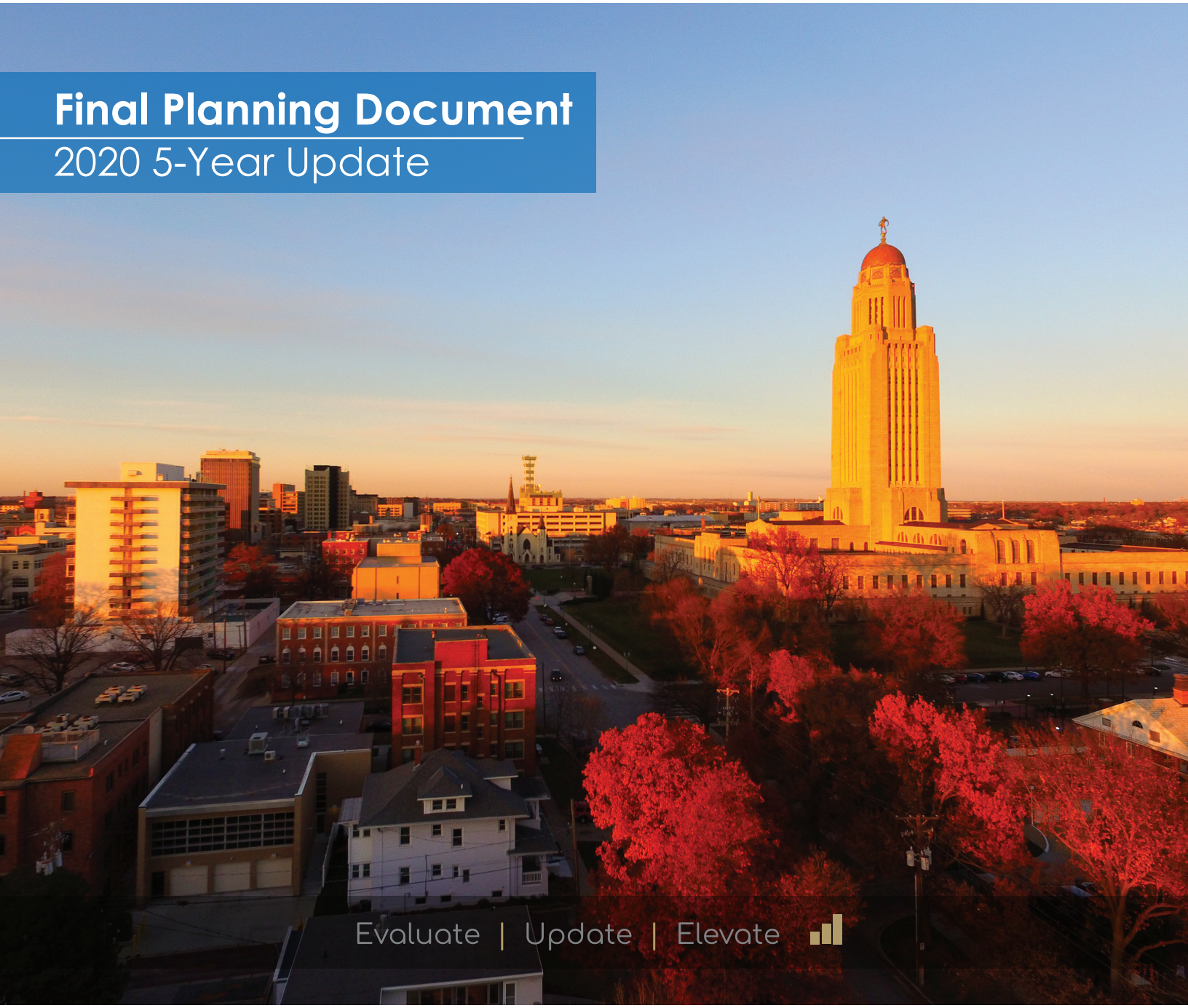
Solid Waste Management Plan 2040
for Lincoln and Lancaster County

Evaluate | Update | Elevate

2020 Update



Final Planning Document
2020 5-Year Update

SCS ENGINEERS

27220087.00 | April 2021

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CITY OF LINCOLN NEBRASKA

LTU CITY OF LINCOLN TRANSPORTATION AND UTILITIES

LINCOLN LANCASTER COUNTY HEALTH DEPARTMENT

SCS ENGINEERS

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1.0 BACKGROUND

The City of Lincoln has been completing solid waste management planning efforts for many years dating back to the dawn of modern (Subtitle D) landfills; integrated solid waste planning which dates back to the mid to late 1980s. In October 2011, the Lincoln-Lancaster County 2040 Comprehensive Plan (LPlan 2040) recognized this ongoing and continual planning effort and solidified, as a strategy, the review and update of information contained in the Solid Waste Management Plan at least every 5 years. As a result, a mayor-appointed advisory committee prepared *Solid Waste Plan 2040* between 2012 and 2013. This comprehensive, long-range plan serves as a communication tool and resource for policy decisions regarding solid waste management systems, facilities, and programs in Lincoln and Lancaster County (Planning Area).

An initial part of the planning process was establishing guiding principles to serve as the foundation for developing *Solid Waste Plan 2040.* The advisory committee designed the guiding principles to complement the following similar statements in the LPlan 2040 relative to solid waste management:

LPlan 2040 Guiding Principle:

> "The City policy of privately owned and operated collection of refuse and recyclables coupled with public ownership, operation, and financing of disposal and select integrated solid waste management services will continue during the planning period."

LPlan 2040 Guiding Principle:

> "No out-of-county waste is accepted for landfill disposal. This policy reserves landfill capacity for city and county residents and allow administration of programs under existing authorities."

In addition, the advisory committee identified five guiding principles specific to *Solid Waste Plan 2040:*

- Engage the community
- Encourage public-private partnerships
- Ensure sufficient system capacity
- Emphasize the waste management hierarchy
- Embrace sustainable principles

The *Solid Waste Plan 2040* planning process also assessed the long-range needs for managing the solid waste generated in the Planning Area, including the baseline conditions for facilities, programs and policies. The combination of guiding principles, needs assessment, and input from the public and advisory committee served as the foundation for identifying *Solid Waste Plan 2040* preferred paths. These preferred paths include:

- Reduce the pounds per capita per year (p/c/y) rate of municipal solid waste (MSW) disposed of in landfills to:
  - 1,940 p/c/y by 2018
  - 1,720 p/c/y by 2025
  - 1,510 p/c/y by 2040
- Expand programs that lead to greater source reduction.
- Expand the toxics reduction program and create a place to provide year-round access.

- Maintain seasonal disposal ban on grass and leaves.
- Assure all single-family and duplex dwellings in the city of Lincoln have access to curbside recycling (residential).
- Assure all multi-family dwellings, businesses, industries, and institutions in the city of Lincoln have access to recycling (commercial).
- Develop/support programs to reduce the quantities of construction and demolition (C&D) waste going to the disposal site(s).
- Develop/support programs to reduce the amount of organic waste, especially food waste, sent to the MSW disposal sites.
- Pursue developing waste conversion technologies as part of a long-term energy recovery strategy and resource conservation strategy.
- Expand on City-owned property to the east of the currently permitted MSW disposal site.
- Expand the disposal capacity for construction and demolition waste on the current site.
- Develop a MSW transfer station if a feasibility study shows it can be cost-effective.
- Evaluate installing a bioreactor/bio-stabilization technology at the City-owned MSW landfill.

The Lincoln Transportation and Utilities (LTU) Department and Lincoln - Lancaster County Health Department (LLCHD) are the primary public entities for overseeing the implementation of the *Solid Waste Plan 2040.* City and County governments, private waste haulers, residents, institutions, and local commercial businesses also play a vital role in successfully fulfilling *Solid Waste Plan 2040.*

2.0 UPDATE PROCESS

In 2020, the City of Lincoln (City) began preparing a 5-year update of *Solid Waste Plan 2040*. The Mayor of Lincoln invited 15 representatives from the community to formulate updates, 13 of which accepted the invitation. The working group included a broad cross-section of community participants who reviewed components of *Solid Waste Plan 2040* and provided input for the 5-year update. Attachment A identifies the members of the working group as well as the City and Consultant participants.

The City convened the working group five times between August 2020 and February 2021. Due to COVID-19, the City conducted virtual working group meetings (work sessions) structured to allow every working group member to participate and share their perspective actively. Additionally, working group members received briefing documents before each session and meeting minutes following each session. The following provides an overview and outcomes of each work session.

2.1 WORK SESSION 1

The topics discussed during work session 1 include:

- Objectives of working group engagement
- Roles and responsibilities
- Voting protocols
- Background on the *Solid Waste Plan 2040* solid waste planning process
- Introduction to the *Solid Waste Plan 2040* preferred paths and existing solid waste management system
- Review and validate *Solid Waste Plan 2040* guiding principles

The working group unanimously voted to retain the guiding principles when evaluating preferred paths and strategies in the 5-year update.

2.2 WORK SESSION 2

In work session 2, the City provided the working group with a quantitative and qualitative analysis of how the solid waste management system in 2020 differs from 2013 and how the infrastructure, regulations, and market conditions have changed. The 2020 Needs Assessment (Attachment B) presented to the working group summarized the programs and initiatives that LTU and LLCHD implemented since 2013 and identified the actions, facilities, policies, and programs required to continue progressing the preferred paths identified in *Solid Waste Plan 2040* for the next five years.

One of the primary goals from *Solid Waste Plan 2040* was a reduction in the pounds per capita per year (p/c/y) disposal rate for MSW:

- 1,940 p/c/y by 2018
- 1,720 p/c/y by 2025
- 1,510 p/c/y by 2040

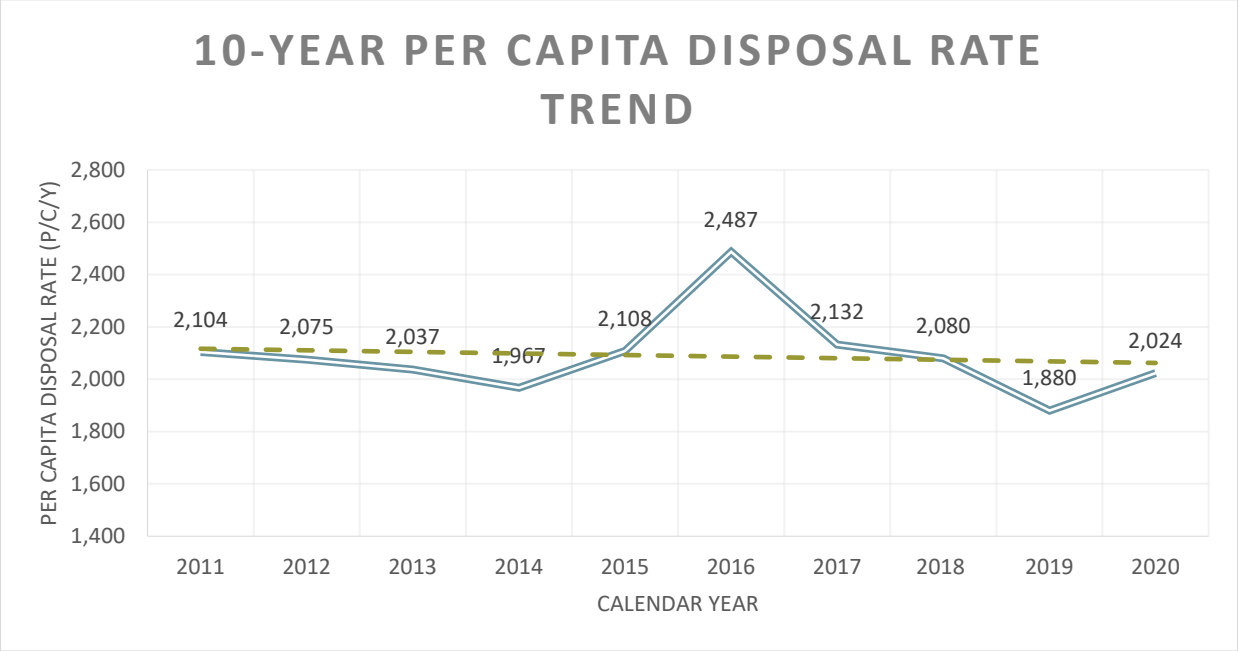
The City derives the p/c/y disposal rate for a given year by taking the total quantity of MSW originating from the Planning Area and disposed of in a landfill and dividing by the Planning Area population.

Table 1 shows the total quantity of MSW disposed at the Bluff Road Landfill from the Planning Area and MSW collected in Lincoln and exported for disposal in a landfill outside Lancaster County.

Table 1. Per Capita Disposal Per Year

Year	Tons of MSW Disposed at Bluff Road Landfill	Tons of MSW Exported & Disposed of Elsewhere	Total MSW Tonnage Sent to Disposal	Total Planning Area Population	Per Capita Disposal Rate (p/c/y)
2011	287,211	17,709	304,920	289,914	2,104
2012	282,380	22,088	304,468	293,431	2,075
2013	292,216	10,395	302,611	297,109	2,037
2014	284,152	13,439	297,591	302,622	1,967
2015	317,606	5,072	322,678	306,096	2,108
2016	343,222	42,698	385,920	310,306	2,487
2017	320,726	13,771	334,479	313,772	2,132
2018	309,983	19,254	329,237	316,527	2,080
2019	288,379	11,579	299,958	319,090	1,880
2020	314,014	10,543	324,557	320,670	2,024

As shown in Table 1 and in the figure below, the p/c/y disposal rate decreased by 10 percent between 2011 and 2019. Table 1 also shows that the per capita disposal rate in 2018 was higher than the goal by 140 pounds. In 2019, the per capita disposal rate decreased to 60 pounds below the 2018 goal. However, in 2020, the per capita disposal rate grew to 84 pounds above the 2018 goal. In order to reach the goal of 1,720 p/c/y by 2025, an additional 61 pounds must be diverted per capita per year over the next five years. Based on the projected 2025 population of 340,760, this is equivalent to diverting an additional 10,400 tons of waste annually from the landfill.



In support of these diversion goals, the City completes waste characterization studies to routinely identify and quantify waste streams and materials that could be targeted for reduction. As example, a significant contributor to reducing the p/c/y disposal rate was the ban on corrugated cardboard from landfill disposal. After completing *Solid Waste Plan 2040*, the City established a working group to develop a strategy to decrease the amount of paper landfilled from the Planning Area. The working group evaluated strategies to divert all fibers (i.e., newsprint, fiberboard, and corrugated cardboard) from landfill disposal. The working group recommended a comprehensive ban on cardboard, paperboard, and newsprint, stacking the banned materials each consecutive year. Ultimately, the City Council approved only the disposal ban on corrugated cardboard, becoming effective April 1, 2018.

During work session 2, the City recommended that the following preferred paths do not require evaluation or new implementation strategies during the next five years:

- Pursue developing waste conversion technologies as part of a long-term energy recovery strategy and resource conservation strategy.
- Expand on City-owned property to the east of the currently permitted MSW disposal site.
- Expand the disposal capacity for construction and demolition waste on the current site.
- Evaluate the installation of bioreactor/bio-stabilization technologies at the City's MSW landfill.

The City made this recommendation because these preferred paths were already being implemented or did not require attention during the next five years. The working group concurred with this conclusion.

2.3 WORK SESSION 3

The City divided work session 3 into two, three-hour work sessions. Before the first session, the City provided the working group with a white paper on implementation criteria (Attachment C) to consider when defining/selecting strategies to support the preferred paths for the next five years.

IMPLEMENTATION CONSIDERATIONS

Session 3A took place November 13, 2020, and covered the preferred paths associated with:

- Residential recycling and diversion
- Source reduction and toxics reduction
- Yard waste collection
- Organic waste diversion

Session 3B occurred on December 15, 2020, and addressed the preferred paths associated with:

- C&D materials diversion
- Commercial recycling and diversion
- The transfer station and household hazardous waste infrastructure

During each session, the working group evaluated preferred paths within the context of implementation considerations. The goal was to seek input from the working group members on strategies and ideas to move preferred paths forward in the next five years. The following sections provide key takeaways from the sessions and the note after the recommended strategies for consideration foreshadows the results of the Session 4 prioritization effort.

2.3.1 Disposal Reduction

Preferred Path: Decrease per capita disposal rate

Reducing the amount of waste requiring landfill disposal remains *Solid Waste Plan 2040 Update's* primary objective and metric. Support remains for a disposal goal (vs. diversion goal) amongst the working group.

Recommended Strategies for Consideration

- Reduce the goal number (greater reduction) in the 5-year update.

Note: As the primary objective and metric, an additional 10,400 tons of waste will need to be diverted from landfilling by 2025 to achieve the goal of 1,720 p/c/y. This is equivalent to an additional 61 pounds per capita per year over the next five years. Sections 2.3.2 through 2.3.9 further detail strategies to realize the necessary reductions. The 2040 goal of 1,510 p/c/y will be further considered during the next 5-year update.

2.3.2 Source Reduction

Preferred Path: Expand programs that lead to greater source reduction.

The City has put forth a significant effort into educating the public about waste reduction and reuse. There was strong consensus support amongst the working group for the City to continue these efforts.

Recommended Strategies for Consideration

- Develop a City-owned and operated or collaborate with the private sector to develop a "hard to manage items" recycling program.
- Increase the City's educational role to encourage the waste hierarchy – don't generate waste in the first place.
- Establish initiatives where the City leads by example in:

- Business practices
- Purchase policies
- Construction practices

Note: The working group rated *"Increase education to change consumer habits regarding diversion and disposal of solid waste"* the highest. However, there was strong support by the working group and City participants for each of the identified strategies.

2.3.3 Toxics Reduction

Preferred Path: Expand the Toxics Reduction program and create a place to provide year-round access.

Recommended Strategies for Consideration

- More aggressively advertise and market the HazToGo Facility (to both residents and small businesses).
- Expand hours for HazToGo Facility.
- Implement a ReUse store within HazToGo Facility, preferably with grant funding support.
- Increase the City's educational role in encouraging the reduction of toxics usage and proper toxics disposal.

Note: The working group rated *"Expand hours for HazToGo facility operation"* the highest. However, there was strong support by the working group and City participants for each of the identified strategies.

2.3.4 Yard Waste Collection

Preferred Path: Maintain status quo (seasonal ban).

Support remains for source-separated yard waste collection during the seasonal ban, which occurs from April 1 to December 1. The Nebraska Department of Energy and Environment (NDEE) regulations would allow landfilling yard waste because the City landfill has a landfill gas-to-energy system. However, the working group did not recommend deviating from the current approach to divert yard waste from the landfill.

Recommended Strategies for Consideration

- The working group did suggest that the City consider offering an end-of-season "free day" as a final push to divert and compost yard wastes. This "free day" would entail the City operating drop-off sites where residents could deliver yard waste without a fee.

Note: The majority of the working group did not support *"offer end-of-season "free" drop-off sites"*.

2.3.5 Organic Waste Diversion (Composting)

Preferred Path: Develop/support programs to reduce the quantities of organics, especially food waste, going to the Bluff Road Landfill.

Consensus support exists for the City to continue to provide and expand composting to include food scraps. Discussion occurred about private compost operations within the waste shed that provide

some capacity (i.e., Big Red Worms, Prairieland). Again, the working group supported the City's role in providing this service.

Recommended Strategies for Consideration

- Focus on commercial and industrial generators to divert pre-consumer, source-separated food wastes.
- City to play an educational role to encourage:
  - Waste hierarchy – don't generate in the first place
  - Household composting
  - Food recovery hierarchy (grocery/restaurants – food for humans, food for animals, compost or digester)
- Recognition program for commercial/industrial entities that implement organic waste diversion programs.

Note: The working group rated *"Target diverting pre-consumer organics from commercial establishments"* the highest. While there was little to no support for source-separated food waste collections at the residential level, there was consensus support by the working group and City participants to target education and overall reduction of residential food wastes.

2.3.6 Residential Recycling and Diversion

Preferred Path: All single-family and duplex dwellings throughout the City have access to curbside recycling.

Curbside Recycling

The Lincoln Municipal Code (LMC) requires all residences to remove putrescible waste from the property at least weekly, and LMC requires independent licensed haulers to offer recycling services at least once per week. A recycling service subscription is voluntary, and the participation rate is approximately 40 percent. The working group is supportive of continued efforts to drive recycling and participation rates at the curb.

Recommended Strategies for Consideration

- Legislate curbside recycling – mandatory participation by the homeowner or mandatory requirement that hauler bundles and provides as part of "basic" waste services (Could the City go further – organized, franchised collection?).
- Legislate mandatory recycling for multi-family residential (i.e., apartment complexes).
- City to play an educational role to:
  - Recycle right
  - Universal signage for curbside recycling carts (challenging due to multiple MRFs accepting different materials)

Note: The working group rated *"Educate residents and businesses on how to Recycle Right"* the highest. However, there was strong support by the working group and City participants for legislating mandatory recycling for multi-family residential. Further, there was strong support by City participants to further evaluate mandatory curbside recycling.

Recyclables Collection Sites

In 2020, the City reduced the number of recycling collection sites. The working group had a mixed reaction about the effect this will have on landfill diversion (i.e., decreased participation due to perceived inconvenience). That said, the working group continued to support the City's initiative to increase participation in curbside recycling at single-family homes and expand involvement at multi-family properties. See recommended strategies in the prior subsection regarding legislative changes and following commercial/multi-family preferred paths.

2.3.7 Commercial Recycling and Diversion

Preferred Path: Increase recycling availability at multi-family dwellings, businesses, industries, and institutions.

The working group did not support mandatory recycling for business and commercial establishments except for multi-family properties. There was consensus support for the City to serve in an educational role.

Recommended Strategies for Consideration

- Legislate mandatory recycling for multi-family residential (i.e., apartment complexes).
- Develop an award or rebate program to encourage commercial recycling.
- The City organizes the collection of multi-family and commercial recycling to reduce the cost of recycling.

Note: The working group rated *"Recognition program for commercial entities with recycling and diversion programs"* the highest. However, there was varying support by the working group and City participants related to all of the identified strategies.

2.3.8 C&D Materials Landfill Diversion

Preferred Path: Develop/support programs to reduce construction and demolition waste quantities going to the disposal site(s).

The working group recommended that the private sector be responsible for physically diverting C&D materials, with education and technical support from the City. The City should continue to provide capacity for C&D materials that require disposal.

Recommended Strategies for Consideration

- The City collaborates with private organizations to provide training and workshops on the benefits of source-separating C&D materials at the construction/point of generation site.
- The City leads by example and adopts C&D diversion for their construction projects (similar to Lincoln Public Schools (LPS)).
- The City continues to listen to and support the private sector with interest in the area of C&D diversion but remains a viable disposal option for the materials, as needed.
- The City could create a center where multiple "hard to recycle" materials, including C&D, could be reused and recycled.

Note: The working group rated *"Adopt C&D diversion measures for City construction projects"* the highest, as did the City participants. However, there was support by the working group and City participants for each of the identified strategies.

2.3.9 Transfer Station and Processing Facilities

Preferred Path: Develop a municipal solid waste transfer station if a feasibility study shows it can be cost-effective.

The working group was supportive of the Transfer Station concept.

Recommended Strategies for Consideration

- Finalize the Transfer Station Feasibility Study.
- Develop preliminary engineering concepts and site requirements.
- Identify and option, or purchase, land for Transfer Station.
- Consider City-owned, contractor-operated, public/private partnership.
- Detailed consideration for additional items/services to be co-located such as:
  - HHW satellite collection
  - Hard to recycle items
  - Consumer recyclables collection site

Note: The working group rated *"Complete transfer station feasibility study, conceptual plans, and land acquisition"* the highest, as did the City participants. Additionally, there was support by the working group and City for co-located, landfill diversion services.

2.4 WORK SESSION 4

Before work session 4, the City distributed a summary of the strategies the working group recommended in work session 3A and 3B, as well as a Strategies Implementation Consideration Alignment Matrix (Attachments D and E, respectively). During work session 4, the working group revisited the guiding principles, needs assessment, and implementation considerations. The City then facilitated a detailed discussion on the Strategies Implementation Consideration Alignment Matrix.

After discussion, the working group then received guidance on scoring and prioritizing the strategies within each preferred path. Each working group member independently completed this process. Table 2 on the following pages presents the summarized results with an average score and rank for the underlying strategies on a preferred path basis.

Table 2. Prioritized Strategies

Preferred Paths and Underlying Strategies Identified	Avg. Score	Rank
Source Reduction		
Develop "Hard to Manage Items" recycling facility	3.00	3
Increase City's educational role to change consumer habits	5.00	1
City to lead by example (Environmentally Preferred Purchasing)	4.00	2
Toxics Reduction		
Increase marketing of HazToGo facility	3.88	2
Expand hours of HazToGo facility	5.50	1
Implement ReUse store within HazToGo facility	3.50	3
Increase City's educational role to decrease the amount of HHW generated	3.13	4
Yard Waste		
Offer end of season "free" drop-off sites	1.13	1
Organic Waste Diversion		
Target diverting pre-consumer organics from commercial establishments	5.13	1
Increase City's educational role in food / waste recovery hierarchy **and** household composting	4.25	2
Recognition program for commercial entities with organic waste diversion programs	2.63	3
Residential Recycling and Diversion		
Curbside Recycling		
Legislate mandatory curbside recycling	2.63	4
Legislate mandatory recycling for multi-family residential	4.50	2
Educate residents and businesses on how to "Recycle Right"	6.13	1
Recyclables Collection Sites		
Status Quo (reducing collection sites)	2.75	3

Table 2. Prioritized Strategies

Preferred Paths and Underlying Strategies Identified	Avg. Score	Rank
Commercial Recycling and Diversion		
Financially incentivized commercial recycling	4.00	2
Recognition program for commercial entities with recycling and diversion programs	4.63	1
Organize private collection system for commercial recyclables	3.38	3
C&D Materials Landfill Diversion		
City partners with organizations to provide training and workshops	3.13	3
City to adopt C&D diversion measures for City construction projects	5.38	1
City to listen & support private sector and continue to provide disposal capacity	3.50	2
Transfer Station and Processing Facilities		
Complete transfer station feasibility study, conceptual plans, and land acquisition	5.38	1
Consider City-owned, contractor-operated, public/private partnership	2.88	3
Co-located, landfill-diversion services	3.75	2

3.0 CONCLUSION

This 5-year update of *Solid Waste Plan 2040* provides an overview and outcomes of the planning process. The City and Mayor-appointed community representatives completed this work during five work sessions between August 2020 and February 2021 and accomplished the following:

- Voted to retain the guiding principles of the *Solid Waste Plan 2040* (Section 2.1)
- Agreed upon nine preferred paths to focus on in the next five years (Section 2.2)
- Identified twenty-four strategies to support the preferred paths for the next 5 years (Section 2.3)
- Scored the strategies based upon their alignment with the guiding principles, preferred paths, and implementation considerations (Section 2.4)

Of the twenty-four recommended strategies developed from this planning process, the following are the working group's **highest priorities** for consideration by the City during the next 5-year planning period.

- Increase education to change consumer habits regarding diversion and disposal of solid waste
- Expand hours of HazToGo facility operation
- Target diverting pre-consumer organics from commercial establishments
- Educate residents and businesses on how to "Recycle Right"
- Recognition program for commercial entities with recycling and diversion programs
- Adopt C&D diversion measures for City construction projects
- Complete transfer station feasibility study, conceptual plans, and land acquisition

The City will now further evaluate the identified strategies and will work to implement those that align with operational and programmatic initiatives to further reduce landfill disposal. As part of the evaluation, the City will consider the identified (and yet to be identified) strategies, in light of the City's Draft Climate Action Plan (CAP), to ensure that the SWMP Update initiatives undertaken align with the CAP "Reduce Waste" key initiatives.

Attachment A

Working Group – SWMP Update Project Matrix

SWP UPDATE PROJECT MATRIX

CITY OF LINCOLN

LINCOLN TRANSPORTATION & UTILITIES

- **ELIZABETH ELLIOTT** – LTU Director and SWMP Update Sponsor
- **DONNA K. GARDEN** – LTU SWMP Update Coordinator
- **KARLA WELDING** – LTU Solid Waste Management Lead
- **WILLA DICOSTANZO** – LTU Solid Waste Diversion Lead
- **CHRIS CONNOLLY** – City of Lincoln - Law Liaison to LTU Solid Waste Division

LINCOLN LANCASTER COUNTY HEALTH DEPARTMENT

- **SCOTT HOLMES** – LLCHD SWMP Update Coordinator
- **BROCK HANISCH** – LLCHD SWMP Update Participant

SCS ENGINEERS

- **MICHAEL MILLER** – Client Success Champion and Project Director
- **ANASTASIA WELCH** – Solid Waste Professional and Facilities Specialist
- **KAREN LUKEN** – Facilitator and Landfill Diversion Specialist
- **VITA QUINN** – Financial Advisor
- **ROBERT GARDNER** – Senior Technical Advisor
- **KRISTA LONG** – Project Engineer

WORKING GROUP

- **RYAN HATTEN** – Paragon Sanitation, Inc.
- **KELLY MCREYNOLDS** – Green Quest Recycling, LLC
- **BRITTNEY ALBIN** – Lincoln Public Schools
- **JANE RAYBOULD** – B & R Stores, Inc.
- *** ADAM PROCHASKA** – O'Neill, Heinrich, Damkroger, Bergmeyer & Shultz, P.C., L.L.O.
- **RICK VEST** – District 5 Commissioner
- **KELLY OELKE** – City of Hickman
- *** PAUL JOHNSON** – Watts and Hershberger, PC
- **NATALIE UMPHLETT** – University of Nebraska - Lincoln
- **DENNY VAN HORN** – Home Builders Association of Lincoln
- **KATHY SIEFKEN** – Nebraska Grocery Industry Association, Inc.
- **SANDY IRELAND** – Lincoln Federal Savings Bank
- **ZAIN SALEH** – Malone Community Center

* Co-Chairs

Updated 9/22/2020

Attachment B

2020 Needs Assessment

Solid Waste Management Plan 2040
for Lincoln and Lancaster County

Evaluate | Update | Elevate

2020 Update

Needs Assessment

SCS ENGINEERS

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1.0 INTRODUCTION

The Solid Waste Plan 2040 was published in November 2013 following a nearly two-year solid waste planning effort. That planning process included a comprehensive Needs Assessment that would be considered "typical" of a strategic planning process that produced a 20-year plan. The Needs Assessment for the Solid Waste Plan 2040 included:

1) An inventory existing solid waste practices and projection of future needs,
2) An evaluation of solid waste management programs and alternatives,
3) Identification of strategy options/alternatives for further evaluation, and
4) Implementation schedule for recommendations.

The City is currently updating the Solid Waste Plan 2040, which requires an updated Needs Assessment (2020 Needs Assessment). However, the 2020 Needs Assessment is an abbreviated process as it focuses on the actions, facilities, policies, and programs required to continue progressing the Preferred Paths identified in the Solid Waste Plan 2040 for the next five years.

The 2020 Needs Assessment addresses:

1) Population and waste composition changes in the Planning Area;
2) The status of the Preferred Paths; and
3) The resources and strategies to progress Preferred Paths for the next five years.

2.0 BACKGROUND

Solid Waste Plan 2040 was prepared over an 18-month period between 2012 and 2013 as a guidance document, communication tool, and resource for policy decisions regarding solid waste management systems, facilities, and programs for the Planning Area. The Planning Area is the City of Lincoln (City) and Lancaster County (County)

2.1 TYPES OF WASTES MANAGED

The types of waste streams managed by the Solid Waste Plan 2040 include:

- Solid waste from residential sources;
- Solid waste from commercial (business, industrial, and institutional) sources;
- Construction and demolition waste (C&D);
- Other wastes, including:
    - Materials diverted from the landfill, such as reusable, recyclable and compostable waste,
    - Household hazardous waste (HHW),
    - Very Small Quantity Generator (VSQG) wastes, formerly known as Conditionally Exempt Small Quantity Generator (CESQG) wastes (small business wastes),
    - Special wastes (ex. petroleum-contaminated wastes, solvents, absorbents, filters, residues, hazardous or toxic chemical products); and
    - Wastes banned from disposal at the state level, such as used tires, household appliances, spent lead acid batteries, yard waste; and locally banned corrugated cardboard.

3.0 PLANNING AREA

As discussed, the Planning Area is Lancaster County in its entirety. However, because most of the population resides in Lincoln; the majority of the 2020 Needs Assessment focuses on the programs, systems and facilities available in Lincoln. Located in southeastern Nebraska about 50 miles west of the Missouri River, the County, like other surrounding counties, is primarily agricultural. The County has a large urbanized area, Lincoln, in its geographic center. Lancaster County covers a geographic area of approximately 847 square miles; Lincoln has corporate limits of approximately 80 square miles.

3.1 POPULATION

In 2019, the U.S. Census Bureau estimated that the total population of Lancaster County was 319,090. Lincoln is the second largest in the state of Nebraska, with a 2019 population estimate of 289,102 (91 percent of the population of Lancaster County). Table 1 lists the yearly population estimates of the Planning Area from 2010 through 2019.

Table 1. City of Lincoln and Lancaster County Population Estimates (as of August 2020)

Year	Lancaster County Total Population	Annual Percent Change	City of Lincoln Total Population	Annual Percent Change
2010	286,162	-	259,455	-
2011	289,914	1.31%	262,690	1.25%
2012	293,431	1.21%	265,861	1.21%
2013	297,109	1.25%	269,129	1.23%
2014	302,622	1.86%	274,128	1.86%
2015	306,096	1.15%	277,345	1.17%
2016	310,306	1.38%	281,339	1.44%
2017	313,772	1.12%	284,527	1.13%
2018	316,527	0.88%	286,930	0.84%
2019	319,090	0.81%	289,102	0.76%

Source: U.S. Bureau of the Census

The County and City have increased in population by 10 percent since 2010 (an average of 1.2 percent per year). Population projections for the next three decades for Lancaster County are shown in Table 2.

Table 2. Lancaster County Population Projections

Year	Total Population	Growth Rate
2020	320,670	12.40%
2030	360,558	12.40%
2040	399,519	10.80%
2050	439,258	9.90%

Source: "Lancaster County Population Projections: 2010 to 2050" prepared in May 2020 by the University of Nebraska at Omaha Center for Public Affairs Research.

3.2 EMPLOYMENT DATA

Based on the U.S. Bureau of Labor Statistics (BLS) Current Employment Statistics, there are a total of 186,200 non-farm jobs in the County as of August 2020. In 2010, there were 152,806 jobs in the County. Employment in the County has increased by 33,394 (approximately 18 percent) since 2010, which closely follows the increase in population. Table 3 summarizes employment in the City by various categories. As non-farm jobs continue to increase and the Planning Area becomes more urban, the total quantity and types of commercial waste required to be managed by the system will change.

Table 3. 2020 Lincoln Employment Data

Employment Category	2020
Mining, logging, & construction	10,100
Manufacturing	13,400
Trade, transportation, & utilities	32,900
Information	3,200
Financial activities	13,300
Professional and business services	21,100
Education and health services	30,100
Leisure and hospitality	17,700
Other services	6,700
Government	37,700
Total Non-Farm	***186,200***

Source: U.S. Bureau of Labor Statistics, Current Employment Statistics

3.3 WASTE COMPOSITION

Important in developing solid waste management plans is to understand the waste composition within a community. This is best determined through waste characterization studies. In 2007 and 2008, the Nebraska Department of Environmental and Energy (NDEE), formerly the Nebraska

Department of Environmental Quality (NDEQ), conducted a waste characterization study at the Bluff Road Landfill, which is the primary disposal facility for the Planning Area. The results of this waste characterization study were used in Solid Waste Plan 2040. Table 4 applies the results of the 2008 characterization study to the quantity of municipal solid waste (MSW) disposed by the Planning Area in 2019, which was 299,958 tons.

Table 4. 2008 Bluff Road Landfill Waste Characterization Study Data Applied to 2019 Disposal Tonnages

Material Category	Percent of Total	2019 Tonnage
Paper	44.1%	132,311
Plastics	19.5%	58,402
Glass	4.2%	12,538
Metals	3.2%	9,599
Other Waste	29.0%	87,078
Total Sample	**100.0%**	**299,958**

3.4 PREFERRED PATHS

As discussed, the Solid Waste Plan 2040 included an assessment of current and 20-year needs for managing the solid waste generated in the Planning Area. This needs assessment also established the baseline conditions for solid waste management in the Planning Area. The combination of this needs assessment and input from the public and an advisory committee served as the foundation for identifying the Solid Waste Plan 2040, Preferred Paths. These Preferred Paths include:

- Reduce the pounds per capita per year (p/c/y) rate of MSW disposed of in landfills to:
  - 1,940 p/c/y by 2018
  - 1,720 p/c/y by 2025
  - 1,510 p/c/y by 2040
- Expand programs that lead to greater source reduction.
- Expand the toxics reduction program and create a place to provide year round access.
- Maintain seasonal disposal ban on grass and leaves.
- Assure all City single-family and duplex dwellings have access to curbside recycling (residential).
- Assure all City multi-family dwellings, businesses, industries and institutions have access to recycling (commercial).
- Develop/support programs to reduce the quantities of construction and demolition (C&D) waste going to the City's disposal site(s).
- Develop/support programs to reduce the quantity of organics, especially food waste, going to the City's MSW disposal site.
- Pursue the development of waste conversion technologies as a part of a long-term strategy for energy recovery and resource conservation.
- Expand on City-owned property to the east of the currently permitted MSW disposal site.

- Expand the City's C&D disposal site.
- Develop a MSW transfer station if a feasibility study shows it can be cost effective.

The Lincoln Transportation and Utilities (LTU) Department and Lincoln - Lancaster County Health Department (LLCHD) are the primary entities for overseeing the implementation of the Preferred Paths. City and County governments, private waste haulers, residents, institutions, and local commercial businesses also play a vital role in the successful implementation of the Preferred Paths.

4.0 ASSESSMENT OF PREFERRED PATHS

4.1 DISPOSAL REDUCTION

Preferred Path: Decrease per capita disposal rate

Many communities establish recycling goals when preparing solid waste management plans. Recycling goals can serve as a metric for what communities diverted from the landfill through activities where tonnages are typically recorded, such as composting and recycling at full-scale facilities. However, they do not account for individuals or business that reduce or reuse waste.

Therefore, the Solid Waste Plan 2040 established a goal to reduce the amount of MSW disposed in landfills used by residents and businesses in the Planning Area. The specific goal is a reduction in the per capita disposal rate, measured as pounds per capita per year (p/c/y). The City derives the p/c/y disposal rate for a given year by taking the total quantity of MSW originating from the Planning Area and disposed in a landfill and dividing by the population of the Planning Area.

The Solid Waste Plan 2040 did not establish a p/c/y disposal goal for C&D waste. The generation and subsequent disposal of C&D can fluctuate significantly due to private sector activities and these wastes are often managed and/or recycled by private entities. Since the City has no means to quantify the generation/disposal of C&D, it was not possible to define a realistic goal.

In 2011, the MSW disposal per capita rate was 2,104 pounds p/c/y, and the Solid Waste Plan 2040 established the following goals:

- 1,940 p/c/y by 2018
- 1,720 p/c/y by 2025
- 1,510 p/c/y by 2040

Table 5 shows the total quantity of MSW disposed at the Bluff Road Landfill from the Planning Area, as well as MSW collected in Lincoln and exported for disposal in a landfill outside of Lancaster County.

Table 5. Per Capita Disposal Per Year

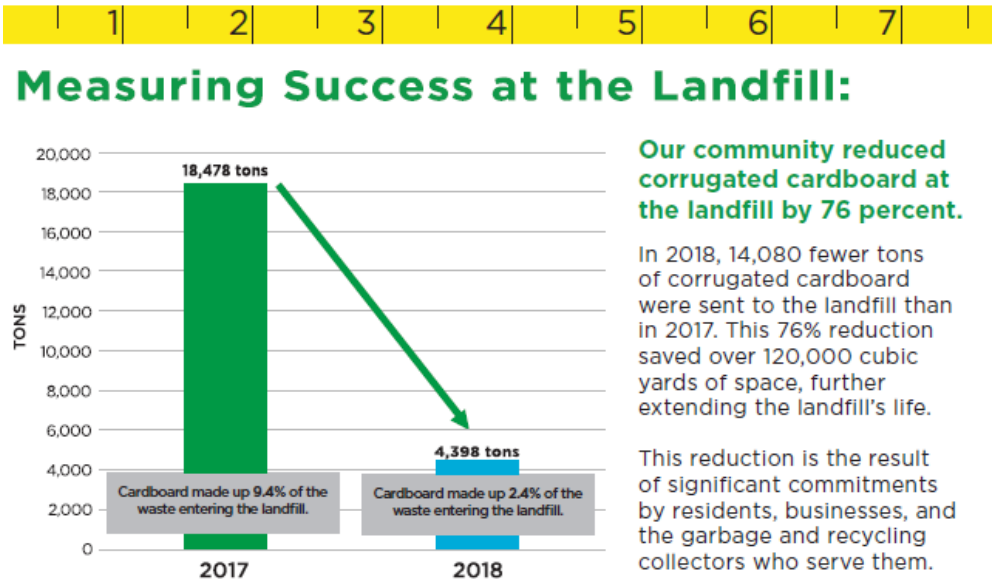
Year	Tons of MSW Disposed at Bluff Road Landfill	Tons of MSW Exported & Disposed Elsewhere	Total MSW Tonnage Sent to Disposal	Total Planning Area Population	Per Capita Disposal Rate (p/c/y)
2011	287,211	17,709	304,920	289,914	2,104
2012	282,380	22,088	304,468	293,431	2,075
2013	292,216	10,395	302,611	297,109	2,037
2014	284,152	13,439	297,591	302,622	1,967
2015	317,606	5,072	322,678	306,096	2,108
2016	343,222	42,698	385,920	310,306	2,487
2017	320,726	13,771	334,479	313,772	2,132
2018	309,983	19,254	329,237	316,527	2,080
2019	288,379	11,579	299,958	319,090	1,880

As shown in Table 5, there has been a 10 percent decrease in the p/c/y disposal rate between 2011 and 2019. Table 5 also shows that the per capita disposal rate in 2018 was higher than the goal by 140 pounds. However, in 2019 the per capita disposal rate decreased to 60 pounds below the 2018 goal.

A significant contributor to reducing the p/c/y disposal rate was the ban on corrugated cardboard from landfill disposal. Following the completion of the Solid Waste Plan 2040, the City established a working group to develop a strategy to decrease the amount of paper landfilled from the Planning Area. The working group evaluated strategies to divert all paper (i.e., newsprint, fiberboard and corrugated cardboard) from the landfill. The working group recommended a comprehensive ban on cardboard, paperboard, and newsprint, stacking the banned materials each consecutive year. Ultimately, only the disposal ban on corrugated cardboard was approved by the City Council, becoming effective April 1, 2018.

The City performed two waste characterization studies – one in the fall of 2017 and the other in the fall of 2018. The purpose of these waste characterization studies was to 1) provide a current waste composition for planning and decision-making purposes and 2) to evaluate the effectiveness of the corrugated cardboard ban. This study indicated a 7 percent reduction of corrugated cardboard disposed after the City enacted the 2018 disposal ban on corrugated cardboard. The corrugated cardboard reduction is illustrated in Figure 1 below and represents an approximate reduction of 90 p/c/y in disposal rate:

Figure 1. Corrugated Cardboard Disposal 2017 vs. 2018 (Pre and Post Disposal Ban)



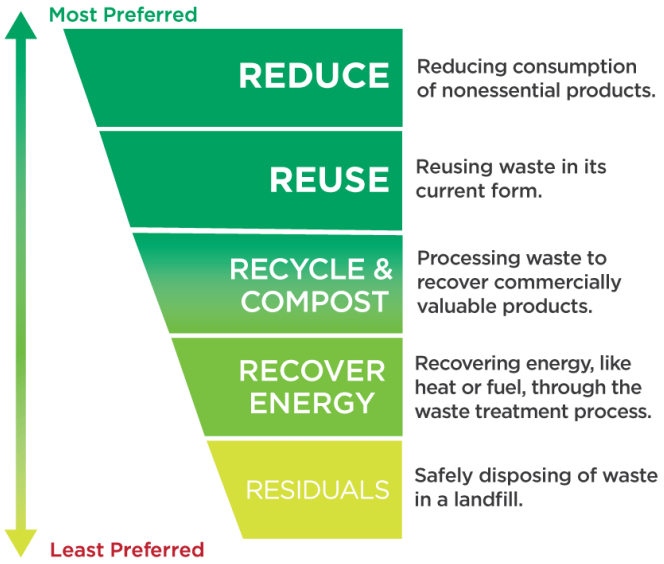
As part of the Solid Waste Plan 2040 update, the future per capita disposal rate goals should be reevaluated and adjusted if warranted. Additionally, the City should identify whether there are certain Preferred Paths to target in order to help achieve those p/c/y disposal rate goals.

4.2 SOURCE REDUCTION

Preferred Path: Expand programs that lead to greater source reduction.

The City has put forth a significant effort into educating the public about waste reduction and reuse. As an example, in 2017 the City undertook a comprehensive residential and commercial recycling communication, education, engagement and behavior change initiative. This initiative lasted three years with an objective to increase recycling in the Planning Area and a focus on encouraging curbside recycling services and proper recycling practices. On the City's website, there is information on the benefits of reducing and reusing, and a list of businesses that accept and resell used items. The City has also established social media pages that promote reducing and reusing. Further, the City refocused the Recycling Coordinator role to Waste Diversion Coordinator in 2019, and began promoting the Integrated Waste Management Hierarchy, shown in Figure 2.

Figure 2. Integrated Waste Management Hierarchy, City of Lincoln, Nebraska



In addition to City efforts, during fiscal year 2015-2016, LLCHD implemented "Poisons to Pollution: The Environmental Problem and Solutions Game," which they began making available to Planning Area schools and youth groups. LLCHD continues to develop education and outreach to help citizens make safer choices with purchasing and the disposal of hazardous and toxic products including, but not limited to, pesticides, oil-based paint, leftover fuel, mercury-containing items (lamps, thermometers), household cleaners and automotive chemicals.

4.3 TOXICS REDUCTION

Preferred Path: Expand the Toxics Reduction program and create a place to provide year round access.

LLCHD coordinates programs for toxics reduction/hazardous waste management for households and small businesses. Funding support for these programs is provided in part through grants from NDEE

and the Nebraska Environmental Trust (NET). Prior to 2017, these programs included an annual series of mobile waste collection events to collect HHW and hazardous wastes from Very Small Quantity Generators (VSQG). The City also has accepted used oil and lead acid batteries at its North 48th Street Solid Waste Management Facility from residents.

From 2014 to 2017, the City hosted mobile collection events (up to 9 per year) where 9,095 participants delivered 100,000 pounds of HHW. Table 6 presents an annual breakdown of this data.

Table 6. HHW Mobile Collection Events prior to 2018 (prior to LHWC)

Year	Number of Participants	Annual HHW Received (Pounds)
2014	2,384	72,000
2015	2,357	76,000
2016	2,659	92,000
2017	1,695	62,000

On August 24, 2017, the HAZTOGO, Lincoln Hazardous Waste Center (LHWC) was officially opened to the public for year-round collection of HHW at a permanent facility. Within the first two years of the opening of the LHWC, there were 2,536 participants and 104,000 pounds of HHW received (Table 7). The City continued providing mobile collection events as well following the open of the LHWC. Table 8 shows 2,760 participants delivered a combined total of 98,000 pounds of HHW to the mobile events since the LHWC opened in 2017.

Table 7. LHWC Receipts

Year	Number of Participants	Annual HHW Received (Pounds)
2018	817	54,000
2019	1,719	50,000

Table 8.
HHW Mobile Collection Events

Year	Number of Participants	HHW Received (Pounds)
2018	1,712	52,000
2019	1,048	46,000

As mentioned above, the City also provides for VSQG hazardous waste collection. A total of 110,000 pounds have been collected from 2014 to 2019 with an average participation from about 50 businesses per year. A breakdown of this data is shown in Table 9.

Table 9. VSQG Collections

Year	Number of Participating Businesses	Annual Waste Received (Pounds)
2014	56	18,000
2015	48	10,000
2016	50	18,000
2017	51	16,000
2018	55	22,000
2019	67	26,000

The establishment of the LHWC fulfilled the need for a year-round public place for HHW and VSQG hazardous waste management. Currently, the LHWC operates Wednesdays, with no appointment necessary, and every third Saturday, by appointment only. As the facility matures and funding becomes available, the implementation of additional open-to-the-public hours would be more convenient for citizens, and would likely elicit more participation in the program.

An additional opportunity to reduce toxics would be to establish a facility where collected materials could be offered to residents and businesses for reuse. Communities often refer to these facilities as “re-stores.” Re-stores can reduce the amount of toxic materials residents and businesses purchase resulting in overall source reduction. Re-stores typically do not charge for items because “giving them away” reduces the costs to manage HHW, which can often be several hundred dollars a ton. It is understood that the LLCHD did apply to the Nebraska Environmental Trust for grant funding in 2021 to complete a planning study for a re-store at the LHWC and implementation of a program such as this would be based on available grant funding.

As shown in Table 8, over one thousand residents delivered HHW to the mobile collection events. To provide more opportunity for these residents to divert HHW, a second permanent hazardous waste collection facility could be considered and evaluated.

Also, electronic waste (E-waste) is a growing part of the waste stream. Options to divert E-waste from the landfill include evaluating the feasibility of accepting these materials, or promoting private companies/retail outlets that accept these materials for reuse or recycling.

Finally, 0.7 percent of the landfilled waste stream in 2018 was HHW, which equates to 2,100 tons of HHW landfilled (based on a total of approximately 300,000 tons of waste landfilled in 2019). Comparatively, only 61 tons of HHW was recovered in 2019 through the three programs mentioned above (LHWC, HHW Mobile Collection Events, and VSQG Collections). Although the ability to expand toxics reduction is directly linked to funding, it is apparent there is still an opportunity to increase participation in the toxics reduction program.

4.4 YARD WASTE

Preferred Path: Maintain status quo (seasonal ban).

Nebraska statutes ban yard waste from disposal in landfills from April 1 until December 1 of each year, with exceptions for landfills that have an active gas collection system and beneficial use of the collected gas. Although the City's Bluff Road Landfill meets the requirements for this exemption, the City has chosen to not request it and therefore bans yard waste from disposal between April 1 and November 30.

Seasonal yard waste bans require separate collection and management systems to serve individuals, institutions and businesses that choose to collect and "bag" their yard waste for off-site management. In response to Nebraska's seasonal yard waste ban, private waste haulers provide curbside collection of yard waste. The City constructed, in 1992, a large-scale (13 acre) commercial composting facility adjacent to the Bluff Road Landfill, and provided for separate material receiving at the City's North 48th Street Transfer Station site. Between April 1 and December 1, grass and leaves cannot be mixed with other waste for general MSW collection. Private waste haulers provide curbside collection of yard waste during these periods.

From the waste characterization study conducted at the Bluff Road Landfill in April of 2018, yard waste and other vegetative wastes (i.e. tree branches, plants) comprises 6 percent of disposed waste (by weight) or 18,000 tons. Thus, even with the ban, some yard waste is still mixed with MSW by residents in the Planning Area and disposed in the landfill.

4.5 ORGANIC WASTE DIVERSION (COMPOSTING)

Preferred Path: Develop/support programs to reduce the quantities of organics, especially food waste, going to the Bluff Road Landfill.

As discussed in Section 4.4, the City operates a 13-acre commercial composting facility. The compost facility processes segregated loads of yard waste delivered directly to the site, or delivered via transfer from the North 48th Street Transfer Station. The compost facility is accessible to private waste haulers, lawn maintenance and landscaping companies. The compost facility charges a fee to accept yard waste, which is structured based on the type of vehicle delivering material.

Small vehicles hauling lawn waste and brush must take it to the North 48th Street Transfer Station. From there, it is transferred to the compost facility by City staff. The compost facility operates year-round. Finished compost material is sold as a soil amendment, or can be obtained at no cost by residents if self-loaded at the North 48th Street facility.

This preferred path emphasizes food waste diversion. Data from a waste characterization study conducted at the Bluff Road Landfill in April of 2018 indicates food waste was the largest component of incoming landfill waste at 18 percent by weight. Currently, the compost facility does not accept food waste. However, the City is preparing a permit application for submission to the NDEE and is developing a food waste compost pilot project to assess the feasibility of a food waste composting program.

The program, if feasible, will target schools, restaurants, and industrial/institutional cafeterias to divert wastes from the landfill to the compost facility. In addition to the City efforts, several other entities have been working on food waste and organic diversion programs and the City continues to partner with and/or assist these entities in their programmatic efforts. Examples include University of Nebraska Lincoln, Lincoln Public Schools, Uribe Refuse Services, Big Red Worms, and others with projects focusing on composting, anaerobic digestion, and other related diversion techniques. Additionally, several businesses divert large quantities of wood waste for landscaping uses or for animal bedding.

4.6 RESIDENTIAL RECYCLING AND DIVERSION

Preferred Path: Residential curbside recycling to be provided to all single family and duplex dwellings throughout the City.

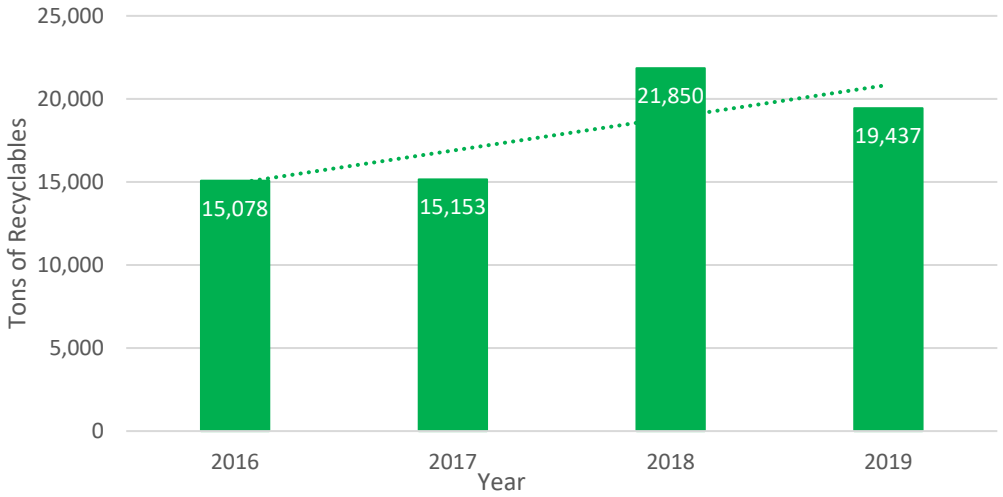
4.6.1 Curbside Recycling

Solid waste and recyclables collection in the Planning Area is primarily performed by approximately 25 independent, licensed waste haulers in an open-competitive collection system. Independent waste haulers generally provide a varying menu of services to residents and businesses. The Lincoln Municipal Code (LMC) requires all residences to remove putrescible waste from the property at least weekly and most accomplish this through the use of licensed haulers. However, if a residential property owner / occupant elects to self-transport their waste, they may do so without being a licensed hauler. Self-transported waste would be delivered to the transfer station located at the North 48th Street Solid Waste Management Facility.

On January 30, 2017, the City Council passed an ordinance requiring each licensed waste hauler to offer curbside recycling services to all residential and commercial customers (LMC 8.32.115). Recyclable materials, as defined by the Lincoln Municipal Code 8.32.010, include aluminum cans, steel (tin) cans, plastic containers #1 through #7, newsprint, recyclable paper, and recyclable cardboard. Plastic bags and foam polystyrene packaging are excluded from the definition of recyclable materials.

Each licensed waste hauler must notify their customers of the availability of curbside recycling services at least two times per calendar year. At a minimum, recycling services shall include collection and removal of all recyclables at least once per week (LMC 8.32.115). Residents and businesses have the option to subscribe to the recycling service but their participation is not required. Figures 3 and 4 show recycling trends within the Planning Area, according to data provided by licensed recyclables collectors.

Figure 3. Total Single Stream Recycled



As seen in Figure 3, the amount of recyclables collected has generally increased over the past four years. A sharp increase in recyclables was seen in 2018, following the ordinance requiring recycling services to be offered as well as implementation of the corrugated cardboard disposal ban which became effective April 1, 2018. A similar trend can be observed in Figure 4, which shows the annual number of curbside recycling customers.

Figure 4. Curbside Recycling Subscriptions

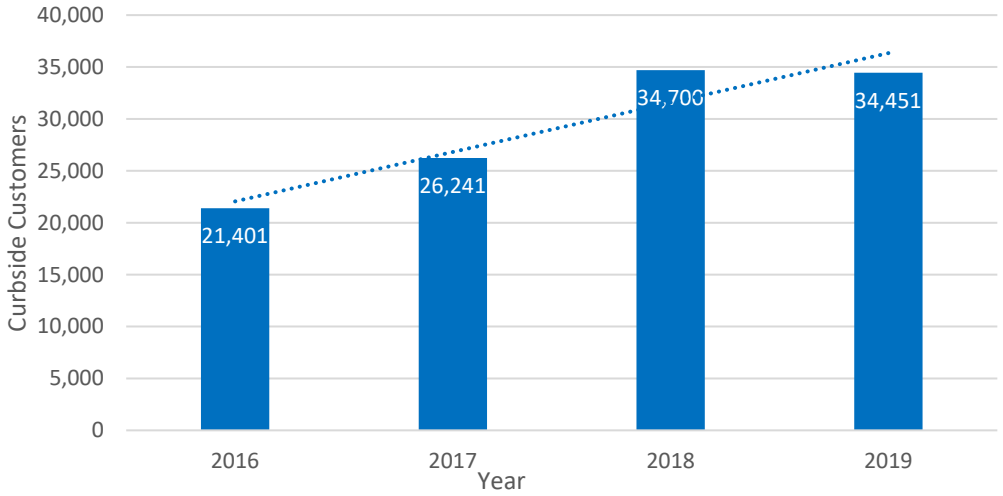


Figure 4 shows 34,451 subscriptions for curbside recycling in 2019, which represents a nearly 40 percent participation rate increase over 2016 subscriptions. Encouraging more households to subscribe to curbside collection of recyclables would possibly decrease the per capita disposal rate.

The facilities that process recyclables are called material recovery facilities (MRFs), and operators of MRFs have generally become increasingly stringent about haulers delivering loads of recyclables containing trash. Some MRF operators charge the haulers high penalties or even reject loads, and haulers naturally pass these costs onto their recycling customers. Nationally, about 20 to 25 percent of what U.S. citizens put in their recycling bin is trash. However, the percentage of trash in Lincoln recycling bins has not been measured. A waste characterization study of curbside recyclables collected in Lincoln could be beneficial, as it would establish a baseline metric for the contamination rate, types of contaminants in Lincoln's curbside recyclables, and overall composition of the recycled materials.

Currently in the City, the monthly fee for a household to participate in the curbside recycling ranges from approximately $10 to $15 per month. If the cost of recycling increases as a result of more stringent requirements from the MRFs or end use markets for the materials processed, participation could decrease. Thus, there is a continued need to educate residents on what can and cannot be recycled (Recycle Right campaign).

Finally, the City may want to partner with the private sector to target elimination of certain materials currently considered as "recyclables" that private haulers collect; especially Plastics #3 through #7. Haulers are likely paying the MRF a premium to accept and process these plastic grades; this is a cost they either currently or eventually will pass onto customers. Targeting certain types of materials haulers collect would require extensive public education, so this would require careful consideration.

4.6.2 Recyclables Collection Sites

As of 2012 when the Solid Waste Plan 2040 effort commenced, there were 29 multi-material recyclables collection sites and four newspaper-only recyclables collection sites in the Planning Area. The City assumed these programs from the private sector in the 1970s. In 2019, there were 19 recyclables collection sites in the City and 9 in the County. Managing this many facilities hosted primarily thru private property owners was a financial and logistical challenge for the City (and its contractors). In addition, the City encountered challenges monitoring this many sites and they often became dumping sites for non-recyclable materials. Total tonnage of materials collected and recycled from the recyclables collection sites since the prior planning effort are shown in Table 10.

Table 10. Recyclables Collection Sites Receipts (TPY)

Year	Total Tons
2013	5,460
2014	5,273
2015	4,879
2016	4,909
2017	5,213
2018	5,992
2019	7,076

As shown in Table 10, a total of 38,802 tons of recyclables were collected in the seven year period since 2013 from sites managed by the City with a spike in 2018 following the corrugated cardboard disposal ban.

The City is currently implementing a consolidation plan to reduce the number of recyclables collection sites in Lincoln and to halt City-provided service to the recyclables collection sites located in the villages/cities in the county. Several of the villages/cities have elected to continue providing the recyclables collection sites on their own and the City is providing transition support. Today, a total of 11 City sites are operating and consolidation will continue into summer 2021 at which time there will be four or five larger sites (intended to be located in each geographical quadrant of the city). The implemented plan will increase efficiency and reduce operational costs for the program. The consolidation of the recyclables collection sites is predicted to reduce the amount of recyclables collected by the City and an increase in curbside subscriptions may occur, but cannot be assumed without additional influences.

The City will need to continue to adapt to programmatic challenges in the coming years as the program evolves to address recyclable markets (i.e. volatility), processing costs, illegal dumping, and labor demands and shortages surrounding recyclables collection and processing.

4.7 COMMERCIAL RECYCLING AND DIVERSION

Preferred Path: Commercial recycling to be provided to multi-family dwellings, businesses, industries and institutions.

Historically, commercial recycling services for source-separated office paper, corrugated cardboard, and other recyclables was provided by private recyclers. Some larger commercial waste haulers have provided separate corrugated cardboard recycling containers at some select retail locations. At the time of the 2012 Needs Assessment, some waste haulers began expanding their waste collection services to include both residential and commercial customers. This resulted in more recycling services available for commercial recycling. Commercial recycling programs are funded by program users through subscription fees and revenue derived from the collected materials.

Previously, private recycling collectors were not required to report any information regarding their service areas, types of services provided, type and quantity of material diverted/recycled, or the number of customers they serviced. However, on January 30, 2017, the City Council voted to modify the Lincoln Municipal Code 8.32.139 to require each recycling collector and waste hauler collecting recyclables to complete and submit an annual report. At a minimum, the reports should include the following: number of recycling customers, types of materials collected, total weight of recyclables collected, total weight by material if applicable, and the location(s) where recyclables were delivered.

Additionally, as previously discussed, an ordinance passed in January of 2017 requires each licensed waste hauler to offer recycling services to all residential and commercial customers (Lincoln Municipal Code 8.32.115). Commercial customers have the option to subscribe to recycling service and following the corrugated cardboard disposal ban in 2018, it has been reported anecdotally that many have subscribed to recycling service.

LTU offers technical assistance upon request to evaluate the economic impacts of diverting recyclables from disposal containers. Guidance documents on commercial recycling are available on the City's website.

A unique program offered by the City is the appliance de-manufacturing facility. Residents and businesses can surrender appliances at the North 48th Street Facility or the Bluff Road Facility. City staff remove Freon, mercury switches and PCB (polychlorinated biphenyl) capacitators and self-haul the appliances to Alter Scrap Metal. Additionally, customers using the transfer station are requested to remove metal materials from their loads. The City then self-hauls these metals to Alter Scrap

Metal for recycling. Since 2006, 3,165 tons of appliances have been processed through this facility, valuing over $325,700 in scrap metal.

The City also provides for commercial recycling at City, County, and Public Building Commission locations in the Planning Area. Examples include libraries, fire stations, County engineering and extension offices, LTU Division offices, public parks and pools, and similar government owned and operated facilities.

To enhance commercial recycling and diversion, the City should continue to provide educational information and continue to support private initiatives to increase participation. As the Planning Area continues to become more urban and less rural diversion at the commercial level will be necessary to continue to meet the p/c/y disposal rate goals set forth.

4.8 C&D MATERIALS LANDFILL DIVERSION

Preferred Path: Develop/support programs to reduce the quantities of construction and demolition waste going to the City's disposal site(s).

C&D waste consists of building rubbish and construction debris. C&D waste is typically hauled by the C&D companies' specialty firms, trucking companies, or small businesses and residents who generate their own C&D waste. C&D can be disposed at the City's C&D Landfill which is located at the North 48th Street Solid Waste Management Facility.

C&D can also be hauled to recycling and processing facilities. When delivered to these facilities, C&D is considered source separated, and is exempt from both licensing requirements for waste haulers and the Occupation Tax which is assessed on all refuse collected within the corporate limits of the City of Lincoln, or collected outside the corporate limits of the City of Lincoln and deposited in the Bluff Road Landfill. These activities are further exempt from reporting requirements regarding the type of services provided and type and quantity of material diverted/recycled.

Various processing facilities are located throughout the region which recover materials such as wood, metals, asphalt shingles, concrete, and asphalt. Continued support of these private entities will enable greater volumes of C&D waste generated in the Planning Area to be diverted away from landfill disposal.

C&D waste is accepted at both the Bluff Road Landfill and the North 48th Street C&D Landfill. In addition to the waste characterization study discussed in Section 3.3, the City performed a four-season visual waste characterization study of open-top vehicles disposing waste at the Bluff Road Landfill in 2018. Open-top vehicles commonly contain C&D waste. The purpose of this study was two-fold: 1) provide information on the quantities of cardboard being delivered to the landfill with consideration of the April 1, 2018 ban on corrugated cardboard and 2) provide information to develop strategies to reduce C&D wastes from landfill disposal. The compiled results of this study are provided in Table 11 standardized to 2019 tonnages.

Table 11. 2018 Bluff Road Landfill Waste Characterization Study - Open-Top Containers

Material Category	Percent of Total	Tons, Standardized to 2019
Wood	32%	95,987
Gypsum Board – Drywall	9%	26,996
Special Wastes	0%	0
Organics	5%	14,998
Other Waste	54%	161,977
Total Sample	**100.0%**	299,958

The study revealed that the main components of the open-top vehicle waste stream at the Bluff Road Landfill are wood (32 percent) and concrete, masonry, brick, & rock (13 percent) within the other category.

The Solid Waste Plan 2040 recommended that the City should collect additional data on C&D waste, recycling, and diversion rates. Without private sector data on C&D diversion, it is difficult to assess the status of diversion within the Planning Area. One modification made since 2013 was an ordinance in February 2017 (No. 20448) to include roof shingles and other roof coverings in the definition of Building Rubbish and Demolition Debris rather than MSW. This legislative change in definition allowed for significant diversion away from Bluff Road Landfill and provided for the beneficial use of the material to remediate the City's garbage dump that operated from the 1950s thru 1980s.

To increase the recovery of C&D, the City may want to inventory local companies that recovery C&D and distribute literature on these services to stores that sell building and home remodeling materials, as well as the C&D Landfill and Lincoln Building Codes Division.

4.9 WASTE CONVERSION TECHNOLOGIES

Preferred Path: Pursue the development of waste conversion technologies as a part of a long-term strategy for energy recovery and resource conservation.

Waste conversion technologies transform waste into energy, such as electricity, biogas and fuel. They can play a valuable role in an integrated waste management system as they reduce the amount of waste that requires landfill disposal by 60 to 90 percent. In the U.S., waste conversion facilities are mostly located on the east coast and in Florida, where landfill prices are high due to limited available land or inappropriate land for developing landfills (i.e. high real estate prices or sandy soils). These conditions do not exist in the Planning Area at this time. For these reasons, the City has not pursued developing waste conversion technologies in the Planning Area. However, the City has and will continue to monitor emerging waste conversion technologies, as deemed appropriate, as they are presented to the City from private sector entities (non-solicited proposals).

4.10 BIOREACTOR/BIO-STABILIZATION TECHNOLOGIES

Preferred Path: No further consideration is given to pursuing the development of a bioreactor/bio-stabilization technology.

Bioreactors require special approval by state and federal regulators, and then only as demonstration projects. For these reasons, no further consideration was given to pursuing the development of bioreactor or bio-stabilization technologies in the Solid Waste Plan 2040. No reconsideration has been given to this topic since the Plan.

4.11 MUNICIPAL SOLID WASTE DISPOSAL

Preferred Path: Expand on City-owned property to the east of the currently permitted site.

The Bluff Road Landfill is permitted and designated for disposal of MSW generated in the Planning Area. The Bluff Road Landfill began operations in 1988 and only accepts MSW generated from within the Planning Area. The site contains 350 acres, of which 171 acres are permitted as a disposal area (landfill). The 171 acres permitted for a landfill has an air space capacity of over 25.2 million cubic yards (excluding the liner system and final cover). Based on projections in the 2020 Volumetric Analysis, the remaining permitted air space capacity is approximately 8.94 million cubic yards (excluding final cover) of landfill volume. Recent waste acceptance rates are detailed below (Table 12).

Table 12. Bluff Road Landfill Waste Acceptance

Year	Waste Acceptance, tons	% Change
2015	328,548	-
2016	338,618	3.0%
2017	305,463	-10.9%
2018	306,266	0.3%
2019	300,311	-2.0%
	AVERAGE	-2.4%

Based on these waste receipts, the Bluff Road Landfill would be projected to close in 2035, rather than 2032 as predicted in 2012. If no waste growth occurs, the Bluff Road Landfill would be projected to close in 2037. Table 13 shows Permitted Site Life Remaining projections, as of 2020, which does assume a small increase in demand for landfill capacity in future years.

Table 13. Permitted Site Life at Bluff Road Landfill

Time Period	Waste Acceptance, tons	Remaining Airspace, CY	Remaining Airspace, %
2019	300,331	9,101,551	36%
2020	303,935	8,572,048	34%
2021	307,582	8,036,190	32%
2022	311,273	7,493,902	30%
2023	315,008	6,945,107	28%
2024	318,789	6,389,726	25%
2025	322,614	5,827,681	23%
2026	326,485	5,258,891	21%
2027	330,403	4,683,276	19%
2028	334,368	4,100,753	16%
2029	338,380	3,511,240	14%
2030	342,441	2,914,653	12%
2031	346,550	2,310,907	9%
2032	350,709	1,699,916	7%
2033	354,917	1,081,593	4%
2034	359,176	455,850	2%
2035	363,487	-177,402	-1%

Volumes shown are airspace available at the end of the year.

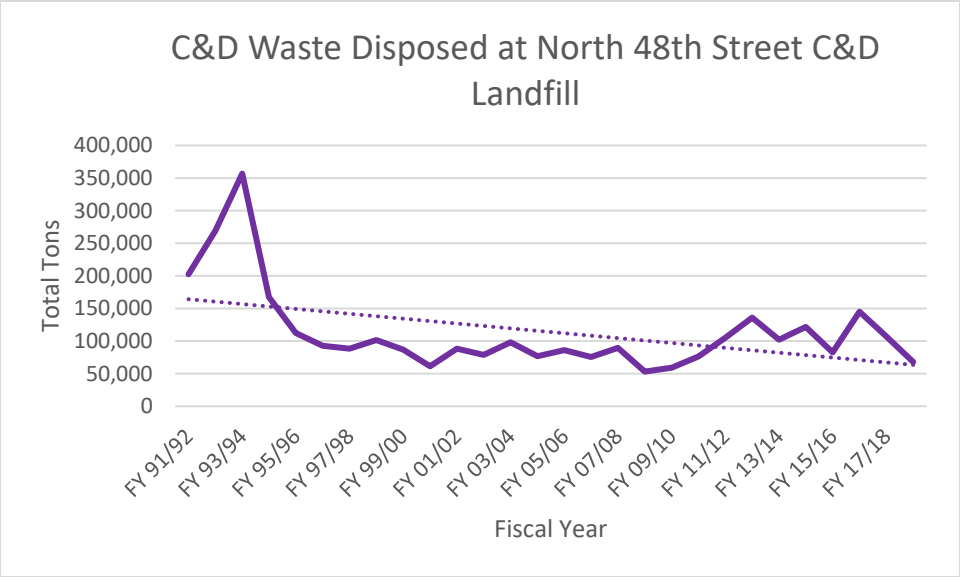
In 2018, the Lincoln City Council granted local siting approval for eastward expansion of the Bluff Road Landfill. Then, the NDEE approved a permit modification to include the east expansion area into the overall site permit. The City has since begun preparing a master plan for use of the east expansion area as a landfill. It is estimated that this expansion will provide an equivalent life to the current landfill which is approximately 45 years. Thus, it appears this Preferred Path does not need to be addressed during the Solid Waste Plan 2040 – 2020 Update.

4.12 C&D WASTE DISPOSAL

Preferred Path: Expand on City-owned property.

The North 48th Street C&D Landfill is strictly permitted for C&D waste. It is located above, and occupies a portion, of an area where MSW from Lincoln and Lancaster County was historically disposed, primarily from the 1950s to 1980s. Figure 5 shows annual C&D waste quantities accepted at the North 48th Street C&D Landfill.

Figure 5. North 48th Street C&D Landfill Acceptance



As shown in Figure 5, C&D waste accepted at the North 48th Street C&D Landfill has generally decreased over the past 30 years. However, since fiscal year 2011-2012, annual waste acceptance has increased by 50,000 tons on average compared to historic averages. The North 48th Street C&D Landfill was expanded from 102 acres to 141 acres during the 2018 NDEE Title 132 re-permitting effort, which will provide capacity until approximately 2046.

4.13 TRANSFER STATION AND PROCESSING FACILITIES

Preferred Path: Develop a municipal solid waste transfer station if a feasibility study shows it can be cost effective.

The City recently completed a feasibility for a City-owned and operated transfer station for MSW. This transfer station would be the City's second transfer station although, unlike the existing transfer station used for cars, pickups, trailers, and other small vehicles, this facility would be primarily used by professional/large-volume MSW haulers. In concept, as the City's geographic and waste centroids move south and further away from the Bluff Road Landfill, the transfer station would provide a more convenient and efficient location for the southern half of the Planning Area and would eliminate congestion on arterial roads and at the landfills. The study is in draft form and is currently under review by the City's LTU Division.

5.0 SUMMARY OF PROGRESS AND NEEDS

Significant changes to the solid waste management system have been implemented in Lincoln and Lancaster County since the completion of the Solid Waste Plan 2040 in 2013. These include building the year-round HHW collection facility (LHWC), passing the ordinance which requires curbside recycling to be offered to all residents and businesses, and banning corrugated cardboard from disposal in 2018. As a result of these efforts:

- More HHW is being collected and properly disposed,
- More citizens are recycling, keeping recyclables out of landfills,
- More cardboard is being recycled, rather than disposed.
- Lincoln and Lancaster County are taking steps toward a more sustainable future.

As the 2020 Update moves forward and resources and strategies to progress Preferred Paths for the next five years are contemplated, it will be important to evaluate these opportunities within the context of the guiding principles; which are:

1. Engage the community
2. Encourage public-private-partnerships
3. Ensure sufficient system capacity
4. Emphasize the waste management hierarchy
5. Embrace sustainable principles

Ultimately, this Needs Assessment is intended to guide the Working Group and to arrive at a Solid Waste Plan 2040 – 2020 Update that continues to move the Planning Area on the path to reducing the pounds per capita per year (p/c/y) disposal rate.

Attachment C

Implementation Considerations White Paper

Solid Waste Management Plan 2040
for Lincoln and Lancaster County

Evaluate | Update | Elevate

2020 Update

Implementation Considerations

SCS ENGINEERS

27220087.00 | November 2020

14755 Grover Street
Omaha, NE 68144
402-884-6202

CITY OF LINCOLN NEBRASKA

LTU CITY OF LINCOLN TRANSPORTATION AND UTILITIES

LINCOLN LANCASTER COUNTY HEALTH DEPARTMENT

SCS ENGINEERS

INTRODUCTION

The Solid Waste Plan 2040 was published in November 2013 following a nearly two-year solid waste planning effort. The Solid Waste Plan 2040 identified 13 Preferred Paths that are intended to manage the waste streams generated in the Planning Area:

1. **Disposal Reduction**
2. **Source Reduction**
3. **Toxics Reduction**
4. **Yard Waste**
5. **Organics Waste Diversion (Composting)**
6. **Residential Recycling and Diversion**
7. **Commercial Recycling and Diversion**
8. **C&D Materials Landfill Diversion**
9. Waste Conversion Technologies
10. Bioreactor/Bio-Stabilization Technologies
11. Municipal Solid Waste Disposal Capacity
12. C&D Waste Disposal Capacity
13. **Transfer Station and Processing Facilities**

Paths not bolded do not require additional effort at this time.

Based on the goal of this 2020 Update, discussions with the Working Group, and planning for Work Session 3, it has been decided these 13 paths remain sufficient. However, the City has a strong desire to continue decreasing dependency on landfills. Thus, the City is seeking input from the Working Group on strategies to achieve this goal. Input from the Working Group needs to be discussed and evaluated in light of the following implementation considerations.

WASTE REDUCTION/DIVERSION:

- Contribution toward source reduction and/or recycling goals
- Available markets for recovered materials or energy
- Minimize solid waste exportation
- Minimize landfill dependence

Waste reduction eliminates the need to collect, process, and dispose of waste. Diverting waste from landfills includes waste reduction, but also includes such measures as reuse, recycling, composting, and converting waste to energy and these activities can require collection and processing. Either can achieve landfill diversion goals. Specific waste reduction/diversion considerations include:

Contribution toward source reduction and/or landfill diversion goals

- Does the strategy encourage reduction of waste from the producer, distributor, or consumer?
- Does the strategy encourage consumer behavior changes that result in reduced waste generation?
- Does the strategy increase landfill diversion?
- What percent of the disposed waste stream does the strategy divert?
- Can the strategy results be quantified?

Available markets for recovered materials or energy

- The benefits of reusing, recycling, composting or converting waste to energy are negated if no market is available.
- Consideration must be given to the proximity of the end user of diverted materials, as much of the cost of diversion is associated with transportation.
- What is the holistic environmental impact of the technology including air emissions, wastewater discharges, water usage, and greenhouse gas (GHG) emissions?

Minimize solid waste transportation

- Does it promote self-reliance, or does it require dependency on entities outside of the County?
- Are end-users available in-state?
- What are the total lifecycle impact on GHG emissions?

Minimize landfill dependence

- Landfills have an expected lifespan; that lifespan is based upon disposal volumes, permitted land area, and landfill design.
- Reducing disposal volumes at the landfill will increase its life expectancy.
- Does the strategy reduce disposal rates at the landfill?

TECHNICAL REQUIREMENTS:

- Capacity requirements (new and existing)
- Compatibility to other program elements
- Level of risk and uncertainty
- Performance reliability and redundancy options
- Effective, compatible and flexible options

Technical considerations for solid waste management strategies include:

Capacity requirements (existing and future)

- Is there sufficient capacity in existing infrastructure or programs to support the strategy?
- What capacity will be needed to serve the target population and quantities?

Compatibility to other program elements

- Does the strategy interfere with existing programs?
- Would it require significant change to existing programs?
- How does it complement existing programs?
- Is the outcome already being achieved through existing programs?

Level of risk and uncertainty

- Do risk/reward adequately balance?
- Has the strategy been successfully implemented before?
- Can the risk be mitigated?
- What is available to increase the reward?

Performance reliability and redundancy options

- Is the strategy reliable?
- If applicable, are feedstock sources reliable?
- What has the potential to impact reliability?
- Can the strategy be easily repeated?
- If the system is down, can it be replaced with alternate, available systems?

Effective, compatible and flexible options

- Is the strategy flexible enough to adapt to changing market, environmental, economic or regulatory conditions?
- Does the strategy create materials that are in demand by end-use markets?
- Is the strategy compatible with other programs, plans, or infrastructure already in place?

ENVIRONMENTAL IMPACTS:

- Conservation of resources (materials and energy)
- Air emissions
- Water quality impacts
- Toxicity reduction
- Health and safety

Solid waste management strategies should aim to minimize negative environmental impact, including those to air, water, soil, energy, wildlife, and land.

Conservation of resources (materials and energy)

- Conservation of resources serves to sustain the *integrity* and *supply* of resources for generations to come.
- Does the strategy foster conservation of one or more natural resources?
- How are natural resources affected, either positively or negatively, by the strategy?
- In what ways could the strategy be altered to better preserve natural resources?

Air emissions

- U.S. EPA defines criteria pollutants as ground-level ozone, particulate matter, carbon monoxide, lead, sulfur dioxide, and nitrogen dioxide.
- GHGs, which include carbon dioxide, methane, nitrous oxide, and fluorinated gases, trap heat in the atmosphere.
- Does the strategy minimize GHG and criteria pollutant air emissions?
- How do potential air emissions from the strategy compare to alternative strategies?
- What air regulations and permits are applicable/required for implementation of the strategy?

Water quality impacts

- Is there a potential for groundwater or surface water contamination from the strategy?
- How can water pollution be minimized?

Toxicity reduction

- Will the strategy avoid the disposal of toxics in landfills, sewers and waterways?
- Are toxics usage and toxic waste generation reduced?
- If landfilled, does the landfill adequately protect human health and the environment from the toxics?

Health and safety

- Does the strategy protect the health of citizens?
- What safety measures must be put in place to protect stakeholders?

ECONOMIC IMPACTS:

- Capital investment
- Cost to residents and businesses
- Funding mechanisms
- Economic development potential

Solid waste management strategies must be viable given economic conditions and potential impact to budgets and rate payers. Specific economic impact considerations include:

Capital investment

- Is significant upfront and ongoing capital investment required to implement the strategy?
- What is the potential return on investment?
- Will the City or other entities need to finance the capital costs?

Cost to residents and businesses

- Is the strategy reliant on funding from residents and businesses?
- What is the potential increase or decrease in cost of services to residents and businesses?
- If there is an additional cost required of stakeholders to participate in the strategy, is it reasonable enough to gain adequate participation?

Funding mechanisms

- How will and how long will it take to secure funds to implement the strategy?
- What kind of process would be required to generate funds?
- What is the certainty of available funds?

Economic development potential

- Does the strategy create jobs?
- Does the strategy support local businesses?
- How could local businesses be engaged in the strategy?

IMPLEMENTATION VIABILITY:

- Legislative and regulatory changes
- Public acceptability
- Responsible parties
- Land requirements and siting considerations
- Permitting requirements
- Timeline factors

There are many logistical steps required to implement solid waste management strategies. Specific logistical considerations include:

Legislative and regulatory changes

- Would new legislation or regulations be required for implementation of the strategy? At what level (local, state, federal)?
- Does the strategy require changes to existing legislation or regulations?

Public acceptability

- Public is defined as Planning Area residents, businesses and officials.
- Will the strategy equally impact the public?
- Will the public accept the strategy?
- Will the strategy generate concerns amongst the public?

Responsible parties

- Who would be responsible for implementing the strategy?
- What kind of ongoing responsibilities would be required of the strategy and is funding available?

Land requirements and siting considerations

- Approximately how much land would the strategy need for implementation?
- What type of land (i.e., zoning, greenfield, brownfield, etc.) would be best suited for the strategy?
- Is the type/quantity of land desired available within the Planning Area?

Permitting requirements

- What permits would be required for implementation of the strategy?
- Would the permitting process result in public opposition?

Timeline factors

- What would the implementation schedule look like?
- What potential scheduling conflicts could arise?

Attachment D

Summary of Session 3 Takeaways

SESSION 3 TAKEAWAYS FOR PREFERRED PATHS

Session 3 was broken into two, three-hour work sessions. The first session took place November 13, 2020 and covered Residential Recycling and Diversion, Source Reduction and Toxics Reduction, and Yard Waste and Organic Waste Diversion. The second session took place December 15, 2020 and covered C&D Materials Diversion, Commercial Recycling and Diversion, and Transfer Station and Household Hazardous Waste (infrastructure).

During each session, the preferred paths were discussed within the context of implementation considerations (waste reduction/diversion, environmental impacts, implementation viability, economic impacts, and technical requirements). The goal was to seek ideas and input from the Working Group members on how the City can move forward in the next 5 years (5-year update) toward landfill diversion goals and overall reduction of waste specific to the preferred paths considered (note – some were not selected for review, i.e. Waste Conversion Technologies). To be coordinated with the 5-year update, consideration will also be taken to harmonize the Solid Waste Management Plan (SWMP) Update with the recently published draft Climate Action Plan (CAP).

The following sections provide key takeaways from the Working Group discussions that could be implemented, in light of the implementation considerations, during the next 5-year period. These key takeaways will be further refined as the Working Group's input is more formally reviewed, organized, and consolidated for inclusion in the SWMP Update. However, they are being provided at a high-level in this summary document for initial review by LTU as discussions related to the CAP are taking place and, more specifically, discussions regarding CAP strategies and key initiatives that can be taken in the next 0-6 years.

IMPLEMENTATION CONSIDERATIONS

DISPOSAL REDUCTION

Preferred Path: Decrease per capita disposal rate

Remains the primary objective and metric of the SWMP Update with pounds per capita per year disposed (tonnage MSW disposed in landfills divided by current population of Lancaster County). Support remains for a disposal goal (vs. diversion goal) amongst the Working Group. Ideas which could be considered in the 5-year planning period were:

- Reduce the goal number (greater reduction) in the 5-year update.

SOURCE REDUCTION

Preferred Path: Expand programs that lead to greater source reduction.

The City has put forth a significant effort into educating the public about waste reduction and reuse and there is strong consensus support amongst the Working Group for the City to continue these efforts. Ideas which could be considered in the 5-year planning period were:

- Develop a City-owned and operated or partner with the private sector to develop a "hard to manage items" recycling program.
- Increase the City's educational role to encourage the waste hierarchy – don't generate waste in the first place.
- Establish City initiatives which lead by example in their business practices:
    - Business practices
    - Purchase policies
    - Construction practices

TOXICS REDUCTION

Preferred Path: Expand the Toxics Reduction program and create a place to provide year round access.

Continue to build on the success of the HazToGo Facility. Ideas which could be considered in the 5-year planning period were:

- More aggressively advertise and market the HazToGo Facility (both to residents and small businesses).
- Expand hours for HazToGo Facility.
- Implement a ReUse store within HazToGo Facility; preferably with grant funding support.
- Increase City's educational role to encourage reduction of toxics usage and proper toxics disposal.

YARD WASTE

Preferred Path: Maintain status quo (seasonal ban).

Support remains for source-separated yard waste collection during the seasonal ban. Although NDEE regulations would allow landfilling, based on the presence of a landfill gas-to-energy system at the landfill, no discussion occurred that would move away from the current system for landfill diversion and composting. Ideas which could be considered in the 5-year planning period were:

- Offer an end of season "free day" as a final push to divert and compost yard wastes

ORGANIC WASTE DIVERSION (COMPOSTING)

Preferred Path: Develop/support programs to reduce the quantities of organics, especially food waste, going to the Bluff Road Landfill.

Consensus support exists for the City to continue to provide and expand composting to include food scraps. Discussion occurred about private compost operations within the waste shed that provide some capacity (i.e. Big Red Worms, Prairieland) but again, the Working Group fully supported the City's role providing this service. Ideas which could be considered in the 5-year planning period were:

- Focus on commercial & industrial generators to divert source-separated food wastes
- City to play an educational role to encourage:
    - Waste hierarchy – don't generate in the first place
    - Household composting
    - Food recovery hierarchy (grocery / restaurants – food for humans, food for animals, compost or digester)
- Recognition program for commercial/industrial entities that implement organic waste diversion programs

There was little to no support for source-separated food waste collection at the residential level.

RESIDENTIAL RECYCLING AND DIVERSION

Preferred Path: Residential curbside recycling to be provided to all single family and duplex dwellings throughout the City.

Curbside Recycling

The Lincoln Municipal Code (LMC) requires all residences to remove putrescible waste from the property at least weekly and LMC requires independent licensed haulers to offer recycling service. Recycling service subscription is voluntary and participation rate is approximately 40%. Working Group is supportive of continued efforts to drive recycling and participation rates at the curb. Ideas which could be considered in the 5-year planning period were:

- Legislate curbside recycling – mandatory participation by homeowner or mandatory requirement that hauler bundles and provides as part of "basic" waste services (Could the City go further – organized, franchised collection?).
- Legislate mandatory recycling for multi-family residential (i.e. apartment complexes).
- City to play an educational role to:
    - Recycle right
    - Universal signage for curbside recycling carts (challenging due to multiple MRFs accepting different materials)

Recyclables Collection Sites

City's collection sites are being reduced in numbers and there was mixed reaction amongst the Working Group as to the effect this will have on landfill diversion (i.e. participation due to perceived inconvenience). That said, consensus support existed to continue to drive recycling to the curb

residentially and to expand participation in multi-family recycling. See bullets in prior subsection regarding legislative changes and following section for commercial / multi-family.

COMMERCIAL RECYCLING AND DIVERSION

Preferred Path: Commercial recycling to be provided to multi-family dwellings, businesses, industries and institutions.

With the exception of multi-family, there was no support for mandatory recycling for the business and commercial community. There was consensus support for the City to serve in an educational role. Ideas which could be considered in the 5-year planning period were:

- Legislate mandatory recycling for multi-family residential (i.e. apartment complexes).
- City develops award program and/or rebate program that incentivizes commercial recycling.
- The City organizes collection of multi-family and commercial recycling to divert more waste in a cost-effective manner.

C&D MATERIALS LANDFILL DIVERSION

Preferred Path: Develop/support programs to reduce the quantities of construction and demolition waste going to the City's disposal site(s).

Consensus of Working Group is that C&D diversion is a private sector matter with City role to be education, assistance, and continued disposal for that which isn't effectively separated and/or diverted. Ideas which could be considered in the 5-year planning period were:

- City partners with private organizations to provide training and workshops on benefit to source separated C&D recycling at the construction / point of generation site.
- City leads by example and adopts C&D diversion for their construction projects (similar to LPS).
- City continues to listen to and support private sector with interest in area of C&D diversion but remains a viable disposal option for the materials, as needed.
- City could create a center where multiple "hard to recycle" materials, including C&D, could be reused and recycled.

WASTE CONVERSION TECHNOLOGIES

Preferred Path: Pursue the development of waste conversion technologies as a part of a long-term strategy for energy recovery and resource conservation.

Not discussed or considered as part of the 5-year update.

BIOREACTOR/BIO-STABILIZATION TECHNOLOGIES

Preferred Path: No further consideration is given to pursuing the development of a bioreactor/bio-stabilization technology.

Not discussed or considered as part of the 5-year update.

MUNICIPAL SOLID WASTE DISPOSAL

Preferred Path: Expand on City-owned property to the east of the currently permitted site.

Not discussed or considered as part of the 5-year update.

C&D WASTE DISPOSAL

Preferred Path: Expand on City-owned property.

Not discussed or considered as part of the 5-year update.

TRANSFER STATION AND PROCESSING FACILITIES

Preferred Path: Develop a municipal solid waste transfer station if a feasibility study shows it can be cost effective.

Working Group was supportive of the South Transfer Station concept. Ideas which could be considered in the 5-year planning period were:

- Complete the Transfer Station Feasibility Study.
- Develop preliminary engineering concepts and site requirements.
- Identify and option, or purchase, land for Transfer Station.
- Consider City-owned, contractor-operated, public/private partnership.
- Detailed consideration for additional items / services to be co-located such as:
    - HHW Satellite
    - Hard to recycle items
    - Consumer recyclables collection site

Attachment E

Summary Matrix of Strategies and Implementation Considerations Alignment

Lincoln Strategy Matrix

Legend:

- ↑ Strategy is **somewhat aligned** with implementation consideration
- ↑↑ Strategy is **aligned** with implementation consideration
- ↑↑↑ Strategy is **very aligned** with implementation consideration
- -- Strategy is **neutral** (has both aligned and unaligned components OR has insignificant impact on the implementation consideration)
- ↓ Strategy is **somewhat unaligned** with implementation consideration
- ↓↓ Strategy is **unaligned** with implementation consideration
- ↓↓↓ Strategy is **very unaligned** with implementation consideration

	{ Implementation Considerations }				
	Waste Reduction/Diversion	**Technical Requirements**	**Environmental Impacts**	**Economic Impacts**	**Implementation Viability**
Source Reduction					
Develop "Hard to Manage Items" recycling facility	↑↑↑ - Will divert materials where there are currently limited recovery opportunities - Diversion can be quantified - End users available in state	↓ - No existing facility (capacity) - "Hard to recycle materials" facility examples in other communities - Challenging to readily change materials accepted - Long-term City commitment required	-- - Conserves resources - Limited impact on reducing air emissions / greenhouse gases, improving water quality, decreasing toxicity or protecting health/safety	↓ - Capital and operating expense - No secure source of funds - Could create jobs, but relatively low paying	↑↑ - Would not require legislative or regulatory changes - Socially and politically acceptable - Would not require permitting - Feasible to implement in 5 years - Would require land
Increase City's educational role to change consumer habits	-- - Would slightly contribute toward landfill diversion goals and minimize landfill dependence - Would not require markets for materials or energy - Would not require exportation of materials - Difficult to quantify	↑ - Changing consumer habits requires extensive advertising and marketing campaign - Program would be compatible with City goals - Messaging could be somewhat flexible	-- - Conserves resources - Limited impact on reducing air emissions / greenhouse gases, improving water quality, decreasing toxicity or protecting health/safety	↓↓ - Position funding (i.e. City FTE(s) or grant funded) - Advertising campaign could require significant funds to be effective - Funding not secured - No economic development potential - Would not increase costs significantly to residents and businesses - Would not require a capital investment	↑↑↑ - No legislative or regulatory changes - Socially and politically acceptable - No land, siting or permitting requirements - Could be implemented within 5 years
City to lead by example (Environmentally Preferred Purchasing)	-- - May have minimal contribution toward landfill diversion goals and minimizing landfill dependence - Would not require markets for materials or energy - Would not require exportation of materials - Difficult to quantify	-- - Changing city procurement policies will take time - Program would be compatible with City goals - Messaging could be somewhat flexible	-- - Conserves resources - Limited impact on reducing air emissions / greenhouse gases, improving water quality, decreasing toxicity or protecting health/safety	↑↑ - May not require new position or advertising campaign - No economic development potential - Would not increase costs significantly to residents and businesses - Would not require a capital investment	↑↑↑ - No legislative or regulatory changes - Socially and politically acceptable - No land, siting or permitting requirements - Could be implemented within 5 years
Toxics Reduction					
Increase marketing of HazToGo facility	↓↓↓ - Since HHW is less than1% of the waste stream, even 100% recovery would have limited impact on landfill diversion goals and minimize landfill dependence - Minimal impact on markets for recovered materials - Some material may end up at a hazardous waste landfill	↑↑↑ - Would require moderate advertising and marketing - Messaging could be somewhat flexible -Numerous examples from other communities -Able to quantify impact	↑↑↑ - Conserves resources - Improves water quality, health and safety - Reduces toxicity - Limited impact on reducing air emissions / greenhouse gases	-- - May not require new position - Marketing campaign could require significant funds to be effective - Would not increase costs significantly to residents and businesses - Would not require a capital investment	↑↑↑ - No legislative or regulatory changes - Socially and politically acceptable - No land, siting or permitting requirements - Could be implemented within 5 years
Expand hours of HazToGo facility	↓↓↓ - Since HHW is less than1% of the waste stream, even 100% recovery would have minimal impact on landfill diversion goals and minimize landfill dependence - Minimal local markets - Some material may end up at a hazardous waste landfill	↑↑↑ -Compatible with existing programs, low risk, reliable and flexible - Able to quantify impact	↑↑↑ - Conserves resources - Improves water quality, health and safety - Reduces toxicity - Limited impact on reducing air emissions / greenhouse gases	↓↓ - Additional operating expense - Could result in reduced funding for mobile HHW collection events	↑↑↑ - No legislative or regulatory changes - Socially and politically acceptable - No land, siting or permitting requirements - Could be implemented within 5 years
	↑	↓	↑↑↑	↓↓↓	↑↑↑

Lincoln Strategy Matrix	Legend: ↑ Strategy is **somewhat aligned** with implementation consideration ↑↑ Strategy is **aligned** with implementation consideration ↑↑↑ Strategy is **very aligned** with implementation consideration -- Strategy is **neutral** (has both aligned and unaligned components OR has insignificant impact on the implementation consideration) ↓ Strategy is **somewhat unaligned** with implementation consideration ↓↓ Strategy is **unaligned** with implementation consideration ↓↓↓ Strategy is **very unaligned** with implementation consideration				
	{ Implementation Considerations }				
	Waste Reduction/Diversion	**Technical Requirements**	**Environmental Impacts**	**Economic Impacts**	**Implementation Viability**
Implement ReUse store within HazToGo facility	'- Since HHW is less than1% of the waste stream, even 100% recovery would have minimal impact on landfill diversion goals and minimize landfill dependence - Reuse of HHW would not require exportation for landfill diversion - HHW would not end up at hazardous waste landfill	- Program would be compatible with City goals - Many existing examples in other cities -Uncertainty as to whether residents would want materials - Long-term, City commitment required	- Conserves resources - Improves water quality, health and safety - Reduces toxicity - Reduces air emissions / greenhouse gases if HHW is reused locally	- Will most likely a capital investment -Added operating expense - Funding source not secured - No economic impact potential - ReUse store may require a user fee	- No legislative or regulatory changes - Socially and politically acceptable - No land, siting or permitting requirements - Could be implemented within 5 years
Increase City's educational role to decrease the amount of HHW generated	--	--	↑↑↑	↓↓	↑↑↑
	- Minimal impact on achieving landfill diversion goals - Would not require markets for materials or energy - Would not require exportation of materials - Difficult to quantify	- Changing consumer habits requires extensive advertising and marketing campaign - Program would be compatible with City goals - Numerous examples from other communities - Messaging could be somewhat flexible - Extremely difficult to quantify impact	- Conserves resources - Improves water quality, health and safety - Reduces toxicity - Reduces air emissions / greenhouse gases if HHW is not generated	- Position funding (i.e. City FTE(s) or grant funded) - Advertising campaign could require significant funds to be effective - Funding not secured - No economic development potential - Would not increase costs significantly to residents and businesses - Would not require a capital investment	- No legislative or regulatory changes - Socially and politically acceptable - No land, siting or permitting requirements - Could be implemented within 5 years
Yard Waste					
Offer end of season "free" drop-off sites	--	--	↓↓↓	↓↓	↑
	- May have minimal contribution toward landfill diversion goals and minimizing landfill dependence since there is already a yard waste ban - Would not require markets for materials or energy - Would not require exportation of materials - Feasible to quantify	- Would require a new collection system - Would need to determine which City department is responsible for operating if it occurs on City property such as parks - "Free" drop-off days for yard waste occur in other communities - Program could be modified if necessary	- No positive impacts on conserving natural resources, air emissions / greenhouse gases, water quality, toxicity reduction or health/safety - Could increase open dumping	- No capital investment required - Would require additional funding - Funding source not secured - No economic development potential	- No legislative or regulatory changes - Socially and politically acceptable - Difficult to limit participants to Lincoln residents - Temporary public land would have to be identified - Could be implemented within 5 years
Organic Waste Diversion					
Target diverting pre-consumer organics from commercial establishments	↑↑↑	↑↑↑	--	↓	↓
	- Would contribute toward landfill diversion goals and minimize landfill dependence - Would not require markets for materials or energy - Would not require exportation of materials for recovery	- Would not require additional processing capacity, but may require a new collection system - Other communities have successfully implemented similar programs - Program has performance reliability - Strategy is flexible and compatible with other programs	- Increased emissions from additional vehicle routes - Reduced air emissions / greenhouse gases from landfill negated by air emissions / greenhouse gases at compost facility - Reduced leachate generation at landfill	- Could increase costs to businesses that are passed on to consumers - Could require the City to hire an FTE(s) to implement	- Could require legislative or regulatory changes to establish collection system - Could be socially/politically acceptable, but dependent on program structure and cost - No land or permitting required - Could be implemented within 5 years
Increase City's educational role in food / waste recovery hierarchy **and** household composting	↑↑	--	↑↑	↓↓	↑↑↑
	- Would contribute toward landfill diversion goals and minimize landfill dependence - Would not require markets for materials or energy - Would not require exportation of materials - Difficult to quantify	- Low risk - Flexible to market conditions - Changing consumer habits would require an extensive and comprehensive outreach campaign	- Conservation of resources - Reduces amount of leachate produced at landfill - Decreases air emissions / greenhouse gases because transportation is not required	- Effective outreach campaign could be expensive - Residents may want City to subsidize composting bins - Position funding (i.e. City FTE(s) or grant funded)	- No legislative or regulatory changes - Socially and politically acceptable - No land, siting or permitting requirements - Could be implemented within 5 years
	--	↑	--	--	↑↑

Lincoln Strategy Matrix

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	{ Implementation Considerations }				
	Waste Reduction/Diversion	**Technical Requirements**	**Environmental Impacts**	**Economic Impacts**	**Implementation Viability**
Recognition program for commercial entities with organic waste diversion programs	- Would contribute toward landfill diversion goals and minimize landfill dependence, but the amount contributed by awardees could be nominal - Uncertainty as to whether there are existing markets for recovered materials or whether they would require exportation - Results can be quantified	- No new capacity required - Compatible with other programs - Uncertainty of as to whether business would participate	- Conservation of resources - Unable to forecast impact on air emissions / greenhouse gases, water quality, toxicity reduction or health/safety	- Supports / promotes local businesses - Providing financial incentive and administering program could be an additional cost to the City - Program costs could exceed the tonnage diverted from the landfill	- No legislative or regulatory changes - Socially and politically acceptable, but don't know if businesses will participate - No land, siting or permitting requirements - Could be implemented within 5 years
Residential Recycling and Diversion					
Curbside Recycling					
Legislate mandatory curbside recycling	↑↑ - Would contribute toward landfill diversion goals and minimize landfill dependence - Would require markets for materials or energy - Would require exportation of materials - Impact could be quantified	↑ - Would not be flexible to adapt to changing market conditions for the value of recyclables - Challenging to enforce	↑ - Conservation of resources - Limited impact on reducing air emissions / greenhouse gases, improving water quality, decreasing toxicity or protecting health/safety	↓ - Would not require capital investment by City but would likely require of private sector - Increased cost to residents & haulers - Could create jobs	↓↓ - Potential for public acceptability challenges - Requires legislative change - Could be implemented within 5 years
Legislate mandatory recycling for multi-family residential	↑↑ - Would divert materials from the landfill that currently are not readily recovered - Would require markets for materials or energy - Would require exportation of materials - Possible to quantify	↓ - Limited examples of mandatory multi-family recycling in other cities - Unknown if new processing capacity would be required - Compatible with City goals and programs - Uncertainty as whether tenants would participate - Would require extensive education campaign - Would require support to private haulers to enforce the mandate	-- - Conservation of resources and potential GHG reductions from recycling - Increased air emissions / greenhouse gases from additional vehicles to collect recyclables - Limited impact on improving water quality, decreasing toxicity or protecting health/safety	↓↓ - Could require a capital investment (i.e. containers) for landlords or haulers - Increased cost for businesses and tenants - Could require an FTE(s) to implement and monitor program	↓↓ - Mixed public acceptability - Requires legislative change - No land or permitting required - Could be implemented within 5 years
Educate residents and businesses on how to "Recycle Right"	↑↑ - Would contribute toward landfill diversion goals and minimize landfill dependence - Would require markets for materials or energy - Would require exportation of materials - Possible to quantify	↑ - New and comprehensive outreach campaign would be required - Extremely difficult to implement since lack of consistency in recyclables accepted and processed - Campaign could be conducted with existing staff - Performed well in other communities - Messages can be modified to target most prevalent contaminants	↑ - Conservation of resources - Decreases air emission from vehicles collecting trash in recycling containers - Limited impact on improving water quality, decreasing toxicity or protecting health/safety	↑ - No capital investment required - Minimize cost of recycling to residents and businesses - Additional city funding to implement and monitor program may be required - No economic development potential	↑↑ - Could require legislative or regulatory changes to create consistent "contaminants." - Socially and politically acceptable - Would require private haulers to enforce consistently - No land, siting or permitting requirements - Could be implemented within 5 years
Recyclables Collection Sites					
Status Quo (reducing collection sites)	-- - Data indicates no change in diversion - No impact on material/energy recovery or waste exportation	↑ - Already being implemented - Modification of existing program	-- - Conservation of resources - Limited impact on improving water quality, decreasing toxicity or protecting health/safety	↑↑ - Requires capital investment - Data supports reduced costs - City has already funded - No economic development potential	↑ - Mixed public acceptability - No legislative or regulatory changes
Commercial Recycling and Diversion					
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	{ Implementation Considerations }				
	Waste Reduction/Diversion	**Technical Requirements**	**Environmental Impacts**	**Economic Impacts**	**Implementation Viability**
Financially incentivized commercial recycling	- Would contribute toward landfill diversion goals and minimize landfill dependence - Uncertainty as to whether there are existing markets for recovered materials or whether they would require exportation	- May require additional collection and processing capacity - Compatible with other programs - Uncertainty as to whether business would participate - Proven in other communities	- Conservation of resources - Unable to forecast impact on air emissions / greenhouse gases, water quality, toxicity reduction or health/safety	- Supports / promotes local businesses - Providing financial incentive and administering program could be an additional cost to the City and require FTE(s)	- No legislative or regulatory changes - Socially and politically acceptable, but don't know if businesses will participate - No land, siting or permitting requirements - Could be implemented within 5 years
Recognition program for commercial entities with recycling and diversion programs	-- - Would contribute toward landfill diversion goals and minimize landfill dependence, but the amount contributed by awardees could be nominal - Uncertainty as to whether there are existing markets for recovered materials or whether they would require exportation	-- - No new capacity required - Compatible with other programs - Uncertainty as to whether business would participate - Proven in other communities	-- - Conservation of resources - Unable to forecast impact on air emissions / greenhouse gases, water quality, toxicity reduction or health/safety	-- - Supports / promotes local businesses - Administering program could be an additional cost to the City - Program costs could exceed the tonnage diverted from the landfill	↑ - No legislative or regulatory changes - Socially and politically acceptable, but don't know if businesses will participate - No land, siting or permitting requirements - Could be implemented within 5 years
Financially incentivized commercial recycling and landfill diversion recognition program	-- - Would contribute toward landfill diversion goals and minimize landfill dependence, but the amount contributed by awardees could be nominal - Uncertainty as to whether there are existing markets for recovered materials or whether they would require exportation	-- - No new capacity required - Compatible with other programs - Uncertainty of as to whether business would participate	-- - Conservation of resources - Unable to forecast impact on air emissions / greenhouse gases, water quality, toxicity reduction or health/safety	-- - Supports / promotes local businesses - Providing financial incentive and administering program could be an additional cost to the City - Program costs could exceed the tonnage diverted from the landfill	↑ - No legislative or regulatory changes - Socially and politically acceptable, but don't know if businesses will participate - No land, siting or permitting requirements - Could be implemented within 5 years
Organize private collection system for commercial recyclables	↑↑ - Would significantly contribute toward landfill diversion goals and minimize landfill dependence for commercial generators - Would require markets for materials or energy - Would require exportation of materials - Somewhat possible to quantify	↑↑ - No new infrastructure required - Compatible with existing landfill diversion programs - Performed well in other communities	↑↑ - Conservation of resources - Decreased air emissions / greenhouse gases due to fewer collection vehicles on the road - Increased safety from less collection vehicle traffic - No significant impact on water quality or toxicity reduction	↑↑↑ - No capital investment required - Decreased collection costs to businesses - City does not need to secure funding - Would support local business and local business would be engaged in strategy	↓↓ - Would require legislative and regulatory changes - Would require coordination with private haulers - May be acceptable with commercial generators - Would not require land or permitting - Can be implemented with 5 years
C&D Materials Landfill Diversion					
City partners with organizations to provide training and workshops	-- - May have minimal impact on achieving landfill diversion goals if limited to workshop participants - Would not require markets for materials or energy - Would not require exportation of materials - Difficult to quantify	↑ - Compatible with other programs - Uncertainty of as to whether business would participate - Successfully implemented in other communities - Program is flexible - Difficult to quantify results	-- - Conservation of resources - Unable to forecast impact on air emissions / greenhouse gases, water quality, toxicity reduction or health/safety	↑↑ - No capital costs required - Supports local businesses - Minimal cost to City to implement -No economic development potential - No new funding source required	↑↑ - No legislative or regulatory changes - Socially and politically acceptable, but don't know if businesses will participate - No land, siting or permitting requirements - Could be implemented within 5 years
City to adopt C&D diversion measures for City construction projects	-- - May have minimal contribution toward landfill diversion goals and minimizing landfill dependence - Would require markets for materials or energy - May require exportation of materials	-- - Could require additional processing capacity - Program may not be compatible with other City goals and existing programs for construction projects (i.e. costs) - Minimal risk to the City - Program has some flexibility	-- - Conserves resources - Limited impact on reducing air emissions / greenhouse gases, improving water quality, decreasing toxicity or protecting health/safety	↓↓ - May increase the cost of City construction projects, which would be passed on to businesses and residents - No economic development potential and may make it more difficult for businesses to bid on City construction projects - May require part-time employee	↑↑ - No legislative or regulatory changes - May not be socially and politically acceptable if it limits the number of companies that can bid on City construction projects - No land, siting or permitting requirements - Could be implemented within 5 years
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	{ Implementation Considerations }				
	Waste Reduction/Diversion	**Technical Requirements**	**Environmental Impacts**	**Economic Impacts**	**Implementation Viability**
City to listen & support private sector and continue to provide disposal capacity	- Minimal impact on achieving landfill diversion goals; continued disposal capacity may deter C&D diversion - May require finding new markets for recyclable C&D - Could require exportation of materials - Difficult to quantify	- Could require additional processing capacity - Program would be compatible with City goals and existing programs - Examples of recovering certain C&D materials is limited	- Limited impact on conservation of resources, reducing air emissions / greenhouse gases, improving water quality, decreasing toxicity or protecting health/safety	- Supports local businesses - Minimal cost to City to implement	- No legislative or regulatory changes - Socially and politically acceptable - No land, siting or permitting requirements - Could be implemented within 5 years
Transfer Station and Processing Facilities					
Complete transfer station feasibility study, conceptual plans, and land acquisition	-- - Minimizing the cost for disposing waste could decrease landfill diversion - No impact on materials or energy - No impact on exportation of recyclable materials - Difficult to quantify	↑ - Already being implemented ' - Numerous successful examples from other communities	-- - Limited impact on conservation of resources, reducing air emissions / greenhouse gases, improving water quality, decreasing toxicity or protecting health/safety	-- - Requires major capital investment by City - May decrease disposal costs - Will create construction and operating jobs	↑ - Socially and politically acceptable - Permitting requirements - Siting considerations (not in my backyard) - Could be implemented within 5 years
Consider City-owned, contractor-operated, public/private partnership	-- - Minimal impact on achieving landfill diversion goals - Would not require markets for materials or energy - Would not require exportation of materials - Difficult to quantify	↑ - Numerous successful examples from other communities	-- - Limited impact on conservation of resources, reducing air emissions / greenhouse gases, improving water quality, decreasing toxicity or protecting health/safety	↑ - Could relieve some operational costs to City - Economic development potential - Could create jobs	↑↑ - May require legislative changes - Socially and politically acceptable - Could be implemented within 5 years
Co-located, landfill-diversion services	↑ - Could be combined with "hard to manage items" recycling program, which would contribute toward landfill diversion goals - Would require markets for materials and energy - Would require exportation of materials	↑↑ - Compatible with City goals and existing programs - Could require additional capacity - Minimal risk - Program has some flexibility	↑↑↑ - Increased water quality if co-located with HHW collection bin - Increased health and safety from reduced collection vehicle traffic - Conservation of natural resources - Decreased air emissions / greenhouse gases from reduced collection vehicle traffic	↓↓ - Requires initial capital cost to City - Could be expensive to operate - No economic development potential	↑↑ - Would not require legislative change - May require additional land - Socially and politically acceptable - Could be implemented within 5 years
Waste Conversion Technologies					
Not discussed or considered as part of 5-year update					
Bioreactor/Bio-Stabilization Technologies					
Not discussed or considered as part of 5-year update					
Municipal Solid Waste Disposal					
Not discussed or considered as part of 5-year update					
C&D Waste Disposal					
Not discussed or considered as part of 5-year update					