

Construction and Demolition Waste Disposal

Overview

Construction and demolition (C&D) waste is not clearly defined to be part of “solid waste” in Nebraska Revised Statutes 81-1502. As further discussed in the technical paper on *Construction and Demolition Material Recycling*, there are many definitions and material types that are considered C&D waste. Consistent with the explanations in that technical paper, waste material resulting from new construction, remodeling or the demolition of existing structures is referred to as C&D waste. C&D wastes may be managed in wide variety of manners. C&D wastes may be landfilled at either municipal solid waste (MSW) landfills or C&D landfills; portions of the waste stream may be used as “fill” or processed (often by grinding) to create materials suitable for replacement of sands and gravels. Portions of the material from C&D projects may also be recovered for reuse, including metal, wood and certain building materials.

Nebraska Department of Environmental Quality (NDEQ) defines C&D waste as including “fill material”, but “fill”, which consists only of one or more of the following: sand, gravel, stone, soil, rock, brick, concrete rubble, asphalt rubble or similar material can be used for erosion control, erosion repair, channel stabilization, landscaping, roadbed preparation or other land improvement and under those conditions is exempt from NDEQ regulation. Materials which are defined as “fill” and used for the above purposes do not require regulatory reporting or disposal in a permitted facility.

NDEQ Title 132 – Integrated Solid Waste Management Regulations (Title 132), Chapter 5 establishes the “Criteria for Construction and Demolition Waste Disposal Area”. C&D processing facilities in Nebraska are required to have a permit from the NDEQ, but are only required to report quantities of processed material sent to disposal (not total quantities processed or quantities diverted).

Current Programs

The North 48th Street Construction and Demolition Waste Landfill, 5101 North 48th Street, is located on City owned land. The North 48th Street site is approximately 450 acres in size; the permit renewal documents (the current permit to operate expires in July 2013) identifies 121 acres for disposal of C&D wastes. Key features of the North 48th Street site are shown on Figure 1. The City’s North 48th Street Construction and Demolition Waste Landfill is located above an area where municipal solid waste (MSW) from Lincoln and Lancaster County were disposed, starting in approximately 1956; in 1990 this site discontinued taking all wastes with the exception of demolition debris and building rubbish (now referred to as construction and demolition waste). These materials were used and continue to be used to create a “dome” or “hill” above certain areas of the historic MSW landfill. The disposal of C&D waste is creating positive grades to ensure surface water drains to the ditches that convey water away from the historic MSW, rather than allowing the surface water to infiltrate (or percolate) through the historic MSW. The North 48th Street Construction and Demolition Waste Landfill has accepted an average of 76,600 tons per year of C&D waste over the last five (5) years. Lincoln’s C&D Waste Landfill is more restrictive on waste types accepted than other C&D Landfill operations

permitted by NDEQ. The City has limited the acceptance of large quantities of certain C&D wastes such as paper, gypsum board, rubber, plastics, shingles and asphalt. The City has also prohibited painted and treated wood. The amount of acceptable wood debris has generally been restricted to approximately 50 percent per each load. The imitations result in a portion of the construction and demolition waste being disposed of at the Bluff Road Landfill.

The closed MSW landfill areas at the North 48th Street site require ongoing maintenance and the City continues to monitor groundwater and for landfill gas migration associated with historic use of the site for MSW disposal.

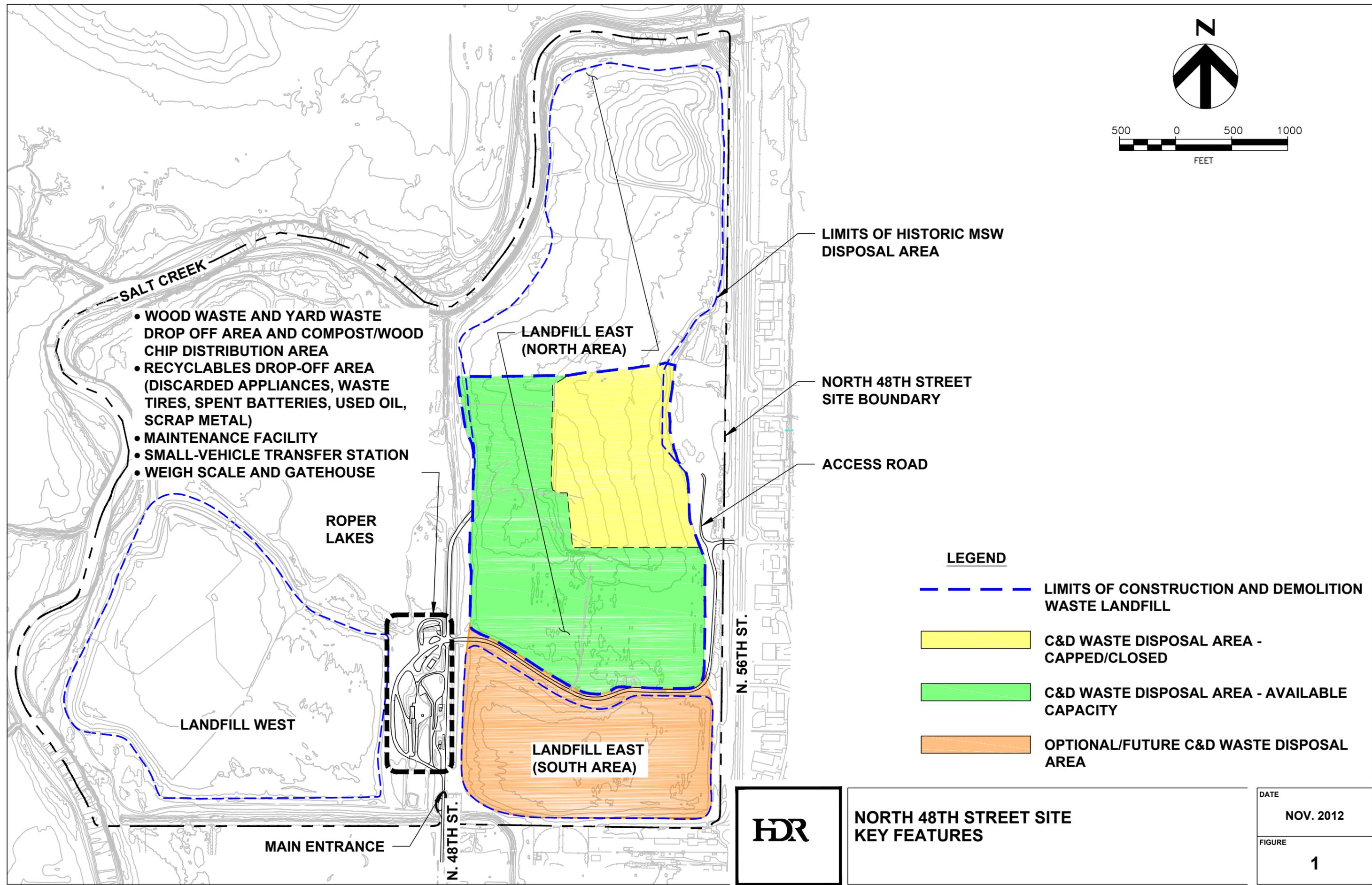
A portion of the C&D waste stream generated in the City and County is exported to other disposal sites in the region, but the quantities exported are not required to be reported. Table 1 provides a summary of historical C&D tonnages disposed at the North 48th Street Construction and Demolition Waste Landfill. The decline in tonnage since 1994 is largely attributed to increased levels of recycling of the concrete, asphalt and metal from C&D waste streams as well as waste exports.

Table 1 –C&D Waste Landfilled at North 48th Street (Tons)

FY	Tons
88-89	138,676
89-90	121,701
90-91	147,563
91-92	202,380
92-93	269,201
93-94	356,764
94-95	167,405
95-96	112,379
96-97	92,868
97-98	88,341
98-99	101,682
99-00	86,760
00-01	61,305
01-02	88,227
02-03	78,649
03-04	98,174
04-05	76,746
05-06	86,159
06-07	75,491
07-08	89,446
08-09	53,185
09-10	59,119
10-11	76,337
11-12	105,130

Facilities on the North 48th Street site include the scale, scale house, transfer station, recyclables drop-off area, lawn waste/wood waste drop-off area, appliance de-manufacturing facility, maintenance building, and storage building. The storage building located within the C&D waste disposal area will eventually be demolished when filling progresses to this area.

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SALT CREEK

- WOOD WASTE AND YARD WASTE DROP OFF AREA AND COMPOST/WOOD CHIP DISTRIBUTION AREA
- RECYCLABLES DROP-OFF AREA (DISCARDED APPLIANCES, WASTE TIRES, SPENT BATTERIES, USED OIL, SCRAP METAL)
- MAINTENANCE FACILITY
- SMALL-VEHICLE TRANSFER STATION
- WEIGH SCALE AND GATEHOUSE

ROPER LAKES

LANDFILL WEST

MAIN ENTRANCE

N. 48TH ST.

LANDFILL EAST (NORTH AREA)

LANDFILL EAST (SOUTH AREA)

N. 56TH ST.

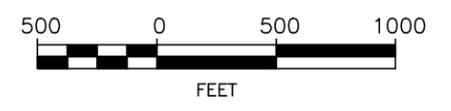
LIMITS OF HISTORIC MSW DISPOSAL AREA

NORTH 48TH STREET SITE BOUNDARY

ACCESS ROAD

LEGEND

- LIMITS OF CONSTRUCTION AND DEMOLITION WASTE LANDFILL
- C&D WASTE DISPOSAL AREA - CAPPED/CLOSED
- C&D WASTE DISPOSAL AREA - AVAILABLE CAPACITY
- OPTIONAL/FUTURE C&D WASTE DISPOSAL AREA



**NORTH 48TH STREET SITE
KEY FEATURES**

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FIGURE	1

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The permit renewal document identifies the total C&D air space capacity as approximately 2.26 million cubic yards (CY) (excluding the final cover). Based on projections contained in Section 5 of the Needs Assessment, this landfill is expected to reach capacity in approximately 2030; the remaining air space capacity is approximately 1.2 million CY (excluding final soil cover).

Generation and Diversion

C&D waste generation has fluctuated over the years based on numerous factors, including economic activity, exports, diversion and other factors, but has been relatively stable over the past 10 years. C&D waste generation is not directly related to population growth; therefore, it is more difficult to predict C&D waste generation. For projection purposes in the Needs Assessment, the average growth rate has been assumed to be equal to the population growth rates reflected in Table 2-2 “Trend Series”.

The North 48th Street Construction and Demolition Waste Landfill has accepted for disposal an average of 76,600 tons per year over the past 5 years; based on 365 days per year, this is equivalent to 210 tons per day.

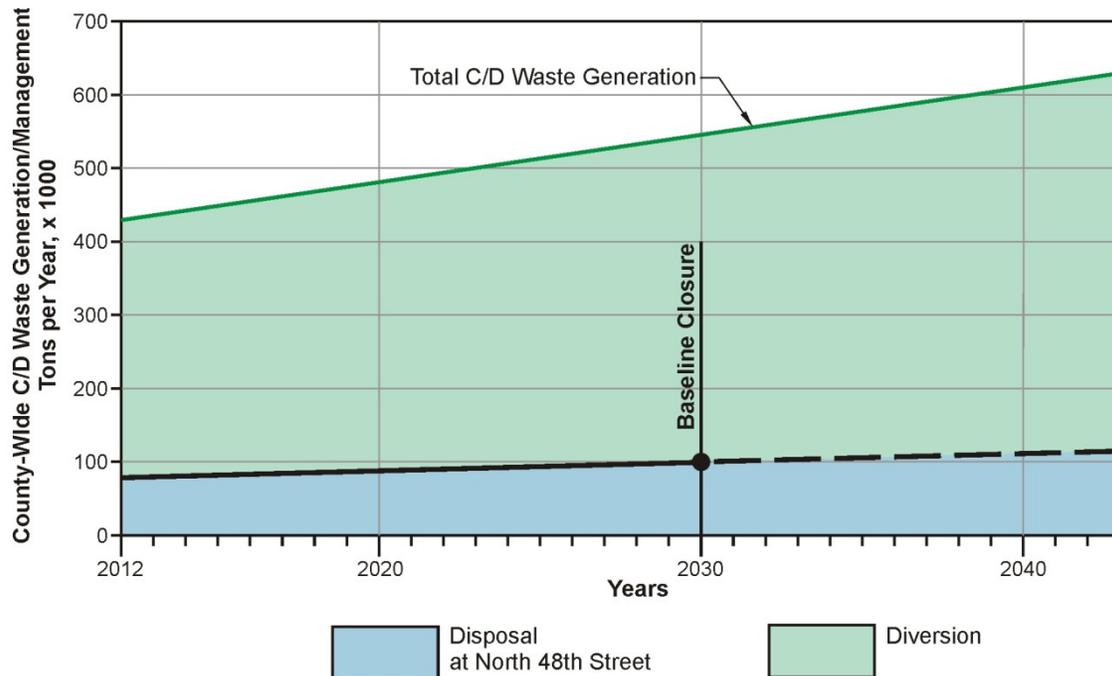
Forecast of future waste quantities sent to disposal were developed as part of the Needs Assessment using the unit waste generation rates and the LPlan 2040 projected population growth rates. These forecasts represent the waste quantities baseline expected to be generated and disposed from the Planning Area under the status quo. The major factors that have the potential to significantly influence the estimates of local disposal capacity needed are:

- Changes in waste export quantities or imports
- Changes in diversion practices (increases or decreases)

As noted in the Need Assessment, it was estimated that 75 percent of C&D waste generated in 2011 was diverted from disposal; over the past 10 years the diversion rate for C&D materials has averaged greater than 80 per percent. Changes in recycling or diversion rates can affect future disposal needs. As part of the planning process, the City may examine options to accept waste from outside Lancaster County for disposal; if this were to occur, there may be benefits to the City, but the increase in disposal quantities would reduce the overall life of the landfill(s).

While it is possible to examine a wide range of factors that might affect variations in waste generation (i.e., changes in projections for population, economic changes) or changes in waste reduction and recycling, the results of any such assumptions are still only assumed values. As such, the Needs Assessment established the baseline estimates for C&D waste generated and landfilled. Figure 2 further illustrates the projected need for C&D waste landfill capacity and the overall life of the City’s North 48th Street Construction and Demolition Waste Landfill, as currently permitted. The baseline is also intended to be used to as a basis of evaluation for future diversion options and to illustrate how future programs may affect disposal capacity (existing or required).

Figure 2 – C&D Waste Generation and Management Baseline



The North 48th Street Construction and Demolition Waste Landfill is projected to reach capacity in 2030. The quantities of C&D wastes currently delivered to the North 48th Street Construction and Demolition Waste Landfill are equivalent to approximately 20 to 30 percent of the solid waste disposed in the Bluff Road MSW Landfill. A new facility for handling C&D wastes will need to be identified during the planning period to avoid directing C&D wastes to the Bluff Road MSW Landfill. Directing C&D waste to the Bluff Road MSW Landfill would negatively affect the life of the Bluff Road MSW Landfill.

Program (Facility/System) Options

A C&D waste landfill is basically a facility designed to store or entomb materials discarded by society. While considered least preferred on the waste management hierarchy it is often the lowest cost per ton option to manage the C&D waste that is not otherwise diverted from disposal by source reduction, recycling, or other alternatives.

There are no federal regulations specific to C&D waste landfills; however, the NDEQ has specific regulations that govern the siting, design and construction, operations, closure and post-closure care of Construction and Demolition Waste Disposal Areas. Site location restrictions are similar to those for a MSW landfills; construction, operations, closure and post-closure care standards are generally less stringent due to the limitations on the types of waste that can be accepted at a C&D waste landfill.

For purposes of this technical paper a C&D waste landfill is addressed as a necessary facility (solid waste management option) to deal with materials not otherwise diverted or recovered. As such, options are discussed in terms of providing secure long-term waste disposal capacity

when the existing, permitted North 48th Street Construction and Demolition Waste Landfill reaches capacity and there remains C&D waste that requires disposal.

Because of the real and perceived issues associated with landfills, it is often quite costly and difficult to establish (site/permit) a new landfill. Siting a new landfill often involves a mix of social, political, environmental, regulatory, technical and economic considerations and can take many years. Well before the City's North 48th Street Construction and Demolition Waste Landfill reaches capacity it will be necessary to identify a suitable disposal site for landfilling C&D waste generated in the Planning Area. The basic options for long-term disposal capacity include the following:

- Expansion of the existing C&D waste landfill
- New City C&D waste landfill
 - At the Bluff Road Site
 - At a new site
- New Private C&D waste landfill
 - In the County
 - Outside the County
- A new co-located C&D waste and MSW landfill

Due to transportation costs and resulting higher cost to C&D waste generators, the City's cooperation in a regional facility outside Lancaster County is not considered or evaluated further in this technical paper.

A LPlan 2040 guiding principle related to solid waste is:

"The City policy of ... public ownership, operation and financing of disposal ... will continue during the planning period."

LPlan 2040 also identifies under the Solid Waste Disposal program, that

"a new facility for handling construction and demolition debris will need to be sited during the planning period, starting in 2014. While this landfill should be completed and closed, the N. 48th Street transfer station and recycling areas are scheduled to remain."

While the remaining life may allow the starting point for siting/expansion evaluation to change, unless these policies, guiding principles and strategies change a new City owned and operated C&D waste landfill has been determined to be the option of choice. As such, the remainder of this technical paper focuses on issues that will need to be addressed in developing a new facility for future use.

The current operation on the North 48th Street site involves placing C&D waste on the area of the site known as Landfill East. As shown in Figure 1, Landfill East is divided into two areas by an access road. Both the northern and southern portions of Landfill East were used for MSW disposal between 1956 and 1990. From a conceptual perspective, if the southern portion of Landfill East were filled with C&D waste in a pattern similar to the north area this would provide approximately 1 million CY of capacity or roughly the equivalent of 13 to 15 additional years of disposal capacity. In the future the southern portion of Landfill East will require maintenance to address insufficient drainage and water ponding issues associated with historic use as an MSW

disposal site, similar to what is currently being done with the filling of C&D waste on the northern portion of Landfill East. Such future maintenance can be done with clean soil, “fill”, or C&D waste material. If C&D waste material is to be used the area will require permitting, likely as a lateral expansion of the existing Construction and Demolition Waste Disposal Area.

The option of combining the C&D waste and MSW in a single landfill is considered technically viable. However, because each landfill type has separate design and construction, operations, closure and post-closure care requirements it may be more appropriate to view them as two separate facilities on the same or contiguous sites rather than a combined facility. Such a concept may have advantages as it relates to siting and operations requirements, but will also require a larger site area. Because the cost of operating a C&D waste landfill is substantially less than an MSW landfill it is not anticipated that future options will include sending C&D waste to a MSW landfill.

A soil borrow area (see Figure 3) identified at the south end of the current Bluff Road MSW Landfill property will be excavated as part of the future construction, operations and capping of that landfill. The area is suitably located, based on current NDEQ criteria, to serve as a C&D waste landfill. Based on planned excavation and conceptual filling grades, this site would provide an approximately 1 million CY of disposal capacity or roughly the equivalent of 13 to 15 additional years of disposal capacity. Significant advantages associated with this location are:

- the current site is permitted as a landfill (although the borrow area is not permitted to accept waste)
- the site is owned by the City and properly zoned
- the site would almost certainly meet the location requirements in NDEQ Title 132
- the site has most of the necessary infrastructure.

While no disadvantages have been identified, the disposal area is in close proximity to Interstate 80 and visual considerations, including screening, would need to be address during the site evaluation and permitting process. As with any other site it would also require local approval from elected officials.

Options Evaluation

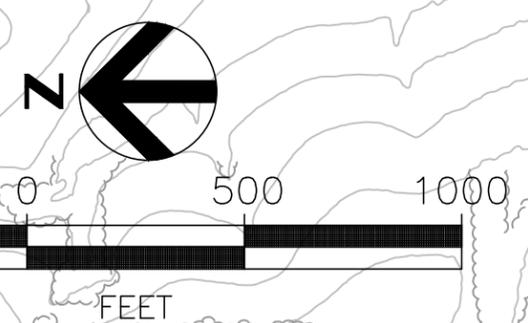
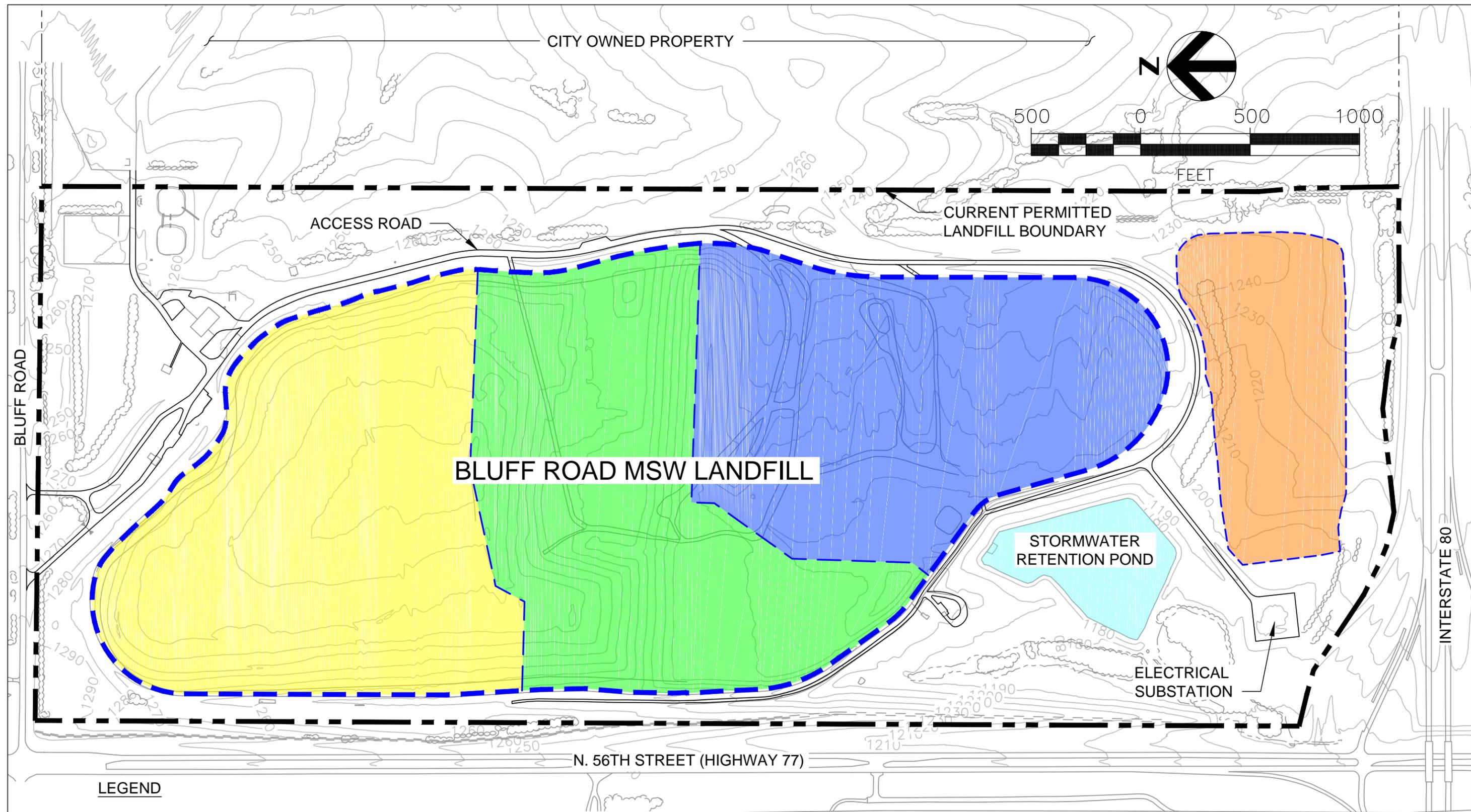
The core issues to be addressed in undertaking a lateral expansion of the existing North 48th Street Construction and Demolition Waste Landfill or using the soil borrow area on the south end of the Bluff Road site include the following:

- Permitting requirements and restrictions
- Local approval by elected officials.

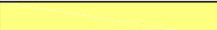
One significant challenge that exists with any future landfill construction and operations is the uncertainty of public policy and the always controversial process of siting a new solid waste management facility or expanding a current solid waste disposal site.

For the purposes of this technical paper, the balance of the discussions focus on considerations associated with implementing a new C&D waste landfill on land that is not a part of the City’s currently permitted disposal sites.

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LEGEND

	LIMITS OF PERMITTED MSW DISPOSAL AREA
	CAPPED/CLOSED MSW DISPOSAL AREA
	ACTIVE MSW DISPOSAL AREA
	CURRENT SOIL BORROW AREA AND PERMITTED MSW DISPOSAL AREA
	FUTURE SOIL BORROW AREA AND OPTIONAL/FUTURE C&D WASTE DISPOSAL AREA



OPTIONAL/FUTURE C&D WASTE DISPOSAL AREA
BLUFF ROAD SITE

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FIGURE	3

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In addition to the core issues listed above, establishing a new City owned C&D waste landfill will require the City to address the following:

- Identification and possibly acquisition of the required land
- Siting/location restrictions
- Permitting requirements and restrictions
- Infrastructure requirements
- Cost of services and funding mechanism
- Implementation schedule

The identification and acquisition of land for a new C&D landfill will encounter opposition and may be one of the more complex aspects of developing a new site. Assuming such an effort is successful, the City will need to consider the proactive measures, similar to the considerations addressed in the paper on Municipal Solid Waste Disposal, including the following:

- Ensure that current and future land-use plans and regulations identify landfilling and solid waste management as acceptable uses.
- Pursue including “solid waste landfilling” and “solid waste processing and management” as specifically defined and approved uses in the zoning regulations.
- Obtain the local land-use (siting) approval, if necessary, to allow for permitting of the selected parcel of land as a solid waste facility (landfill or solid waste processing and management).
- Evaluate options in land-use plans and zoning rules to prevent conflicting development near the landfill boundary. One such option may be the establishment by code or ordinance of a buffer area (setback distance) for residential and commercial development around the perimeter of a City-owned land/landfill.

At this time, the City’s operations at the North 48th Street site are not considered a significant nuisance to neighbors. However, in siting a new landfill the issues that may be raised include both neighborhood nuisance considerations and property value impacts. From a logistical perspective the site chosen will, at a minimum, need to meet locational/siting criteria set forth in NDEQ Title 132; neighbors and community members may want additional siting considerations or mitigations to be considered.

Siting/location restrictions: Consistent with current practices the City owned land will likely need to be zoned Waste Management and Extractive Services Use Group. A review of City and County zoning regulations identifies a Waste Management and Extractive Services Use Group, which includes landfills as one potential special use (permit required).

Consistent with NDEQ Title 132 regulations, the City will need to demonstrate the future landfill site meets certain regulatory “location restrictions”. These restrictions are intended to ensure that landfills are built in suitable geological areas away from seismic faults, wetlands, flood plains, or other restricted areas. Specific investigations and analysis will ultimately be required as part of the permitting process to demonstrate that these conditions are being satisfied or addressed.

Permitting: Both state and local regulations govern the siting, construction and operations of a C&D waste disposal site.

NDEQ regulations relative to siting, design, construction and operations are quite specific and detailed. The current North 48th Street Construction and Demolition Waste Landfill and Bluff Road Municipal Solid Waste Landfill comply with these NDEQ Title 132 and related regulations. Any new permit (or any lateral expansion of the existing site) will require public notice and potentially a public hearing before approval is granted by NDEQ.

Infrastructure requirements: Essential infrastructure will need to be provided and would generally include suitable roadways, electrical power, a water source and storm water management provisions. Site security fencing will be required and screening should be anticipated. While these all have associated costs, none are considered barriers to a new C&D waste landfill and are typically part of a new landfill development.

Cost of services and funding mechanism: For purposes of this technical paper it was assumed that continued City ownership and operation of the C&D waste landfill will remain cost competitive with other disposal facilities in the region. The cost of funding long-term site development is assumed to be a continued part of the City's capital improvement program and would continue to be paid for by the tipping fees assessed for use of the C&D waste landfill. The City has used a revenue bond to fund capital improvements at the Bluff Road Landfill; it is assumed this option would be viable in the future for a C&D waste landfill. Revenue bonds imply the repayment of bonds will be from revenues generated by tipping fees as opposed to general obligation bonds which are repaid from tax levies.

Implementation Schedule: From a national perspective the timeframe associated with siting and permitting a new municipal solid waste landfill is often 5 to 10 years and not all such efforts are successful. While the timeframe for siting and permitting a new C&D waste landfill should be somewhat shorter, there remains no certainty that such an effort would be successful. For this reason a proactive program involving land acquisition, zoning, permitting, and site designation is considered appropriate. Such proactive measures may also include establishment of site buffers and associated infrastructure.

Options Evaluation

Consistent with the evaluation criteria developed for use in the Solid Waste Plan 2040, C&D waste disposal options have been evaluated based on the following considerations:

- **Waste Reduction/Diversion:** Landfilling is used to manage the C&D waste not otherwise diverted from disposal. As such, landfills are not a waste reduction or diversion program. While exportation of C&D waste would extend the life of the existing City C&D waste landfill it will not reduce the amount of waste disposed.
- **Technical Requirements:** The current baseline projections for C&D waste disposal indicate that the existing North 48th Street Construction & Demolition Waste Landfill will reach capacity in approximately 2030 and as such additional disposal capacity will be required before the end of the planning period. The technology utilized for C&D waste landfills is considered reliable and has been deemed protective of the environment by the NDEQ. The issues, concerns and uncertainty often discussed in association with a C&D waste landfill is what risks the site may pose to neighbors.

- **Environmental Impacts:** Landfills are currently considered a necessity in the solid waste management system to protect human health and the environment. As organic waste decomposes in a C&D waste landfill it produces air emissions that may include criteria pollutants and greenhouse gases (principally, methane and carbon dioxide (CO₂)). Air emissions (principally particulate (dust) and CO₂) also result from facility operations and vehicles that use the C&D waste landfill. An active landfill gas collection system is not commonly used in C&D waste landfills, due to the limited amount of readily degradable organic waste that they accept. Also, because not all waste placed in a C&D waste landfill degrades, C&D waste landfills also serve to sequester carbon (help reduce a portion of the greenhouse gas generation) that might otherwise result in air emissions. Monitoring of surface water is a routine part of C&D waste landfill operations and a permit compliance requirement. Such monitoring is used to demonstrate that constructed and operational controls are performing properly.
- **Economic Impacts:** The initial construction and capping of completed areas of a C&D waste landfill require significant capital expenditures. These are typically paid from the tipping fee charged to site users. C&D waste generators generally pay costs associated with the C&D waste landfill through tipping fees either directly or through the firm hauling the C&D waste material to the disposal site. The City establishes landfill tipping fees based on the necessity for capital and operating expenditures. The tipping fee at the North 48th Street Construction and Demolition Waste Landfill is \$4 per ton for large vehicles hauling and disposing of C&D waste material, or \$4 per load for small vehicles hauling and disposing of C&D waste material. Currently C&D waste hauled to the North 48th Street Construction and Demolition Waste Landfill is exempt from the Occupation Tax. C&D waste landfills are not considered a tool for economic development; however low cost disposal can be a consideration in attracting new businesses.
- **Implementation Viability:** Implementing new landfills in the Planning Area or elsewhere can be difficult and complex. Siting a new landfill often involves a mix of social, political, environmental, regulatory, technical and economic considerations and can take many years; some efforts to site new landfills across the U.S. have been unsuccessful. Locally, proactive efforts in designating land for solid waste management and associated land-use planning and zoning can aide efforts to identify locations for new disposal capacity. While the City has currently adopted a policy of “public ownership, operation and financing of disposal and selected integrated solid waste management services” during the planning period, it may still require significant efforts to successfully develop and permit additional disposal capacity during this planning period. From a national perspective the timeframe associated with siting and permitting a new municipal solid waste landfill is often 5 to 10 years. While the timeframe for siting and permitting a new C&D waste landfill should be somewhat shorter, there remains no certainty that such an effort would be successful. For this reason a proactive program involving land acquisition, zoning, permitting, and site designation is considered appropriate.

Relationship to Guiding Principles and Goals

As it relates to the Guiding Principles and Goals of the Solid Waste Plan 2040, maintaining the availability of a local C&D waste landfill would be applicable as further noted below:

- **Emphasize the waste management hierarchy:** while landfilling may be considered a lesser preferred option on the waste management hierarchy it nonetheless is recognized as an option where reduction, reuse, and recycling do not eliminate all C&D wastes from disposal.
- **Encourage public/private partnerships:** Currently the City's role in providing a C&D waste disposal site is based on fulfillment of LMC as well as LPlan 2040 which states "The City policy of privately owned and operated collection of refuse and recyclables coupled with public ownership, operation and financing of disposal ... will continue during the planning period."
- **Ensure system capacity:** Additional C&D waste disposal capacity is anticipated to be required before the end of the planning period. As such, a strategy to establish and ensure additional disposal capacity for C&D wastes will likely need to be component of the Solid Waste Plan 2040.
- **Engage the community:** Public education to engage the community will be important to implement alternatives to land disposal of C&D wastes. Additionally, any effort to purchase land and site a new landfill will create additional opportunities for public comment. In terms of obtaining added landfill capacity an informed public will be important to understanding why approval of such a facility is necessary.
- **Embrace sustainable principles:** While resource recovery, reuse, waste minimization and waste diversion from landfills are often key aspects of sustainability programs, for waste that is not otherwise diverted, or does not provide a viable alternate use or resource recovery option, landfills can serve to protect the environmental and minimize social impacts. Low cost disposal for C&D waste can also have economic benefits. Recycling and reuse would be alternatives of a higher priority, but may need to be balanced with economic and environmental factors.

Summary

Until such time as waste is eliminated landfills will be a necessary part of an integrated solid waste management strategy. City policies and regulations make the City responsible for ownership, operation and financing of disposal facilities during the planning period.

Baseline estimates of waste generation and disposal suggests that the existing North 48th Street Construction & Demolition Waste Landfill will reach capacity prior to 2040 (the end of the planning period). Consistent with the Guiding Principle of the Solid Waste Plan 2040 to ensure system capacity it is anticipated that the Solid Waste Plan 2040 will need to include action items related to the establishment of additional C&D waste disposal capacity. A proactive program including the following options may be of significant value in securing such land for future solid waste management uses:

- Ensure that current and future land-use plans and regulations identify landfilling and solid waste management as acceptable uses.
- Pursue including “solid waste landfilling” and “solid waste processing and management” as specifically defined and approved uses in the zoning regulations.
- Obtain the local land-use (siting) approval, if necessary, to allow for permitting of the selected parcel of land as a solid waste facility (landfill or solid waste processing and management).
- Evaluate options in land-use plans and zoning rules to prevent conflicting development near the landfill boundary. One such option may be the establishment by code or ordinance of a buffer area (setback distance) for residential and commercial development around the perimeter of a City-owned land/landfill.