials generated by residences, businesses, institutions, and manufacturing. MSW consists of: paper, plastics, glass, metals, yard waste, food scraps, textiles, electronics, appliances (white goods), and household hazardous wastes (HHW).

## Solid Waste Management Services Today

Davidson County has a two-tiered service system composed of the Urban Services District (USD) and General Services District (GSD). In the USD, Metro Public Works (MPW) provides waste collection to single family residences, multifamily residences, Metro-owned buildings, public housing, and parts of the central business district (CBD). Recycling collection is also provided to single family residences, Metro-owned buildings and Metro waste customers in the CBD. MPW residential waste collection is provided weekly and recycling collection is monthly. Construction and demolition (C&D) waste collection is provided exclusively by private waste haulers.

In 2010, the Solid Waste Code, which hadn't seen significant change since the early 1960's, was updated to emphasize landfill diversion, waste reduction, and improved access to recycling services throughout the county. As set forth in the revised code, bans were established for yard waste, electronics, cardboard, and C&D waste (residents only). Trash carts were limited to a maximum of two carts per address to encourage recycling and private waste haulers were required to offer recycling services.

Despite these improvements landfill diversion rates in Davidson County have remained low—out of the 1.5 million tons of waste generated in 2016, less than 25 percent was recycled or composted. In researching the causes of the low diversion rate the following were determined to be the most pressing challenges:

- 80% of all collection services are provided by private waste haulers
  - Private waste haulers have no incentive to encourage diversion
  - MPW lacks the authority to monitor or control private waste hauler services
- Funding for solid waste education and compliance is inadequate for promoting recycling and enforcing landfill bans
- Recycling of MSW and C&D waste is not mandatory
- Current options to landfilling food waste are limited



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**25%**  
 Waste Generated

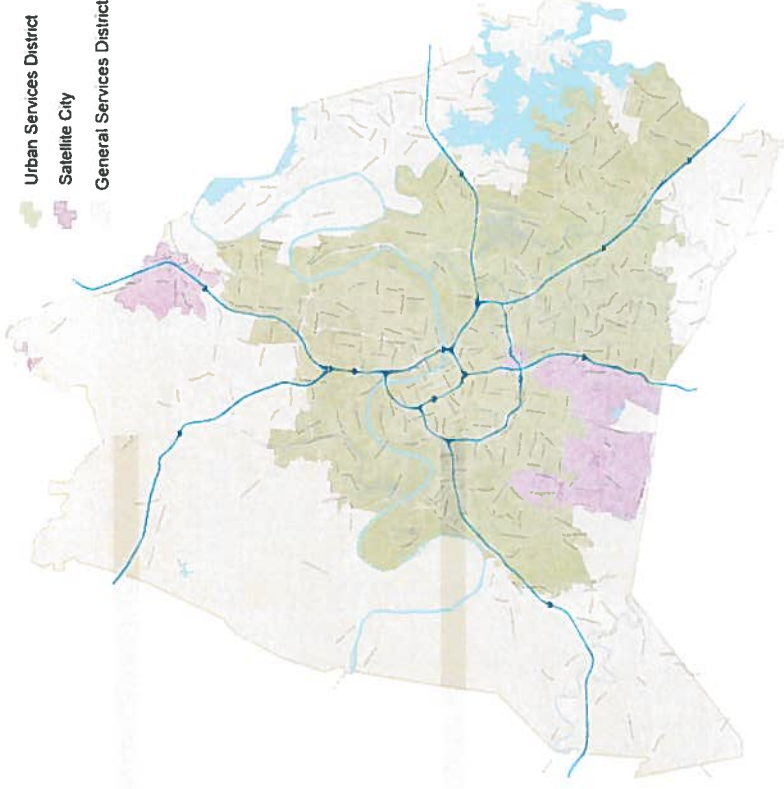
**GENERAL SERVICES DISTRICT**

195,000 residents  
 Suburban and rural; lower tax rate

**75%**  
 Waste Generated

**URBAN SERVICES DISTRICT**

496,000 residents  
 Higher tax rate; more municipal services, including trash & recycling



Urban Services District  
 Satellite City  
 General Services District

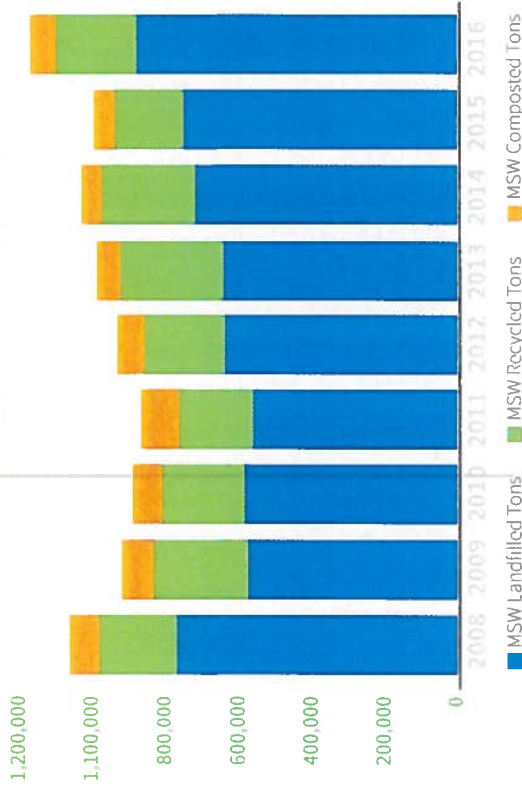


*Understanding the Solid Waste Master Plan*

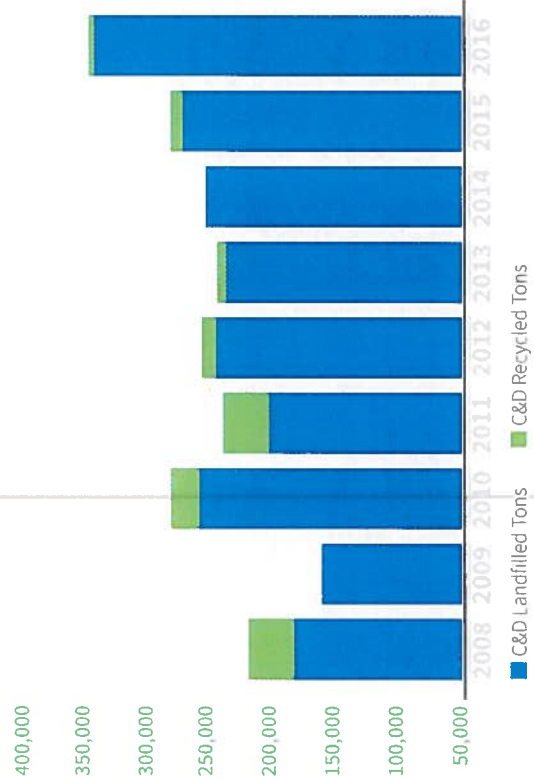
**ZERO WASTE** is the conservation of resources by means of responsible production, consumption, reuse and recovery of products, packaging and materials.

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MSW Waste Landfilled, Recycled, & Composted



C&D Waste Landfilled & Recycled



2016 Waste Management Breakdown



Waste Generated by Sector



**23%**  
of Total Waste Stream  
**AMOUNT OF  
CONSTRUCTION &  
DEMOLITION  
WASTE IN 2016**





## How to Get to Zero Waste

### Creating a Roadway to Waste Reduction and Diversion

Zero Waste cannot be achieved with a single strategy. The Master Plan outlines the various policies and programs required to substantially increase waste reduction and diversion. All stakeholders will play an important role in achieving the goals of the Master Plan. It will require the collaboration of the elected officials to enact effective policies, the MPW to implement zero waste strategies, and the community to support the policies and participate in the new programs.

Increasing waste diversion from its current level of .18% to high performance (75%) and ultimately to reaching Zero Waste (90%) will take time and careful planning. A three-phase approach has been developed for the 30-year planning period with diversion goals for each phase.



## Engaging the Community

As part of the planning process, Metro assembled a task force of various agencies, organizations, educational institutions, and individuals to provide input in each phase of the process and ensure Metro develops a community-driven, implementable plan. Meetings were conducted with the Solid Waste Region Board, Solid Waste Master Plan Task Force, Metro Council Public Works Committee, local environmental groups, and the Tennessee Department of Environment and Conservation.

In addition, six public meetings were conducted throughout the Metro service area and an online survey was performed to provide stakeholders unable to attend a public meeting a convenient way of participating in the outreach activities. Stakeholder engagement and public outreach were important components of the Master Plan's development and will be critical to the implementation of strategies to reach Zero Waste. **Outreach efforts provided a method to garner stakeholders' opinions and thoughts about aspects of the Master Plan, develop innovative ideas, and identify issues and challenges.** Stakeholders provided input on the programs and services needed to increase landfill diversion through recycling, composting, recovery, and reuse programs.

### Master Plan Public Meetings



### Understanding the Solid Waste Master Plan

During preparation of the Plan, workshops were held with a **Solid Waste Task Force** consisting of representatives from local businesses, restaurants, environmental groups, builders, and state regulators.

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**Resident and Business Online Solid Waste Survey**

*The survey results provided valuable insights for preparation of the plan.*



**Section 4** of the Master Plan provides details on the results of the public engagement efforts.

## Key Policy and Program Recommendations



*Understanding the Solid Waste Master Plan*

**WASTE DIVERSION** minimizes solid waste generation through source reduction, recycling, reuse, or composting. Waste diversion reduces disposal costs and the burden on landfills.

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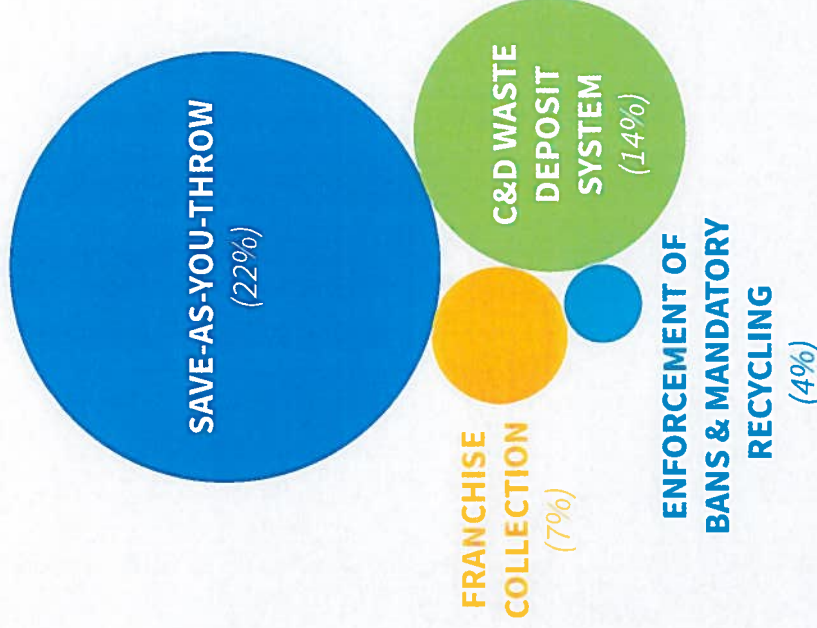
The first step in bringing about change is to establish a set of policies that will become the foundation of Metro's solid waste management program. These changes will not be easy because they require fundamental change to the way waste is currently managed. However, without them, Davidson County can expect only minor improvements to the existing 18% diversion rate. Policies commonly adopted by Zero Waste model cities were evaluated and screened to identify the most critical elements for developing a successful high diversion program. Once the foundational policies are in place, Metro will be in position to implement strategies that build on the success of the existing recycling program and raise the public's expectations for diversion.

Perhaps the most essential policy is the formation of a **Solid Waste**

**Authority** that is inclusive of the USD, GSD, and satellite cities and has the authority to assess household and business solid waste fees across all of Davidson County. An authority will provide the governance structure needed to develop, implement and oversee the new programs.



Access and price incentives provide a strong motivation for diversion; however these types of strategies usually plateau at diversion levels of 40-50%. Mandates and bans are needed to move toward 75% diversion as they provide the motivation that drives increased participation. Fortunately, Metro already has some bans in place. The most important modification is introduction of a **food scraps ban** as this material represents the largest single item remaining in the waste stream. The second modification is to make **recycling mandatory countywide**. Recycling should be made mandatory for both residential and commercial sectors and recycling should be required at all construction sites with specifications stating responsibilities, enforcement, and escalating penalties.



*Diversion in Davidson County can reach 65% by implementing the top four recommended program strategies plus existing 18% diversion.*

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The most impactful strategy recommended in the master plan is a **Save-As-You-Throw (SAYT)** collection service that provides recycling and food scraps collection service to all residences and businesses in the County. Each household and business receives a large bin for recycling, a large bin for diverting yard waste and food scraps, and a bin for trash, with the size of trash bin selected by each household/business. Smaller trash bins cost less than larger bins. The pricing differential for the trash bins will be set to encourage waste reduction, recycling, and diversion of food scraps.

The goal of this strategy is to increase diversion through increased access and economic incentive. The largest barrier to diversion is that trash plus recycling and food scraps collection costs more than trash alone under the existing program. This strategy reverses the economics by embedding the costs of recycling and food scraps collection within the trash collection fee. In a SAYT program customers save money by diverting more materials and using a smaller trash bin.



The very high tonnages of C&D waste generated by the explosive growth of the Nashville area warrants special attention in the diversion plan. The most effective C&D waste diversion programs in place nationally use a

**C&D waste recycling deposit program.** Developers filing for a construction or demolition permit are required to leave a financial deposit that is reclaimed only when they provide documentation at the end of the project that they recycled or reused a threshold amount of the material generated on-site. Many communities require 50% diversion. Diverting that much C&D material from existing landfills will spur development of new C&D waste processing facilities—reversing the recent trend of



declining C&D waste processing capacity in the area. A landfill ban for select components of C&D waste would further support the deposit system.



Replacing the current direct-subscription collection services for non-MPW customers with **franchised collection** would provide significant opportunities for increasing diversion as well as provided other social benefits. This strategy eliminates the routing of multiple haulers operating on the same streets, reducing noise and emissions and improving pedestrian and biker safety. Additionally, a countywide collection program under the control of a solid waste authority would streamline outreach, improve quality of service and benefit from greater economies of scale.

Optimization of collection frequency for incentivizing recycling and organics collection would be another benefit of this strategy. It has been demonstrated in other cities that if trash collection is provided less frequently than recycling and organics collection, the diversion rates will increase substantially.

**Section 6 provides details on all of the proposed strategies in the master plan.**

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## Triple Bottom Line

Environmental and social benefits are often overlooked when considering advancements to waste management programs. Implementation of the Solid Waste Master Plan will provide multiple benefits to the region. Moving towards diversion will attract sustainable businesses to the area. Additionally, food waste diversion will help address Metro's meal gap through the enhancement of local donations of fresh foods.

The Master Plan accounts for these benefits through a Triple Bottom Line (TBL)—Economic, Environmental, and Social—which accounts for broader environmental and societal effects. **The TBL analysis of the aggressive portfolio of programs shows the benefits of implementing the new programs exceeds the costs.**



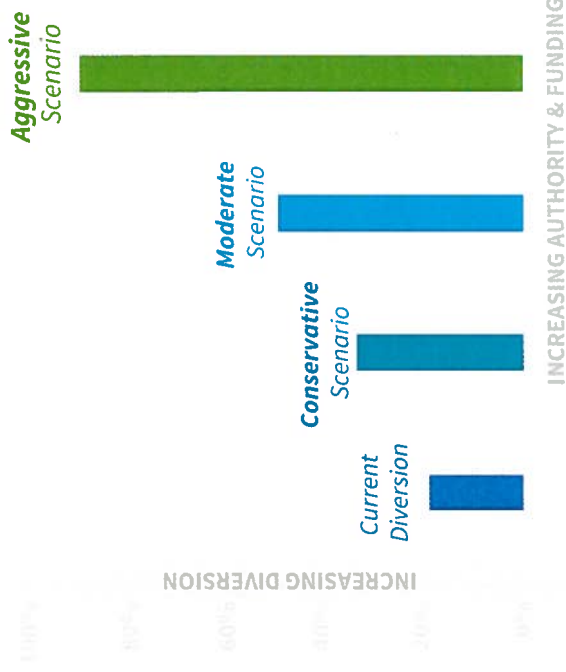
## Funding Approach

Arguably the biggest challenge of the Master Plan is determining how to fund new programs that serve both the USD and GSD. Funding of the Master Plan across the entire county is currently hindered by the varying tax rates of the USD and GSD and the exclusion of collection services in the GSD tax rate. Under the current scenario MPW is unable to generate sufficient revenues to support a high diversion plan.

Another challenge of the solid waste program is its reliance on General Fund revenues. With public service priorities for General Fund revenues shifting from year to year, MPW lacks a consistent funding source for planning diversion programs.

MPW solid waste funding is further stressed by its commitment to serving the downtown business area where the increasingly high quantities of generated waste far exceed the requirements in the Code and are a strain on funding.

The proposed solution to these challenges is the creation of a solid waste authority. Establishment of an authority provides the opportunity to address funding (through residential and commercial fees) free of the limitations associated with the current tax structure. The ability of an authority to collect adequate fees is paramount to establishing a long-term, sustainable source of funding that would allow the program to move forward.



INCREASING AUTHORITY & FUNDING

An authority would administer solid waste management services as a utility similar to how water services are provided by Metro Water Services; and would serve as the lead entity responsible for implementation of the Master Plan including policies, programs, services and funding. The authority could eventually expand into a regional authority that would take advantage of processing infrastructure in adjoining counties resulting in potential savings.

**Reliance upon General Fund revenues to support the Master Plan's programs is one of the biggest challenges to successful implementation.**

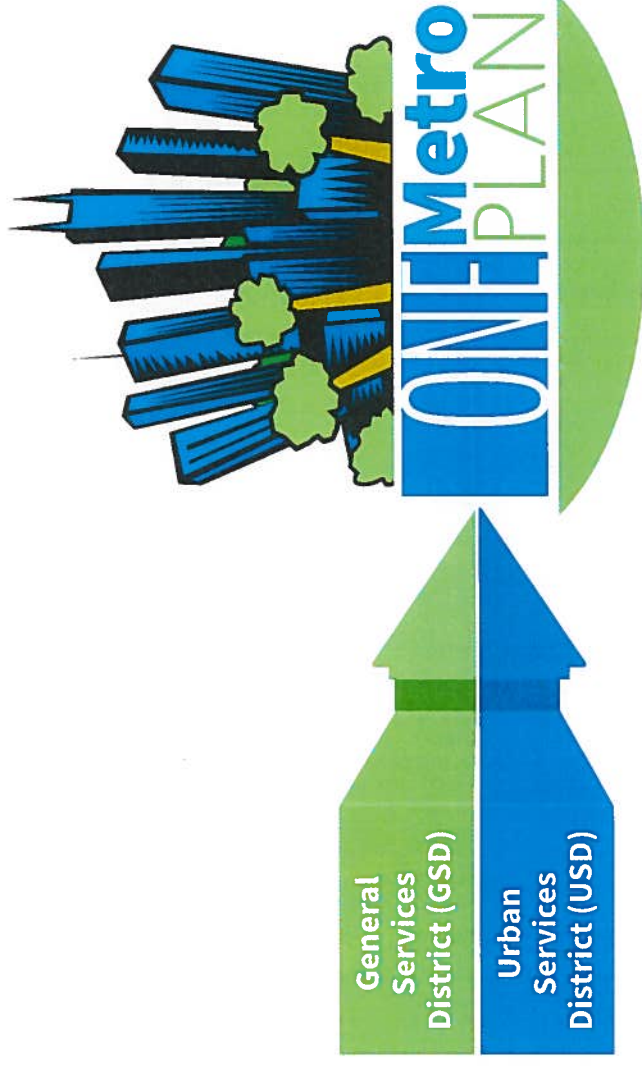


## One Metro, One Plan

Metro has demonstrated its commitment to taking progressive actions and embracing change beginning with the installation of a new form of government in 1963 and continuing with more recent aggressive investments in infrastructure improvements to attract professional sports teams and cultural venues. These changes have resulted in substantial growth in the Metro area.

The continued growth of Davidson County and the Middle Tennessee region means waste management at both the local and regional levels must be viewed as a priority by all stakeholders—residents, businesses, and elected officials. Addressing the waste management needs becomes a focal point that will impact the quality of life that Metro residents enjoy.

**One Metro, One Plan** is the theme of the Solid Waste Master Plan. It succinctly captures Metro's intention to unify service delivery and program implementation across Davidson County. It reiterates Metro's commitment to increase waste reduction, diversion and recycling and move the area to achieving Zero Waste. This Solid Waste Master Plan is similar in nature to the progressive character by which Nashvillians have approached prior transformative plans and decisions that have, and will, continue to benefit residents for generations to come.



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## PHASE 1 (Yrs 1-4)

- \$360,000** HP1 Planning & Funding Authority, and Tracking System
- \$24,120,000** HP2 Residential Save-As-You-Throw Collection
- \$310,000** HP5 Education
- \$20,000** HP6 Code Support for Compost from Yard Waste & Food Scraps
- \$510,000** HP7 Enhanced Public Space Recycling
- \$2,990,000** HP8 C&D Waste Recycling Containers and Public Bid Recycle Mandates
- \$28,310,000** **Total Phase 1 Annual Cost**



## PHASE 2 (Yrs 3-6)

- \$880,000** HP4 Enforcement of MSW Mandates and Bans
- \$1,380,000** HP9 Improved Access to Convenience Sites
- \$2,260,000** **Total Phase 2 Annual Cost**



## PHASE 3 (Yrs 6-9)

- \$8,720,000** HP11 Contracted Franchise Zone Collection for Residential Sector with EOW trash collection
- \$30,000** HP12 Adding New Materials to Curbside Recycling
- \$20,000** HP13 Incentive Pricing
- \$17,030,000** HP3 Commercial Save-As-You-Throw Collection
- \$10,000** HP14 C&D Waste Recycling Deposit System
- \$8,370,000** **Total Phase 3 Annual Cost**

Savings!



## PHASE 4 (Yrs 9-20)

- \$17,200,000** HP10 Multifamily Strategies
- \$240,000** HP15 Contracted Franchise Zone Collection for Commercial Sector
- \$17,440,000** **Total Phase 4 Annual Cost**

## PLAN IMPLEMENTATION

The Plan has been developed to allow Metro to adjust strategy and project implementation through the planning period in response to changes in available revenue and funding, population, environment, technology, and regulatory pressure. The schedule considers that a great deal of flexibility exists within the Plan, so that Metro can adjust the schedule based on changing priorities, preferences, funding, or immediate needs. The Plan must be flexible and modifiable to address the potential for unknown setbacks and delays. Ultimately, the Plan provides general direction with the key to success driven by the timely and successful implementation of the strategies.

Based on Metro's solid waste goals and the Plan's recommended strategies and options, the schedule must balance an aggressive timeline with realistic expectations. The overarching implementation plan is to develop and execute both strategy portfolios (aggressive and extended) on parallel tracks. The Plan indicates the primary high-performance and zero waste strategies needed to reach 90% diversion will be implemented in four phases over 20 years. Each phase is designed to build upon the previous one.

### EXTENDED IMPLEMENTATION SCHEDULE

The phases will help guide Public Works and Metro Nashville toward successful diversion; however, implementing the strategies, policies, and projects will vary over the time period. The table to the right compares the aggressive and extended schedules regarding the implementation of key diversion strategies. The primary difference between the aggressive and extended schedules is that the extended Phase 1 activities focus solely on developing and implementing Metro authority, policies, and pilot programs; delaying rollout of the key diversion programs. Even with the technical, financial, and environmental components considered in developing the Plan, success will depend on the early adoption of the policy, authority, and funding requirements that are the key diversion strategies' foundation.

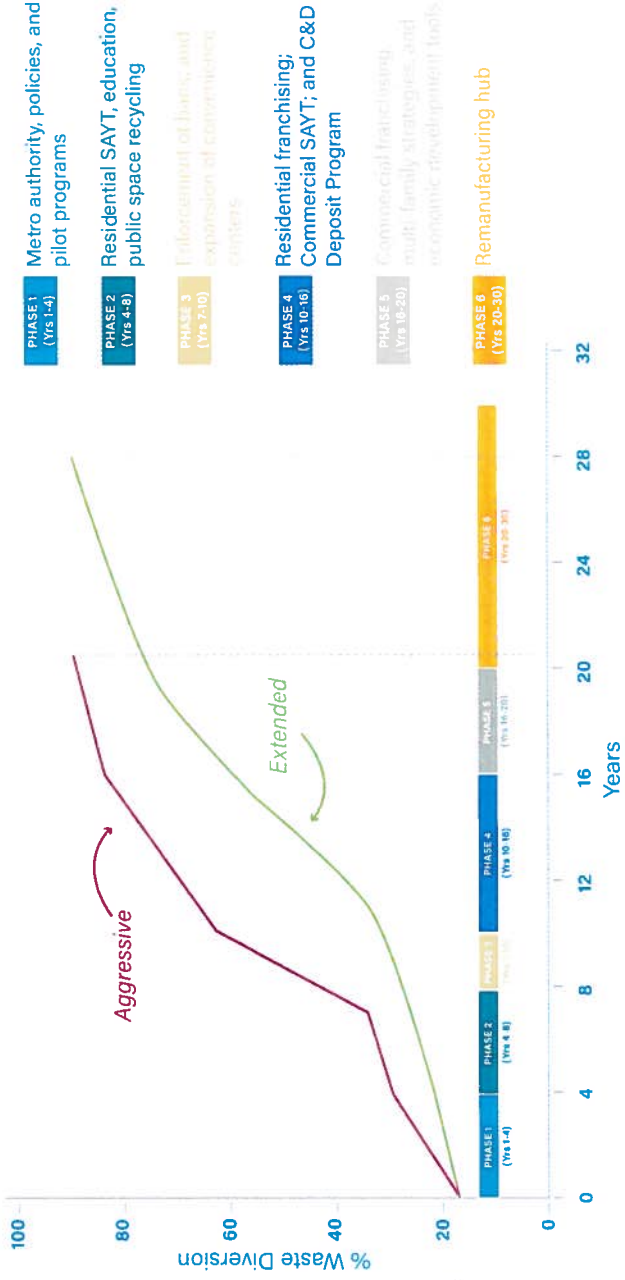
Comparison of Aggressive and Extended Schedules

KEY DIVERSION STRATEGIES	AGGRESSIVE SCHEDULE (20 YEARS)	EXTENDED SCHEDULE (30 YEARS)
Metro authority, funding and policies	Phase 1	Phase 1
Residential SAYT	Phase 1	Phase 2
Public Space Recycling	Phase 1	Phase 2
Enforcement of bans and mandates	Phase 2	Phase 3
Expansion of convenience centers	Phase 2	Phase 3
Residential franchising, commercial SAYT; and C&D deposit program	Phase 3	Phase 4
Commercial franchising and multi-family strategies	Phase 4	Phase 5
Re-manufacturing hub	Phase 5	Phase 6

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The figure to the right depicts the two proposed implementation schedules: aggressive and extended. The aggressive scenario strategies were developed with the idea that full implementation of the anticipated diversion benefits will take 20-30 years. The extended schedule's 30-year timeline is more pragmatic given the significant change to the waste management system the Plan requires. The anticipated diversion is more gradual under the 30-year timeline and reflects the challenges associated with establishing sustainable funding, gaining proper authority and control over the waste stream, and achieving the required changes in the waste management behaviors of residents and businesses.

Implementing the Strategy in Phases



## CURRENT PROGRESS TOWARDS HIGHER DIVERSION

Because change is required throughout the County, the successful, long-term implementation of the program needs to allow for consistent delivery of services. The current steps being implemented by Metro Public Works combined with Phase 1 activities will provide a significant start toward increased waste reduction, diversion, and recycling; and form the building blocks for growing new strategies and programs to drive increased diversion towards a Zero Waste Nashville.

**Section 13** provides a detailed discussion on Plan Implementation.



**EXHIBIT N**

## The Plan

WM hereby incorporates by reference the entire August 2019 Metropolitan Nashville and Davidson County Solid Waste Master Plan dated August 2019 (“Plan”). Because the Plan is comprised of over 400 pages, including all appendices, tables, and figures, WM is not including all of the pages of the Plan as an exhibit. WM has included the entire Plan Table of Contents and all pages of Plan specifically referenced in its position paper. The Solid Waste Region Board has the Plan available on its website at [Nashville | Solid Waste Region Board](#). On that website, the entire Plan can be located at:

[SWMP Complete.pdf \(nashville.gov\)](#)

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# Metropolitan Nashville and Davidson County



## SOLID WASTE MASTER PLAN: *Achieving Zero Waste*

August 2019

**CDM  
Smith**

In association with:

**RRS**

**SERA**

**wilmot inc**  
waste • utility • services • consulting



LDA ENGINEERING





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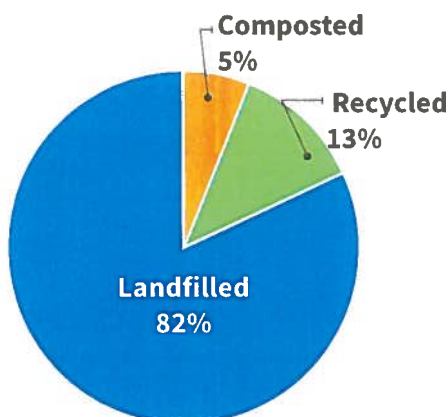
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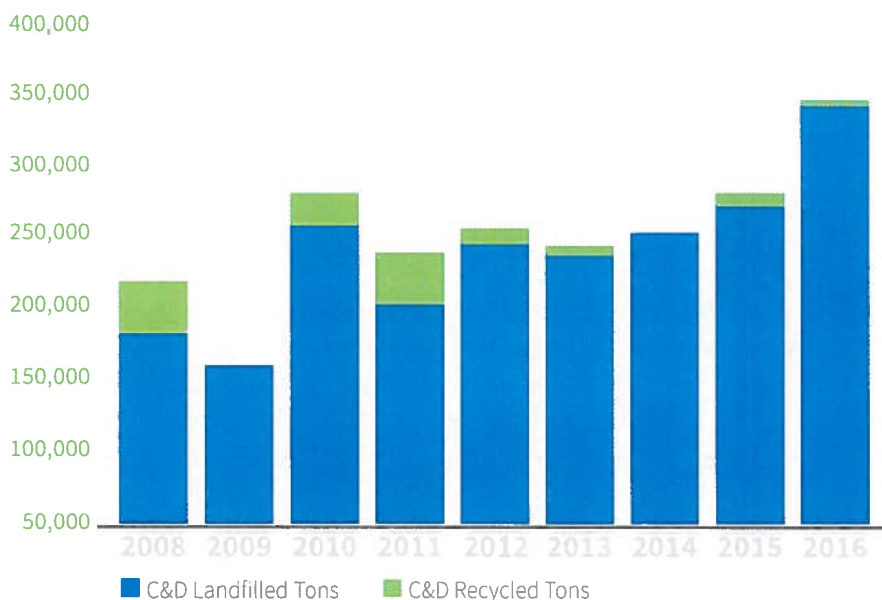
Figure 2-3: Management of 2016 Total Waste in Davidson County

DISPOSAL METHOD	QUANTITY (TONS)
Landfill	1,235,222
Recycling	207,104
Compost	69,151



Since 2008, Nashville’s construction and demolition (C&D) waste generation has nearly doubled while C&D waste recycling has decreased to minimal levels (Figure 2-4). In 2016, C&D waste was 23% of the total waste stream.

Figure 2-4: Nashville C&D Waste Landfilled and Recycled



Tonnages for C&D waste landfilled and recycled are likely underreported because:

- Some C&D waste is disposed of in MSW landfills and recorded as MSW tonnage. According to a 2008 Waste Composition Study completed by TSU, approximately 5% of the waste landfilled in the Bi-County and Cedar Ridge Landfills was C&D waste.<sup>1</sup>

<sup>1</sup> TDEC, 2008 Tennessee Waste Characterization Study





Landfilled and recovered tonnages for 2016 were divided by district and generator sector as shown in **Table 6-1** and input into the diversion model. The data indicate that C&D waste represents nearly a quarter of the total waste managed and is a large portion of the waste stream which represents a challenging sector from which to gain diversion.

Table 6-1: 2016 Tonnage Allocation Per Generator Sector

Estimated Tons	USD			GSD			TOTAL GENERATED	% OF TOTAL TONS
	Landfilled	Recycled	Composted	Landfilled	Recycled	Composted		
Single Family	126,900	15,000	27,600	74,700	5,700	300	250,200	16%
Multifamily	80,100	-	-	47,100	-	-	127,200	9%
Commercial	364,100	119,900	27,000	213,700	63,300	14,300	802,300	52%
C&D Waste	225,900	2,000	-	124,200	1,100	-	353,200	23%
Total	797,000	136,900	54,600	459,700	70,100	4,600	1,532,900	100%
Percent	52%	8%	4%	30%	5%	1%	100%	

### EVOLVING TON COMPUTATIONS

The composition of MSW has changed dramatically over time and will continue to do so. Information on trends in packaging materials was used to forecast compositional changes<sup>1</sup> and refined using the results of the waste composition study described in **Section 3**. A 1% growth factor was applied to the percentages shown for each material based on the information from the NashvilleNext Plan. The refinements include

- Plastic has increased more than 55% since the early 1990s, and will most likely continue at a similar rate
  - Food has increased by 18% since the early 1990s (with recent slowing), but this sector was expected to increase, barring substantial changes in food recovery.<sup>2</sup>
  - Metals have been increasing and modest upward trend is expected
  - Paper has decreased by 21% since the early 1990s, and a continued declining trend is anticipated
- 
- Glass use has decreased by 30% and a continuing decline is expected

<sup>1</sup> SERA data and research

<sup>2</sup> Note that a food recovery program is included in the Zero Waste strategies outlined in Chapter 7.

more expensive than trash alone.<sup>14</sup> Providing convenient opportunities for every household to have recyclables and organics (yard and food scraps) to be collected, along with a supporting price incentive to encourage participation is the most effective and cost-effective strategy for moving toward 75%. with a supporting price incentive to encourage participation is the most effective and cost-effective strategy for moving toward 75%.

- **Contracted Collection in the Residential and Commercial Sectors:** Two additional strategies include introducing contracts for collection in the residential, and later commercial, sectors. These strategies increase diverted tonnages by providing unified collection, outreach, enforcement, and service, at greater economies of scale, and potential cost economies. This strategy reduces the routing of multiple haulers operating on the same streets, reducing inefficiencies and emissions.
- **Enforcement of Existing Bans and Food Scraps Ban:** Access and price incentives (the SAYT options above) provide a strong motivation for diversion. However, those types of programs usually achieve diversion levels of 40-50%. Bans (and/or mandates) can provide the motivation not just to recycle, but to recycle better or more thoroughly, and these strategies are needed to move toward 75%. Most fortunately, Metro already has some bans on the books (specifically yard waste, cardboard, and electronic waste), and getting a ban passed can be the hardest part of the program. For those materials, the program provides budget for an enforcement program for both the residential and commercial sector; Metro Public Works staffing levels are too low to enforce existing bans, and an unenforced ban is not effective.<sup>15</sup> As mentioned above, we also introduce a very important food scraps ban, as this material represents the largest single item remaining in the waste stream. Compliance with this new ban is also enforced using the same staff.
- **Incentive Pricing of Waste Streams at Facilities:** In this program, enhanced surcharges are placed on disposed tonnage at all landfills and transfer stations, and reductions in taxes or fees (or incentive pricing) used for recycling and organics. This changes the apparent economics of recycling, and, when large enough, changes institutional, commercial, and industrial (ICI) sector decision-making regarding diversion, particularly affecting large and small self-haul customers who may not be easily included in the commercial SAYT program.<sup>16</sup>
- **C&D Deposit System:** The very high tonnages of C&D generated by Nashville’s booming on-going development represent a priority waste stream – especially since it is either captured during construction / demolition, or the opportunity is lost forever. The most

<sup>14</sup> The program should allow those customers that need more than one recycling bin to have one (recommended collection frequency is every other week). That unlimited service is not expected for yard waste service; one large bin, weekly is the expected service.

<sup>15</sup> Lack of enforcement also leads to an uneven playing field; those who comply with the ban often experience higher costs or inconvenience and are left at a disadvantage relative to non-complying competitors. Enforcement levels the playing field.

<sup>16</sup> See Skumatz et. al., “The Costs and Benefits of Minnesota K-12 School Waste Management Programs”, prepared for MCPA, State of Minnesota, July 2014, <https://www.pca.state.mn.us/sites/default/files/p-p2s6-15.pdf>.

effective programs in place nationally are deposit programs. Developers filing for a construction or demolition permit are required to leave a financial deposit that can be reclaimed if they provide documentation that they recycled or reused a threshold amount of the material generated on-site. Most communities have established a 50% goal; reaching 75% in Nashville/Metro in the combined MSW and C&D sectors is not mathematically possible without a higher goal for C&D because this sector represents 25-30% of the waste stream. However, handling that much C&D material effectively and efficiently requires a special new processing facility. Until that can be developed (and it is among the highest priority facilities), a series of other C&D programs are put in place right away, starting with a requirement for recycling bins with trash service at all sites, and submittal of waste management plans (pre and post project).<sup>17</sup> An associated C&D ban can help support the deposit system. Metro already implements Leadership in Energy and Environmental Design (LEED)-informed guidelines, specifically requiring LEED certification Metro construction projects. When possible, LEED certification includes recycling and reuse of materials.

These core strategies may be a “heavy lift” because they require fundamental change to the existing solid waste management system, and forays into the commercial and C&D sectors. However, without fundamental change in services, incentives, and enforcement, Nashville can expect only minor changes to Metro’s existing 18%-19% diversion rate.

These core High Performance Strategies do not quite achieve the 75% goal on their own, and we developed a number of additional strategies to:

- Provide tailored recycling and diversion opportunities for specific customer subgroups.
- Build on successes in existing programs.
- Provide opportunities that deliver additional tonnage.
- Publicly build expectations that recycling is expected.
- Deliver strategies that are more conservative politically.

As a consequence, this Appendix describes a list of nearly four dozen strategies that were included in SERA’s WDAM (Waste Diversion Assessment Model). In particular, the 75% High Performance goal cannot be met without adding new materials including textiles (representing 5-6% of disposal), glass (representing 4-5% of disposal) and high capture of traditional recyclables (hence the use and enforcement of bans and Metro-wide programs).

We recognize two factors that affect our modeling – timing of strategy roll-out, and “aggressiveness” of the strategies included in a portfolio. We present results for three portfolios and four phases in our modeling and the results are presented in Appendices F.4 and F.5.

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<sup>17</sup> Note that the modeling work captures C&D from three sources: the C&D material currently being landfilled in C&D landfills, and those (smaller) portions from the commercial and residential streams that were identified as C&D in the waste sort.

In addition to the two facilities owned and operated by Living Earth, which has an exclusive contract with Metro to take all MPW collected brush and yard waste, several other facilities take organic waste generated in Nashville (**Table 2-3**). According to Metro Water Services, private grease recyclers processed a total of 8,012 tons of recycled fats, oils, and grease.

Table 2-3: Compost and Mulch Facilities in the Region that Accept Materials from Nashville

FACILITY	CONFIRMED MATERIALS ACCEPTED	2016 TONS REPORTED TO TDEC	CURRENT OPERATING RATE TONS/YR	OPERATING CAPACITY TONS/YR	CAPACITY WITH FACILITY EXPANSION TONS/YR
Ground Up Recycling	Wood Pallets	N/A	21,000	30,000	N/A
AEP Inc	Wood	N/A	13,505	unknown	N/A
The Compost Company, LLC	Food Waste, Yard Waste, Brush	750	6,000	22,500 <sup>1</sup>	75,000 (max. for site) <sup>2</sup>

Notes: <sup>1</sup> 22,500 tpy comprises 7,500 tpy of food scraps and 15,000 tpy of woody waste.  
<sup>2</sup> 75,000 tpy comprises 25,000 tpy of food scraps and 50,000 tpy of woody waste.

Nashville has one dedicated C&D waste landfill and one mixed C&D waste processing facility (**Table 2-4**). Republic Transfer Station and Waste Management Antioch Pike Transfer Station also accept C&D waste. Several facilities allow source-separated C&D material for recycling.

Table 2-4: C&D Waste Management Facilities

FACILITY	MATERIALS ACCEPTED	CURRENT OPERATING CAPACITY TONS/YR	AVAILABLE OPERATING CAPACITY TONS/YR	CAPACITY AFTER FACILITY EXPANSION TONS/YR
C&D Waste Processing: Atomic Resource Recovery, LLC	Mixed C&D	78,000	89,700	260,000
C&D Waste Landfill: Waste Management, Inc. Southern Services C&D LF	Mixed C&D	327,000	Expected to reach capacity in 2024	None

Table 8-2: Additional Facility Requirements for Diversion Strategies in Year 10

MODELING SCENARIO	SINGLE STREAM MRF (EACH)	FOOD SCRAPS COMPOSTING OR ANAEROBIC FACILITY (EACH)	C&D DEBRIS RECOVERY FACILITY (EACH)
Aggressive	2	5	2
Moderate	1	2	2
Conservative	1	2	0

### TRANSFER STATIONS AND LANDFILL FACILITIES

The existing transfer stations have adequate capacity to meet the long-term transfer needs of the area and, based on conversations with Republic and Waste Management representatives, they can operate indefinitely with proper maintenance and upkeep. For example, as part of their maintenance program, Republic resurfaces their tipping floor once every three years to prevent structural damage to the flooring.



Republic’s Middle Point Landfill in Rutherford County receives the majority of MSW from Davidson County but is slated to close sometime in the next five to ten years. With no known plans for new landfills to be built in middle Tennessee, the remaining disposal options after Middle Point Landfill closes are two Waste Management landfills located in Marshall County and Benton County. Both landfills are located on large properties with ample space for expansion.

With Metro Nashville aggressively working to reduce reliance on landfills, this Plan does not include recommendations for any new or expanding landfills in Davidson County. Permitting new or expanding landfills would be inconsistent with the goals of the Plan.



Table 9-2: Remaining Material Disposal/Processing Outlets

WASTE MATERIAL	CURRENT COLLECTION OR DISPOSAL FACILITY	LOCATION(S)	CURRENT PROCESSING FACILITY	PROGRAM EXPANSION OPTIONS	POTENTIAL OTHER OUTLETS
HHW	Convenience Centers	Ezell Pike Center & East Center	Clean Harbors Environmental Services	New center for West Nashville	New end-uses for oil-based paints
Electronic Waste	Convenience Centers (residential only)	Ezell Pike Center, East Center, & Omohundro Center	Dynamic Recycling, Inc.	Two new centers for West Nashville	EPR collection & recycling
MRF Residual	MSW Landfill	Middle Point, Cedar Ridge, and West Camden	N/A	Further sorting for marketable recyclables	Plastics to biofuels, fiber to composting
Biosolids	Class A pellets for agricultural land application and landfilling of Class B biosolids	Metro Water Services Central and Dry Creek Wastewater Facilities	Metro Water Biosolids Facility		100% production of Class A pellets for agricultural applications
Bulky Waste	MSW Landfill	Middle Point, Cedar Ridge, and West Camden	N/A	Further sorting for reuse and recycling opportunities	Plastics to biofuels, shredded wood to composting
Non-recycled material	MSW Landfill	Middle Point, Cedar Ridge, and West Camden	N/A	Further sorting for marketable recyclables	Product redesign and creation of new end-use markets
Tires	Convenience Centers and Liberty Tire Recycling Holdco, LLC	Ezell Pike, East Center, Omohundro, & Anderson Lane	Liberty Tire Recycling Holdco, LLC	Utilize existing centers and one new center for West Nashville	Grind/recycle; creation of new end-use markets

## SUBTITLE D AND C&D LANDFILLS

As Metro advances towards its Zero Waste goal, Subtitle D and C&D landfills will serve a decreased role in the integrated solid waste management system. The Republic Middle Point Landfill (Rutherford County) and Waste Management's West Camden (Benton County) and Cedar Ridge (Marshall County) landfills are the Subtitle D facilities currently handling disposal of almost 900,000 tons of waste generated within Davidson County.

Waste Management's Southern Services C&D Landfill, located within Davidson County, accepts approximately 90% of Davidson County's landfilled C&D waste.

Estimates of remaining life for the Middle Point Landfill range from five to ten years based on industry volatility and rapid growth in the region, while Cedar Ridge and West Camden are estimated to have twelve years and more than twenty-five years of disposal capacity, respectively. The Southern Services C&D Landfill is projected to exhaust its disposal capacity within five years.

The availability of long-term landfill disposal capacity for managing materials remaining after 90% diversion will depend on the West Camden Landfill. Since this landfill is almost 100 miles away from Nashville, Metro should continuously evaluate new programs and end markets to minimize the amount of materials where landfills are the last management option.

Furthermore, with Metro Nashville aggressively working to reduce reliance on landfills, this Plan does not include recommendations for any new or expanding landfills in Davidson County. Permitting new or expanding landfills would be inconsistent with the goals of the Plan.

## **CONVENIENCE CENTER SITES**

Because all recyclable, reusable, or compostable materials are not collected curbside, convenience centers will play an essential role in implementing the Plan. These facilities offer residents access to collection/drop-off services for materials not picked-up at their locations. The addition of new convenience centers will provide staffed and secured facilities where residents will be able to properly dispose of HHW, electronic waste, tires, and other waste materials not captured through other Plan strategies.

## **BENEFICIAL USE OF BIOSOLIDS**

Wastewater treatment plant operators are increasingly viewing their residuals as a resource—a product that can be beneficially reused rather than being disposed of at a landfill. Dewatered biosolids meeting Class B standards can be used as a feedstock for composting and fertilizer-manufacturing operations, or it can be directly applied at permitted land application sites as a soil amendment. Treated biosolids, such as dried and pelletized biosolids meeting Class A standards, can be used in agriculture, and they can also be sold or given away to the general public for use in lawns and gardens.

Metro Water Services (MWS) manages the treatment and disposal of sludge from the wastewater treatment plants using anaerobic digestion (AD). MWS currently operates a biosolids facility at the Central Wastewater Treatment Plant, which produces dried Class A fertilizer pellets; and a biosolids facility at the Dry Creek Wastewater Treatment Plant that produces Class B biosolids that are currently landfilled. A key infrastructure requirement of the Plan is using AD either as co-digestion at an existing wastewater treatment plant or creation of a standalone facility to process increased amounts of diverted food waste.

Waste Material	Current Collection or Disposal Facility	Location(s)	Current Processing Facility	Program Expansion Options	Potential Other Outlets
				West Nashville	
Medical Waste (sharps)	MSW Landfill			Expandable through EPR programming	Regulated waste stream
Pharmaceuticals	Metro Police Precincts	8 precincts across the Metro area		Expandable through EPR programming	Regulated waste stream

### Subtitle D and C&D Landfills

As Metro advances and meets its Zero Waste goal, Subtitle D and C&D landfills will serve a decreasing role in the integrated solid waste management system. The Republic Middle Point Landfill (Rutherford County) and Waste Management’s West Camden (Benton County) and Cedar Ridge (Marshall County) Landfills are the Subtitle D facilities currently handling disposal of almost 900,000 tons of waste generated within Metro Nashville and Davidson County. The Middle Point Landfill accepts approximately 54% of the waste disposal stream. The Cedar Ridge Landfill accepts the next largest portion (24%) of the Davidson County waste stream.

Davidson County is also home to Waste Management’s Southern Services C&D Landfill which accepts approximately 90% of Davidson County C&D waste that is landfilled.

The Tennessee Department of Environment and Conservation (TDEC) prepares an annual survey of the remaining life for sanitary landfills. The 2018 survey indicates that the Republic Middle Point Landfill has between 5 and 10 years of remaining waste disposal capacity, while Cedar Ridge and West Camden have 12 years and > 25 years of disposal capacity, respectively. The Southern Services C&D Landfill is projected to exhaust its disposal capacity within five years.

The availability of long-term landfill disposal capacity for managing materials remaining after 90% diversion will be dependent upon the West Camden Landfill. Since this landfill is almost 100 miles away from Nashville, Metro should continuously evaluate new programs and end markets to minimize the amount of materials where landfills are the last management option.

Furthermore, with Metro Nashville aggressively working to reduce reliance on landfills, this Plan does not include recommendations for any new or expanding landfills in Davidson County. Permitting new or expanding landfills would be inconsistent with the goals of the Plan.

### Convenience Center Sites

Expansion of Metro’s existing convenience center infrastructure is discussed as Strategy #15 within Section 6/Appendix F of the Plan. In addition to the role convenience centers will play in reaching the 75% High Performance goal, these facilities are also critical to managing the materials remaining after 90% diversion has been achieved.

The addition of at least one and possibly two new convenience center sites, as implemented over time, will provide convenient staffed and secured facilities where residents could properly