Solid Waste Management Programs Study

Draft Report

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LIST OF DEFINITIONS

For purposes of this report, the following terms are defined as:

Administrative Costs	Expenses for services or fees relating to product or service.
Banned Material	Material that is not allowed to be placed in a landfill or other disposal site.
Bags	Non-rigid plastic containers that are filled with solid waste and placed at the curb or in alleys for collection.
Best Management Practice	Procedure or operation that produces positive results.
Bio Waste	Food materials or animal parts.
Cans	Rigid metal or plastic containers that are filled with solid waste and placed at the curb or in alleys for collection.
Carts or Toters	Rigid plastic containers that are filled with solid waste and placed at the curb or in alleys for collection. These containers have wheels and are designed to be utilized by collection vehicles that have automated mechanisms for lifting the container.
Certificate Program	Class or seminar that is registered with organization or State.
Clearing House	An agency or organization that collects and distributes something, especially information or materials.
Closure/Post-Closure Costs	Expense to close solid waste facility and to monitor closed facility.
Collection Trailers	Wheeled vehicle for collecting materials including recyclables.
Commercial Waste Generator	Business that generates waste.
Compost Turner	Equipment utilized to mix and separate green waste and compost.
Construction and Demolition Debris	Materials generated during the construction, renovation, and demolition of buildings or structures. These wastes include materials such as concrete, bricks, wood and lumber, roofing, drywall, landscape and other wastes.

LIST OF DEFINITIONS *(continued)*

Convenience Center	Manned or unmanned facility for dropping off solid waste or recyclables. Recyclables are collected and taken to a recycling facility for further processing. Solid waste is collected and taken to a transfer station or landfill.
Curbside or Street Collection	The process of placing bags, cans, carts and/or carts filled with solid waste at the curbside or edge of street for collection.
Drop-Off Center	Where recyclables or other materials are delivered for processing.
Disposal Fee	A fee collected by solid waste disposal facilities and paid to the state.
Dumpsters	Rigid metal or plastic containers that are filled with solid waste. These containers are typically rectangular in shape and utilized to service large commercial waste generators.
Final Cover	Final cover is a multilayered system of soil or synthetic materials which are primarily used to reduce the amount of storm water that will enter a landfill after closing.
Front-Load Truck	A solid waste collection vehicle that collects waste utilizing two forks to lift various size containers or dumpsters.
Granter	Organization, government agency or others providing financial support.
Green Waste	Vegetation removed from property.
Habitat	The natural home or environment of an animal, plant, or other organism.
Household Hazardous Waste	Any waste generated from the use of a product containing hazardous material, that if misused or improperly disposed, could pose a threat to human health or the environment.
Hauler	Business or individual that collects municipal solid waste.
Infrastructure	Buildings, utilities, roads, or other government or private services.
Landfill Life Expectancy	Estimated time landfill will operate before it is at capacity.

LIST OF DEFINITIONS *(continued)*

Local Government Agencies	City or town division or department.
Mandatory Recycling	Community where recycling is required by code or law.
Master Composter	Certified composter with minimum number of years' experience.
Materials Management	The use and reuse of materials in the most productive and sustainable way across their entire lifecycle.
Material Recovery Facility	Operation to sort recyclables into bales or other containers.
Measurement Standards	The fundamental reference for a system of weights and measures.
Pay-As-You-Throw	System that allows for variable costs to dispose of waste.
Plastic Bag Problem	Contamination to recyclables or compost caused by plastic bags in the material.
Rear-Load Truck	A solid waste collection vehicle that collects waste by placing it in an opening at the rear of the truck, via manual or automated means.
Recycling Facility	Facility where recyclables are prepared for shipment.
Regulations	Rules or orders for protection of environment.
Repurposing	Utilizing an object for a task or function that it was not originally identified to perform.
Reuse and Repurposing	Identify new approaches to utilize materials.
Roll-Off	A solid waste collection vehicle that collects waste deposited in a large metal container (dumpster) from one location, such as a construction site, large store, or industrial site.
Side-Load Truck	A solid waste collection vehicle that collects waste by placing it in an opening at the side of the truck, via manual or automated means.
Stakeholders	Individuals who are committed to plan or program.
Subtitle D	The federal rules and regulations that govern the environmental operations of municipal waste landfills.

LIST OF DEFINITIONS *(continued)*

Tipping Fees	A fee charged for the amount of waste disposed of by customers at a landfill or transfer station.
Transfer Station	Building or open space where solid waste is transferred from a small vehicle to a larger vehicle, typically a semi-tractor trailer.
Vandalism	Purposeful damage or destruction.
Waste Hierarchy	List of waste management options in priority order.
Waste Minimization Concept	Program to reduce quantity of generated waste to acceptable level.
Waste Reduction	Method to shrink quantity of generated waste.
White goods	Appliances
Zero Waste	A philosophy that encourages the redesign of resource lifecycles so that all products are reused.

1.0
INTRODUCTION AND PURPOSE

In 2016 the Nebraska Legislature passed Legislative Bill 1101 (LB 1101).[1.1] Section 2 of this legislation directed the Nebraska Department of Environmental Quality (NDEQ) to conduct a study to examine the status of solid waste management programs in the State of Nebraska. This study is to include, but not be limited to:

(1) determining whether existing state programs regarding litter and waste reduction and recycling should be amended or merged;

(2) conducting a needs assessment of the recycling and composting programs in the state, including the need for infrastructure development, operating standards, market development, coordinated public education resulting in behavior change, and incentives to increase recycling and composting;

(3) identifying methods to partner with political subdivisions, private industry, and private, non-profit organizations to most successfully address waste management issues in the state;

(4) providing recommendations regarding existing funding sources and possible new revenue sources at the state and local level to address existing and emerging solid waste management issues; and,

(5) recommending revisions to existing grant programs to address solid waste management issues in a proactive manner.

Part 2 of Section 2 of LB 1101 requires the establishment of a committee to advise NDEQ regarding the solid waste management programs study. This committee is comprised of nine members, and includes the following individuals:

- Danielle Easdale
- Lash Chaffin
- Ed Sadler
- George Hoellen
- Jo Leyland
- Jim Weber
- Rick Yoder
- Kelly Danielson
- Fred Hlava

The committee has advised NDEQ on all matters related to this report. At the committee's second meeting, solid waste challenges and issues were discussed extensively. The committee prioritized the many issues and selected the top five to be examined in the Issue Papers contained in Appendix A.

Part 3 of Section 2 of Legislative Bill 1101 allowed NDEQ to retain the services of a consultant to assist in the development of the study. NDEQ issued a Request for Proposals(1.2) and through this process selected Engineering Solutions & Design, Inc. (ES&D) to conduct the study.

The Bid Schedule included in the RFP(1.3) outlined a detailed activity/task list or scope of work. This scope of work addressed the focus areas described above as well as the need for meetings with recyclers, compost facility operators, landfill managers, and other public and private organizations that are involved with solid waste activities in Nebraska. The preparation of five issue papers was another requirement outlined in the scope of work; a paper that focused on each of the following five issues was to be prepared: (1) Recycling and Composting; (2) Materials Management; (3) Information; (4) Grant Programs; and (5) Landfill Bans.

The five issue papers were prepared and submitted to NDEQ in August 2017 (see Appendix A). Several issues relating to recycling and composting, materials management, information, grant programs, and landfill bans were identified. These issues are outlined below.

(1) ***Recycling and composting*** both present many issues which require consideration and resolution. For example:

- How are costs to be controlled or reduced to make recycling a break-even proposition?
- With the potential increase in food waste entering composting operations, how will odors be controlled?
- Are there methods where local governments can be more involved in transporting or marketing recyclables without negatively impacting private enterprise?
- Although not available throughout the entire state, can wood chipping and the sale of wood chips be a part of composting operations?
- How can the state be more aggressive in motivating commercial and industrial business to recycle more cardboard and metals?

- Should a determination be made as to the impact of having grass clippings included or excluded from compost operations?
- Should the state conduct a survey to determine the level of interest in placing recycling facilities in all parts of Nebraska?
- Should compost from public composting operations be more widely available for sale at garden shops, grocery stores, and home improvement stores?
- Should the state update goals for recycling,[1.4] provide incentives to meet those goals, and establish a program to measure whether these goals are being met?
- If a compost operation has excess compost, can it provide the compost to area farmers?

(2) ***Materials management*** varies with the type of material and the goals of a recycling or waste reduction program. Issues to consider for successful materials management include:

- balancing storage space and aging inventory;
- finding reliable and consistent buyers;
- recognizing fluctuating markets for materials;
- meeting the interests of the public and the agencies supporting and/or directing the recycling facility;
- developing a sound business plan;
- pinpointing opportunities to team or establish a joint venture with other recyclers to handle and market certain materials;
- identifying methods to utilize or repurpose materials with low market value; and
- utilizing public education programs to control material flow and promote material reuse.

(3) ***Information*** needs to be collected to provide all stakeholders a more thorough understanding of the industry and facilitate the development of long-term plans and strategies. Several issues need to be addressed so consistent and reliable information can be collected. Some of these issues include:

- establishing a secure method of collecting information;
- requiring recycling programs to regularly report specified data regarding their programs;
- creating formats to present useable and understandable information and data;
- presenting data in a manner that does not identify any program as a winner or loser;
- making electronic equipment available to securely submit data;
- establishing a system to share information on markets and transportation opportunities;
- developing a system to share techniques to optimize the collection, sorting, storing, and transporting of materials;
- providing on-site training; and
- establishing an annual gathering of recyclers to disseminate information and conduct training.

(4) ***Grant programs*** for recycling and waste reduction in Nebraska have been successful and have allowed for the addition of several recycling facilities located throughout the state. Issues facing the operation of these grant programs include:

- developing a single application for grants from any of the granters;
- attaining long-term commitments to the waste hierarchy through more consistent public education;
- implementing procedures that result in site visits to each facility, community or county that has received grant funding within 12 months of grant award;
- identifying long-term, sustainable funding for grant programs;

- linking the submittal of data to NDEQ with access to grant funding;
- expanding grant support for household hazardous waste programs; and
- clearly identifying the needs and not wants of a particular program.

(5) ***Landfill bans*** enacted to remove selected materials from landfills is a common solid waste management practice. Before banning specific materials from being disposed at municipal waste landfills, the following issues need to be addressed:

- What new public education programs are needed?
- What alterations to the present recycling system will be required?
- What level of funding will be needed to assist recycling facilities to prepare for the influx of the banned material?
- What preparations for the ban will be needed and/or required at the municipal solid waste landfills?
- What role should the Nebraska Department of Environmental Quality play in assuring the ban is effective?
- What adjustments to the recycling and waste reduction grant programs will be needed?

This report is the culmination of efforts to examine the status of solid waste management programs in the State of Nebraska. The report: (1) provides information on present State of Nebraska programs that focus on recycling, waste reduction, and solid waste; (2) presents the results of a needs assessment for recycling and composting programs in the State of Nebraska; (3) identifies methods for promoting partnering programs; (4) considers and evaluates funding opportunities for both existing and emerging solid waste issues; and (5) evaluates and develops possible revisions to Nebraska's solid waste and waste reduction grant programs.

(1.1) Legislature of Nebraska. One Hundred Fourth Legislature, Second Session. Legislative Bill 1101 (2016). *A bill for an act relating to the Department of Environmental Quality; to amend sections 81-15,158.01 and 81-15,160, Reissue Revised Statutes of Nebraska; to require a study to examine the status of solid waste management programs; to create . . .*

(1.2) State of Nebraska. Department of Environmental Quality. RFP # 5513Z1 (2017). *Request for Proposal for the purpose of selecting a qualified Contractor to conduct a Solid Waste Management Programs Study.*

(1.3) State of Nebraska. Department of Environmental Quality. RFP # 5513Z1 (2017). *Form B, Bid Schedule for RFP # 5513Z1, SWMP Study RFP Section IV.B.1 through IV. B.8 Scope of Work, Project Activity/Task Line Item Bids.*

(1.4) Legislature of Nebraska. Legislative Bill 1257 (1992). *Integrated Solid Waste Management Act.*

2.0
REVIEW OF EXISTING STATE PROGRAMS

The State of Nebraska has established a set of programs that focus on litter, waste reduction, and recycling and composting. This section assesses these programs and considers how they are presently functioning, possible program adjustments, and potential long-term opportunities for each program. The goal of this section of the report is to determine if these programs should be amended or merged.

2.1 LITTER

The State of Nebraska's litter program is driven by the Litter Reduction and Recycling Grant Program.[2.1] This program was established in 1979 and has provided funds to address litter issues, for education programs that promote the reduction of littering, and to promote recycling.

From 2011 through 2016, more than $10 million[2.2] have been distributed through the Litter Reduction and Recycling Grant Program. These funds have been used for: (a) public education; (b) litter cleanup along highways, waterways, public use areas, open spaces, and other public access areas; and (c) recycling programs that address standard recycled items such as cardboard, paper, plastics, and aluminum cans as well as e-waste, paint, pesticides, and household hazardous waste. The map presented in Figure 2.1 identifies communities that have benefited from the Litter Reduction and Recycling Grant Program from 2011 through 2016.

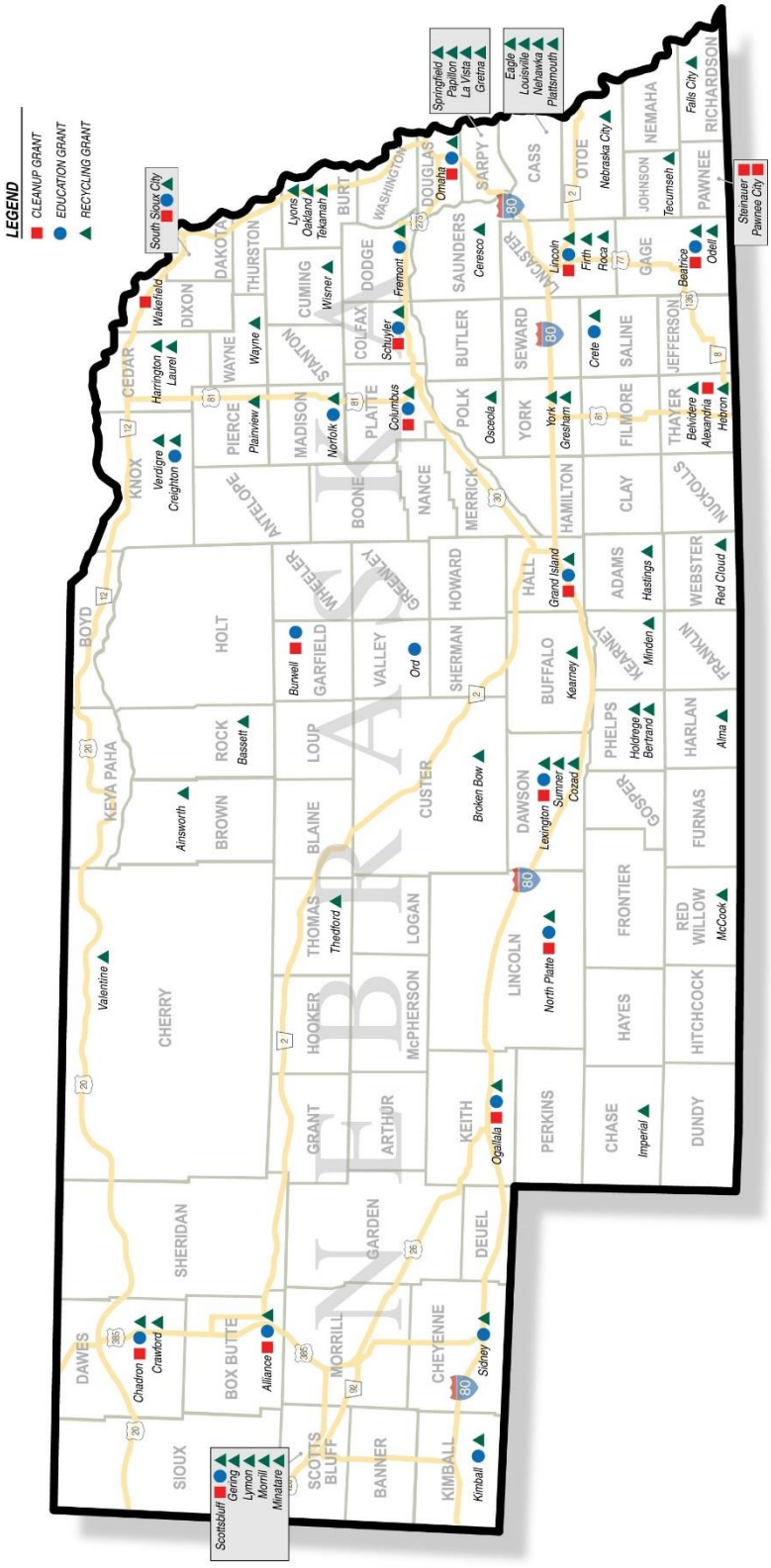

FIGURE 2.1
Communities That Have Been Awarded Funds through the Litter Reduction and Recycling Grant Program from 2011 through 2016.

As is indicated on the map in Figure 2.1, communities throughout the state have received grant funds for a variety of uses. It is important to note that many of these communities have received grants for use in all three areas (cleanup, education, and recycling). It is likely that these communities employed a grant writer or had an individual on staff who was proficient in preparing grant applications. These communities identified needs that NDEQ supported through its grant process as well as through information and guidance as these grants were implemented.

Although the number of grants for recycling has increased, the number of grants for litter cleanup has stayed the same, or in some years even decreased(2.2). Litter control is still an important issue; however, the level of funding required to address it has diminished. NDEQ's and Nebraska's Keep America Beautiful affiliates' successful efforts to reduce littering have positively impacted littering in the state, which has resulted in needing less funding to address this issue.

Addressing litter issues is an area of focus for the Keep America Beautiful (KAB) program.(2.3) Research was undertaken to assess KAB programs in seven states, six that adjoin Nebraska (Iowa, Missouri, Kansas, Colorado, Wyoming, and South Dakota) plus Minnesota. This research indicates that Iowa is the only state of the seven that has a formalized, state-level KAB affiliate. KAB programs in this state, Iowa,(2.4) were evaluated for comparison to litter control programs through the KAB in Nebraska. Iowa's KAB affiliate is well organized and coordinates litter control efforts from a centralized system. The affiliate provides training, organizes events throughout the state, and has a diverse board.

Nebraska's state-level KAB organization, Keep Nebraska Beautiful,(2.5) is also well established. Along with Keep Nebraska Beautiful, there are an additional 20 affiliates located throughout in the state. Recycling is one focus of some of the Keep Nebraska Beautiful affiliates. This is not the situation in Iowa or the other six states selected for comparison.

In 2013, ten Keep Nebraska Beautiful affiliates were awarded grants for recycling through the Litter Reduction and Recycling Grant Program(2.6) and seven affiliates were awarded recycling grants in 2014.(2.7) When some of these affiliates were interviewed as a part of this study, two affiliates indicated that the recycling grants as well as the recycling programs they operate were essential to keeping the affiliate viable.

Litter reduction efforts in Nebraska are addressed through the Nebraska Department of Transportation's Adopt-A-Highway Program[2.8] as well as the Keep Nebraska Beautiful organization. The Nebraska Department of Transportation's website provides information on the number of miles cleaned each year through their "Great Nebraska Trash Off" program. Over the past eight years more than 3,545 miles of road, or an average of 443 miles of roads each year, have been cleaned.

2.2 WASTE REDUCTION

Waste reduction efforts in Nebraska can be divided into three groups. The first effort encompasses repurposing used tires through a program established by the Nebraska Department of Environmental Quality. Currently in Nebraska, tires are repurposed as crumb rubber for use: (1) as playground surfaces (loose fill, tiles, and poured-in-place surfaces); (2) athletic running track surfaces; (3) artificial turf fields; and (4) manufacturing and landscaping mulch. In the past, it has been used in rubber-modified asphalt. Tire-derived fuel should be reconsidered for repurposing tires in Nebraska. This process consumes a significant number of scrap tires, therefore reducing their nuisance in the environment.

The second waste reduction effort embraces the repurposing or reuse of materials. An example of this type of effort is the Nebraska Materials Exchange Program established by Keep Nebraska Beautiful.[2.9] As stated on the Keep Nebraska Beautiful website:

> "Since its inception in the Fall of 1994, the number of materials listed and exchanged has grown tremendously. Nearly 2 million pounds of materials are exchanged every month.
>
> Participating in the program saves money and space associated with storage, disposal, and overall landfill waste. Many schools and businesses have saved hundreds of dollars by seeking materials through the Exchange Program instead of purchasing new items.
>
> The Nebraska Materials Exchange Program encourages businesses and manufacturers across Nebraska to review disposal costs and examine the management of their waste products. Good, usable materials no longer needed can be listed in the Materials Exchange Program. The cost is free. Keep Nebraska Beautiful is proud to offer this program and anticipates continued growth and success."

The third waste reduction effort encompasses recovery, which involves the rehabilitation or remodeling of material or equipment. Examples of recovery include appliances that are fitted with new or used parts or furniture that is reupholstered or restored to its original or similar characteristic. The value of recovery is that the material or equipment can be recovered at a cost that is manageable for either a business or family.

2.3 RECYCLING AND COMPOSTING

Recycling and composting operations in Nebraska are owned and/or operated by public and private entities. These operations focus on specific service areas, usually defined by geographic or political boundaries. The level of effectiveness and efficiency of these recycling and composting programs varies.

Recycling and composting programs in seven states, Iowa, Missouri, Kansas, Colorado, Wyoming, South Dakota, and Minnesota,[2.10] were evaluated and compared to Nebraska's recycling and composting programs. Recycling and composting operations in the seven selected states were relatively equivalent to operations throughout Nebraska. Operations in or near the largest communities in each state were typically more sophisticated than in rural areas and provided more options for collecting recyclables. As is the case in Nebraska, recycling and composting operations in the seven selected states varied depending upon a community's or county's commitment to recycling and/or composting and whether a facility was publicly or privately operated.

One concern about Nebraska's present recycling and composting efforts is the lack of comprehensive data regarding these endeavors. There is no centralized program to collect information pertaining to the amount of recyclable materials collected through drop-off centers and/or curbside collection. Presently, the state does not directly collect data relating to recycling and composting. The information that is collected is generated and voluntarily provided by recycling and composting facilities, and this information is not consistent from facility to facility. Comprehensive state recycling and composting data would facilitate reviews of the various recycling programs, assist in identifying successful and unsuccessful strategies and programs, and provide the opportunity to focus funding to improve the success rate of recycling operations and programs.

During recent interviews undertaken as a part of this study and conducted with many of the state's recycling program operators, it was found that each recycling facility collects information differently and facilities do not necessarily collect the same information. Most facilities collect information on the:

- types of materials they collect and/or process;
- quantity of materials collected and or processed;
- number of bales or gaylords that were filled; and
- where the materials were sent.

To establish a useful database, it is imperative that each facility or operation collect and submit data in formats provided by NDEQ and that the most essential information is identified for inclusion. Information that should be incorporated into this database includes, but is not limited to, the following:

- quantities (in tons) and types of materials accepted and processed;
- facility size and capacity quantified as tons per day the facility can handle;
- staff members' level of experience;
- facility's service area;
- where collected materials are sent for processing;
- where processed materials are sold;
- if materials are stored outside; and
- amount of time materials have been stored outside.

Although there are limited rules or regulations specifically designed for recycling, the systems for collecting and processing recyclables are quite active in the state and encouraged by NDEQ. In turn, local codes/ordinances/regulations can potentially impede certain recycling efforts by limiting where these operations can operate or place drop-off bins. Further, barriers to increasing recycling in Nebraska are driven by the state's characteristics. For example, the distances between communities and processing facilities, the cost to transport recyclables, and the markets for the recyclables can be formidable obstacles.

NDEQ has prepared a guidance document(2.11) designed to present information on the regulatory aspects of composting and the procedures and responsibilities that accompany the operation and ownership of a composting operation. As with recycling, the proximity to markets, or end users, does impact the quantity of compost generated and its availability within the state.

When a composting operation is established, it is imperative compost operators are properly educated and trained. Access to extensive and strong educational tools such as seminars and training videos as well as outreach from NDEQ staff or others is vital to the success of composting.

(2.1) Nebraska Administrative Code. Title 133, Chapter 1, Nebraska Department of Environmental Quality. Nebraska Revised Statues §81-1549 (Reissue 2008). *Nebraska Department of Environmental Quality, Title 133 – Litter Reduction and Recycling Grant Program* (effective December 13, 2014).

(2.2) Nebraska Department of Environmental Quality. Annual reports to the Nebraska Legislature (2011-2016). *Annual Report to the Legislature, Chapter 5* (submitted in December 2011, 2012, 2013, 2014, 2015, and 2016).

(2.3) Keep America Beautiful. End Littering Program. https://www.kab.org/resources/end-littering.

(2.4) Keep Iowa Beautiful. https://www.keepiowabeautiful.com.

(2.5) Keep Nebraska Beautiful. www.knb.org and http://www.knb.org/affiliates.html.

(2.6) Nebraska Department of Environmental Quality. Annual report to the Nebraska Legislature (2013). *Annual Report to the Legislature, Chapter 5.*

(2.7) Nebraska Department of Environmental Quality. Annual report to the Nebraska Legislature (2014). *Annual Report to the Legislature, Chapter 5.*

(2.8) Nebraska Department of Transportation. Adopt-A-Highway Program. http://dot.nebraska.gov/projects/get-involved/adopt-hwy.

(2.9) Keep Nebraska Beautiful. Materials Exchange Program. http://www.kb.org/exchange.html.

(2.10) SCS Engineers in conjunction with Pierpont Consulting. Report prepared for Iowa Department of Natural Resources (2017). *Rural Iowa Hub and Spoke Recycling Project*.

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(2.11) Nebraska Department of Environmental Quality. Guidance document # 06-203. (Revised 2016). *Permitting and Operating Compost Sites (In Accordance with Title 132 Regulations*. http://deq.ne.gov.

3.0 NEEDS ASSESSMENT OF NEBRASKA'S RECYCLING AND COMPOSTING PROGRAMS

Recycling and composting operations in Nebraska are owned and/or operated by public and private entities. These operations focus on specific service areas, defined by geographic or political boundaries. The level of effectiveness and efficiency of these programs is relatively unknown. To better understand recycling and composting in Nebraska, it is important that the needs of these two programs are identified and assessed.

3.1 INFRASTRUCTURE DEVELOPMENT

The infrastructure that serves solid waste, recycling and composting operations is essential to the success of these operations. There are four infrastructure components that must be provided to ensure the stability of these programs: (1) collection; (2) sorting; (3) storage; and (4) transport.

3.1.1 Solid Waste

Generally in Nebraska, fully- or partially-automated rear-, front-, or side-load trucks collect solid waste. Semi-automated trucks are usually operated by two workers, a driver and an assistant who picks up and deposits waste into the truck. If the truck is fully automated, then there is usually only one worker – a driver - who collects the waste utilizing an automated arm that grabs the trash cart and deposits it into the truck.

These collection vehicles run assigned routes and can transport from six to twelve tons of waste. When the truck is full, it is driven to a transfer station or landfill where it unloads. The driver then returns to his/her route and continues to collect waste. Large semi-trailer trucks are utilized to transport waste from transfer stations to landfills. These trucks can transport as much as twenty tons of waste.

Throughout Nebraska, both private and public haulers provide solid waste collection services. Public haulers primary function is to provide solid waste collection services and some also provide recyclables collection services. Those public systems that do not collect recyclables usually have recycling drop-off centers available for their citizens' use.

Private hauling companies provide varying levels of collection services and employ a variety of equipment when collecting solid waste or recyclables. The trucks they use vary from completely automated vehicles to rear-load trucks that require a driver and two assistants to pick up and deposit the waste. As is the case with public collection entities, some private haulers also provide curbside recyclables collection. These private haulers often own and/or operate a recycling facility where their collected recyclables are delivered for processing; or they have arrangements with specific facilities that take their collected recyclables.

Both public and private haulers can provide a wealth of valuable information relating to the solid waste systems in use throughout Nebraska. These haulers are the first line of defense in keeping banned materials from entering a landfill or transfer station. Based upon the types of materials they observe being disposed and waste containers they observe being used, they can assist in identifying waste stream trends.

In Nebraska, landfilling is the primary method of solid waste disposal. There are 21 active Subtitle D landfills in the state. Fourteen of these landfills are located in the eastern half of the state; and five are located in the state's panhandle region. Figure 3.1 provides the locations of these 21 landfills together with the year it is anticipated each landfill will reach its capacity. Table 3.1 delineates the estimated year each landfill will reach its capacity. As can be seen in the table, there are only seven landfills with life expectancies of 20 years or less and only two landfills with life expectancies of less than ten years. In turn, there are five landfills with life expectancies of more than 50 years.

When considering the location of the landfills as shown on Figure 3.1, those landfills with more than 65 years of estimated capacity are located in either the far west or middle portion of the state. There is only one landfill is in the eastern portion of the state that has an estimated remaining capacity of more than 65 years. Given this circumstance, it is important to continue to reduce the flow of waste to these landfills to further increase their longevity.

Using the landfill life expectancies as delineated in Table 3.1, it can be deduced that the state has adequate landfill capacity. This abundance of available capacity along with reasonable tipping fees inhibit interest and other disposal options. However, this situation also provides an opportunity for Nebraska to study other disposal options before these landfills reach capacity. Additionally, there is the opportunity for the state to expand the breadth and reach of its waste reduction programs before these landfills reach capacity, therefore further extending their life expectancies.

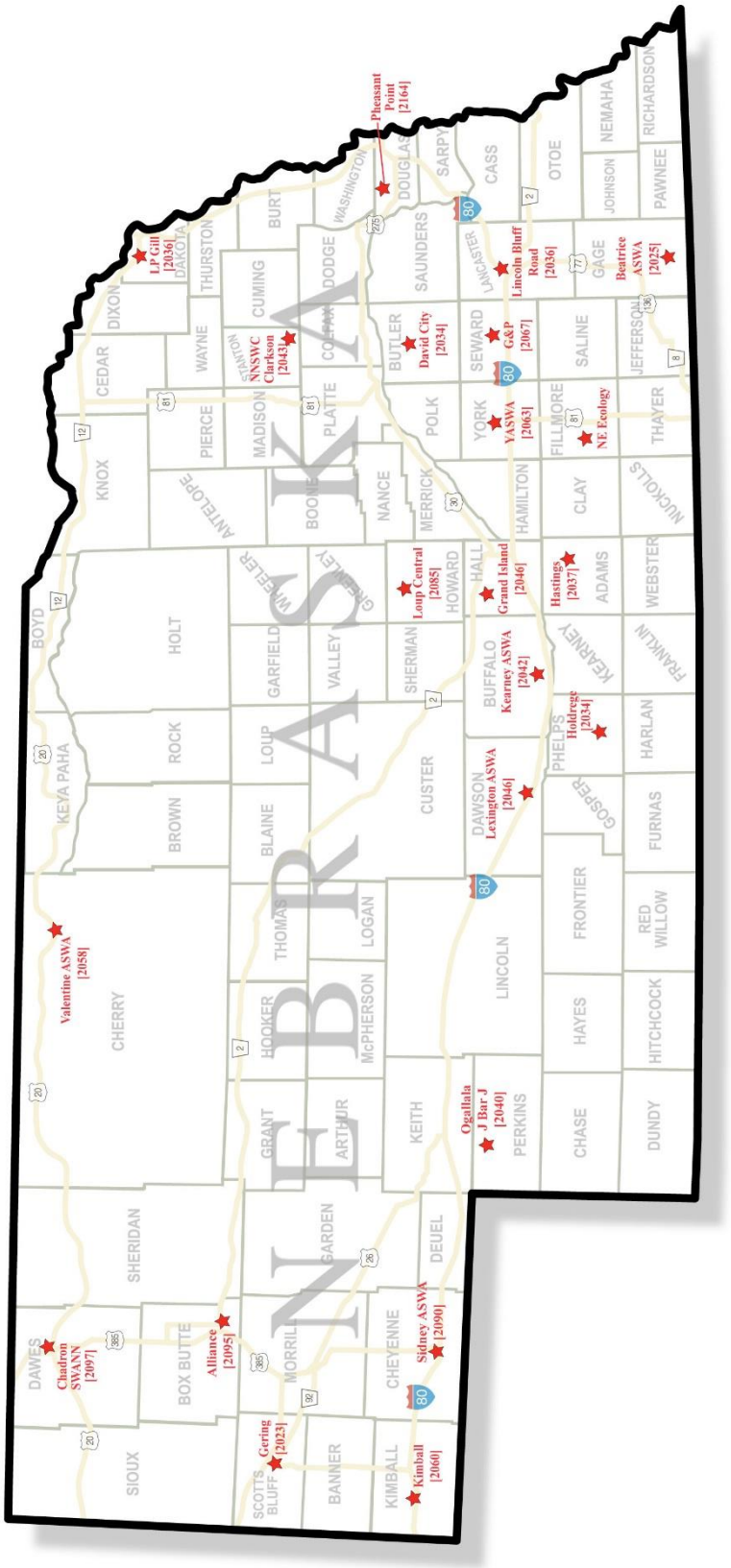

FIGURE 3.1
Location of Active Landfills in Nebraska Along With the Year Each is Anticipated to Reach Capacity

TABLE 3.1
Nebraska Landfills and the Year
Each is Anticipated to Reach Capacity

Landfill	County	Maximum Capacity (year)
Beatrice Area Solid Waste Agency	Gage	2025
Butler County Landfill, Inc.	Butler	2034
City of Alliance	Box Butte	2095
City of Gering	Scotts Bluff	2023
City of Hastings	Adams	2037
City of Holdrege	Phelps	2034
City of Kimball	Kimball	2060
City of Lincoln	Lancaster	2036
Grand Island	Hall	2046
G&P Development, Inc.	Seward	2067
J Bar J Land, Inc.	Keith	2040
Kearney	Buffalo	2042
Lexington	Dawson	2046
Loup Central Landfill Association	Loup	2085
L.P. Gill Inc.	Dakota	2036
NE Nebraska Solid Waste Coalition	Stanton	2043
Sidney	Cheyenne	2090
Solid Waste Agency of NW Nebraska	Dawes	2097
Valentine	Cherry	2058
Waste Management - Pheasant Point	Douglas	2164
York	York	2063

Source: Nebraska Department of Environmental Quality

3.1.2 Recycling

Whether the material is recyclable or compostable it is imperative that it can be collected and transported. Recyclables are typically collected at drop-off centers, returned to the material's point of origin, or captured via curbside collection. Depending upon the system of collection, contamination (where materials that are not recyclable are mixed with those materials that are recyclable) and scavenging can be problematic.

Drop-off centers are the predominant method of collection in Nebraska. Drop-off facilities can be as simple as a metal box or trailer where recyclables are accumulated, or as sophisticated as separated containers designated for specific recyclables. There is a high risk for contamination or scavenging at drop-off locations.

Return centers are typically designed to collect specific recyclables (i.e., cardboard, newsprint, white paper, paperboard, select plastics, aluminum cans, and glass). The level of contamination is reduced at return centers because they are usually located in areas where the collection receptacles can be observed. In addition, collection receptacles at return centers normally have smaller openings where recyclables are inserted which also reduces the potential for contamination.

Curbside collection is another method of collecting recyclables. Recyclables are accumulated in plastic bags, bins or carts, placed at the curb and then picked up for further processing. The plastic bag system or bin system is less expensive to start up than the cart system. However, the bag system is susceptible to spillage due to tearing bags, is more labor intensive than carts, and slows the sorting process at the MRF. Bins are sturdier than bags, but have less capacity, are also prone to spillage, and because of their rigidity they tend to crack when exposed to cold temperatures.

The cart system utilizes a wheeled container where recyclables are deposited and then the cart is placed at the curb. The recyclables are then collected by emptying the cart into a side-arm or rear-loading collection vehicle. The side-arm system requires only one operator while the rear-loading system requires at least two and possibly three people. A semi- or fully-automated cart system is safer than manual collection.

After the recyclables are collected, they are delivered to a recycling facility where they are unloaded on to a hard surface for sorting. Material sorting can encompass total separation, selected separation, or no separation. Total separation involves sorting materials into predetermined categories. At a minimum, these categories include cardboard, paperboard, newsprint, packaging, aluminum, metals, plastics (possibly further sorted into PET, HDPE, and numbered plastics), and other materials as desired by the facility or end user.

Selected separation condenses the sorting of the recyclables into fewer and more general categories. Categories normally include cardboard, paperboard, aluminum, PET plastics, HDPE plastics, and other recyclables as desired by the facility or end user.

The no separation process involves either no separation of the recyclables or removing only one or two recyclable materials (typically cardboard and/or aluminum). When none of the recyclables are separated, all the co-mingled materials are then loaded onto a transport vehicle and delivered to a material recovery facility (MRF) or similar type operation. If one or two types of recyclables are removed, they are then sold and the remainder of the comingled recyclables are loaded onto a transport vehicle and delivered to a MRF.

The sorting of recyclables at a receiving facility varies and is dependent upon the distance to a MRF or similar facility. A significant distance can be based on driving time, size of vehicle utilized to transport the recyclables, and/or whether the vehicle is owned or provided by a third party.

If the collection point for the recyclables is a reasonable distance from a MRF or similar operation, less sorting will occur at the receiving facility. If the collection point is a significant distance from a MRF, then it is possible the facility will sort some or all the recyclable materials. A select number of high-value recyclables will be baled at the receiving facility and sold directly to the mills. By selling some of the recyclable materials and sending the rest to a MRF, the receiving recycling facility can potentially cover some or all its costs.

It is important to note that collecting and processing glass for recycling can be problematic. Glass is still being collected at many facilities; however, less glass is being collected and recycled because of its low market value and high shipping costs. Glass also poses problems when processed. It contaminates other recyclable materials and can damage the processing equipment.

An often overlooked but critical aspect of the recycling infrastructure is the ability to store materials. Materials storage occurs because of a lack of transport, the low value of the material, or an end user's request to hold a material. In each of these situations the facility must have the space and the financial ability to store the material. Comments made during interviews conducted as a part of this study indicated that storage is a primary issue for certain facilities. The most often noted reason for storing recyclables is the material's low value or the cost to transport the material.

Materials can be stored in either indoor or outdoor locations. The value of the material is maintained when it is stored indoors because there is limited impact from the elements. In turn, vandalism is problem when materials are stored outside and materials stored outdoors can lose value due to their exposure to sunlight and weather elements. For example, the negative impact of temperature and sunlight on plastics can reduce its value by as much as 50% to 65%, depending open the length of exposure to the elements.(3.1) As noted in interviews with recycling operations in Nebraska conducted as a part of this study, one of the most significant costs they face is a material's loss in value because of the exposure to the elements or the long-term retention of the material.

In smaller communities and rural areas, materials are often stored due to low collection volumes. Facilities in these areas must sometimes wait weeks or months before their recyclable materials are collected for processing, particularly if the facility is not convenient to a large collection route. If the facility is not convenient to a larger collection route, it must often rely on volunteers and use pickups or pull trailers to transport the materials for processing.

The transport of recycled materials and its impact on the viability of recycling operations in Nebraska can be significant. As with real estate, the issue is location. The further a recycler is from a MRF or other processing facility, the higher the transport costs. To address this issue some recyclers have utilized a "piggy-back" system, where two or more recyclers utilize the same truck to transport materials to a MRF or other processing facility. This system works well when all of the recyclers are in sync. However, when the recyclers are not in sync the "piggy-back" system is disrupted and added costs are incurred.

Some recyclers choose to have their recyclables transported via vehicles provided by the MRF or similar facility. The recycler or recyclers will informally or formally agree to have a MRF or similar operation provide a truck to collect their recyclables on a scheduled basis. As with the "piggyback" system, this program does depend on a schedule. Failure to maintain a schedule or miss a pickup may result in the MRF or similar facility removing the recycling facility from the collection route.

A third approach some recyclers employ to transport their recyclables to a MRF or similar facility is to purchase a truck. Although the initial cost is significant, ownership of the vehicle provides more flexibility when moving materials to a MRF or end user. In addition, the recycler may gain additional income by utilizing the truck to transport other recyclers' materials or products for public and private clients.

3.1.3 Composting

Unlike recycling, green or other organic wastes are often collected by communities and individuals and delivered to compost sites. The collection of the green or organic waste is typically accomplished utilizing open-top trucks with high side panels. In larger communities, organic waste is often collected utilizing rear-loader vehicles. If other organic wastes with higher moisture content (i.e., food waste) are collected, then the waste is collected in barrels or similar water-tight containers.

Green or organic wastes delivered to a compost site are typically segregated based upon the level of processing they require. Green waste is separated based upon its ability to be processed by the on-site equipment. For example, if the grinder or shredder that is available can only process materials that are three inches or less in diameter, any material larger than that must be pre-processed to reduce it to a workable diameter.

To ensure that yard waste and other green waste can be milled to integrate with bio waste, including food, compost facilities may require some initial screening. If the food waste or other bio waste has a high liquid content, it should be allowed to dry before mixing it with yard waste or other green waste.

Inorganic materials, such as plastic bags, plastic containers, and metals, must be removed before organic materials can be processed at a compost operation. Requiring compost be delivered or picked up loose or in compostable paper bags can reduce, and possibly eliminate, the plastic bag problem. In addition, a compost operation must address the high moisture content of some organics. It is imperative that they have wood chips or other organic materials available to absorb the moisture in the organic waste.

Compost is normally stored in dry bins that a loader or similar piece of equipment can enter. To maintain the quality of the compost, it is critical that excess water drains from the bins. Because the storage area will experience higher volumes of traffic, it is necessary to segregate away from the compost pads and other operations. It is important that the compost be kept relatively dry so the nutrients within the compost can be retained. It is recommended that the compost piles be covered during winter months.

The form of transportation used for compost is based on the type and location of compost facility. In many urban areas, the compost facility does not provide transportation. Instead, consumers transport their compost, usually via automobiles or small trucks. Larger compost consumers (i.e., commercial green houses and nurseries) use dump trucks and trailers to transport their desired compost. Compost is transported in similar vehicles in rural parts of Nebraska.

3.2 OPERATING STANDARDS

Operating standards for recycling facilities and compost facilities should be driven by Best Management Practices (BMPs) as well as the need to maintain safe working environment. BMPs utilized in seven nearby or adjoining states, Iowa, Missouri, Kansas, Colorado, Wyoming, South Dakota, and Minnesota,[3.2] were researched. Utilizing this information and information from recycling and composting facilities in Nebraska, many BMP's were evaluated to identify optimal practices. These BMPs are delineated below:

- Using hub-and-spoke systems for recycling and composting programs. A variation in this concept incorporated direct hauling from one outlier community to the hub community along with the standard practice of collecting from several communities before returning to the hub.
- Instituting mandatory recycling to establish a program or revitalize a program.
- Establishing pay-as-you-throw programs for commercial accounts to stimulate recycling and target specific recyclables.
- Requiring recycling data be submitted online and accessible from the website.
- Creating a system that is integrated with the waste hierarchy and waste minimization concept and provides information for educating the public, improving recycling, handling yard waste, addressing other activities.
- Providing environmental education tools for teachers to use with students from first grade through high school.
- Employing a standardized recycling and composting message to eliminate confusion.
- Identifying and modifying city, county, and state codes that inhibit recycling and composting (i.e., littering codes that only focus on waste receptacles or codes that limit where recycling bins can be placed).
- Expanding and improving materials exchange programs.
- Establishing a sustainable purchasing program for local and state agencies.
- Developing programs for businesses and/or residents to reduce food waste.
- Setting targets to establish recycling collection in at least two communities annually.

- Collecting waste on a bi-weekly rather than weekly basis.
- Collecting recyclables and waste on the same day.
- Establishing safety standards corresponding to the specific operation with enhancements to make safety both common sense as well as beneficial.

This list of BMPs is not exhaustive; however, it does provide a spectrum of ideas and tools other communities and states have utilized to further increase composting and recycling. Implementing some of these BMPs could be relatively straightforward and data from nearby states indicate they result in exceptional outcomes.

3.3 MARKET DEVELOPMENT

Developing markets for recycling and composting programs in Nebraska involves enhancing present markets as well as recognizing new opportunities. There are two primary approaches to developing markets for recyclables. The first is to identify all existing material recovery facilities in and adjacent to the state and then add facilities in areas of the state that are under served.

The second approach is to attract recycled material end users to the state. Given Nebraska's exceptional transportation network and the number of food processors located within the state, there is the potential to attract cardboard companies, metal and plastic container companies, and other similar manufacturers that utilize recovered materials in their manufacturing processes. Examples of potential recovered material end users include manufacturers of:

- Cardboard containers
- Plastic crates
- Metal containers
- Packaging material
- Large containers
- Metal fasteners
- Aluminum cans
- Plastic components for animal feeders
- Plastic tables and chairs
- Signs

Along with identifying manufacturers and businesses that utilize recovered materials, the ability to provide these materials in sufficient quantities is also a critical component of market development. It is vitally important that the amount of recovered materials is accurately reported and that these materials can be consistently delivered to the end user. Knowing the quantity and availability of recovered materials for manufacturers' use is crucial to establishing and expanding markets for recyclables in Nebraska.

Marketing compost is primarily driven by end users' needs. In urban areas, compost operations have more options – contracting with local nurseries, local governmental departments, school districts, home improvement centers, etc. There are fewer options available in rural areas. Further, the distance between a compost operation and potential end user poses more challenges.

3.4 COORDINATED PUBLIC EDUCATION

As with any subject taught in school, the key for individuals to retain information is through the continuity of the learning process. To ensure that the maximum amount of recyclable materials is recovered, it is essential that individuals and businesses subscribe to the concept of recycling materials and that they clearly understand what can be recycled and how and where to recycle these materials. To this end, it is vitally important that educating the public – at all ages – and businesses – at all stages – is coordinated, consistent, and fresh.

Coordinated and consistent education encompasses planned programs that present information in a manner that harmonizes with what has been previously presented, what is being presented now, and what is expected to be presented in the future. This requires a set of lessons that complement each other. The message delivered in the first lesson is utilized as the basis for the next lesson. One tenet of this building-block approach[3.3] is to make the building blocks tangible and visible along with allowing students, in this case the public, enough time to process the information and make connections. This process results in better retention of the presented information. Employing this approach to educate individuals and businesses about recycling and waste reduction will allow them to synthesize the information which makes implementing the ideas and processes easier.

When tackling public education, it is critical that the process and the information is fresh. The material must be unique, presented in an enlightening manner, and entertaining. It is also important that the message is informative, positive, and presents a call to action. If the recycling and waste reduction information is presented in a proactive and upbeat manner, it is more likely that the audience will be attentive and take actions to reduce their waste and recycle.

Along with coordinated, consistent, and fresh messages, it is important to undertake education efforts that address business challenges. For example, private haulers often view collecting recyclables as a money-losing proposition. Messaging needs to be specifically tailored to counteract this perception; and as with public education, this messaging needs to present a call to action that is relatable to their circumstances. Another example involves messages that address manufacturers. These types of businesses need to be informed of the quality, quantity, and cost of recycled materials. Sometimes their perception is that recovered and recycled materials are of lesser quality than virgin materials, are not readily available in the quantity they need to efficiently produce their product, and are more costly than virgin materials.

Programs with the goal of providing recycling and/or composting experts in all aspects of those fields could be promoted to community colleges with the goal of providing a certificate program. Some composting programs (i.e., master composter) are being offered in larger communities; however, there is limited participation and the subject matter is limited. Community colleges are more visible and could potentially reach more people.

3.5 INCENTIVES TO INCREASE RECYCLING AND COMPOSTING

To incentivize the public, it is essential that the program's goals are clear and that there is an ultimate target in place. It is also important that the public believes the benefits of such programs will enrich and improve their lives, either directly or indirectly. Consequently, it is imperative to remain consistent with the target(s) and goals; and, they need to be firm, fixed and attainable. For recycling and composting the target is to increase participation in recycling and composting and the goal is to collect and process more materials.

There are several possible incentives that can motivate the public to increase their recycling and composting. These incentives include, but are not limited to:

- A cleaner community translates to higher property values.
- Public processing of yard waste results in clean compost for the community.
- More material recycled or recovered results in using less landfill space.
- Increased composting of yard waste results in less potential for vectors.
- Recovered materials that are recyclable can be reused at less cost to the consumer.
- Increased composting provides more nutrients for both public and private gardens.

- Expanding the collection of recyclables reduces litter.
- Compost material can enhance the soils in public parks and public areas thus reducing the cost of fertilizers.
- Increasing the number of recyclables recovered from landfills can result in employment opportunities at local recycling facilities.
- Generating compost for use at public schools will enrich athletic fields, playgrounds, and the school landscaping.
- Recycling large items such as furniture and appliances can provide opportunities for reuse while also capturing metals, fabrics, wood, and fixtures.

This list is far from being exhaustive; however, it does provide examples of the possibilities for the reuse and repurposing of materials presently in Nebraska's waste streams. The incentives provided are relatively localized and do not reflect available opportunities on a regional or statewide level. It is important to note that the success of any program begins at the local level and then, with success, expands to the regional and statewide level.

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4.0
METHODS TO PROMOTE PARTNERING OPPORTUNITIES

Partnering among public, private, and non-profit organizations has been in practice for several years. Successful partnerships require mutual respect and collaboration among all partners. Participants must rely on each other and commit to opportunities presented through the partnership. Further, proactive and frequent communication among partnership participants is essential.

There are also some inherent challenges to partnering. The number of recycling organizations and businesses now operating, along with each entity's need to capture as many marketable materials as possible, results in overlapping competition. Because most entities do not desire to partner with their competitors, partnering opportunities are limited. Further, many recycling organizations and businesses are too busy handling their own agendas, needs, and challenges to envision having the time, means, and ability to tackle the demands a partnership can present.

Partnerships among organizations can take many forms. They can be built between two or more public entities, between public and private entities, and between public and non-profit organizations. Each partnering relationship has its benefits and disadvantages.

4.1 PUBLIC ENTITY - PUBLIC ENTITY PARTNERSHIP

The need for partnering between two or more public entities occurs when there is a specific public need that these multiple public entities can address more successfully together than separately. Often these partnerships are related to an infrastructure need. When applied to recycling and solid waste issues, partnerships of this sort are usually based on a need for a specific type of service. Communities and counties have partnered to develop landfills, material recovery facilities and fleets of collection vehicles. These types of partnerships usually take the form of a utility.

The development of a material recovery facility is the most common driving force for a partnership of this type relative to recycling and waste reduction. The facility along with its level of sortation and how the recycled materials are marketed, varies from partnership to partnership. In Nebraska, communities and counties have formed quasi-partnerships that allow for one community or county to deliver their recyclables to another county or community for processing. In each of these relationships, one partner provides a service by taking the recyclables and the other partner is released from any further responsibility for the recyclables.

This type of arrangement is advantageous because fewer communities need to invest in processing facilities. Further, it allows those communities that cannot afford to invest in a facility access to processing services. A disadvantage is that there is no comprehensive plan in place that promotes establishing processing facilities in the most strategic locations possible. This is the present situation in Nebraska.

4.2 PUBLIC - PRIVATE PARTNERSHIP

The reasons for establishing a public-private partnership vary; however, in most situations such partnerships are formed because it is necessary to complete a specific project as quickly or efficiently as possible. For example, public entities sometimes face obstacles to completing a project that a private entity would not. Advantages of a public-private partnership include:[4.1]

- A wider array of project solutions.
- Faster completion time and potentially reduced delays.
- The return-on-investment for both parties may be greater.
- The risks of the project are evaluated early on to determine project feasibility.
- Early completion bonuses can be incorporated which can potentially increase efficiency.
- Operational and project execution risk is transferred from government to private participants.
- Increased efficiency of government funds which allows these funds to be re-directed to other important socio-economic concerns.
- Quality standards are potentially increased.

Disadvantages of a public private partnership include:[4.1]

- The risk the private sector firm can accommodate may be borne, in part, by the government partner which increases the government's costs.
- If the expertise in the partnership lies mostly on the private side, the governmental partner is at an inherent disadvantage.
- The government is at risk of the private partner defaulting.
- Depending upon the type of project, the government's level of risk may be greater because the project must be completed, with or without the private partner.
- The project profits can vary depending on the assumed risk for either party.
- The government's risk increases if the number of private partners who can perform the tasks is limited.

In Nebraska, the concept of public-private partnerships, relative to recycling and waste reduction, is limited. However, the recycling facility located in Broken Bow is an example of this type of relationship. The recycling facility is housed within a transfer station that is owned by a private solid waste hauling company. The facility's operator is allowed to capture recyclables from the waste stream delivered to the transfer station; and, in turn, the transfer station operator captures and uses or sells the metals found in the waste stream.

As is the case with the public entity-public entity partnership, recycling facilities have developed based more on the specific wants or needs of a community than on any plan. In most cases, the relationship between the recycling center or drop-off location and the MRF or processing center is as seller and buyer, not as partners.

Employing the public-private partnership concept in Nebraska would involve a very specific circumstance. For example, establishing a curbside collection system in a large community that partners with a material recovery facility. In this example, this type of relationship would utilize the expertise of a public collection program and a private material handling company. Further, this relationship would result in the public entity having a committed processing facility to take its recyclables, which should result in positive results for both organizations.

4.3 PARTNERING WITH PRIVATE, NON-PROFIT ORGANIZATIONS

Private, non-profit organizations have a unique role in recycling programs in Nebraska. These organizations, such as Keep Nebraska Beautiful and the Nebraska Recycling Council (formerly the Nebraska State Recycling Association and WasteCap Nebraska), have been involved in recycling and waste reduction activities for many years. These organizations have championed recycling and waste reduction through educational events, communication with schools and other civic organizations, and by establishing recycling programs in various parts of the state. These efforts have furthered the growth and expansion of recycling programs in Nebraska.

The concept of partnering with these non-profit organizations and others has already occurred throughout the state. An example is the Keep Nebraska Beautiful affiliate in Alliance. This organization (Keep Alliance Beautiful) works closely with the City of Alliance in the collection and processing of recyclables. In turn, the City of Alliance and Box Butte County(4.2) provide financial support.

Non-profit organizations in Nebraska provide an opportunity to further educate the public regarding recycling and waste reduction. Whether an actual partnering with non-profit organizations occur, these groups' capabilities can benefit both public and private organizations. Utilizing these organizations to continue educating and informing the public and Nebraska communities and businesses will result in exceptional benefits for the state.

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(4.2) Keep Alliance Beautiful. http://www.keepalliancebeautiful.org.

5.0
FUNDING SOURCES TO ADDRESS EXISTING AND EMERGING SOLID WASTE ISSUES

Funding of solid waste operations in Nebraska varies dependent upon whether the operation is public or private, and what type of facility it is – landfill, transfer station, convenience center, or recycling operation. Landfills, transfer stations, and convenience centers are normally funded by the tipping fees each of these operations charge. If the tipping fees and operation charges are not sufficient to address all its costs, local government agencies may also contribute funding.

Recycling and waste reduction facilities and programs are primarily funded through the sale of materials they have collected, local government agencies, and grant awards. This funding can fluctuate dramatically and is dependent upon a facility's capability and capacity to capture materials, the value of materials a facility captures and sells, market prices for the recycled materials, and the local government's economic circumstances and stability.

5.1 EXISTING FUNDING SOURCES

Solid waste operations in Nebraska are funded through a variety of sources. These funding sources include:

- Local tax base
- Tipping fees
- Sale of materials including, but not limited to: (a) metals; (b) lumber; (c) compost; (d) recyclables; (e) soil; (f) broken or chipped concrete; and (g) boulders and rocks
- Grants
- Loans or other financing

5.1.1 Local Tax Base

A local government's funding for any solid waste program is dependent upon its perception of the program's value. For most local governments, the most important solid waste programs are those that address the safe disposal of solid waste. Consequently, many small- and medium-sized communities allocate their solid waste funding to the collection and disposal of waste. If there are any remaining funds, they are divided among the local government's other solid waste programs. Which programs are favored depends upon the needs and wants of the community. For example, some communities will fund collection trailers for recyclables or local litter control campaigns. The extent of the support for any solid waste activity is dependent upon the circumstances of the community for each year. Any emergency funding that occurs within a community – the unanticipated failure of the community firetruck or dump truck, for example – will consume the funds that could be utilized for solid waste activities.

5.1.2 Tipping Fees

Tipping fees fund solid waste programs in most Nebraska communities and counties. These fees are conventionally set at a monetary level that addresses the cost to operate a landfill or transfer facility, with reserves for future construction activities, facility upgrades, equipment replacement, and anticipated closure/post-closure costs. However, competitors present in the local marketplace can also influence tipping fees. This often occurs in larger communities. Competing private operators build transfer stations or other disposal facilities to capture solid waste that would normally be handled at the local landfill. In these situations, tipping fees may be held to an artificially low rate so the local disposal facility can acquire as much waste as possible. When this circumstance occurs, local governments must then provide additional funds so the facility can continue to operate.

Because a tipping fee's primary function is to address costs associated with the operation of a landfill, transfer station, or convenience center, there is often little or no funding remaining to support other solid waste activities. For this reason, very few recycling programs rely on funding from tipping fees. The exception is when the local community or private operator provides both disposal and recycling services at the same location. In cases such as this, the cost to develop the recycling facility may be included in the tippin fee.

5.1.3 Sale of Materials

The sale of materials can be advantageous for both disposal and recycling operations. For disposal operations, materials delivered to the facility that may be reused or repurposed and can be segregated from the waste stream can provide additional income. These materials are usually: (a) inert materials such as rocks and boulders that contractors and landscapers can use; (b) white goods; (c) large metal items such as sheds or steel plates; or (d) lumber and wood that can be utilized for fencing or wood chips. In addition to potentially providing additional income, removing materials from the waste stream saves air space and the materials are repurposed, which reduces waste.

The sale of materials is a recycling operation's main source of income. These operations target the capture of prevalent and higher-value recyclables like cardboard and metals to sell on a continual basis. They may also target white paper and some plastics. Recyclers also receive items that can be reused (i.e., bicycles, lawn mowers, furniture, selected wood materials, white goods) which they then give to other agencies within the community for reuse or refurbishing.

5.1.4 Grants

There are three potential grant sources for funding solid waste, recycling and waste reduction, and litter control programs in Nebraska: (1) the Litter Reduction and Recycling Grant Program (LRRG); (2) the Waste Reduction and Recycling Incentive Grants (WRRI); and (3) the Nebraska Environmental Trust (NET).

The LRRG program provides grants for public education, site cleanups, and recycling. This grant program has been in place since 1979. From 2010 through 2016, this program awarded $4,223,430.00 in grants for public education; $525,197.00 in grants for site cleanup; and, $5,920,549.00 in grants for recycling projects.[5.1] The map provided in Figure 5.1 identifies the location of communities that have received grants through the LRRG program.

In addition to the communities delineated in Figure 5.1, Keep Nebraska Beautiful and all its 20 affiliates have been awarded funds through the LRRG program. Eight of these affiliates have been awarded funds through this grant program every year from 2009 through 2016.

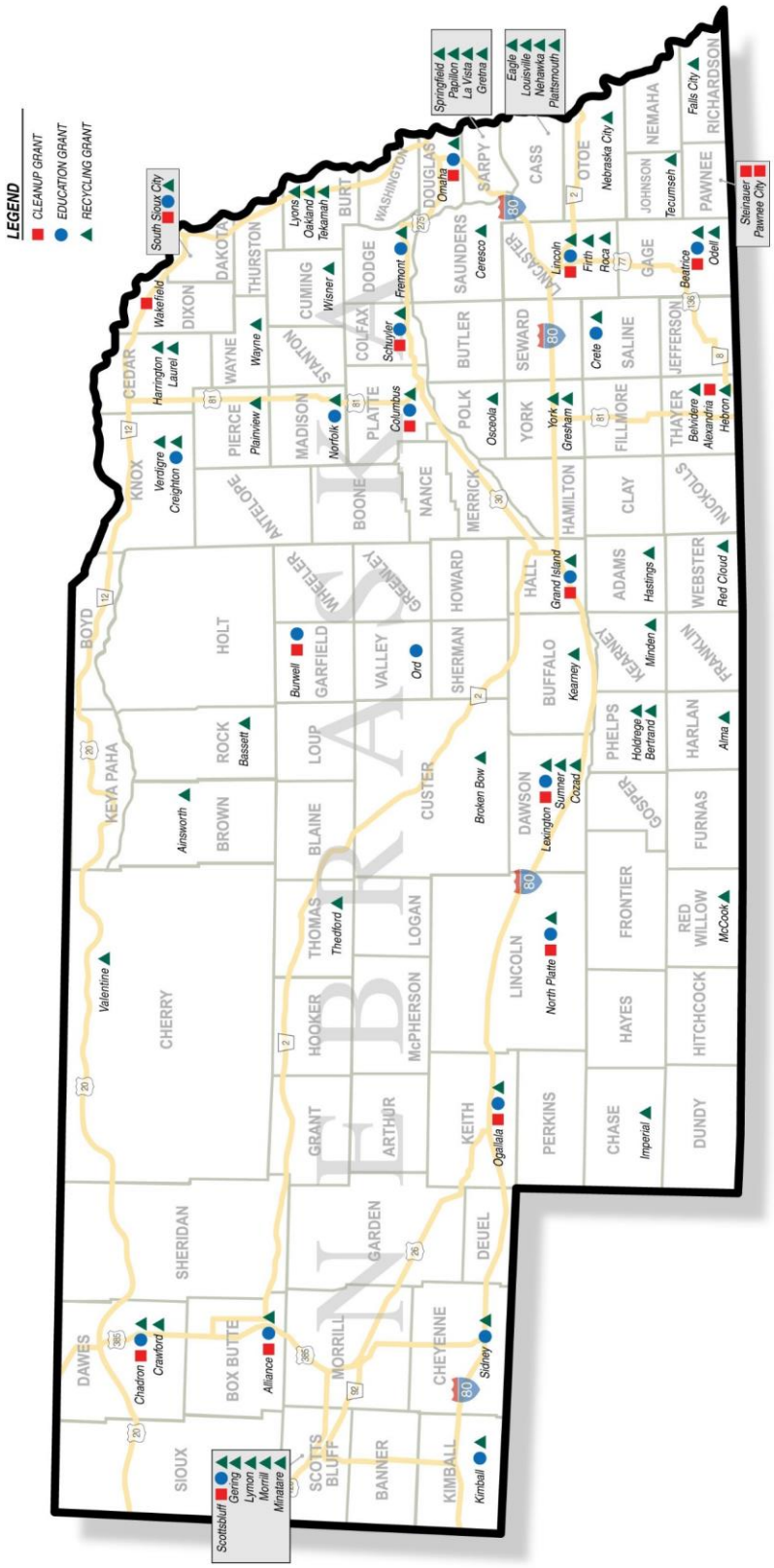

FIGURE 5.1
Communities That Have Been Awarded Funds through the Litter Reduction and Recycling Grant Program from 2011 through 2016.

The WRRI grant program has been in place since 1990. This program provides financial support for recycling systems, the identification and development of recycling markets, processing facilities, yard waste composting, composting with sludge, waste reduction, household hazardous waste programs, solid waste infrastructure, and incineration. From 2011 through 2016, this program approved over $12,031,448.00 in grants for recycling, composting, and waste reduction and $11,255,264.00 for scrap tire recycling projects.[5.1] As with the LRRG program these projects have been undertaken throughout the state.

Table 5.1 outlines the number of grants and the total annual amount of funds awarded on an annual basis from 2011 through 2016 through the WRRI program for scrap tire projects. The map provided in Figure 5.2 delineates the location of communities that have received grants through this program for recycling, composting, and waste reduction during this time.

TABLE 5.1
Number and Total Monetary Amount of Grants Awarded from 2011 through 2016 for Scrap Tire Projects

Year	Number of Grants	Total Monetary Amount of Awarded Funds
2011	63	$ 1,152,500
2012	134	$ 1,855,485
2013	104	$ 1,930,714
2014	120	$ 2,176,322
2015	126	$ 2,059,000
2016	127	$ 2,081,189

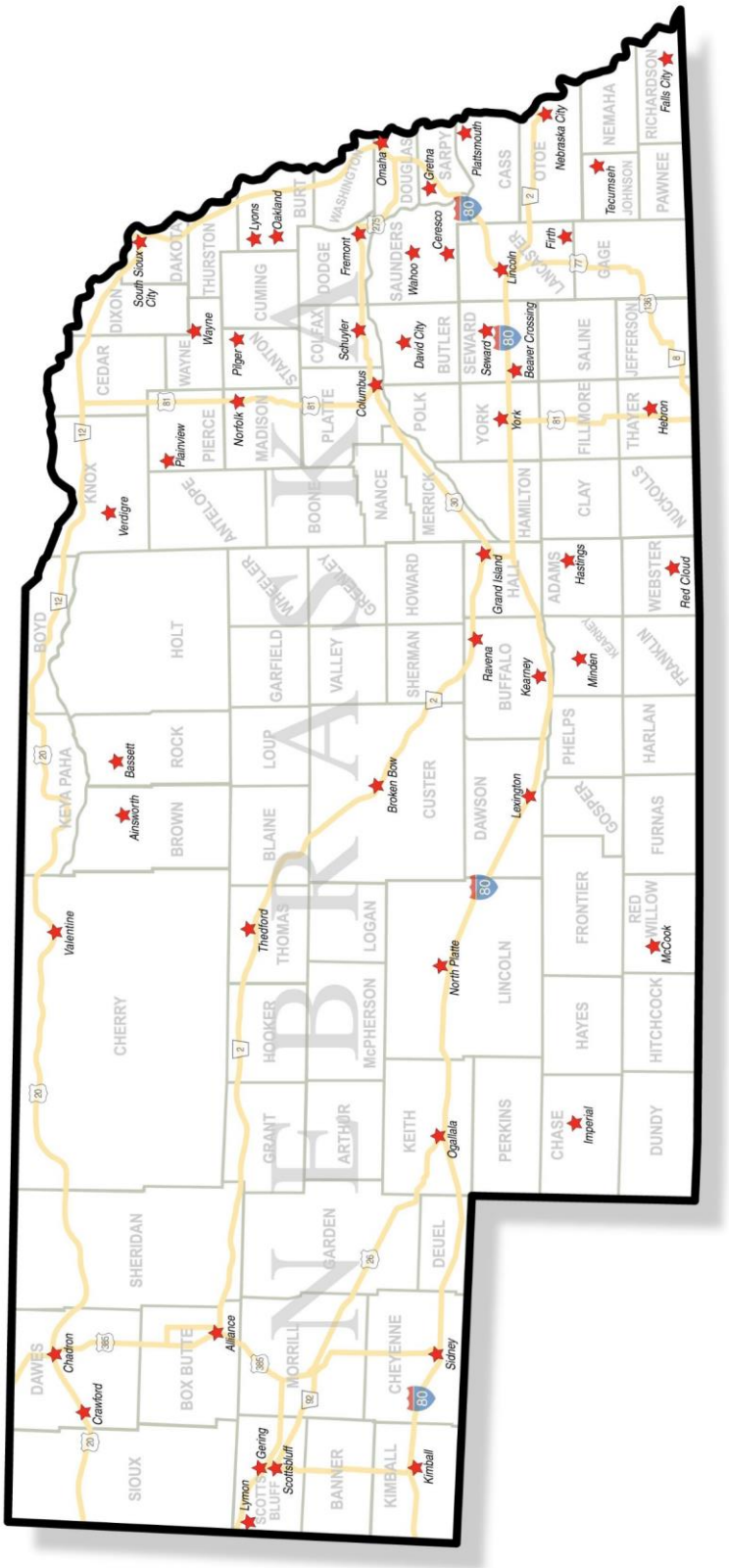

FIGURE 5.2
Communities That Have Been Awarded Funds through the Waste Reduction and Recycling Incentive Grant Program from 2011 through 2016 for Recycling, Composting, and Waste Reduction Projects

The Nebraska Environmental Trust (NET) was established in 1992 and is funded through the Nebraska Lottery. NET funds projects that fall under categories adopted by the trust board: (a) habitat; (b) surface and ground water; (c) waste management; (d) air quality; and (5) soil management. Solid waste grants are included under the waste management category. There are no restrictions on applicants or project sponsors as long as the project falls within the eligibility criteria established by the trust. Individuals, private organizations, and public entities can apply for funding. Figure 5.3 delineates those communities that have received NET funding for waste management projects from 2005 through 2016.

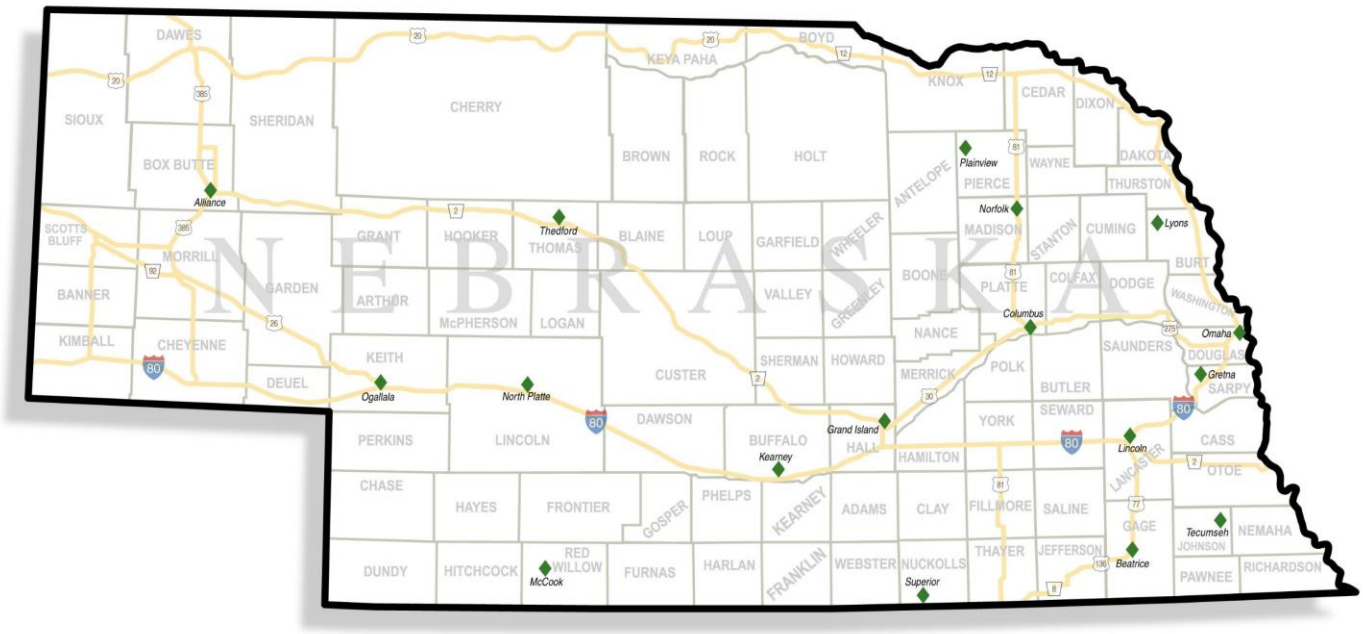

FIGURE 5.3
Communities That Have Received Funding from The Nebraska Environmental Trust for Waste Management Projects from 2005 through 2016

5.1.5 Loans or Other Financing

If other funding is not available, both public and private entities may consider borrowing funds from a financial institution. The public sector is somewhat limited in the options it can pursue. Further, a public entity's credit worthiness and its other outstanding debts are critical aspects in its ability to procure a loan. Although loan options may be limited and an entity must have its finances in order, a loan may be easy to acquire depending upon the amount of funds required.

There are more loan and financing options available to private-sector organizations. These options often include higher interest rates and lower payback periods and are based on the level of risk the financial institutions can accommodate.

5.2 POSSIBLE NEW FUNDING SOURCES

Unlike some of Nebraska's neighboring states, solid waste project grants (particularly recycling and waste reduction grants) in Nebraska have been comparatively generous and consistent for a number of years. Further, although funds for these programs have sometimes been re-appropriated to support other state programs, these re-appropriations have been relatively infrequent and have not had a significant impact.

Although Nebraska has a very positive history of supporting recycling and waste reduction programs, it is important to identify other funding sources in case circumstances change. A reuse grant program is one funding source to consider. The purpose of a program of this type is to accumulate grant funds that have been allocated but not utilized within a designated time. These funds are then re-allocated to other grantees for use. Although the amount of funds recouped by this program on an annual basis could be small, the amount accumulated over time could be significant.

Another new funding source to consider is accessing other private environmental grant, financing, and/or loan programs. Several private organizations and corporations provide grants for environmental programs relating to recycling, waste reduction, zero waste, and similar activities. A clearing house[5.2] for these programs could be established on NDEQ'S website for ease of access. Expanding potential sources of funding for solid waste and waste reduction programs increases the potential to address challenging issues including waste prevention, increasing the types of materials that can be recycled, and long-term security for closed landfills.

Other solid waste program funding options include teaming with adjoining states to address common problems like material markets, transportation of recovered materials, abandoned landfills, illegal dump sites, contaminated soil sites, and final cover and liner failures. A teaming effort such as this could facilitate the ability of a group of states retaining one or two specialty firms to focus on addressing these common environmental issues. By teaming together, efficacies would be realized through lower overhead costs and working with fewer contractors. Further, the costs would be distributed among the participants and each participant would shoulder less financial burden than if it procured these services alone.

A key aspect of accessing any new funding source is its ability to exhibit revenue sustainability.(5.3) An example of revenue sustainability is when a landfill facility maintains its level of revenue when the amount of waste generated or delivered to the facility decreases. When considering any new funding or revenue source, it is important to evaluate it utilizing the revenue sustainability approach.

(5.1) Nebraska Department of Environmental Quality. Annual reports to the Nebraska Legislature (2011-2016). *Annual Report to the Legislature, Chapter 5* (submitted in December 2011, 2012, 2013, 2014, 2015, and 2016).

(5.2) Terra Viva Grants Directory. (2017). http://terravivagrants.org.

(5.3) Heller, B. (2012). *Five Key Areas for Revenue Sustainability*. http://hellerheller.com/?s=five+key+areas+for+revenue+sustainability.

6.0
GRANT PROGRAMS

Since 1979, the State of Nebraska has provided grants to both public and private organizations to address environmental issues related to solid waste. More specifically, the Nebraska Department of Environmental Quality (NDEQ) and the Nebraska Environmental Trust (NET) provide grants for recycling and waste reduction. NDEQ grants are funded through fees established by legislation and NET grants are funded by the Nebraska Lottery. Grants from these programs have provided financial support for recycling and waste reduction programs in all sections of the state. Figures presented in Section 5.0 of this report (Figure 5.1 through 5.3) identify communities that have been awarded funds through the Litter Reduction and Recycling grant program, the Waste Reduction and Recycling Incentive grant program, or the Nebraska Environmental Trust grant program. Grant awards have allowed many of Nebraska's recycling and waste reduction programs to grow and expand the services they provide.

The LRRG program is administered by NDEQ. This program focuses on litter control as well as recycling and waste reduction programs. Grants awarded through this program have funded several litter control projects conducted by Keep Nebraska Beautiful affiliates and communities located throughout the state. This same grant program has also assisted in funding recycling operations in Imperial, Kearney, Hershey, Alliance, Scottsbluff, O'Neill, Norfolk, and Fremont as well as other Nebraska communities. Many recycling facilities have received financial support to purchase equipment, hire and retain staff, acquire working space, and conduct recycling and waste reduction education activities.

Another NDEQ grant program, WRRI program, was established when the $1.25-per-ton disposal fee was enacted in 1990. This program focuses on two key components of the Nebraska Solid Waste Management Hierarchy – waste reduction and recycling (see Figure 6.1). The priorities in this graphic are depicted from highest to lowest, top to bottom.

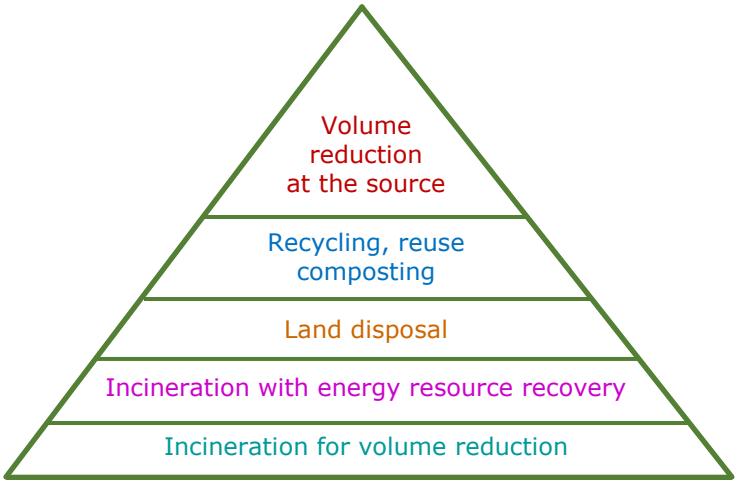

FIGURE 6.1
Nebraska's Solid Waste Management Hierarchy

Most of the grants distributed through this program assist in funding recycling programs. The WRRI grants also support many scrap tire re-use projects. Table 5.1, presented in Section 5.0 of this report, outlines the number and total monetary amount of funds awarded from 2011 through 2016 for scrap tire projects. Funds for these scrap tire project have contributed to the successfully removing abandoned tire piles as well as collecting scrap tires. Tires are currently repurposed as crumb rubber for use: (1) as playground surfaces (loose fill, tiles, and poured-in-place surfaces); (2) athletic running track surfaces; (3) artificial turf fields; and (4) manufacturing and landscaping mulch. In the past, it has been used in rubber-modified asphalt. These processes consume a significant number of scrap tires, therefore reducing their nuisance in the environment.

The NET grant program provides grants for habitat, surface and ground water, waste management, air quality, and soil management. The waste management grants are distributed once a year as well as monthly. Annual grants are designated for large projects that typically cost more than $25,000. Monthly grants are distributed through the Nebraska Recycling Council for projects costing less than $25,000.

Nebraska's grant programs garnered much discussion during interviews conducted with recycling operators located throughout state. Interviewees largely agreed that the grant programs provided by NDEQ and NET were essential for the establishment and growth of their programs. Some of the organizations noted that without these grant programs, their operation would likely not survive.

One directive of this study is to receive recommendations relative to revising existing grant programs so solid waste management issues can be addressed in a proactive manner. To accomplish this, Nebraska's current grant programs and any potential new grant programs were evaluated. Three distinct areas were considered: (1) expanding the existing grant programs; (2) awarding grants more frequently and/or merging grant programs; and (3) utilizing zero-interest loans, along with grants, to fund waste reduction and recycling programs.

6.1 EXPANDING EXISTING GRANT PROGRAMS

As noted previously, the State of Nebraska has provided grants for recycling since 1979. This financial support increased dramatically in the early 1990's with the advent of a grant program funding from the $1.25-per-ton fee placed on all solid waste disposed in Nebraska municipal landfills. The Nebraska Environmental Trust Fund, which provides grants for recycling program support, was also established in the early 1990's.

Recyclers greatly appreciate the funds available via grants programs; however, they also voiced their opinion that:

- Funding should be expanded to allow for acquiring more equipment, conducting training, and retaining staff;
- NDEQ should provide more assistance in identifying favorable transportation routes; and,
- NDEQ should help to identify potential markets.

There is a lack of consensus among the interviewed recyclers about expanding activities eligible for grant award. However, there is agreement that if materials to be accepted for recycling are increased or the mandatory recycling of certain materials is implemented, an expansion of the grant program will be needed.

The landfill disposal fee of $1.25 per ton is currently split equally (50% each) between grants and NDEQ waste programs. It has been considered that more of the funds should go to the latter programs and less to grants, or raise the disposal fee to better accommodate both the programs and grants.

Although politically there has not been interest in increasing the disposal fee, the need for additional grant funding is evident. For example, the Nebraska Solid Waste Management Hierarchy indicates that volume reduction at the source is the most important solid waste management concern; however, there are no grant programs to support this initiative. Landfills receive limited grant support; and yet, land disposal is the third most preferred method of disposal in the solid waste hierarchy. Some landfills have received grants for equipment, alternative daily cover, and, in one case, an on-site building for training.

It is short sighted to limit Nebraska's grant programs' focus and funding on litter control and recycling. An expansion of the grant programs to address all Nebraska Solid Waste Management Hierarchy issues is critical to ensuring the long-term success of solid waste management throughout the state.

6.2 AWARDING GRANTS MORE FREQUENTLY

Presently, grants are awarded once a year from each of the three grant programs – LRRG, WRRI, and NET - however, the various grant programs do not award funds at the same time during the year. NDEQ has also considered combining programs and then awarding grants more often or even continuously, which raises the issue of the availability of funds throughout the year.

Increased frequency in awarding grants would allow NDEQ to react more quickly to the need of grantees and other issues that may occur. The grant application award and review process may need to be shortened if grants are distributed more frequently. The recently-implemented online process should aid in shortening the application and review processes. However, it is important to note that this online process is a statewide system designed to do a variety of things and it may need to be modified to more specifically address the grant application and award process.

Merging the LRRG and WRRI grant programs would be of significant benefit to potential grantees. First, merging these grant programs could reduce administrative costs. Second, only one application process would be required. Third, implementing one grant program could enable two subsets of applicants: (1) applicants that need to fund significant projects or purchases (i.e., equipment, vehicles); and (2) applicants that need funds for smaller projects or purchases (i.e., bins, carts, trailers, ramps). This second subset of applicants would be allowed to submit grant applications throughout the year, as needs arise.

Treating similar requests equally and awarding them on a less challenging basis should be considered. For example, all litter cleanup, or all HHW collection events, might be handled on an almost automatic basis. For example, a community has conducted an annual litter cleanup program for the past ten years. The community applies for a grant each year to cover the cost of advertising the cleanup program and for bags to collect the litter. Given the consistency and success of the project, rather than requiring the community to submit an annual grant application a shorter letter application process could be utilized. The same type of letter application could be utilized for HHW programs that conduct annual cleanups or drop-off days. This approach would allow for a less onerous application-award process and would address similar programs at one time.

6.3 ZERO-INTEREST LOAN PROGRAM

There has been discussion over the years regarding the use of loans to support recycling and waste reduction programs. Discussions have ranged from deleting the matching funds requirement to increasing matching fund requirements. Providing loans with or without interest has also been considered. Past experience with loans in the State of Nebraska included awarding funds to the Nebraska Energy Office, who in turn loaned out the funds for various projects tied to energy savings.[6.1] An analysis of this program indicates that it resulted in 790 new jobs and contributed $28.3 million dollars to Nebraska Gross State Product.

One of the biggest issues with loans is the perceived increase in the work load required for administration. The loan process could create more work for NDEQ personnel who would have to obtain new skills along with an increased commitment of time. This concern is driven by the likelihood that the loans would require repayment over several years and thus increase the prospect for either renewal or default.

Zero-interest loans would provide organizations access to larger sums of money with less limitations than grant funds. In addition, there is the possibility that these loans could be bought or sold which in turn could reduce the state's risk. Finally, if the organization receiving the loan is exceptionally responsible regarding loan management and facility operation, consideration could be made for extended loan repayment. This approach allows both the lending organization, either NDEQ or NET, and the borrower the ability to ensure a project can be successfully completed as well as returning the funds to the lending party for use in supporting other projects.

6.4 POTENTIAL GRANT PROGRAM REVISIONS

The grant programs for recycling and waste reduction in Nebraska have been successful and allowed for the addition of several recycling facilities, litter control programs, and material collection and recovery facilities. Further, these grant programs have facilitated improvements to the environment, established new businesses in every part of the state, and added jobs to the state's economy. These efforts have afforded opportunity to establish a robust recycling and waste reduction industry in Nebraska.

Adjustments to the grant programs described in this section are considered enhancements and not wholesale changes. Each potential enhancement has certain aspects that could enable improvements and further expansion of recycling and waste reduction programs in the state. Any changes to the present grant program process should be carefully thought out and gradually introduced.

6.5 EXAMPLES OF UTILIZING THE GRANT PROGRAMS

The City of Imperial and the City of Kearney are two examples of Nebraska communities utilizing funds awarded through the present solid waste grant programs to implement forward-thinking projects for their citizens. The City of Imperial established a pay-as-you-throw program with the assistance grant funding. The city purchased trash carts for solid waste disposal and provided a cart for each property in the community. Then, each property owner, or occupant, purchases stickers to place on the cart to indicate they want the cart emptied. Each sticker costs $7.00. On the day designated for the owner/occupant's cart to be emptied, they place a sticker on the cart and place the cart in the alley or along the street. When the cart is emptied, the operator removes the sticker and records the collection. Only those carts with a sticker are emptied. This system allows Imperial's citizens direct control of their disposal costs and the time required for the city to collect waste is reduced.

The City of Kearney has been utilizing NDEQ and NET grant funds since 1993. During this time, the city has been able to acquire a compost turner, establish a state-of-the-art recycling facility, and purchase side-load automated collection vehicles. Further, through the use of grant funding from NDEQ and NET, the City of Kearny has been able to save more than $1.5 million and provide its citizenry vital environmental services.

(6.1) International Institute for Energy Conservation, Nebraska Energy Office. (1994). *Dollar and Energy Saving Loan Program, Profile #112.*

7.0 ANALYSIS

The previous six sections of this report provide information on various aspects of solid waste management in Nebraska. This section considers issues relating to opportunities for the state to capitalize on its successes related to improving its solid waste system; and, analysis in this section also considers potential directions the state could take to further improve its solid waste system. Specific issues to be addressed include (a) materials management; (b) data collection; (c) analysis of advantages and disadvantages of waste management strategies; (d) successful partnership strategies; (e) regulatory and statutory obstacles to increasing recycling and composting; (f) methods for data collection and standards of measurements; and (g) landfill bans.

7.1 MATERIALS MANAGEMENT

The management of materials involves controlling and diverting materials from being disposed and identifying options to repurpose or recycle these materials. The extent of the options depends on the value and availability of a diverted material along with its flexibility for reuse.

7.1.1 Best Management Practices

Best management practices (BMPs) from seven states (Iowa, Missouri, Kansas, Colorado, Wyoming, South Dakota, and Minnesota)[7.1] were evaluated to determine their potential application in Nebraska. BMPs were identified for possible implementation in Nebraska. These BMPs, along with their potential advantages and disadvantages, are presented in Table 7.1.

An important aspect of these BMPs is their focus on waste prevention and diversion, recycling, and waste reduction. There are fewer BMPs relating to training or public education. Although it is not possible to determine exactly why there are fewer BMPs related to training or public education, a possible reason could be the assumption that public education regarding recycling and waste reduction is well established and the need for extended public education is not warranted or as beneficial as other efforts.

TABLE 7.1
Advantages and Disadvantages of Identified Potential Best Management Practices for Materials Management, Waste Reduction, and Recycling

	Best Management Practice (BMP)	Value of the BMP	Disadvantage of the BMP
1	Buy food in large quantities or in bulk	Good stewardship Reduces packaging	Smaller families, single households, and older families may not utilize bulk items quickly enough
2	Purchase products with limited packaging or no packaging	Reduces packaging Less waste	If the product is bulky it may be difficult to handle without adequate packaging
3	Remove junk mail from your mailbox	Reduces the amount of this material in the waste stream	None
4	Use towels, rags, and sponges for cleaning and wiping up spills	Reusable materials reduce waste and costs	Storage of materials and increased use of washer and dryer
5	Use cloth napkins	Reusable materials reduce waste and cost	Storage of the napkins and increased use of washer and dryer
6	Use cloth bags for groceries	Reusable material reduces waste and cost	Storage of bags
7	Utilize glass jars as food storage containers	More durable than plastic bags Washable Reduces odors in refrigerator	Dangerous when broken and storage space
8	Utilize rechargeable batteries and battery charger	Reduce cost of batteries Removes battery disposal in landfills	Storage of batteries and cost of rechargeable batteries
9	Establish compost programs for training relating to composting food waste	Reduces number of organics sent to landfill Provides food for gardens flower beds, trees, and shrubs	Potential for odors if composting is conducted improperly

TABLE 7.1 *(continued)*

	Best Management Practice (BMP)	Value of the BMP	Disadvantage of the BMP
10	Establish a sustainable purchasing program for businesses and public offices in the community	Good stewardship Potential increases in recycling	Keeping the program active The potential level of effort required to maintain high sustainability levels
11	Locate green-painted dumpsters, with "Recyclables Only" printed on each side, in alleys in the commercial sections of the community	Commercial businesses have easy access to a dumpster for recyclables Recycling centers have access to more recyclables	The cost of dumpster maintenance Potential for contamination
12	Modify recycling collection trailers to allow more flexibility in the size of each bin	Accommodates the collection of varying types and sizes of recyclables	Greater potential for cross contamination resulting from confusion with a bin's size
13	Monitor the trailer drop-off locations to identify traffic flow and adjust as needed	The ability quickly adjust to the flow of materials being delivered to the drop-off trailer An early indication of the potential success of drop-off system	The potential cost of monitoring Developing the criteria to determine when a trailer should be moved
14	Work with large retailers to setup single-stream collection points at the front and rear of the store	The opportunity to capture a greater volume of selected recyclables Monetary value of materials such as cardboard, white paper, certain plastics, and selected metals	The length of time the container may need to be placed at the store Increased risk of contamination and need to clearly mark which container is "trash" and which container is "recyclables"

TABLE 7.1 *(continued)*

	Best Management Practice (BMP)	Value of the BMP	Disadvantage of the BMP
15	Arrange collection trailers so smaller recyclables can be collected in removeable bags or boxes	Easier unloading from the trailers Safe and efficient speed in which the recyclable can be removed from the trailer	Additional manhours due to time required to remove the box or bag from its container
16	Take a census of the materials received during each quarter and determine which materials should be targeted for greater marketing and which materials do not need as much emphasis	Recognizing the ebb and flow of the quantity of materials throughout the year Recognizing the need to direct attention to collecting more materials that may be lagging in volume or weight	Identifying a balanced method to encourage, rather than dissuade, increasing the volume of recyclables collected
17	Establish a traffic pattern at recycling facilities and use maps and floor markings to demarcate traffic directions and control points	Increased safety Reduction in the number of accidents More efficient movement of materials	Applicability at certain recycling centers, some of which are small enough that an established traffic pattern is not needed
18	Store fiber using the first in first out (FIFO) inventory plan to maintain the material's quality	Increased monetary value of fiber materials being sold (cleaner and fresher fiber materials command higher prices)	Attempting to time market swings and the inflow of fiber materials Risk of holding material too long or selling too soon
19	Take quarterly photographs of the recycling facility to note changes and to identify problem areas	Photographs could be utilized to: track the changes in the facility; document issues with the facility's operation and record how these issues were addressed; recognize workers; and record visitors to the facility	Failure to document the photographs and to share photographs with staff, visitors, and regulators

TABLE 7.1 *(continued)*

	Best Management Practice (BMP)	Value of the BMP	Disadvantage of the BMP
20	Conduct hands-on training to ensure students have a clear sense of the difference in materials	Allows direct contact with materials and recognize how materials can be handled	Space to conduct such training and access to variety of materials
21	Display pictures or drawings of various recoverable materials to insure the correct materials are being recovered	Improve quality control of the product with heightened awareness of the material	Need to replace pictures and drawings if materials change or drawings are damaged
22	Develop a waste reduction lesson plan for use in schools as well as for conferences and other training locations	Provide a definitive program that enlightens people to the concept of waste	Training may be too limiting or lack the depth necessary for the information to be retained
23	Offer information sessions with local retail stores regarding waste reduction methods to utilize with customers	Begins the process of expanding the customer's understanding of waste reduction and how it applies to the shopping experience	Potential inconsistence regarding information provided by retail clerks and managers as it relates to waste reduction

7.1.2 Strategies to Increase Waste Prevention

The transition from recycling to waste prevention will require a concerted effort to affect the public's, commercial businesses', and manufacturers' thinking toward reducing and eventually eliminating their generation of waste and away from their current thinking of disposing waste. This re-training should focus on clearly defining waste reduction and the ultimate goal of waste reduction – zero waste.

Like the littering and waste disposal campaigns of the second half of the 20th century, the transition toward waste prevention must focus on, and encompass, all age groups. Messages must address each age group's attitudes and encourage embracing the concept of waste prevention.(7.2) Further, these messages need to provide ideas, reasons, and methods to implement waste prevention strategies.

As the expansion of the public education process unfolds, it will be important to sync with commerce and industry to allow for balance in developing waste prevention programs. This approach allows for a more uniform education process and will assist in getting the public and commerce and industry "on the same page."

Another important aspect of transitioning from recycling to waste reduction is access to products, such as guides to reusing or repurpose materials and product containers that can be easily stored for future reuse, which will help facilitate their ability to ease into and embrace waste reduction and prevention.

One source that should be utilized to transition to a waste prevention system is the public airways. As was witnessed with recycling programs introduced in the second half of the 20th century, mass media outlets, such as television, radio, and the internet, all encouraged recycling and created a demand for recycling.(7.3) This same effort can be applied to the transitioning from recycling to waste reduction. With the increased coverage of public radio and television, and the migration of public radio and television to the internet, the cost to promote waste reduction may be more manageable.

7.1.3 Examples for Manufacturers to Move Toward Zero Waste

The movement toward zero waste is occurring throughout the United States.(7.4) At the national level, there are companies such as Proctor & Gamble and Nestle USA implementing zero waste strategies; at the regional level, American Packaging in Story City, Iowa and West Liberty Foods, also located in Iowa, are executing this strategy. These firms have identified the potential savings that accompany zero waste initiatives.

To begin moving manufacturers in Nebraska toward zero waste, it is imperative to provide information and examples of how the zero-waste program works. This effort begins with a series of meetings that provide comprehensive assessments of the zero-waste initiatives. Key to these meetings is a candid description of what it will take to reach zero waste and providing approaches that are most applicable to a specific industry.

One approach in starting a zero-waste program is to offer a free waste audit of the facility. This approach allows for frank discussions relative to the facility's current waste control programs and identifies methods to alter these programs to meet zero-waste initiatives.(7.5) Waste audits also provide facilities an opportunity to better understand those waste control procedures that are functioning well and identify those waste control processes that need attention.

Another way to support manufacturers that are working toward zero waste is to recognize and champion their efforts. This could entail: (a) a news article in the local newspaper; (b) a feature piece on television that is broadcast throughout the entire state; or (c) utilizing a website that exclusively promotes and supports manufacturers working toward zero waste or who have achieved the zero-waste goal.

When enlisting manufacturers to move toward zero waste as well as those that are working to become zero-waste generators, it is essential to provide information relating to equipment and reusable packaging and shipping containers. This could be accomplished through a clearing house or similar program manufacturers could access to identify those types of packaging, containers, or materials and equipment that will aid them in reaching the zero-waste goal.

An excellent tool to provide to manufacturers working toward zero waste is examples of firms who have reached their zero-waste goals. As presented in the article, *20 Companies with Zero Waste to Landfill Operations*(7.4) an exceptional cross-section of companies provide proof that zero waste is possible. These firms, from Nestle USA to Molson Coors Brewing Company and Unilever North America to American Packaging and West Liberty Foods is Iowa, all made the decision to reduce waste and have remained profitable.

7.2 STATEWIDE STRATEGY TO INCREASE RECYCLING AND COMPOSTING

There are seven inputs to developing a statewide strategy to increase recycling and composting. The first input is identifying cost effective programs. As noted in the article, M*unicipal Recycling Performance: A Public Sector Environmental Success Story*:(7.6)

> "it is important to continue to improve the bottom-line results of recycling programs and sustaining and expanding popular support for recycling in the future depends on making this service as convenient as possible."

To this end, it is best to identify cost-effective programs that follow the advice above. Recycling programs that understand the value of service as well as the overarching importance of reducing waste provide valuable services.

The second input is public education. An informed and attentive public responds positively to recycling and composting programs that provide updated information and advice relative to the best methods to prepare recyclables for collection or drop off or the best methods for delivering green waste to a compost facility. Utilizing the latest information from a multitude of sources also improves the creditability of the messages.

The third input is to have consistent and reliable data as it relates to the waste stream. A waste stream characterization study conducted at least every five years would provide this data. These studies provide a wealth of knowledge for the public, regulators, cities and counties, recyclers, processors, haulers, and transfer station and landfill operators. All these groups need consistent and reliable data to assist them in decisions that impact how waste is handled. Properly designed and implemented waste characterization studies along with tools on how to use the data they provide can meet this need.

The fourth input is regular and updated information relative to recycling and compost markets. In addition to identifying fluctuations in these markets, it is important to provide an evaluation of market trends and an assessment of potential long-term impacts. This information could facilitate operators' ability to better anticipate market movements and implement more positive reactions.

The fifth, and one of the most important, input to developing a statewide strategy is comprehensive and accurate information relative to the quantity of materials collected, processed, stored, and sold. Simply put, "data is king." Without this information, planning is hampered and the risk of operation failures is increased. From a statewide perspective, wide-ranging, comprehensive and accurate data must be available so local and state government officials can be prepared and react positively to fluctuations within their solid waste management programs. Further, this data is vital in order to plan effectively for the possible closure of solid waste facilities.

The sixth input for recycling and compost operations is establishing an appropriate service area to prevent overreaching and missed opportunities. Overreaching can be very detrimental. When an operation exceeds the limits of an appropriate service area, costs for transporting and handling materials as well as the cost of added wear and tear on equipment and personnel ensue. Further because an operation's manpower and equipment are serving areas outside a manageable service area, it is probable that opportunities are being missed that exist within the limits of the manageable area. Failure to properly maintain an appropriate and manageable service area can result in losing clients and missing opportunities to collect more or a wider array of materials. Both circumstances could ultimately result in an operation's failure.

The seventh and final input addresses materials collection. Efficient materials collection programs result in recycling or composting at a reasonable cost. Efficient collection processes are predicated on proactive scheduling systems that enable effective routes and ensure recyclables or compost are collected on a regular and punctual basis.

7.3 ADVANTAGES/DISADVANTAGES OF WASTE MANAGEMENT STRATEGIES

Table 7.2 delineates ten waste management strategy options. Although this is not an exhaustive list, these strategies could be implemented in Nebraska with positive outcomes.

TABLE 7.2
Advantages and Disadvantages of Ten Waste Management Strategies

	Strategy	Advantage	Disadvantage
1	Collection of solid waste utilizing automated cart system	Reduces injuries and accelerates collection	Cost of trucks and carts
2	Collection of recyclables utilizing automated cart system	Increases number of recyclables collected	Added collection vehicle costs and need for a second cart
3	Control collection of waste through local franchising and establishing model hauling agreements	Reduces number of collection vehicles on city streets	Legal and management costs to reduce number of haulers collecting waste

TABLE 7.2 *(continued)*

	Strategy	Advantage	Disadvantage
4	Expand education programs to include waste prevention	Reduces waste stream and saves landfill space	Expense of education program
5	Work with local commercial and industrial facilities to reduce or zero out waste generation	Reduces waste going to landfills	Increases number of recyclables and loss of disposal fees
6	Provide collection of green waste	Increases availability of compost	Cost to purchase collection vehicles and establish or expand composting facilities
7	Establish a clearing house for construction materials and appliances	Reduce constructions and demolition debris entering landfill and provides reuse for appliances	Cost to establish clearing house Cost for personnel to run and maintain clearing house
8	Capture landfill gas and utilize as on-site fuel or identify other end users	Removes a volatile gas from the landfill without discharging it to the environment	Cost of installing gas collection system and increased maintenance costs
9	Recycle leachate into landfill to accelerate decomposition of waste	Reduces need for leachate storage and treatment	Potential for pockets of leachate to form which would result in leachate seeping out of the landfill
10	Divert roll-offs to capture cardboard and other large quantities of recyclables	Increase income to solid waste operation	Potential risk damaging the recyclables during removal Need for temporary storage of materials

7.4 SUCCESSFUL PARTNERSHIP STRATEGIES

Successful partnerships require mutual respect and collaboration among all partners. Participants must rely on each other and commit to opportunities presented through the partnership. Partners' willingness to share information, adjust as situations evolve, and facilitate positive outcomes are essential for successful partnerships. Further, successful partnerships recognize the need for partnering and that partnering presents more rewards and greater value than going solo. Without a sense of need and anticipated success, partnering is destined to fail. Partnering relative to solid waste programs typically occur for the following reasons:

- One partner has equipment or expertise that the other partner needs;
- The partnership garners greater leverage for purchasing equipment or similar materials;
- One partner has an exceptional skill or knowledge that is needed by the other partner;
- One partner has a landfill and the second partner hauls waste; and
- One partner has land that can be utilized by the second party to build a solid waste facility.

Five of the most common strategies[7.7] in creating partnerships are presented in Table 7.3. Along with these strategies, selecting mutually-beneficial partners, sharing information, evaluating the potential risks and rewards, and developing a mutual and flexible approach increases the likelihood of a partnership's success. Partners must be able to: (a) trust each other; (b) believe in the value of the partnership; (c) support each other; (d) find opportunities for joint success; and (e) exercise honesty in all dealings with each other.

TABLE 7.3
Five Most Commonly Utilized Partnership Strategies

Type of Strategy	Description
Horizontal	Businesses in the same area (i.e. competitors) agree to collaborate in a way that will improve their market position.
Vertical	A business collaborates with companies in its supply chain (its suppliers and/or distributors). Vertical partnerships often allow businesses to minimize risk in the supply chain and obtain lower prices in exchange for long-term commitment. Also known as channel partnerships or supply chain partnerships.
Intersectional	Businesses from different areas agree to share their special knowledge for the advancement of all partners.
Joint Venture	Two or more businesses form a new company. The new company is its own legal entity, and its profits are split according to terms spelled out in a formal contract.
Equity	A company acquires a minor equity stake in another business in exchange for a monetary investment. Such exchanges can accompany other types of collaboration and, to a certain extent, agreed-upon access to decision making.

7.5 REGULATORY AND STATUTORY OBSTACLES

Seven statutes[7.8] that pertain to solid waste issues in the State of Nebraska were reviewed to determine what regulatory or statutory obstacles may exist that inhibit increasing recycling and composting. The reviewed statutes, found in the Nebraska Revised Statutes include:

- §19-2101 to §19-2111. *Garbage Disposal*
- §13-1701 to §13-1713. *Solid Waste Disposal*
- §13-2001 to 13-2042.01. *Integrated Solid Waste Management Act*
- §81-1534 to §81-1570. *Nebraska Litter Reduction and Recycling Act*
- §81-15,158.01 to §81-15,165. *Waste Reduction and Recycling Incentive Act*
- §81-15,166. *Solid Waste Management Plan*
- §81-15,167 to §81-15,176. *Nebraska Environmental Trust Act*

It appears that these statutes present no obstacle to increasing recycling and composting. Both activities are considered very important as they relate to meeting the legislature's Nebraska Solid Waste Management Hierarchy, with recycling and composting at the second level of the hierarchy. This is further confirmed with a repetition of the hierarchy in the Nebraska Environmental Trust Act, the Solid Waste Management Plan, the Integrated Solid Waste Management Act, the Nebraska Litter Reduction and Recycling Act, and the Waste Reduction and Recycling Incentive Act.

In addition to strong support for both recycling and composting, this legislation allows NDEQ to capture more information from recycling and composting programs as well as landfills, transfer stations, and other solid waste facilities. For example, there is a requirement for certifying facility capacity in §13-2030 of the Integrated Solid Waste Management Act. The language of this section indicates that these certifications may be required to be submitted to NDEQ at anytime. Another section of the Integrated Solid Waste Management Act (§13-2032) requires that a solid waste management plan be "updated at anytime to reflect local needs and conditions." Finally, §13-2042 in the Integrated Solid Waste Management Act requires each landfill to submit the total volume of solid waste disposed at the landfill for each quarter.

In the Nebraska Litter Reduction and Recycling Act §81-1553 and §81-1563, there are requirements for conducting an annual survey measuring the amount and composition of litter and for grant recipients to submit periodic reports to ensure that the purposes of the act are being achieved. Under the provisions of these sections, requests for information could be utilized to capture extensive information on the quantity of waste and recyclables captured in the State of Nebraska.

The Waste Reduction and Recycling Incentive Act allows for the collection of more data on recycling and tire programs, and it provides an approach to adding staff to support the recycling and composting programs. In §81-15,162.07 of this act, the requirements for grant recipients to submit periodic reports is outlined. Language in this section is broad enough to allow for requests regarding the quantity of materials captured, processed and sold. Further, language in §81-15,160 of this act may provide the opportunity to utilize grant funds to support one or more NDEQ staff. Subparts 2a and 2f of this section should be further researched to interpret their applicability.

7.6 METHODS FOR DATA COLLECTION AND STANDARDS OF MEASUREMENT

Data can be submitted in a variety of ways that include online, hardcopy, and verbal methods. As NDEQ's recent move to having grant applications submitted online demonstrates, submitting data online is a feasibility. If it is assumed that the online submittal of data is implemented, then the next step is to determine what information should be collected. At a minimum, it is recommended that the following information be collected.

(A) Landfills

- Quantity of all waste accepted during a reporting period, segregated into the following types of waste:
  - Municipal solid waste;
  - Construction and demolition debris;
  - Liquids;
  - Special wastes; and
  - Other wastes
- Recyclables or reuse materials received and quantity
- Where recyclables were sent for processing

(B) Transfer Stations

- Quantity of all waste accepted during a reporting period, segregated into the following types of waste:
  - Municipal solid waste;
  - Construction and demolition debris;
  - Liquids;
  - Special wastes; and
  - Other wastes
- Recyclables or reuse materials received and quantity
- Where recyclables were sent for processing

(C) Recycling Facilities

- Recyclables or reuse materials received and quantity
- Quantity and types of recyclables sent for processing
- Quantity and types of recyclables stored on site
- Quantity and types of other materials received

(D) Composting Facilities

- Quantity and type of green waste received
- Quantity and types of other organic received
- Quantity and type of compost distributed
- Quantity and type of compost stored on site

Facilities should report this information at least twice each year; however, quarterly reporting would provide more accuracy and would assist in establishing potential trends in the waste, recycling, and compost streams. A separate annual report would also be required.

Along with the above-listed mandatory information, it is suggested that additional information is also collected. This information would provide a more complete picture of the state's solid waste system and could aid in proactively addressing potential issues. Some of the information that should be collected includes, but is not be limited to, the: (a) types of equipment at the facility; (2) age of the equipment; (3) amount of landfill gas collected; (4) any unique materials received at the facility; (5) types and quantities of unacceptable waste received at the facility; (6) how the unacceptable waste was addressed; and (7) number of staff and their skills.

Each facility's annual report should include information relating to its measuring devices. As required in the regulations and by manufacturers, all scales are to be inspected annually. The results of each test and any scale maintenance should be provided. If the facility does not have a scale, then the methods employed to measure materials should be provided. If a facility uses a measuring device that cannot provide a weight, the method to translate the measurement into pounds or tons should be clearly detailed.

Reports should be submitted no more than 30 calendar days after the end of the reporting period. This would allow NDEQ staff time to review the reports and address any issues prior to the next reporting period's submittal.

The measurement standards for all the solid waste facilities should be tons or pounds. Measurements should be to the nearest pound or tenth of a ton, depending on the scale. For those facilities that do not have access to a scale, then measurements should be taken in cubic yards or cubic feet and a relationship between cubic feet or cubic yards and tons should be established. This can be facilitated by locating the nearest scale and weighing different sized bales of specific materials. For single items such as appliances, furniture, trailers, or similar items, the weight can be measured in pounds.

7.7 LANDFILL BANS

Banning specific wastes from disposal in municipal solid waste (MSW) landfills is typically considered for two reasons. The first reason is that the banned material is either potentially dangerous or may adversely impact the operation of the landfill. For example, lead-acid batteries are dangerous and are banned from disposal in MSW landfills. Similarly, tires are statutorily banned from disposal in MSW landfills because disposal of these materials, and other similar materials, in landfills can adversely affect the environment as well as the facility's operations. The second reason for banning a material from a MSW landfill is that it may have potential for beneficial reuse or recovery, yard waste, for example.

Nebraska's waste hierarchy emphatically emphasizes banning or diverting as many wastes as possible from landfills. A stronger emphasis on removing more materials from the solid waste stream has resulted as recycling and waste recovery programs throughout the state have flourished. This has put pressure on state and local entities to implement bans on certain materials entering the municipal solid waste landfills.

7.7.1 Present Material Bans

The following materials are banned from being disposed in municipal solid waste landfills in Nebraska:

- Yard Waste (April 1 to November 30)
- Waste Oil
- Lead Acid Batteries
- Household Appliances
- Unregulated Hazardous Waste
- Waste Tires

Most of these banned materials either contain hazardous materials or are problematic for the proper operation of the landfill. Although a definitive study of the success of these bans at Nebraska landfills has not been conducted, anecdotally it does appear that the bans have had an impact on landfills and reduced the amount of these banned materials from entering landfills.

7.7.2 Impact of Present Material Bans

As noted previously, the impact of banning certain materials from municipal solid waste landfills in Nebraska has not been thoroughly evaluated. However, it does appear that waste generators and landfill operators have been successful in keeping banned materials out of the waste stream. A major force in the success of these bans is their longevity. For example, yard waste, household appliance, and tire bans have been in effect for around two decades. The yard waste ban was implemented in 1994; the ban on household appliances began in 1995; and, the tire ban was established in 1998. During this time, a generation of Nebraskans have grown up knowing only these bans.

7.7.3 Potential Material Bans

Banning a material from municipal solid waste landfills should not be undertaken without thorough evaluation. It is important to consider the impact the ban may have on both residential and commercial waste generators and avenues for safely collecting and disposing of the material.

There are two types of materials banned from disposal in MSW landfills: (1) materials that pose a hazard to the community, landfill, or environment; and (2) materials that have the potential to be beneficially reused or recovered. The first type of materials pose public health and/or operational issues for facilities. As noted previously, most of the bans implemented in Nebraska encompass these materials.

The second type of ban identifies materials that can be taken out of the landfill and either recycled or reused, for example the state's present yard waste ban or the forthcoming ban of the disposal of cardboard at the City of Lincoln's landfill. In both cases the banned material can be recycled (e.g. cardboard) or beneficially utilized (e.g. yard waste).

Banning an entire spectrum of materials that have the potential be beneficially reused or recovered can impose negative impacts. For instance, certain plastics cannot be recycled and their presence in the recycling waste stream negatively impact material recovery facility operations[7.9] and solid waste facility operations. An example of this is plastic bags. At landfills, plastic bags are difficult to contain when air borne and create hazards to wildlife, landfill operators, and the general public. At material recovery facilities, plastic bags can become lodged in conveyor belts and other sorting equipment, which results in the equipment shutting down and added maintenance time to remove these bags. By banning only select plastics (i.e., plastic bags) from recycling facilities, the level of contamination in the plastic waste stream is reduced and maintenance costs are also potentially reduced. At landfills, removing plastic bags from the waste stream would improve safety and lessen negative impacts to the environment.

Implementing new landfill bans should be driven by safety or opportunity issues. Safety issues are currently an integral part of the regulatory framework. Environmental regulations allow certain materials, liquid or solid, to be banned from entering landfills in the state. Constituents usually accept these types of bans as a matter of course as the danger of the materials is easily recognized.

Landfill bans driven by opportunity issues are more involved. Implementation of these bans requires informing and educating the public and businesses as to the value of the ban as well how the banned material will be handled. In addition, alternatives to disposing the banned material must be provided. These alternatives can encompass a variety of options – providing drop-off locations, separate collection at the curb, or separate collection bins for large generators.

Potential landfill bans may include many materials, each of which possess certain value or disposal problems. In either case the need to establish an infrastructure to accommodate each ban should be in place and properly functioning before the ban is in full force.

7.7.4 Potential of Banned Materials

Experience gained from more than 20 years of recycling and recovering a variety of materials along with the growth of the recyclables and reuse market makes it possible to determine a banned material's potential value. In addition to the material's possible value, it is important to recognize the level of effort needed to collect the material. Table 7.4 presents an evaluation of a material's potential value if it is removed from the solid waste stream together with an assessment of the volatility of the market for the material. Two elements comprise the rating of a material's potential value, the material's consistency and its availability; market volatility is based on the stability of the material's value and fluctuations in the value of the material.

TABLE 7.4
Possible Banned Materials and Potentials

Material	Potential Value	Market Volatility
Cardboard	Excellent	Limited
Aluminum	Excellent	Limited
Newsprint	Very Good	Potential
Plastics	Good	High
Food	Good	Limited
Construction and Demolition Debris	Good	Limited
Glass	Fair	High
Other Metals	Fair	Potential
Other Paper	Fair	Potential
CRT	Limited	High
Televisions	Fair	Fair

Of the materials presented in Table 7.4, those that are most reliably found in the municipal waste stream and have the most stable marketability are aluminum and cardboard. These two materials are most in demand in the commodity market and the market for these materials has been the most stable from year to year. Further, these two materials are consistently found on the list of materials collected by recycling operations.

Other than these two materials, the remaining materials presented in the table vary in both availability and potential value. Newsprint, for example, has been diminishing in availability as the interest in newspapers as a primary source of information has declined. In addition, given the potential options for uses of newsprint the value of the material is in flux.

Plastics provide another example of a material that can be recycled but its accessibility and value varies significantly. From an accessibility perspective plastic can be very easy to recycle. The complication with plastics is the difficulty of segregating plastics into specific types. Even the most common plastic containers, PET and HDPE, can be challenging to successfully segregate as they often contain plastic materials that are not PET or HDPE.

Shipping and storing plastic materials presents another challenge. Although some plastics can be baled using a standard baler, there are other plastics that are either too rigid or too flexible to easily bale. Other methods such as the use of gaylords or heavy-duty bags are often utilized for these types of plastics. When gaylords or bags are used, the amount of space these plastics consume increases which, in turn, increases shipping costs.

When the commodity market demand for plastics is down, the issue of storage and material degradation become more prevalent. Some plastics, including PET and HDPE, have limited life and are susceptible to degradation from deformation, temperature, and light.

The success or failure of banning a specific material from MSW landfill's is ultimately dependent upon the material's long-term value or long-term risk. In either case the decision to ban a material from MSW landfill's must be clearly thought out and evaluated to ensure there are alternatives in place for the material's final disposal or reuse. If alternative options for disposal or reuse are not available, the banned material may become a burden on both the economy and environment.

7.7.5 Enforcing Material Bans

Successfully banning certain materials in MSW landfills relies on effectively communicating the reasons for banning a specific material and the ban's value to the public, and providing alternative options for disposing or reusing the banned material. Education campaigns through the schools, radio, television and social media, public hearings, and signage at landfills are the most prominent methods for educating the public. In addition, working directly with waste generators to develop alternative methods to dispose of or reuse the material affect a ban's success or failure. Further, emphasizing the health and safety reasons for banning a material from being disposed at MSW landfills together with the consistent reinforcement of this message are crucial in the success of any ban.

Four methods are conventionally used to enforce landfill bans: (1) conducting spot inspections of loads of waste delivered to landfills; (2) reviewing facility records; (3) performing spot checks at banned-material generators; and (4) inspecting roll-off containers as they deliver waste to a landfill. Conducting spot inspections occur at the landfill. These spot inspections involve looking at a load of waste after it is unloaded from the delivery vehicle. The load is spread out to allow for as complete an inspection as possible and then it is closely inspected to identify whether any banned materials are present in the load.

Reviewing landfill records assists in identifying businesses and industries that generate banned wastes. With this information, landfill operators and staff can be trained to more carefully check where loads are coming from and anticipate delivery of wastes that could potentially contain banned materials.

Identifying businesses and industries that generate banned wastes allows for the implementation of a proactive enforcement approach. This method entails inspectors performing spot checks at these material generators to see how the waste is generated and how it is packaged for disposal. There are circumstances where generators, for ease of transporting the waste, place it in a box or other container. When the banned material is in a container it cannot be visually inspected and it may inadvertently be placed in the landfill. Inspectors can then provide landfill facilities with information on how and in what type of containers these materials are packaged. Landfill operators and staff can then be more vigilant in their inspections of wastes delivered from these generators and prevent these materials from being placed in the landfill.

The final method of enforcement encompasses inspecting incoming roll-offs and dumpsters before they can be unloaded at the landfill. These inspections involve removing the tarp and closely looking at the waste in the roll-off or dumpster. Although all the contents of the load cannot be seen, conducting these inspections reduces the possibility of banned materials entering the landfill.

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§81-15,158.01 to §81-15,165. *Waste Reduction and Recycling Incentive Act*
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8.0
RECOMMENDATIONS

Throughout the previous seven sections of this report activities relating to various aspects of solid waste operations in Nebraska have been discussed and evaluated. Each section touched on issues that have created either road blocks or opportunities to improve solid waste systems. Drawing upon all the information generated for this report and presented in previous sections of this document, a set of recommendations has been generated.

RECOMMENDATION 1
Combine the Litter Reduction and Recycling Grant Program and the Waste Reduction and Recycling Incentive Grant Program

The Litter Reduction and Recycling Grant (LRRG) program was established in 1979 and the Waste Reduction and Recycling Incentive (WRRI) Grant program was established in 1990. These programs have provided significant funding to support both private and public recycling, waste reduction, public education, and litter control programs. With the advent of NDEQ's online application process and the fact that these two grant programs often support the same endeavors, the need to keep the programs separated doesn't exist. Combining the two programs presents the possibility that more projects can be funded. It will also clearly indicate that efforts to address littering, recycling, waste reduction, solid waste operations, and public education are of equal importance. Further, combining the two programs allows for a more focused approach to supporting and funding the state's solid waste programs in accordance with the waste management hierarchy and priorities established by NDEQ.

RECOMMENDATION 2
Remove the Disposal Fee Split

The disposal fee is presently split equally between the state's solid waste grant programs and support of NDEQ's waste programs. Because these programs' needs fluctuate from year to year, it is recommended that an annual assessment be conducted to determine how the disposal-fee funds should be divided. This process can be addressed by a small panel of NDEQ staff who do not receive any direct support from the disposal fee.

RECOMMENDATION 3
Assess NDEQ Expertise

The continued growth of Nebraska's recycling and waste reduction programs has been discussed throughout this report. Increases in these programs and activities have driven the need for more information and direction from NDEQ. It is imperative that NDEQ stay ahead of this growth and maintain its ability to respond to issues as they arise. Staying ahead of the growth curve will allow NDEQ to expand recycling and waste reduction in Nebraska instead of being in a position of reaction and catchup.

RECOMMENDATION 4
Expand Public Education Programs and NDEQ Outreach Programs

Coordinated effort is needed to provide continuing proactive education for NDEQ and its partners in the waste management industry to meet continuing challenges. Efforts should be devoted to educating the public on the need for waste minimization with the ultimate goal of zero waste. NDEQ should institute a new training program that concentrates on waste minimization methods and strategies that the public, businesses, and industries can employ. This may require significant preparation and additional training for NDEQ staff. It is also recommended that a secure and resilient funding source for solid waste and recycling public education programs be identified so there is continuity in the education format and structure.

Specific efforts should be devoted to providing peer exchange opportunities to those involved in recycling and waste reduction. This will enable them to learn from each other's experiences, and keep abreast of new innovations and developments in the industry. Additionally, NDEQ should develop a web-based repository of related information including, but not limited to:

- best management practices;
- a listing of potential waste management grant opportunities;
- educational documents prepared by grantees; and,
- a listing of materials management-related organizations at the state and federal level.

It is essential that all opportunities be made available across the state; those in western Nebraska should not be expected to travel to the eastern half of the state for these opportunities.

RECOMMENDATION 5
Assess Information Needs

One of the continuing themes of this study is the inconsistency and limited data reported to NDEQ. To be able to understand where any program or organization is presently and to be able to plan for future changes, it is vitally important to have concise, accurate, and consistent data. It is recommended that a NDEQ task force be formed to ascertain the level of data that can be acquired and if all NDEQ divisions – air, water, land and waste, and environmental assistance – have access to the quantity and quality of data they need.

Many of the recyclers and solid waste managers interviewed for this study commented on the value of the Nebraska's statewide waste characterization study (*State of Nebraska Waste Characterization Study*, March 2009). This waste characterization study was conducted almost nine years ago. Since that time, several efforts have been instituted that impact the state's solid waste stream. A waste characterization study would provide updated data that can be used to measure the impacts of modifications within the state's solid waste systems along with those impacts increased recycling and waste reduction efforts have facilitated. It is recommended that a waste characterization study be conducted as soon as feasible and that follow-up studies should be conducted every five to eight years thereafter.

RECOMMENDATION 6
Assess Opportunities for State Agency Collaboration

The state should serve as an example for the pursuit of sound and sustainable waste management practices. NDEQ should collaborate with other state agencies to examine steps that could be taken to further waste management goals. Those agencies should include, but not be limited to the:

- Department of Transportation;
- Department of Economic Development;
- Department of Agriculture; and,
- Game and Parks Commission.