Focused Feasibility Study Report

Freeway Landfill and Freeway Dump

Prepared for
Minnesota Pollution Control Agency

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Certifications

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the state of Minnesota.

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August 26, 2019
Date

Acronyms

Acronym	Description
ARAR	Applicable and Relevant or Appropriate Requirements
ASTM	American Society for Testing and Materials
BTU/lb	British Thermal Units per Pound
CD	Construction Debris
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Closed Landfill Program
COC	Contaminant of Concern
DRO	Diesel Range Organics
FEMA	Federal Emergency Management Agency
FFS	Focused Feasibility Study
GCL	Geosynthetic Clay Liner
GRE RDF	Great River Energy Refuse Derived Fuel
HERC	Hennepin Energy Recovery Center
LFG	Landfill Gas
MCES	Metropolitan Council Environmental Services
MDNR	Minnesota Department of Natural Resources
MnDOT	Minnesota Department of Transportation
MPCA	Minnesota Pollution Control Agency
MSL	Mean Sea Level
MSW	Municipal Solid Waste
NCP	National Contingency Plan
NSP	Northern States Power
NWS	National Weather Service
OWEF	Olmsted Waste to Energy Facility
PCB	Polychlorinated Biphenyl
PE	Professional Engineer
PFAS	Per- and Polyfluoroalkyl Substances
PLP	Permanent List of Priorities
RAO	Remedial Action Objectives
RI	Remedial Investigation
ROD	Record of Decision
SLV	Soil Leaching Value
SRV	Soil Reference Value
SVOC	Semi-volatile Organic Compound
TBC	To Be Considered
TMV	Toxicity, Mobility, or Volume
US EPA	United States Environmental Protection Agency
USACE	United States Army Corps of Engineers
VOC	Volatile Organic Compound

1.0 Introduction

This Focused Feasibility Study (FFS) has been prepared by Barr Engineering Co. (Barr) on behalf of the Minnesota Pollution Control Agency's (MPCA) Closed Landfill Program (CLP).

1.1 Purpose and Organization of Report

This report develops Remedial Action Objectives (RAO), screens remedial technologies, and develops and evaluates remedial alternatives for the Freeway Dump (Dump) and Freeway Landfill (Landfill). The Dump and Landfill, collectively referred to as the Site, are located in Burnsville, Dakota County, Minnesota (Figure 1-1). The Site setting and Site layout are shown on Figures 1-2 and 1-3 respectively.

The current and anticipated Site conditions are outlined in the Focused Remedial Investigation Report (Barr, 2019). The Site is unique in that current site hydrogeological conditions are highly influenced by groundwater pumping at an adjacent rock quarry, and consideration has been given to both current conditions and the anticipated future conditions when the quarry pumping operations cease.

Based on the results from investigations conducted to date, the MPCA has determined that additional waste management efforts are needed for the Landfill and Dump sites. As the Site conditions have been assessed, the MPCA has maintained on-going consultation with US Environmental Protection Agency (US EPA), Dakota County, the City of Burnsville, and other stakeholders. Although there is some variation between those parties as to a specific course of action for additional waste management at the site, all parties have been in agreement that additional waste management efforts are needed to address existing and anticipated future Site risks. This FFS has been developed to assess a range of alternatives for an interim remedial action to address containment and/or treatment of the waste at the Sites.

This feasibility study is focused on addressing immediate impacts associated with the presence of waste. Wider-ranging topics, such as current or future groundwater conditions or surrounding land use (e.g., redevelopment, etc.), are beyond the scope of the FFS, but it is recognized that improved waste containment or removal from the Site will be an important component when wider risk pathways are evaluated and addressed in the future.

1.2 Organization of Report

The report is organized as follows:

1.0 **Introduction**: describes the content and objectives of this report and provides general Site background information, including a description and brief history of each project area

2.0 **Development of Remedial Action Objectives:** identifies the Remedial Action Objectives (RAOs) and the Applicable and Relevant or Appropriate Requirements (ARARs) for the site

3.0 **Identification and Screening of Technologies**: identifies and screens relevant remedial technologies

4.0 **Identification of Alternatives**: identifies and develops remedial action alternatives

5.0 **Alternative Analysis**: individually and comparatively evaluates alternatives and recommends a remedy for the Site

6.0 **Selected Remedy**: describes the recommended remedy based on the alternative analysis

7.0 **References:** includes a summary of references cited in the report

1.3 Site Background

This section summarizes the site background, including Site description, history, nature and extent of waste, contaminant fate and transport, and risk evaluation. Additional information and a summary of previous investigations at the Site is provided in the Focused Remedial Investigation Report (RI Report; Barr, 2019).

1.3.1 Site Description

The Site comprises two project areas (Figure 1-3): the Dump and the Landfill. Multiple parcels are associated with the Site and are controlled by various ownership entities, including the R.B. McGowan Company, Inc., Freeway Transfer, Inc., Quarry Property, LLC, Michael B. McGowan, and Trustees of the Richard B. McGowan irrevocable Trust Agreement, dated October 22, 1997.. For the remainder of this report, those various entities will be referred to as the Site Owner. Property boundaries and ownership in the vicinity of the Site are shown on Figure 1-4.

The limits of waste associated with both the Dump and Landfill extend beyond parcels owned by the Site Owner and onto adjacent properties, as shown on Figures 1-5 and 1-6. The following sections describe the two project areas.

1.3.1.1 Freeway Dump

Freeway Dump is an unpermitted, inactive waste disposal area located at 11937 Interstate 35 W (Parcel ID: 02-03410-38-010), just north of the east service road for Interstate 35W and the Cliff Road interchange. The Dump is unlined and has a vegetated soil-covered, encompasses approximately 28 acres, and is currently used as a golf driving range. Two office trailers and one small building are located on the Property.

The majority of the Dump is a generally flat-top mound that sits above the surrounding wetland at elevations ranging from approximately 720 feet to 725 feet above mean sea level (MSL). The tee-box area of the driving range sits a little higher at approximately 730 feet MSL. The raised elevation of the Dump extends beyond the north and east boundaries of the Dump property. The surrounding wetland is located at an elevation ranging from approximately 700 feet MSL along the north perimeter to about 710 feet MSL to the southeast of the Dump.

Based on review of historical aerial photographs and recent investigations (Barr, 2019), the extent of waste at the Dump is believed to extend onto several adjacent properties, as shown on Figure 1-4, including:

- Allstate Self Storage facility owned by Burnsville Storage Company – MN LP, located south of the Dump. A Subaru auto dealership is located south of Burnsville Storage.

- Interstate 35W (I-35W) right of way, located west of the Dump. Edward Kraemer and Sons quarry (Kraemer Quarry) is located west of I-35W.
- Vacant land/wetlands owned by Northern States Power Company (Xcel Energy) and US Fish and Wildlife Service (USFWS), located north and east of the Dump.

The area of waste associated with the Dump (including waste present on neighboring properties) is approximately 34 acres and the estimated volume of waste is approximately 760,000 cubic yards. A cross section through the Dump is shown on Figure 1-7.

A historical dump site referred to as the "Astleford Dump" was located south of the Freeway Dump along the east side of the frontage road. While the exact dates of the Astleford Dump activity is unknown, based on aerial photos, the dump was potentially active in the 1950s and 1960s (Barr, 2019). Waste was observed in investigation locations south of the Site as part of the RI. Based on the location of those observations, combined with historical photograph review of the Freeway Dump operations, the delineation of the extent of waste between the two dumps is not determined. The waste extent is not defined to the south of the Site.

1.3.1.2 Freeway Landfill

The Landfill is an MPCA-permitted unlined, soil-covered, inactive waste disposal area. The surrounding properties include a salt storage and distribution facility to the north, Interstate Highway 35W to the east, and Kraemer Quarry to the south. To the west of the Landfill is a former quarry, also owned by the Site Owner.

The Landfill is located primarily on the following property parcels: 037-02-15600-00-010; 037-02-15600-00-060; 037-02-15600-00-020, 037-02-15600-02-010; 037-02-15600-00-030; 037-02-15600-00-040; and 037-02-15600-00-050 (Figure 1-4).

Prior to landfill operations commencing, the topography of the Landfill area likely varied from 696 to 705 feet MSL (Liesch, 1991). According to current Lidar survey data (Fugro and MDNR**,** 2011), the maximum elevation of the Landfill is approximately 750 feet MSL at its peak near the center of the property. The ground surface slopes downward in all directions to an elevation of approximately 700 feet MSL at the property limits. The average water level for the Minnesota River located north of the Landfill is approximately 692 feet MSL (calculated from 2015-present elevation data provide from US Army Corps of Engineers). The 100-year flood elevation is 716 feet MSL (FEMA, 2011), and the recorded historical river level extremes at the nearby Savage river gage are 719.40 feet on April 15, 1965 and 687.05 feet on October 29, 1976 (NWS, 2018).

The Kraemer Mining and Materials quarry is located approximately 1,000 feet west of the Dump and immediately south and southwest of the Landfill. The resource being mined in the quarry is the Prairie du Chien Group dolostone. Dewatering in the quarry (at an average reported rate of approximately 8.4 million gallons per day from 2010 to 2013 (Barr, 2015)) likely captures groundwater in the Prairie du Chien aquifer beneath the site, significantly depressing the water table from what it would be under natural

conditions. Except for near the northern edge, waste is generally not in contact with groundwater at the Landfill, but models predict that condition will change when Kraemer Quarry operations and pumping cease (Barr, 2015).

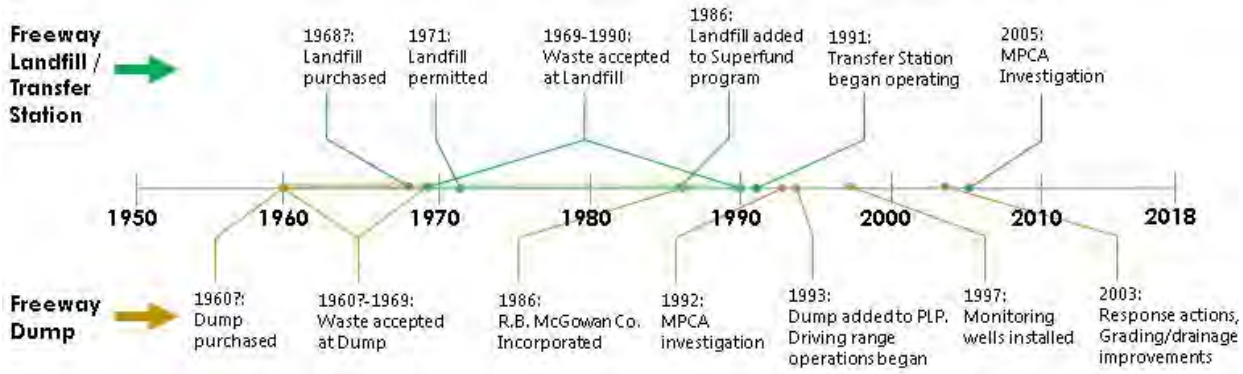
Freeway Transfer Station is located on the east side of the Landfill property and currently operates as a waste processing, recycling, and hauling facility. The transfer station is located in a topographically depressed area at an elevation of approximately 710 feet MSL. For the purposes of the FFS, it is assumed that the transfer station will remain operational during the planned landfill closure activities. Other commercial activities on the Landfill properties include a gravel crushing operation in the quarry located to the west of the Landfill and a dumpster storage operation that is present on the Landfill.

Based on review of historical aerial photographs and recent investigations (Barr, 2019), waste is present on all of the Site Owner parcels and appears to extend on to the salt storage and barge unloading facility owned by Port Marilyn LLC, located north of the Landfill.

Approximately 5,310,000 cubic yards of waste are associated with the Landfill, covering approximately 141 acres (including waste present on neighboring properties). A cross section through the Landfill is shown on Figure 1-8.

1.3.2 Site History

Based on historical landfill records, files provided by the MPCA, and historical aerial imagery the following approximate chronology of significant milestones has been developed for the Site (Barr, 2018).



1.3.2.1 Freeway Dump

The Dump property was purchased by Richard McGowan and his business partner sometime around 1960. Although it is not certain exactly when the dump became active and started receiving waste, some reports indicate that dumping began as early as 1960. A review of historical aerial photographs indicate that the Dump was active between 1960 and 1969. The Dump initially accepted ash from a nearby power plant and later accepted other refuse including municipal solid waste and construction waste (MPCA, 2017). Based on the soil borings completed during Phase A of the Remedial Investigation (Barr, 2018), it is estimated that less than 20% of the waste material in the Dump consists of ash. After the Dump ceased operating in

1969, the property remained largely unused until 1993, when the driving range operations began. Based on a review of aerial photographs, the storage facility buildings south of the dump were constructed between 1970 and 1979, and the storage facility buildings at the southeast corner of the dump were constructed between 1984 and 1990.

1.3.2.2 Freeway Landfill

The Landfill property is comprised of multiple parcels that were purchased from several different owners in the 1960s by Richard McGowan. Prior to Landfill operations, the area was mostly wetland and undeveloped, with the exception of farming activities visible in the 1937 aerial photo and a few small structures located north of the frontage road on the south bank of the Minnesota River, visible in the 1966 aerial photo.

The Landfill began accepting waste in July of 1969 under a conditional use permit issued by the City of Burnsville. In October of 1971, the MPCA issued the Landfill a solid waste permit (No. SW 57). From a review of historical aerial photos, it appears that Landfill operations began in the northeast corner of the property and then expanded to the south. In the late 1970s and 1980s, environmental regulations were significantly updated in response to evolving knowledge about environmental contaminants and associated risks to human health and the environment. Landfill regulations were updated to require engineered liners and caps for new landfills. Based on concerns at the Site, the Landfill was added to the Superfund National Priorities List in 1986 (MPCA, 2015). Under the new regulations, landfill owners were requested to either make necessary upgrades to their facilities or to stop accepting waste. In 1990, Freeway Landfill stopped accepting waste. It is estimated that approximately 5 million cubic yards of waste were deposited in the 131-acre area of the Landfill.

The landfill cover was constructed in two stages. A soil cover constructed over the inactive portion of the landfill (approximately 125 acres) was completed prior to the implementation of the 1988 MPCA Solid Waste Rules. Cover verification testing was completed in 1989 to confirm two feet of cover and additional fill was spread in deficient areas. A soil cover was constructed over the remaining active portion of the landfill (approximately 6 acres) in 1990 and eight gas-monitoring probes were installed at the Landfill in 1993 (Liesch, 1993).

The Transfer Station was constructed in the late 1980s and operates on a 12-acre parcel bounded by the Freeway Landfill to the north, south, and west. The Transfer Station is currently in operation and has been since 1991 (Liesch, 1993).

1.3.3 Nature and Extent of Waste

The FFS is primarily focused on the large volume of waste that is present at the Landfill and Dump, both unlined disposal areas. Municipal solid waste (MSW) and construction debris (CD) was encountered across most of the site. MSW consisted of paper, plastics, glass, ash (at the Dump only), wood, metal, and rubber and was sometimes mixed with fill material. Construction debris varied, typically including bricks, concrete, wood, shingles, and insulation. The level of decomposition varied as well, with some areas appearing relatively dry and containing readable lines of newspaper, whereas other pockets of waste material were

well degraded and had a noticeable odor of decomposition. The estimated waste extent, which is shown on Figures 1-4 and 1-5, extends onto neighboring properties (see Section 1.2.1).

Samples of the waste show elevated concentrations of numerous metals, semi-volatile organic compounds (SVOC), volatile organic compounds (VOC), polychlorinated biphenyls (PCB), diesel range organics (DRO), and gasoline range organics (GRO). Groundwater samples in contact with the waste and in nearby wells show elevated concentrations of those compounds, along with 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS). (Barr, 2015; 2019). A detailed description of the analytical results is included in the RI (Barr, 2019).

The decaying waste also produces landfill gas (LFG), including methane, which has been observed at concentrations posing a risk for ignition. LFGs can also migrate away from the waste, posing a risk to off-site receptors.

Vegetated soil covers are present over the waste. As summarized in the RI (Barr, 2019), the cover soil investigation results indicate that the majority of the cover soils are suitable for re-use. Approximately 75% of the soil samples met even the most conservative acceptance criteria (defined as MPCA Unregulated Fill guidance and Dakota County Ordinance #110). The exceptions were exceedances of a few soil leaching values (SLV), arsenic in excess of soil reference values (SRV) at one location, lead in excess of Dakota County Ordinance #100 in one location, and DRO in excess of the Unregulated Fill guidance in several locations. For the purposes of the FFS, it is assumed that the cover soil at the Landfill and Dump can be reused at the Site and will not pose environmental risks for the alternatives under consideration. Because the volume of soil that doesn't meet criteria for unrestricted use appears to be relatively small, it is assumed that those soils could be managed under clean covers, if necessary.

1.3.4 Contaminant Fate and Transport

A detailed assessment of the potential contaminant fate and transport from the waste will be considered under a future effort that is beyond the scope of the FFS. The primary concern will be waste management alternatives that address the challenges of the site setting and the anticipated future changes to the nearby Kraemer Quarry operations.

The Landfill and Dump setting is unique in that the hydrogeological conditions are heavily influenced by the significant, long-term dewatering operations at the nearby Kraemer Quarry, which lowers the water table to a depth below the waste a majority of the time and affects groundwater flow directions in the area of the waste. Generally, the groundwater beneath the waste flows towards the Kraemer Quarry. Additionally, periodic floods in the nearby Minnesota River and associated wetlands can temporarily raise the water table into the waste in some areas and affect groundwater flow.

Cross sectional views of the Site and adjacent features are depicted on figures 1-7 through 1-8.

In general, the waste leaches contaminants to the groundwater from infiltration, which can then migrate laterally through the groundwater towards nearby receptors. The more waste that comes into contact with the groundwater, the greater the risk of contaminant migration from the waste. When Kraemer Quarry

operations and groundwater pumping end, a number of significant changes are anticipated based on previous groundwater modeling (Barr, 2015). The changes generally include:

- Groundwater elevations that are currently present in the bedrock will begin to rise into the waste layer that is present above the bedrock
- A new surface water receptor will form on the south side of the landfill as the deep Kraemer Pits fill with water
- Groundwater flow directions will change, with more areas of the waste switching from being located up-gradient of the Kraemer Quarry to becoming up-gradient of the Minnesota River and associated wetlands

With those concerns in mind (which are represented by the "no action" alternative below), and recognizing that the current Landfill and Dump areas do not meet current standards for landfills, the FFS is focused on common waste management approaches for on-site and off-site alternatives.

1.3.5 Risk Evaluation

Given the focus of the FFS on waste management and the anticipated changes to the hydrologic setting discussed above, a Baseline Risk Assessment in not included in the FFS. A brief overview of the current and future risk is summarized below.

1.3.5.1 Direct Contact

In general, the waste at the Dump and the Landfill in their current configuration present a number of risks under both the current and future conditions (e.g., post Kraemer Quarry dewatering operations). Under current conditions, there is limited risk of direct contact with waste. There is a vegetated soil cover present at both the Landfill and Dump that is being maintained by the Site Owner. Access is controlled at the Landfill and land use is commercial for both areas. There are also limited areas of waste that extend onto adjacent commercial properties as follows:

- The U.S. Salt property located north of Freeway Landfill - a gravel driving surface and support structures are present over the underlying debris, limiting direct contact risk for this commercial property.
- The wetland complex (Xcel Energy and US Fish and Wildlife) located north and east of Freeway Dump - a vegetated cover over the waste is present in these areas, reducing direct contract risks for these areas that are rarely accessed by people.
- The Burnsville Storage Company facility located south of Freeway Dump - a paved surface and slab-on-grade storage building limit direct contact concerns for this property.

1.3.5.2 Landfill Gas

The waste at the Landfill and Dump generates LFG, including high levels of methane. The majority of the waste area is vacant land and the landfill, and minimal monitoring is currently conducted. There are a few

existing buildings near the waste that may pose a risk of LFG intrusion (all believed to be slab-on-grade construction), including:

- Freeway Transfer Station at Freeway Landfill
- Commercial building at driving range at Freeway Dump (operated seasonally)
- Storage units and two residentially-occupied spaces at the Burnsville Storage Company at south end of Freeway Dump (Soil gas samples near the occupied units did not identify soil vapor intrusion risks [Barr, 2019])

Any future development and buildings at or near waste areas would need to account for potential vapor intrusion risks, mainly related to the generation and potential movement of explosive methane in soil gas.

1.3.5.3 Leachate and Groundwater

As discussed in the previous section, another primary risk concern is related to leachate from the landfill waste and its impacts to the groundwater pathway. Currently, groundwater impacts at the Landfill and Dump present risk to the following potential receptors:

- Minnesota River
- Wetland complex surrounding portions of the landfill and dump areas
- Burnsville water supply, including the intake at the reservoir in the southeastern portion of the Kraemer Quarry Operation and water supply wells located southeast of the site (previous sampling of the water supply system at Burnsville has not identified contaminants exceeding applicable water quality values)

When Kraemer Quarry dewatering ends, an additional surface water receptor will emerge at the former quarry.

2.0 Development of Remedial Action Objectives

This section presents the development of RAOs for waste management at the Landfill and Dump to address the risks identified in the previous section. In order to develop the RAOs, this section first identifies the project area for the interim remedial action, describes the exposure source control that will be addressed by the interim remedial action, and includes a discussion around Applicable or Relevant and Appropriate Requirements (ARARs).

2.1 Project Area for the Interim Remedial Action

The project area for the interim remedial action is shown on Figure 2-1. Generally, the project area will include: waste on parcels owned by the Site Owner (excluding the transfer station operation), and the portion of the Dump extending north and east onto NSP and US Fish and Wildlife properties.

A portion of the Landfill also extends onto the US Salt property north of the landfill, but that area of the waste will not be included in the project due to (1) the presence of the active commercial operations and (2) the observations in recent test trenches (Barr, 2019) that indicated the waste in this area primarily appeared to be inert demolition debris without MSW.

A portion of the Dump extends south onto the Burnsville Storage Company property, but that area of the waste will not be included in the project due to (1) the presence of the active commercial operations and (2) the waste in this area is capped under the existing building slabs and pavement and LFG impacts were not identified during recent investigations (Barr, 2019).

Waste management/removal at the US Salt and Burnsville Storage Companies properties could be managed in the future as part of facility demolition and/or redevelopment efforts, but is beyond the scope of the FFS alternatives.

2.2 Exposure Pathways to be addressed by FFS Alternatives

Source control of the MSW is the primary focus of this FFS, including containing the waste and controlling the associated landfill gas and leachate. Although beyond the scope of the FFS, alternatives providing additional management of the waste will also reduce risks associated with other media and exposure pathways as summarized in Section 1.2.5. These measures will be an important initial component when future evaluations are conducted regarding the groundwater pathway and potential land use changes around the site.

2.3 ARARs

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site. State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

To be considered materials (TBCs) are criteria, advisories, guidance, and proposed standards developed by government agencies that are not legally enforceable but contain information that would be helpful in carrying out, or in determining the level of protectiveness of, selected remedies. TBCs are meant to complement the use of ARARs, not replace or compete with them.

Deferred materials are criteria, advisories, guidance, and proposed standards developed by government agencies that are not being considered in this phase of work at the Site but may be considered in future phases. The FFS relates to evaluation of interim waste management alternatives.

A listing of ARARs are included in Tables 2-1 through 2-5.

2.4 Remedial Action Objectives

In general, an RAO provides the goals for protecting human health and the environment. The RAO should be media specific and it should address the waste or contaminants of concern (COC) identified for each site, and potential exposure routes and receptors.

RAOs have been developed for addressing the MSW that is present in the Landfill and Dump, which is the focus of the FFS. The RAOs include:

- Prevent direct contract with MSW
- Restrict infiltration into the MSW
- Restrict groundwater contact with MSW (includes current conditions, flood conditions for the Minnesota River, and the anticipated future conditions of higher groundwater when the dewatering ends at the adjacent quarry)
- Restrict leachate migration from the MSW towards groundwater and surface water receptors
- Prevent migration of MSW-generated LFG into nearby buildings

As discussed in the next section, the RAOs may be achieved by removal of the MSW for off-site management, or developing on-site alternatives involving standard landfill construction and long-term management approaches following current MSW regulations.

3.0 Identification and Screening of Technologies

Due to the focused nature of this study, only technologies that specifically address waste were considered and screened. In other words, technologies that would specifically address groundwater impacts were not considered. The following sections describe the technologies that were screened as part of this study. Based on the screening, technologies that could reasonably be technically implemented at the Site were developed into Alternatives in Section 4.0.

3.1 Presumptive Remedy – Containment

The EPA Superfund program has acknowledged that certain categories of sites, including municipal landfills, have similar characteristics, types of contaminants, and effects on environmental media. In an effort to streamline the remedial process, EPA has developed presumptive remedies for these types of sites. In 1993, EPA issued a directive titled *Presumptive Remedy for CERCLA Municipal Landfill Sites* (EPA, 1993) identifying containment as the presumptive remedy for municipal landfill sites. The presumptive remedy does not address exposure outside the source area (landfill), nor does it include the long-term groundwater response action.

The directive further identified the following components of the containment remedy:

- Landfill cap;
- Source area groundwater control to contain plume;
- Leachate collection and treatment;
- Landfill gas collection and treatment; and/or
- Institutional controls to supplement engineering controls.

The following subsections detail each of these components, with the exception of Institutional Controls, which are outside the focused nature of this study. Based on its demonstrated effectiveness at numerous facilities, the containment technology is retained and developed into several alternatives in Section 4.0.

3.1.1 Landfill Cap

A landfill cap is used to prevent direct contact with soil and/or debris in the landfill and to reduce leachate generation by limiting infiltration. MSW landfill caps often consist of a combination of low permeability barrier layers, drainage layers, and vegetated covers. Minnesota Rule 7035.2815 requires a three layer cap system consisting of a barrier layer, drainage layer, and top layer. The purpose of each layer is as follows:

- Barrier Layer – reduces infiltration into the landfill, thereby limiting leachate generation
- Drainage Layer – buffers the barrier layer from punctures and increases the effectiveness by providing a pathway for water to flow off of the landfill
- Top Layer – supports establishment and maintenance of final cover vegetation.

A typical detail for the cap configuration selected for the FFS is shown on Figure 3-1 and included in the alternatives developed in Section 4.0. This cap configuration provides several enhancements over the

statute requirements, based on professional judgement and consistent with generally accepted industry standards.

3.1.2 Landfill Liner

For the purpose of the FFS, a landfill liner was chosen as the preferred technology to provide the most immediate control over impacts to groundwater. A landfill liner is installed to contain the waste and prevent contamination migration from the waste to the groundwater below.

There are many types and configurations of liners that have been installed at landfill sites, ranging from simple compacted clay liners to complex, multi-layer liner systems. The selection of liner type is based on several factors, primarily the type of waste and associated contaminants that the liner is intended to contain. Minnesota Rule 7035.2815 requires a liner consisting of a smooth stable subgrade, four feet of a natural soil barrier layer (i.e., compacted clay), and a drainage layer. Rule allows for replacement of portions of the soil barrier with synthetic barrier systems. For example, two feet of the soil barrier layer can be replaced by a flexible membrane liner. The purpose of each layer is as follows:

- Smooth stable subgrade – provide a stable base for construction of the landfill
- Barrier layer - limits leachate migration through the base of the landfill
- Drainage layer – increases the barrier layer effectiveness by providing a pathway for leachate to migrate to a collection system

Depending on the site setting, type of contaminant, etc., there is precedent for additional layers of liner to enhance the effectiveness of the liner system – such as adding a geosynthetic clay liner (GCL) beneath the geomembrane, or adding a second geomembrane.

For the purpose of the alternative development and comparison (Sections 4.0 and 5.0, respectively), a clay/geomembrane composite liner, consistent with Minnesota Rule, is assumed as the "base" scenario; however, there is also discussion of the cost, schedule, and potential performance implications associated with other liner configurations. Details showing the "base" scenario liner configuration and several potential enhanced liner options are shown on Figure 3-1. An evaluation of these potential liner configurations is included in Table 3-1.

3.1.3 Leachate Collection and Treatment

Leachate is generated as water comes into contact with waste. In order to protect groundwater resources, leachate collection and treatment are common components of landfills and are part of the presumed remedy (containment). Leachate is typically collected in a network of collection piping and sumps, which is installed to function in conjunction with the base liner system. Many options for leachate collection and treatment exist, including evaporation ponds, land application, recirculation, on-site treatment, or off-site treatment. The leachate management approach at a given landfill is frequently driven by landfill location (regulations, proximity to treatment plants, etc.) and the type of associated contaminants.

For the purpose of the alternative development (Section 4.0), leachate will be collected and discharged to the Metropolitan Council Environmental Services (MCES) sanitary sewer system. Significant on-site pre-

treatment of the leachate is not assumed to be necessary for acceptance at MCES wastewater treatment facilities, consistent with the current leachate management approach utilized by other metro-area landfills. However, it is anticipated that the detailed design will include the flexibility to provide on-site treatment (or pre-treatment) in the future, if necessary, to address emerging contaminants (e.g., PFAS).

3.1.4 Landfill Gas Collection and/or Treatment

Landfill gas collection and/or treatment is an important part of the waste containment technology. As the waste degrades, it generates landfill gases, including methane. If not properly controlled, the landfill gases have the potential to migrate away from the waste footprint, posing a risk to adjacent properties. Therefore, landfill gas collection systems are a standard component of MSW landfills, both active and inactive. Landfill gas is commonly collected via a network of horizontal or vertical piping and managed via passive venting, active flaring, or incineration for energy generation.

3.2 Excavate and Haul Waste Off-site

The previous subsections were focused on containment of the waste by means of constructing an on-Site facility. Another technology that could be implemented is to utilize an existing, permitted landfill for disposal of the waste. An existing, permitted landfill facility will have the necessary controls in place (e.g., liner, leachate collection, landfill gas controls, etc) to accept and manage MSW. This is a highly proven technology and is retained for alternative development in Section 4.0. For the purpose of the FFS, landfills located within Dakota County were considered as potential locations for off-Site disposal, as discussed in Sections 4.0 and 5.0.

3.3 Waste to Energy Technologies

This section discusses the assessment of potential waste-to-energy (incineration) technologies, which includes various approaches for burning garbage and generating beneficial energy and/or heating. There have been a limited number of incineration facilities near the Twin Cities that accept new MSW being generated in the local communities. MSW incineration facilities located out of state are not being considered because the transport distance and associated cost would not be feasible.

The local market dynamics of this technology are evolving with a major facility recently closing, plus the facilities have been facing a general decrease in energy prices obtained from power purchasers compared to when the facilities were originally conceived (Herman, 2019). The facilities that were considered are listed below. Additional facilities may exist; however, they were not considered based on a number of factors, including distance and capacity.

1. **Great River Energy Elk River Refuse Derived Fuel facility** (**GRE RDF).** This facility recently closed, but was permitted for 500,000 tons/year and operated at about 60 percent capacity. The facility included a waste processing facility that sorted wastes, recovered metals, and produced waste "pellets" used as fuel at a nearby burner. The processing removed metal and segregated out unsuitable high density waste 'residuals' (shoes/golf balls/wet diapers/etc) that were landfilled as MSW. In 2018, GRE was accepting waste at $75/ton (Herman, 2019), and the facility was located 45 miles from the Landfill site.

2. **Hennepin Energy Recovery Center (HERC) in Minneapolis**. Currently, HERC only takes waste generated within Hennepin County and cannot accept all of the waste within the County due to capacity limitations (about 365,000 tons per year is burned at HERC). About 75 percent of the waste delivered to HERC comes from Minneapolis; the remaining 25 percent comes from suburban Hennepin County (Hennepin County, 2019). Hennepin County charges $85/ton for MSW accepted at HERC (Hennepin, 2019), and the facility is located 15 miles from the Landfill site.

3. **Ramsey/Washington Co Newport Minnesota waste processing facility (Newport Facility).** Currently, the Newport Facility only takes waste generated within Ramsey and Washington Counties, and has a capacity of approximately 440,000 tons per year. The Newport Facility processes MSW similar to GRE RDF above, then sends fuel to Xcel power plants in Mankato and Red Wing. The Newport facility charged $94/ton in 2018 when they still accepted out-of-county waste. The Newport transfer facility is located 25 miles from the Landfill site.

4. **Olmsted County (Rochester) Waste to Energy Facility (OWEF).** OWEF is a waste to energy facility located near Rochester that has a reported capacity of 146,000 tons/yr. OWEF charges $83/ton for out-of-county waste and the facility is located 80 miles from the Landfill Site.

There has also been some local interest in a Waste "Gasification" or refining process (e.g., the process proposed by Enerkem), but the concept has yet to be implemented commercially in the Twin Cities area.

Assuming a transportation price of $0.20 per ton per mile, the above facilities present an estimated cost range for transportation and treatment of approximately $84/ton to $99/ton (roughly $500 million to $600 million for the anticipated volume of MSW at the Site). Additionally, the capacities of these facilities appears to be inadequate to address the estimated 6 million yards of MSW at the Freeway Site in a reasonable time frame, ranging from 14 to 47 years if any one of the facilities devoted their entire capacity to Freeway waste. It is also recognized that acceptance of Freeway MSW would replace the incineration of current MSW generation from those communities. Further, as detailed in the following paragraph, it would be replacing fresh, higher caloric content MSW with older, lower caloric content waste from Freeway, thereby having a negative overall effect of reduced total energy generation.

Another important factor in the feasibility for burning garbage is the caloric value of the waste (ASTM D5865). In order to further assess these technologies, three samples of Freeway MSW were submitted to Minnesota Valley Testing Laboratories for analyses for caloric value. Typical "fresh" garbage heating values for MSW recently processed at HERC have a caloric value ranging from 5,860 to 6,646 British thermal units per pound (Btu/lb) (Burns & McDonnell 2017). As summarized in the Focused Remedial Investigation Report, the MSW samples from Landfill ranged from 580 to 1265 BTUs/lb., significantly lower than typical garbage being accepted for incineration. This is likely due to the 40 to 50 years of garbage decay that has occurred since the waste placement in Landfill.

Based on the above limitations, the garbage to energy technologies are not believed to be feasible for the Landfill site and are not developed into alternatives in Section 4.0.

4.0 Identification of Alternatives

This section describes the components of each interim response action alternative developed from the screened technologies and evaluated in detail for this FFS. Three main alternatives were selected: no action, excavate the waste and line the landfill on-site, and excavate the waste and manage off-site. Multiple options were evaluated within those three alternatives. The following paragraphs describe each alternative. Key quantities associated with each alternative are summarized on Tables 4-1 and 4-2.

4.1 Alternative 1 – No Action

Alternative 1, the No Action Alternative, involves no changes from existing operations. The Landfill and Dump do not have liner systems to control MSW leachate. The Landfill would continue to be closed and controlled by the Site Owner. The Transfer Station and other business activities occurring at the Landfill would continue. The Dump would continue to be closed and operate as a commercial business. Therefore, the current and future risks are the same as detailed in Section 2.0, which primarily relate to potential MSW leachate impacts to groundwater and surface water receptors.

In the current condition, waste associated with the Landfill occupies 140 acres and has a peak elevation of 750. Waste associated with Freeway Dump occupies 34 acres and has a peak elevation of 730. An overview of Alternative 1 is shown on Figure 4-1.

4.2 Alternative 2 – Excavate Waste with On-Site Lined Landfill

Alternative 2 involves removing the accessible waste from both the Landfill and Dump and consolidating waste in a new, lined landfill that would be constructed within the existing Landfill footprint. Several variations of Alternative 2, related to the footprint and height of the future landfill, were developed. Each alternative would result in a reduced footprint, as the waste would be consolidated within the permitted extent of the Landfill.

The following is a listing of the key design assumptions and elements that are common among the three variations of Alternative 2. The differences between each alternative are then detailed in the subsequent subsections.

- **Existing Cover Soil Reuse** – existing cover soils will be stripped prior to waste excavation and are suitable for reuse on-Site
- **Waste Removal** – waste will be removed from within the project area limits, as defined in Section 2.1 and shown on Figure 2-1. The vertical extent of waste removal will be based on field decisions. For the purpose of estimating cost and computing quantities, it was assumed that an additional one foot of soil that is present between the waste and bedrock will be removed as part of waste recovery to facilitate construction of the liner system. Some waste will remain near the limits of removal (e.g., adjacent to existing facilities). In these areas, the waste will remain covered by the existing facilities and any transitions with remaining waste will be covered by a minimum of four feet of soil. The volume of waste (and underlying soil) that will be removed from the Landfill

is approximately 5,200,000 cubic yards, and the volume of waste that will be removed from the Dump is approximately 760,000 cubic yards – for a total of approximately 6,000,000 cubic yards. The volume of waste outside of the limits of removal is approximately 100,000 cubic yards near the Landfill and approximately 30,000 cubic yards near the Dump – for a total of 130,000 cubic yards.

- **Waste Classification** – the waste is assumed to consist of typical MSW and construction debris. Hazardous waste is not assumed to be widespread (consistent with MSW). It is assumed that less than one percent of the waste will require treatment and/or management as hazardous waste based on potential contingencies encountered during removal. This potential cost is one example of an item that could be covered by the 20% contingency included in the cost estimates.
- **Haul Route from Dump to Landfill** – the bike path adjacent to the east side I-35W will be upgraded and utilized to allow off-road haul trucks to transport waste north from the Dump to Black Dog Road, passing under the I-35W overpass, and utilizing the existing Landfill entrance (Figure 2-1). Following completion of the project, the bike path will be restored.
- **Landfill Liner** – the liner will be set at an average base elevation of 700, which is generally above the predicted groundwater elevation during non-flood conditions (Barr, 2015). The landfill liner system consists of 2 feet of compacted clay overlain by a 60-mil geomembrane, compatible with solid waste regulations (Option 1 in Table 3-1 and shown on Figure 3-1). The liner will be sloped to facilitate leachate collection. Potential modifications (enhancements) to the base liner system are shown in Figure 3-1 and described in Table 3-1. The performance, cost, and schedule implications associated with various multi-layer liner systems are included in Section 5.0.
- **Landfill Cap** – the landfill cap (Figure 3-1) consists of one foot of buffer fill over the waste material, overlain by a 40-mil geomembrane barrier layer, overlain by three feet of soil (one foot of sand drainage layer and two feet of vegetative cover soils).
- **Leachate** – both during construction and after closure, leachate will be collected and discharged to the Metropolitan Council Environmental Services (MCES) sanitary sewer system. Significant on-site pre-treatment of the leachate is not assumed to be necessary for acceptance at MCES wastewater treatment facilities, consistent with the current leachate management approach utilized by other metro-area landfills. However, it is anticipated that the detailed design will include the flexibility to provide on-site treatment (or pre-treatment) in the future, if necessary, to address emerging contaminants (e.g., PFAS).
- **Landfill Gas** – a landfill gas collection wellfield will be constructed, consisting of vertical wells and lateral piping. The gas will be distributed to a blower/flare system. It is assumed that energy production will not be feasible, based on the age of the waste, as noted in Section 3.3.
- **Existing Commercial Business Operations** – access to Freeway Transfer Station and its operational areas (i.e., building, scale, and adjoining vehicle parking/maneuvering areas) will be maintained to the extent possible during and after construction. Other business operations will need to be interrupted to allow for the excavation of the cover soil and MSW at the Site. These include the dumpster storage on the Landfill, the on-site access roads to the concrete crushing

operation west of the Landfill and the driving range at the Dump. Decisions regarding future operation of these entities, post-construction, is outside the scope of the FFS.

- **Future Conditions (Landfill)** – after removal, fill would be placed on-Site, outside of the new landfill footprint. The grading plan would be developed during the design phase. For the purpose of the FFS alternatives, the design and associated cost assumes placement of fill to an elevation that is below the 100-year floodplain, but above the predicted future groundwater table. Additional fill may be required depending on future land use of that area, which is outside of the scope of the FFS
- **Future Conditions (Dump)** – after removal, fill would be placed in the footprint of the former Dump. The grading plan would be developed during the design phase. For the purpose of the FFS alternatives, the design and associated cost assumes placement of fill to an elevation that is below the 100-year floodplain, but above the predicted future groundwater table. Additional fill may be required depending on future land use of that area, which is outside of the scope of the FFS.

4.2.1 Alternative 2a – Minimal Area/Highest Peak

Alternative 2a represents the smallest footprint of the future landfill, which in turn results in the highest peak and preserves the most space for potential future land uses. In Alternative 2a, the footprint of the lined landfill is 60 acres and the elevation of the landfill peak is 850. An overview of Alternative 2a is shown on Figure 4-2a and additional detail is included in the drawings in Appendix A.

4.2.2 Alternative 2b – Largest Area/Lowest Peak

Alternative 2b represents the lowest peak of the future landfill, which in turn results in the largest footprint and preserves the least space for potential future land uses. In Alternative 2b, the footprint of the lined landfill is 90 acres and the elevation of the landfill peak is 778. An overview of Alternative 2b is shown on Figure 4-2b and additional detail is included in the drawings in Appendix A.

4.2.3 Alternative 2c – Moderate Area/Moderate Peak (Hybrid)

Alternative 2c represents a balance between Alternatives 2a and 2b. This alternative preserves some space adjacent to the I-35W right-of-way, resulting in a reduced peak (relative to Alternative 2a) but also a reduced area for potential future use (relative to Alternative 2a). In Alternative 2c, the footprint of the lined landfill is 75 acres and the elevation of the landfill peak is 785. An overview of Alternative 2c is shown on Figure 4-2c and additional detail is included in the drawings in Appendix A.

4.3 Alternative 3 – Excavate Waste with Off-Site Disposal

Alternative 3 involves excavating waste from the Site and transporting it to another permitted MSW landfill. For the purpose of the cost estimate, it is assumed that existing landfills within Dakota County would be the likely options; however MPCA would also consider options outside of Dakota County. The following components of Alternative 3 would be the same as the Alternative 2 components, as outlined in Section 4.2:

- Existing Cover Soil Reuse

- Waste Removal
- Waste Classification
- Existing Commercial Business Operations
- Future Conditions – Dump

In Alternative 3, the future conditions at the Landfill would be different because the waste would be transported to an off-site location. After removal, fill would be placed to restore the Site. The grading plan would be developed during the design phase. For the purpose of the FFS, the design and associated cost assumes placement of fill to an elevation that is below the 100-year floodplain, but above the predicted future groundwater table. The future land use is outside of the scope of the FFS, but, with the waste removed, a wider range of future land uses may be possible. As with Alternative 2, additional fill may be required to achieve future land uses.

Other engineering controls (liner system, leachate collection, landfill gas collection, etc.) are not included as part of Alternative 3 as they would already be in place at the off-Site facilities.

For Alternative 3, only disposal at existing facilities located within Dakota County were considered. The ability of a particular facility to accept the entire volume of waste excavated from the Site would depend on permit restrictions, capacity, local acceptance, and current economic conditions. For that reason, and because any existing, permitted facility should already have the appropriate controls and technologies in place, a specific disposal facility is not selected as part of this Alternative.

The evaluation of Alternatives in Section 5.0 accounts for potential ranges in cost associated with disposal facility location, as well as potential local and state fees.

5.0 Alternative Analysis

This section of the FFS provides the basis for determining how the alternatives compare to the statutory balancing criteria in Section 121 of CERCLA and in Section 300.430 of the National Contingency Plan (NCP). First, the alternatives are evaluated individually against the criteria, and then the alternatives are compared against each other.

5.1 Individual Analysis of Alternatives

The following are definitions of the nine NCP evaluation criteria against which each alternative is evaluated:

Threshold Criteria, which are the criteria that must be satisfied in order for an alternative to be eligible for selection, include:

- Overall protection of human health and the environment - this assessment focuses on whether the RAOs from Section 2.5 are being met, and considers adequate overall protection over time, including short-term effectiveness during implementation through long-term effectiveness
- Compliance with Applicable and/or Relevant and Appropriate Federal and State public health or environmental requirements (ARARs)

Balancing Criteria, which are the primary factors used to weight major trade-offs among alternatives, include:

- Long-term effectiveness and performance
- Reduction of toxicity, mobility, or volume (TMV) of hazardous substances - all alternatives will involve containment of MSW, which will not result in TMV reduction
- Short-term effectiveness - protection of workers, community, and the environment during implementation, and time to achieve RAOs
- Implementability - the technical and practical implementability for alternatives, including the availability of services and materials required
- Cost effectiveness—preliminary cost estimates are prepared based on conceptual design level plans (generally the alternatives represent a project definition of less than 30% design). The cost estimates carry a 20% contingency and are expected to provide an accuracy of plus 30 to minus 20 percent. Each alternative includes operation and maintenance costs, which are low compared to the construction costs, but are included as the present worth of the long-term cost calculated using an assumed 5% interest rate for a 30-year period. The engineering, permitting, and construction quality assurance (CQA) costs are based on the EPA guidance document *A Guide to Developing and Documenting Cost Estimates During the Feasibility Study* (EPA, 2000), modified

based on professional judgment. The cost estimate for each alternative is summarized in Table 5-1. Detailed cost estimates are included in Appendix B.

Modifying Criteria include state and community acceptance, criteria which are formally taken into account after public comment is received on the proposed plan and incorporated into the Record of Decision (ROD). The FFS is being prepared for the MPCA and so the state's acceptance of the alternatives analyses and conclusions in the FFS are incorporated into the report. Local communities (Burnsville and Bloomington) and Dakota County have also periodically provided input to MPCA as the FFS was being developed, and that information is included as part of the modifying criteria discussion.

5.1.1 Alternative 1 – No Action

The NCP requires that a no action alternative be evaluated as part of the FFS screening process, in order to provide a baseline for comparison to other alternatives. Under this alternative, no further actions would be taken to address the MSW at the Site. Additionally, the future conditions for the no action alternative will be subject to the significant changes to the hydrogeologic conditions that are anticipated when the quarry operations cease.

Threshold Criteria

Alternative 1 is not believed to meet the threshold criteria of Overall Protection of Human Health and the Environment. The Landfill and Dump are unlined and recent groundwater data collected at the Site has identified contaminants exceeding drinking water and surface water criteria (Barr, 2019). Additional groundwater monitoring is planned for these areas to further assess the current groundwater pathway risks. When the adjacent quarry groundwater pumping ceases in the future, the overall groundwater levels at the Site are predicted to rise and intercept portions of the waste, presenting additional concerns for the groundwater migration pathway.

Similarly, Alternative 1 is not believed to comply with ARARs. The existing Landfill and Dump do not comply with current MSW landfill requirements. There has also been on-going disagreement between the MCPA and the Site Owner regarding the adequacy of the post closure monitoring for the Landfill.

Balancing Criteria

Alternative 1 is considered to have unacceptable long-term effectiveness and performance, primarily due to impacts to the groundwater pathway under current conditions, plus additional impacts to the groundwater pathway that are anticipated when the adjacent quarry dewatering operations cease in the future.

Alternative 1 will not result in any reduction of toxicity, mass, or volume of the waste, and will not control contaminant migration away from the waste.

Since it involves taking no additional action, Alternative 1 is easily implemented, involves little cost, and does not trigger Short Term Effectiveness concerns related to remediation activities. Ongoing groundwater monitoring and maintenance of the existing vegetated soil covers would continue for the Site. The estimated present value cost for Alternative 1 is $770,000, which is the net present value cost of

ongoing monitoring and maintenance for 30 years, which is a typical duration for feasibility study cost analyses.

5.1.2 Alternative 2 – Excavate Waste with On-Site Lined Landfill

The onsite landfill Alternatives 2a, 2b, and 2c are very similar remedies involving slightly different landfill layouts as described in Section 4.2.

Threshold Criteria

The Alternative 2 remedies are believed to attain the threshold criteria of (i) Overall Protection of Human Health and the Environment and (ii) compliance with ARARs. The on-site landfill variations are expected to be equally protective by meeting the RAO of containing the waste above the current and future groundwater elevations, and establishing engineered systems to properly manage leachate and landfill gas.

Balancing Criteria

The Alternative 2 remedies are considered to have favorable long-term effectiveness and performance to contain the waste and would involve commonly-used and demonstrated waste containment technologies and methods. The long-term effectiveness and performance will rely on well designed, well-constructed, and properly maintained landfill system components, along with groundwater monitoring of a perimeter well network.

As described in Section 4.2, the base liner for the Alternative 2 remedies includes a 60-mil geomembrane over 2 feet of compacted clay, which MPCA has set as the minimum liner assumption to provide acceptable performance and compliance with current ARARs. However, MCPA is also considering a range of liner configurations (see Table 3-1) that would allow for potentially increased long-term performance and would also provide additional confidence that the liners will remain acceptable under potentially evolving regulatory requirements (e.g., addressing PFAS concerns similar to other recent landfill construction projects with enhanced liner designs).

The Alternative 2 remedies will not result in any reduction of toxicity, mass, or volume of the waste, but the waste containment will restrict contaminant migration away from the waste.

Alternative 2 will involve a multi-year, large scale construction and waste handling project that could result in potential for impacts to air, groundwater, site workers, and neighboring properties. During the work, it is anticipated those risks can be addressed by standard remedial construction practices and monitoring similar to other metro area landfill sites. The duration of the project is expected to be between 3 to 4 years for the base liner scenario (range in duration is based on the footprint differences in Alternative 2a, 2b, or 2c), with an additional 1 to 2 years if one of the potential enhanced liners is included in the design.

The Alternative 2 remedies are believed to be implementable and would follow standard landfill construction practices. It is assumed that the excavation work would occur while the adjacent quarry

continues to operate its dewatering system, which would allow for waste removal and liner construction in dewatered conditions.

Cost estimates for the Alternative 2 remedies are included in Table 5-1. Estimated cost ranges are as shown on the following table.

Alternative	Estimated Cost w/ -20% to +30% range, costs in millions	Additional Cost Range for Liner Enhancements, cost in millions (additional $45,000 - $135,00 /acre)[1]
2a - Minimal Area/Highest Peak	$80 ($69 to $112)	$2.7 to $8.1
2b - Largest Area/Lowest Peak	$101 ($81 to $131)	$4.0 to $12
2c - Moderate Area/Peak	$91 ($73 to $118)	$3.4 to $10

1 – Additional cost of liner and installation; does not consider costs associated with design, CQA, operations, etc.

Modifying Criteria

The City of Burnsville has indicated a preference that the waste from the Site be removed to another facility, suggesting less favorable community acceptance for any variation of Alternative 2. One of the City's concerns (also shared by the neighboring City of Bloomington) relates to the visual impact of the taller on-site landfill that would be created, particularly for Alternative 2a. The City of Burnsville and Dakota County have also expressed an interest in freeing up developable land around the completed landfill. Under that interest, there would be less support for the larger landfill footprints for Alternative 2b and 2c. MPCA continues to periodically meet with representatives of the community to discuss their input.

5.1.3 Alternative 3 – Excavate Waste with Off-Site Disposal

Alternative 3 involves excavating the waste and transporting it off-site to an existing, permitted landfill facility.

Threshold Criteria

Alternative 3 is believed to attain the threshold criteria of (i) overall Protection of Human Health and the Environment and (ii) compliance with ARARs.

Balancing Criteria

Alternative 3 will fulfill the RAOs, eliminate on-site waste management concerns, and would have favorable long-term effectiveness and performance by removing the waste from the Site for proper off-site management.

Alternative 3 will not result in any reduction of toxicity, mass, or volume of the waste, but the waste will be removed from the site for containment elsewhere, which will eliminate the source of potential contaminant migration.

Alternative 3 will involve a multi-year, large scale construction and waste handling project that could result in potential for impacts to air, groundwater, site workers, and neighboring properties. During the work, it is anticipated those risks can be addressed by standard remedial construction practices and monitoring similar to other metro area landfill sites. The large number of truck trips to transport the Site waste volume would create additional impacts to the community, resulting in increased traffic impacts, accident risks, vehicle emissions, and wear on public transportation infrastructure. The scale of these impacts vary widely and are directly related to the travel distance and routes that would be used for various off-site facilities. The closest off-site landfill is located less than two miles from the Site and might be accessible on non-public roads, which would minimize concerns regarding short-term effectiveness. Other landfills are located 20 to 30 miles from the Site and would involve travel on public roads, increasing concerns regarding short-term effectiveness.

Alternative 3 is believed to be implementable, although the size of the waste export may put pressure on existing landfill capacity and markets in Dakota County. Expansions at existing facilities have been under discussion and, if allowed by regulatory authorities, would reduce this concern. Some facilities not currently accepting MSW may be available to accept waste from Freeway if further waste characterization and regulatory review determine acceptability at those facilities, or if those facilities revised their permit to accept the large volume of Freeway waste.

Alternative 3 would follow standard earthwork construction practices. It is assumed that the excavation work would occur while the adjacent quarry continues to operate its dewatering system, which would allow for waste removal and soil backfill in dewatered conditions.

Cost estimate ranges for Alternative 3 are included in Table 5-1. Alternative 3 carries enormous uncertainties around state and local fees, haul distance to a facility willing to accept the quantity of waste, and economic conditions that would affect the cost of disposal. In order to highlight the impact of those uncertainties, two cost models were developed for Alternative 3 – one with very favorable assumptions (waiver of taxes/fees, acceptance at a nearby facility, and competitive tipping fees) and one with more unfavorable cost assumptions (longer haul distance and higher taxes/fees). As shown in Table 5-1 and the charts on Figure 5-1, the unfavorable assumptions make Alternative 3 non-competitive from a cost standpoint. However, when using the more favorable set of assumptions (or if even more favorable conditions were realized), Alternative 3 may start to become competitive with the on-site options.

5.2 Comparative Analysis

This section presents a comparative analysis of the alternatives. The purpose of the comparative analysis is to identify the relative advantages/disadvantages of the alternatives within each of the evaluation criteria. A comparison of the alternatives is included in Table 5-2.

5.2.1 Overall Protection of Human Health and the Environment

Alternative 1 (the No Action alternative) is not believed to be protective of human health and the environment. The primary concerns involves impacts to the groundwater pathway under current conditions, plus additional impacts to the groundwater pathway are anticipated when the adjacent quarry

dewatering operations cease in the future (see Sections 1.2.3 and 1.2.4). Alternative 1 does not meet the RAOs (Section 2.4).

All other alternatives are believed to be equally protective as they involve containment of the waste in a lined landfill with appropriate engineering controls.

5.2.2 Compliance with ARARs

Alternative 1 is not believed to be in compliance with ARARs, as noted in Section 5.1.1. All other alternatives are believed to be in compliance with ARARs as they would involve containment of the waste in a lined landfill with appropriate engineering controls.

5.2.3 Long-term Effectiveness and Permanence

Alternative 1 is not considered to provide long-term effectiveness, as noted in Section 5.1.1. All other alternatives are similar and are expected to provide long-term effectiveness and permanence for waste containment through well-designed, well-constructed landfills, with proper long-term maintenance and monitoring. Liner design and construction at existing landfills for Alternative 3 vary. Additional long-term effectiveness may be achieved for Alternative 2 options if liner enhancements are included (see Section 4.2).

5.2.4 Reduction of Toxicity, Mobility, or Volume through Treatment

None of the alternatives provide a reduction in toxicity, mobility, or volume through treatment. Alternatives 2 and 3 provide better controls of on-going releases because the waste material will be contained in a lined landfill with engineered systems to manage leachate and landfill gas.

5.2.5 Short-term Effectiveness

Alternative 1 (No Action) has minimal concerns regarding short effectiveness since there would be no remediation activities. The Alternative 2 on-site landfill remedies would involve multi-year construction projects with similar impacts during the remedial construction, with short-term effectiveness directly related to the duration of the construction (3 to 4 years, plus another 1 to 2 years if liner enhancements are included). Alternative 2a would involve higher short-term effectiveness based on the shortest construction time.

Alternative 3 would have lower on-site construction impacts compared to Alternative 2 as it has a shorter construction schedule. However, the overall short-term effectiveness of Alterative 3 varies widely, depending on the off-site facility selected and the travel route and distance used for hauling. Off-site hauling impacts (e.g., traffic, emissions, infrastructure wear) could be relatively low if the closest landfill is selected and if access to private roads is obtained. Off-site hauling impacts would be much greater for more distant landfills.

5.2.6 Implementability

All alternatives are expected to be implementable, although there is some uncertainty around the off-site landfill capacities in Dakota County for Alternative 3 (see Section 5.1.3). Alternative 2b would involve the

most complex earthwork (i.e., greatest amount of double handling of materials among the Alternative 2 scenarios) and construction staging for the on-site landfill alternatives because of the larger landfill footprint.

5.2.7 Cost Effectiveness

The range of cost for each alternative is summarized in Table 5-1. A comparison of major cost components are summarized on Figure 5-1. Alternative 1 has the lowest cost, although it does not meet the threshold criteria in the FFS. Alternative 2a has the lowest cost for alternatives meeting the threshold criteria in the FFS. As discussed in Section 5.1.3, Alternative 3 carries enormous uncertainties around tipping fees and haul costs, depending on the landfill selected and whether public fees will be applied to the Site waste. Using optimistic assumptions, Alternative 3 may begin to become competitive with the Alternative 2 costs.

6.0 Summary and Recommendations

This Focused Feasibility Study has been prepared on behalf of the MPCA Closed Landfill Program to help inform remedy selection efforts for the Freeway Landfill and Freeway Dump in Burnsville, Minnesota. The evaluation involved a focused set of commonly implemented waste containment technologies that were assembled into five alternatives (Alternative 1, 2a, 2b, 2c, and 3). Alternative 1 would involve taking no action beyond long-term monitoring and maintenance at the existing Landfill and Dump. Alternatives 2a, 2b, and 2c, which would involve excavation of the waste with placement in a new lined landfill to be constructed on-site, include three variations related to the new landfill height and footprint. Alternative 3 was developed to represent a range of possible off-site disposal options in Dakota County.

The five alternatives were evaluated against the statutory criteria listed in Section 121 of CERCLA and in Section 300.430 of the NCP, as summarized in Table 5-2. Although Alternative 1 (No Action) involves the lowest cost and ease of implementation, the evaluation determined that Alternative 1 does have long term effectiveness and does not meet the threshold criteria for (1) protection of human health and the environment and, and (2) compliance with ARARs. Based on past discussions, Alternative 1 is not supported by key stakeholders, including the City of Burnsville, Dakota County, MPCA CLP, or US EPA.

The other four alternatives are believed to have similar long-term effectiveness, and each meets the FFS threshold criteria for compliance with ARARs and overall protection of human health and the environment. The main differences between the four remaining alternatives involve cost, implementation effort/duration, and the modifying criteria of state and community acceptance (see Table 5-2).

Three liner configurations for Alternatives 2a, 2b, and 2c were considered in this evaluation, including the base option that meets Minnesota Statute for municipal solid waste (MSW) landfills, an enhanced composite liner with an additional layer of geosynthetic clay liner (GCL), and a double composite liner traditionally used for hazardous waste landfills (see Table 3-1). The nature of the Site and historical waste disposal practices may warrant a more protective landfill liner, and this choice will also depend on community acceptance and legislative processes.

Based on this evaluation, the three configurations for Alternate 2 are less expensive than Alternative 3. Cost estimates (Table 5-1) for the design and construction of Alternatives 2a, 2b, and 2c are based on landfill industry standards and actual cost of similar projects. Alternative 2a utilizes the smallest footprint and therefore remains the least expensive option due to economies of scale.

Alternative 3 would involve excavating the waste from Freeway Landfill and Dump and disposing of the waste material in a permitted off-site Solid Waste Disposal Facility. Alternative 3 is estimated to be the most expensive alternative based on several current unknowns, including finding a landfill that has the capacity to handle the volume of waste and the actual disposal fees that will be charged by the landfill. These disposal fees include the trucking, facility operation fees, and city/county/state fees and taxes. As noted in table 5-1, the cost range for disposal of the Freeway Landfill and Dump waste material at an alternative site is estimated to be between $23-$80 per ton.

Path Forward

At this time, the MPCA intends to present Alternatives 2a, 2b, 2c, and 3 at a public meeting and solicit public comments on each alternative. The desired outcome after review of the public comments would be to choose which configuration for Alternative 2 would be most acceptable for the public and other government stakeholders (e.g., City of Burnsville, Dakota County, and other regional governing bodies).

Once the preferred configuration from Alternative 2 is selected, the MPCA intends to move forward on the preparation of design and bidding documents for one configuration for Alternative 2 and Alternative 3. The design and bidding documents will also consider option pricing for an enhanced bottom liner system to aid in the decision-making process. Bids will be posted for one configuration for Alternative 2 and Alternative 3. The bid results will be presented to the Legislature and the decision to move forward with Alternative 2 or Alternative 3 will be based on the support and availability of a funding source from the Legislature.

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Tables

Table 2-1
Potential Federal Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Federal Environmental Laws (except RCRA)					
CERCLA	Addresses investigation and remediation of a release of a hazardous substance.	Release of a hazardous substance.	42 USC 9601 et seq.	Applicable	
NCP	Provides organizational structure and procedures for preparing for and responding to discharges of oil and releases of hazardous substances, pollutants, and contaminants.	Release of a hazardous substance.	40 CFR 300	Applicable	
Safe Drinking Water Act	Protects the quality of public drinking water supplies from source to tap.		42 USC 300f et seq.	Deferred	The FFS relates to evaluation of interim waste management alternative. Other pathways/media to be evaluated in later phase of projects.
Clean Water Act	Establishes structure for regulating discharges of pollutants and regulating surface water quality.	Activities that affect or may affect surface water.	33 USC 1251 et seq.	Applicable	
Clean Water Act	Surface water quality requirements for discharges of pollutants to federally-regulated waters.	Discharge of pollutants to federally-regulated waters.	33 USC 1342 40 CFR 129	Applicable	
Clean Air Act	Regulates air emissions from stationary and mobile sources.	Stationary or mobile source air emissions.	42 USC 7401 et seq.	Applicable	Mobile sources will be excavation and trucking equipment, plus landfill gas management.
Clean Water Act – Section 404	Regulates dredge or placement of fill in wetlands under the jurisdiction of the USACE	Assessment of work in wetlands		Applicable	As part of the Section 404 Permit, compliance with Section 7 of the Endangered Species Act and Section 106 of the National Historic Preservation Act will also be required.
Section 10 (Rivers and Harbors Act of 1899)	Applies to activities that will obstruct or alter any navigable water of the United States.	Construction activities that will potentially obstruct or alter navigable waters.	33 USC 403	Not an ARAR	No activities are contemplated that would obstruct or alter any navigable waters of the United States.
Permits and Certifications					
NPDES Permits	Requirements for treatment and monitoring of discharges to waters of the state	Discharge of a pollutant to waters of the state	40 CFR 122	Applicable	
Resource Conservation and Recovery Act (RCRA) 42 USC 6901 et seq.					

Table 2-1
Potential Federal Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Hazardous Waste Management	Standards for hazardous waste management	Generation of hazardous waste	40 CFR 260-268	TBC as presence of hazardous waste is not known.	The waste is not characterized as hazardous waste.
Disposal of Solid Waste that is not a Hazardous Waste	Generator of RCRA Subtitle D regulated waste.	Placement of RCRA Subtitle D waste in a landfill.	40 CFR 257	Applicable	
Standards of Performance for Municipal Solid Waste Landfills			40 CFR Subpart WWW 60.750 through 759	Applicable	
Standards of Performance for New Stationary Sources	Requirements for flares	Operation of flares as part of the landfill gas management system	40 CFR 60.18 (e)	Applicable	Requirements for flares.
U.S. Department of Transportation					
Transportation and Packaging of Hazardous Waste	Requirements for transportation and packaging of hazardous waste	Offering of hazardous materials for transportation.	49 CFR 171-179	TBC as presence of hazardous waste is not known.	The waste is not characterized as hazardous waste.
Occupational Safety and Health Administration (OSHA)					
Work on Contaminated Sites	Requirements for workers on uncontrolled hazardous waste sites such as training, personal protective equipment, recording and reporting work-related fatalities/injuries/illnesses.	Work on uncontrolled hazardous waste sites, RCRA CA sites, and emergency response sites.	29 CFR 1904 - Recording and Reporting Occupational Injuries and Illnesses 29 CFR 1910 - Occupational Safety and Health 29 CFR 1926 – Safety and Health Regulations for Construction	Applicable	Not relevant for operating landfill workers but applicable due to legacy issues.
Management of Certain Toxic Substances					
Remediation of release of polychlorinated biphenols	Requirements governing the remediation, release, and disposal of PCBs must be met.	Remediation, release, and disposal of PCBs.	40 CFR 761	Applicable	PCB exceedances reported in Phase A investigation report for solid media at the Dump, Landfill, and Transfer Station
Dibenzo-para-Dioxins/Dibenzofurans	Requirements governing the testing and reporting of chemical substances containing dibenzo-para-dioxins / dibenzofurans	Manufacturing (and/or importing), or processing, a chemical substance identified under §766.25	40 CFR 766	Applicable	2,3,7,8 TCDD detected in solid media and water (Phase A report Appendix D tables)
Air Quality					
Standards of Performance	Standards of Performance for Landfill Gas collection and control	Municipal Solid Waste Landfill meeting specific criteria	40 CFR 60, subparts A and WWW/XXX	TBC	

Table 2-2
Potential State and Local Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Water Pollution Control Act	Administration and enforcement of laws relating to the pollution of any waters of the state.	Release of pollutants to Minnesota waters.	Minnesota Statute 115	Applicable	
Pollution Control Agency	Provides organizational structure and procedures for responding to problems relating to water, air, and land pollution.	Release of hazardous substance in Minnesota.	Minnesota Statute 116	TBD	
Water Law	Provides regulations pertaining to any waters of the state, including surface water, wetlands and groundwater.	Release of pollutants to Minnesota waters or activities that affect bed, banks or cross section of Minnesota waters.	Minnesota Statute 103A, 103B, 103C, 103D, 103E; 103F, 103G, 103H	Applicable	
Permits and Certifications					
Permits and certification for regulated activities	General requirements for obtaining MPCA permit for regulated activities.	Work involving a regulated activity.	Minnesota Rules Ch. 7001.0010 through 7001.0210	Applicable	
Hazardous waste facility permit	Requirements for hazardous waste facility permit.	Construction of a hazardous waste management facility in Minnesota.	Minnesota Rules Ch. 7001.0500 through 7001.0730	Applicable	Substantive permit requirements would need to be met for regulated activities.
NPDES Permits	Requirements for treatment and monitoring of discharges to waters of the state.	Discharge of a pollutant to waters of the state.	Minnesota Rules Ch. 7001.1000 through 7001.1150 Construction Stormwater - Minnesota Rules Chapter 7090 Industrial Stormwater - Federal Clean Water Act (CWA), as amended, (33 U.S.C. 1251 et. seq.; hereafter the Act), 40 CFR pt.122, 123, and 124, as amended, et. seq.; Minn. Stat. chs. 115 and 116, as amended, and Minn. R. chs. 7001 and 7090	Applicable	NPDES/SDS Construction Stormwater General Permit MNR100001 Substantive permit requirements would need to be met for regulated activities. Surface runoff would be managed with a Storm Water Pollution Prevention Plan (SWPPP). NPDES/SDS General Permit MNR050000 for Industrial Stormwater
MCES Industrial Discharge Permit – Special Discharges	Comply with limits for discharge of leachate to MCES	Collection of landfill leachate	Minnesota Statutes Chapter 473 as amended. Waste Discharge Rules for the Metropolitan Disposal System, and the MCES Leachate and Contaminated Groundwater Program	Applicable	
Certifications	Requirements for certification for regulated activities.	Requirement to obtain certification by	Minnesota Rules Ch. 7001.1400 through 7001.1470	Applicable	

Table 2-2
Potential State and Local Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
		section 401 of the Clean Water Act.			
Solid Waste Management Facility	Requirements for permitting a soil waste management facility.	Construction of a solid waste management facility in Minnesota	Minnesota Rules Ch. 7001.3000 through 7001.3550	Applicable	
Waste Discharge Rules	Waste Discharge Rules for the Metropolitan Disposal System	Leachate discharge	Waste Discharge Rules Articles I-V	Applicable	Leachate discharge to wastewater treatment plant. Article II includes Industrial Discharge Permits, Article IV includes pretreatment requirements
Storm Water Regulatory Program	Permit program requirements for storm water discharge	Storm water discharge	Minnesota Rules Ch. 7090	Applicable	
Hazardous Waste Regulations					
Hazardous Waste	Requirements for generation, management, and transportation of hazardous waste	Generation of hazardous waste	Minnesota Rules Ch. 7045.0102 through 7045.1400	TBC as presence of hazardous waste is unknown	The waste is not characterized as hazardous waste.
Hazardous Waste Regulation	Requirements for the regulation of hazardous waste	Management of hazardous waste	Dakota County Ordinance No. 111	TBC as presence of hazardous waste is unknown	The waste is not characterized as hazardous waste.
Solid Waste					
General requirements for management of solid waste.	Requirements and standards for solid waste	Generation of a solid waste	Minnesota Rules Ch. 7035.0300 through 7035.0605	Applicable	
Individual Properties	Responsibility for management of solid waste	Generation of solid waste	Minnesota Rules Ch. 7035.0700 through 7035.0805	Applicable	
Industrial Solid Waste Land Disposal Facilities	Requirements for industrial solid waste land disposal facilities	Generation and management of an industrial solid waste	Minnesota Rules Ch. 7035.1590 through 7035.2500	Not Applicable	
Solid Waste Management Facility General Technical Requirements	General requirements for facilities that manage municipal solid waste	Operation of a solid waste management facility	Minnesota Rules Ch. 7035.2525 through 7035.2655	Applicable	Closure and postclosure care procedures 7035.2625 through 7035.2655
Solid Waste Management Facilities Financial Requirements	Requirements for cost estimates and financial assurances documentation	Construction of a industrial solid waste land disposal facility	Minnesota Rules Ch. 7035.2665 through 7035.2805	Not Applicable	

Table 2-2
Potential State and Local Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Solid Waste Management Facility Specific Technical Requirements	Requirements for facilities that dispose of mixed municipal solid waste in or on the land.	Management of a mixed municipal waste landfill	Minnesota Rules Ch. 7035.2815 through 7035.2915	Applicable	7035.2815 Mixed MSW, 7035.2825 Demo Debris, 7035.2870 Transfer Facilities 7035.2885 MSW combustor ash, 7035.2815 Subp 4 (H) (2) includes alternative intervention limits
Abandonment of motor vehicles and scrap metal	Requirement for disposal and reuse of abandoned motor vehicles and other scrap metal	Disposal and reuse of abandoned motor vehicles and other scrap metal	Minnesota Rules Ch. 7035.3000 through 7035.3600	Not Applicable	
Solid Waste Programs and Projects	Requirements for application procedure for grants-in-aid, state requirements, approval of applications, and payments for programs or projects which will encourage both the reduction of the amount of material entering the solid waste stream and the reuse and recycling of solid waste.	Plan for facility meeting requirements	Minnesota Rules Ch. 7035.4000 through 7035.6000	Not Applicable	
Infectious Waste	Requirements for owners and operators of facilities, commercial transporters and all infectious waste.	Generation and management of infectious waste	Minnesota Rules Ch. 7035.9100 through 7035.9150	Not Applicable	Infectious waste not anticipated
Disposal of Dioxin Contaminated Soil in Subtitle D Landfills	Provides conditions for disposal of dioxin contaminated soil in a Minnesota Subtitle D landfill. Dioxin-contaminated soil may be placed in a Minnesota "Subtitle D" facility if $TEQ_{DF} \leq$ 10 µg/kg.	Disposal of dioxin-contaminated soil in a MPCA-permitted Subtitle D landfill.	MPCA Office Memorandum to Remediation Division from Stephen Thompson and Elizabeth Gawrys. August 29, 2006	Not Applicable	Dioxin contaminated soils not anticipated (verify with analytical from RI)

Table 2-2
Potential State and Local Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Remediation of Residential and Commercial/Industrial Property under MPCA VIC Program	MPCA VIC guidance	Contaminated site – enrollment in MPCA VIC program	http://www.pca.state.mn.us/cleanup/vic-guidedoc.htm.	Not Applicable	
Dakota County Solid Waste Management Ordinance No. 110	Comprehensive requirements for solid waste management	Dakota County, solid waste management	Dakota County Ordinance No. 110	Applicable/TBC	Solid Waste Management//Dakota County Ord. 110// The MPCA and the County will identify the substantive requirements or variances.
Solid Waste Management General Provisions	General requirements for solid waste management	Establish, operate or maintain an intermediate or final disposal solid waste facility	Dakota County Ordinance No. 110 Solid Waste Management Sections 3.00 through 3.21	Applicable	The MPCA and the County will identify the substantive requirements that are applicable
Off-site Reuse of Minimally Contaminated Soil from Development Projects and Road Construction Projects	Requirements for minimally contaminated soils reuse		Dakota County Ordinance No. 110 Solid Waste Management Section 3.11	TBC	On-site soil reuse is planned. Soil import may be needed on project and the MPCA and the County will identify the substantive requirements that are applicable
Solid Waste Surcharge	Requirements for solid waste surcharges	Acceptance of solid waste	Dakota County Ordinance No. 110 Solid Waste Management Sections 4.00 through 4.04	TBC	MPCA and Dakota County are discussing a range of possibilities for alternatives involving offsite management of wastes
Industrial Waste Management and Land Application of Waste	Requirements for industrial waste management	Acceptance of industrial waste	Dakota County Ordinance No. 110 Solid Waste Management Section 5.00 through 5.05	Applicable	Requirements for acceptance of industrial waste material. Waste accepted at freeway includes ash and non-exempt construction waste. Need written permission to dispose of ash.
Use of Industrial Waste of Contaminated Soil as Cover Material	Requirements for use of industrial waste or contaminated soil as cover material	Use of Industrial Waste or Contaminated Soil as Cover Material	Dakota County Ordinance No. 110 Solid Waste Management Section 5.04	Not Applicable	Requirements for use of contaminated soils as cover, includes requirements for stockpiling
Solid Waste Landfill Facilities	Requirements for solid waste landfill facilities	Establish, operate or maintain a landfill facility	Dakota County Ordinance No. 110 Solid Waste Management Section 6.00 through 6.08	Applicable	General requirements for solid waste landfill facilities, includes additional requirements for sanitary, special, and demolition waste
Special Waste Storage Facilitates and Waste Tire Management	Requirements for special waste storage facilities and waste tire management	Establish, operate or maintain a special waste storage facility or manage tire waste	Dakota County Ordinance No. 110 Solid Waste Management Section 7.00 through 7.05	TBC	Mostly addresses tire– applicable if tires are found at the landfill/dump or handled at transfer station that need to be managed

Table 2-2
Potential State and Local Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Incineration	Requirements for waste incineration	Establish, operate or maintain an incinerator	Dakota County Ordinance No. 110 Solid Waste Management Section 8.00 through 8.01	Not Applicable	Applicable if onsite incinerator used
Energy Recovery Facility	Requirements for energy recovery facilities	Establish, operate or maintain an energy recovery facility	Dakota County Ordinance No. 110 Solid Waste Management Section 9.00 through 9.02	Not Applicable	Assume flaring only of LFG
Solid Waste Processing Facilities	Requirements for solid waste processing facilities	Establish, operate or maintain a waste processing facility	Dakota County Ordinance No. 110 Solid Waste Management Section 10.00 through 10.03	Applicable	Includes list of reduced regulation type facilities
Transfer Stations	Requirements for transfer stations	Establish, operate or maintain a transfer station	Dakota County Ordinance No. 110 Solid Waste Management Section 11.00 through 11.02	Not Applicable	
Infectious Waste Facilities	Requirements for infectious waste facilitates	Establish, operate or maintain an infectious waste facility	Dakota County Ordinance No. 110 Solid Waste Management Section 12.00 through 12.02	TBC	
Composting Facilities	Requirements for composting facilities	Establish, operate or maintain a composting facility	Dakota County Ordinance No. 110 Solid Waste Management Section 13.00 through 13.06 Facilities	Not Applicable	
Nonconforming Sites	Requirements for nonconforming sites	Site conditions that do not conform with Dakota County Ordinance No. 110	Dakota County Ordinance No. 110 Solid Waste Management Section 14.00 through 14.04	Applicable	Requirements for remediation of nonconforming sites
Collection and Transportation of Solid Waste and Recyclable Materials	Requirements for collection and transportation of solid waste and recyclable materials	Collection and transportation of solid waste and recyclable materials	Dakota County Ordinance No. 110 Solid Waste Management Section 15.00 through 15.10	Applicable	Relocation of waste to different landfill
Waste Abatement Program	Requirements for waste abatement program		Dakota County Ordinance No. 110 Solid Waste Management Section 16.00 through 16.04	Not Applicable	Recycling requirements
Variances	Requirements for variances		Dakota County Ordinance No. 110 Solid Waste Management Section 17.00 through 17.03	Applicable	Application process for variance from ordinance standards
Emergency Waiver of Standards	Requirements for emergency waivers of standards	Disaster event occurrence	Dakota County Ordinance No. 110 Solid Waste Management Section 18.00 through 18.03	Applicable	Flooding
Best Management Practices for the Off-Site Reuse of Unregulated Fill	Requirements for Unregulated Fill Reuse		MPCA Best Management Practices for the Off-Site Reuse of Unregulated Fill Document c-rem1-01 dated February 2012	Not Applicable	
Water Supply Regulations					
Connection to public sewer	State Plumbing Code (MDH)	Use of public sewer and water systems and plumbing	Minnesota Rules Ch. 4715	Applicable	

Table 2-2
Potential State and Local Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
		materials and methods			
Sewer expansion and connection approval			MCES	Applicable	
Modifications to sanitary sewers to provide new or improved services		Modifications to sanitary sewers	Minnesota Rules Ch. 7077.0105	Applicable	
Public Water Supply	State Public Water Supply Code (MDH)	Use of public water supply	Minnesota Rules Ch. 4720	Applicable	
Public Water Resource	Water appropriation permitting, standards and criteria for alterations to structure of public water (DNR).	Plans to appropriate water or alter structure of public water	Minnesota Rules Ch. 6115	Not Applicable	
New well construction in contaminated area	Allows for designation of special Well Construction Area (MDH)	Conditions requiring Special Well Construction Area designation	Minnesota Rules Ch. 4725.3659	Not Applicable	
Monitoring well installation or abandonment	Well and boring construction, use, maintenance, and sealing information (MDH)	Water Well Code	Minnesota Rules Ch. 4725	Applicable	
Certification of Environmental Laboratories	Laboratory accreditation requirements for the State of Minnesota (MDH).	Requirement that analyses be conducted by a certified lab.	Minnesota Statute 144.97 through 144.98 Minnesota Rules Ch. 4740 Minnesota Rules Ch. 4740.2010 through 4740.2040	Applicable	
Surface Water Quality					
Water Pollution Control Act	Regulates point source discharges to waters of the state.	Point source discharges to waters of the state	Minnesota Statute 115	Not Applicable	
Water of the State	Classifies waters of the state and establishes standards	Standards for Surface Waters	Minnesota Rules Ch. 7050	Not Applicable	
Groundwater Quality					
Discharge to groundwater	Nondegradation goal, prohibition of discharge to saturated zone, limitation on discharge to unsaturated zone, remediation requirements.	Discharges to underground waters	Minnesota Rules Ch. 7060	Deferred	The FFS relates to evaluation of interim waste management alternative. Other pathways/media to be evaluated in later phase of projects
Groundwater use or contact	Establishes human health based groundwater standards (MDH)	Release of hazardous substances to drinking water aquifer	Minnesota Rules Ch. 4717.7500 and 4717.7801 to 4717.7900	Deferred	The FFS relates to evaluation of interim waste management alternative. Other pathways/media

Table 2-2
Potential State and Local Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
					to be evaluated in later phase of projects
Air Quality					
Air emissions	Duty to notify and abate excessive or abnormal unpermitted air emissions	Abnormal unpermitted air emissions	Minnesota Statute 116.061 Minnesota Rules Ch. 7019.1000	Applicable	
Air emissions	Control equipment efficiencies and monitoring	Air emissions control equipment	Minnesota Rules Ch. 7011.0060 through 7011.0080	TBC	ARAR if flare is otherwise not regulated
Air emissions	Performance Testing	Stationary emission source	Minnesota Rules Ch. 7017.2001 through 7017.2060	TBC	ARAR if testing is required
Air emissions	Emissions inventory	Stationary emission source	Minnesota Rules Ch. 7019.3000 through 7019.3100	Applicable	
Air emissions	Air emission permits for air emission sources	Stationary emission source	Minnesota Statute 116.081 Minnesota Rules Chs. 7005, 7007	Applicable	
Standards for Stationary Sources	Gas Emissions From Municipal Solid Waste Landfills	MSW Landfill of a certain size	Minnesota Rules Ch. 7011.3500 through 7011.3510, adopts 40 CFR 60 Subpart WWW, by reference	TBC	
Noise Pollution Control					
Sound generation	Standards for noise generated during operations.	Generation of noise during site activities	Minnesota Rules Ch. 7030	Applicable	
Health and Safety					
Worker protection	Standards for worker health, safety and training	Health and Safety	Minnesota Rules Ch. 5205	Applicable	
Property Use in Superfund Remedial Action Decisions					
Property use	Incorporating property use into cleanup decisions	Need for remedial action decision. Use of institutional controls as part of remedial actions.	MPCA Guidance on Incorporation of Planned Property Use into Site Decisions	TBC	
Lower Minnesota River Watershed District Rules and Standards					
Stormwater Management	Manage subwatershed discharge rates and flood storage volumes to be consistent with the Commission's and local water resources management plans.	Plans for land or site development adjacent to or within a lake, wetland, or natural or altered watercourse as listed in the final inventory of Protected Waters and Wetlands, as prepared by the DNR.	Lower Minnesota River Watershed District Stormwater Management Standard	Applicable to LMRWD	Appendix K Section 7 of Watershed Management Plan No permits required in LMRWD

Table 2-2
Potential State and Local Action-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Erosion and Sediment Control	Control runoff and erosion during land disturbing activities	Plans for projects covered by Rule D.	Lower Minnesota River Watershed District Erosion and Sediment Control Standard	Applicable to LMRWD	Appendix K Section 5 of Watershed Management Plan No permits required in LMRWD

Table 2-3
Potential Federal Location-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
National Archaeological and Historical Preservation Act					
Within area where action may cause irreparable harm, loss, significant artifacts.	Construction on previously undisturbed land would require an archaeological survey to the area.	Alteration of terrain that threatens significant scientific, prehistoric, historic, or archaeological data.	Substantive requirements of 36 CFR 65, National Historic Landmarks Program.	Not an ARAR	The project area has been extensively altered by landfilling and earthwork
Federal National Historic Preservation Act, Section 106					
Historic project owned or controlled by federal agency.	Action to preserve historic properties; planning of action to minimize harm to properties listed on or eligible for listing or the National Register of Historic Places.	Property included or eligible for the National Register of Historic Places.	Substantive Requirements of 36 CFR 800, Protection of Historic Properties; 16 USC 470	Not an ARAR	
Historical Sites, Buildings, and Antiquities Act					
Historic sites	Avoid undesirable impacts on landmarks.	Areas designated as historic sites.	16 USC 461-467; 40 CFR 6.3, Requirements for Environmental Information Documents and Third-Party Agreement for EPA Actions Subject to NEPA	Not an ARAR	
Endangered Species Act of 1973					
Critical habitat upon which endangered species or threatened species depend.	Action to conserve endangered species or threatened species, including consultation with the Department of the Interior. Reasonable mitigation and enhancement measures must be taken, including live propagation, transplantation and habitat acquisition and improvement.	Determination of effect upon endangered or threatened species or its habitat by conducting biological assessments.	16 USC 460 et seq. 16 USC 1531; 16 USC 1536(a) 50 CFR 81, Conservation of Endangered and Threatened Species of Fish, Wildlife, and Plant – Cooperation with the States 50 CFR 402, Interagency Cooperation – Endangered Species Action of 1973, as amended	Not an ARAR	No designated critical habitat and marginal suitable habitat for threatened and endangered species.
Bald and Golden Eagle Protection Act					
Presence of nesting indicators	Protects bald and golden eagles from being impacted.	Determination dependent on assessment for nesting eagles.		Not an ARAR	Survey for nesting eagles completed in May 2019 – no eagle nests were present in project vicinity.
Migratory Bird Treaty Act of 1972					
Migratory bird area	Protects almost all species of native birds in the U.S. from unregulated “take” which can include poisoning at contaminated sites.	Presence of migratory birds.	16 USC 703	TBC; applicable if nesting birds present in remediation area	Can be mitigated by not initiating construction during nesting season and assuming that the multiyear remediation activities will prevent nesting from being initiated at this location until after site restoration is complete.

Table 2-3
Potential Federal Location-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Wilderness Act					
Wilderness Area	Area must be administered in such a manner as will leave it unimpaired as wilderness and preserve its wilderness character.	Federally-owned area designated as wilderness area.	16 USC 1131 et seq.; 50 CFR 35.1 et seq.	Not applicable	
National Wildlife Refuge System					
Wildlife Refuge	Only actions allowed under the provisions of 16 USC Section 688 dd(c) may be undertaken in areas that are part of the National Wildlife Refuge System.	Areas designated as part of National Wildlife Refuge System.	16 USC 668; 50 CFR 27	TBC	MN Valley Wildlife Refuge adjacent to dump/across highway from landfill, dump remediation activities adjacent to refuge
Fish and Wildlife Coordination Act, Fish and Wildlife Improvement Act of 1978, Fish and Wildlife Conservation Act of 1980					
Area affecting stream or other water body	Provides protection for actions that would affect streams, wetlands, other water bodies or protected habitats. Any action taken should protect fish or wildlife.	Diversion, channeling or other activity that modifies a stream or other water body and affects fish or wildlife.	16 USC 661; 16 USC 662 16 USC 742a; 16 USC 2901; 50 CFR 83	TBC	
Upper Mississippi River Management					
To ensure the coordinated development and enhancement of the Upper Mississippi River system.	Cooperative effort and mutual assistance on the comprehensive planning of the use, protection, growth, and development of the Upper Mississippi River System	Actions that may affect river reaches that have commercial navigation channels on the Mississippi River.	33 USC 652	Applicable	The Minnesota River is part of the Upper Mississippi River system
Clean Water Act, Section 404					
Wetland	The degradation Section requires degradation or destruction of wetlands and other aquatic sites to be avoided to the extent possible. Dredged or fill material must not be discharged to navigable waters if the activity contributes to the violation of Maryland water quality standards CWA Sec. 307; jeopardizes endangered or threatened species; or violates requirements of the Title III of	Wetland as defined by Executive Order 11990 Section 7.	40 CFR 230.10; 40 CFR 231 231.1, 231.2, 231.7, 231.8)	Applicable	Wetlands within Site that are under jurisdiction of the USACE

Table 2-3
Potential Federal Location-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
	the Marine Protection, Research and Sanctuaries Act of 1972.				
Wild and Scenic Rivers Act					
Within area affecting national wild, scenic, or recreational rivers.	Avoid taking or assisting in action that will have direct adverse effect on national, wild or scenic recreational rivers.	Activities that affect or may affect any of the rivers specified in Section 1276(a).	16 USC 1271 et seq. and Section 7(a); 36 CFR 297; 40 CFR 6.302(e)	Not an ARAR	There are no designated wild, scenic, or recreational areas within the Site
Coastal Zone Management					
Within coastal zone	Regulates activities affecting the coastal zone including lands thereunder and adjacent shoreline. Must conduct activities in a manner consistent with the approved State management programs.	Activities affecting the coastal zone including lands thereunder and adjacent shoreland.	Section 307(c) of 16 USC 1456(c); 16 USC 1451 et. seq.; 15 CFR 930; 15 CFR 923.45	Not an ARAR	The Site is not located within a designated coastal zone
Coastal Barrier Resources Act, Section 3504					
Within designated coastal barrier	Prohibits any new federal expenditure within the Coastal Barrier Resource System.	Activity within the Coastal Barrier Resource System	16 USC 3504	Not an ARAR	The Site is not located within a designated coastal zone.
Navigation and Navigable Waters					
Navigable waters	Establishes regulations pertaining to activities that affect the navigation of the waters of the United States.	Activities affecting navigable waters.	33 CFR 320-329 33 USC 1341	Not Applicable	Minnesota River is a US navigable water throughout (USACE list), No activities are contemplated that would obstruct or alter any navigable waters of the United States.
Magnuson Fishery Conservation and Management Act					
Managed Fisheries	Provides for conservation and management of specified fisheries within specified fishery conservation zones (in federal waters).	Presence of managed fisheries in federal waters.	16 USC 1801, et seq.	Not applicable	Not in fishery conservation zone.

Table 2-3
Potential Federal Location-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Hazardous Waste Control Act (HWCA)					
Within 61 meters (200 feet) of a fault displaced in Holocene time	New treatment, storage or disposal of hazardous waste prohibited.	Resource Conservation and Recovery Act (RCRA) hazardous waste; treatment, storage or disposal of hazardous waste	40 CFR 264.18 (a)	Not applicable	Dakota County Geologic Atlas and Hennepin County Geologic Atlas
Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to avoid washout.	RCRA hazardous waste; treatment, storage, or disposal of hazardous waste.	40 CFR 264.18(b)	Applicable	Perimeter of dump and parts of landfill in flood zone AE (100-yr) FEMA/Dakota County GIS maps
Within salt dome formation, underground mine, or cave	Placement of noncontainerized or bulk liquid hazardous waste prohibited.	RCRA hazardous waste placement.	40 CFR 264.18(c)	Not Applicable	
Executive Order 11988, Protection of Floodplains					
Within floodplain	Actions taken should avoid adverse effects, minimize potential harm, restore and preserve natural and beneficial values.	Action that will occur in a floodplain, i.e., lowlands, and relatively flat areas adjoining inland and coastal waters and other flood-prone areas.	40 CFR 6, Appendix A; excluding Sections 6(a)(2), 6(a)(4), 6(a)(6); 40 CFR 6.302	Applicable	Perimeter of dump and parts of landfill in flood zone AE (100-yr) FEMA/Dakota County GIS maps
Rivers and Harbors Act of 1972 – Section 10					
Navigable waters	Permits are required for structures or work affecting navigable waters.	Activities affecting navigable waters.	33 USC 403	Not Applicable	Minnesota River is a US navigable water throughout (USACE list), No activities are contemplated that would obstruct or alter any navigable waters of the United States.
Fire and Electrical Code					
National Fire Protection Association Code			NPFA 70	Applicable	Assuming gas flare used.
National Electrical Code			NEC	Applicable	Assuming gas flare used.

Table 2-4
Potential State and Local Location-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Endangered, Threatened, and Special Concern Species					
Endangered, Threatened, and Special Concern Species	Protection of state-level endangered or threatened species (DNR)	Endangered or threatened Species	Minnesota Rules Ch. 6134, Endangered, Threatened, Special Concern Species	TBC	Calcareous Fen state-threatened plans regulated under MN Statute 84.0895. Fen area will be determined in the wetland delineation and is anticipated to be east of the project.
Protected Waters/Water Appropriation					
Surface Water	Classifies lakes and wetlands, appropriation permitting (DNR)	Protected Waters/Water Appropriation	Minnesota Rules Ch. 6115, Public Water Resources	Applicable	Wetland adjacent to Site
Surface Water	Shoreland alterations or structures (DNR)	Shoreland Management	Minnesota Rules Ch. 6120, Shoreland and Floodplain Management	TBC	Extent of waste may extend to the shoreline
Surface Water	For work below ordinary high water mark of waters designated as “public waters of wetlands” by State of Minnesota.	State of Minnesota Public Water designation		Applicable	Applicable to activities that take place below the OHWM of the Minnesota River.
Minnesota Wetland Conservation Act					
Wetlands	Protection of wetlands	Presence of wetlands	Minnesota Statute 103G.221-2373	Applicable	Wetlands adjacent to Site
Wetlands conservation	Protection of wetlands, wetland functions for determining public values.		Minnesota Rules 8420, Wetland Conservation	Applicable	Wetlands adjacent to Site
State Advisories					
Fish Consumption Advisories	Consumption guidelines for lakes and rivers where fish have been tested for contaminants.	Advisories established by Minnesota Department of Health	Fish Consumption Advice (MDH Website)	Not Applicable	
Lower Minnesota River Watershed District Rules and Standards					
Floodplain Alteration	Requires compensatory storage for floodplain fill.	Alteration or filling of land below the 100-year critical flood elevation of any public waters	Lower Minnesota River Watershed District Floodplain and Drainage Alteration Standard (Appendix K Section 6 of Watershed Management Plan)	Not Applicable	Alternatives expected to create more (not fill in) 100 year floodplain.
Wetland Alteration	Requires replacement of affected wetlands where avoidance is not feasible and prudent.	Presence of wetlands		Applicable	
City of Burnsville Ordinances					

Table 2-4
Potential State and Local Location-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Zoning Ordinance	Restricts use of property that is inconsistent with the City's designated uses.	Land development in Burnsville	City of Burnsville City Code, Title 10 Zoning	Applicable	City of Burnsville City Code, Title 10 Zoning Landscaping requirements (tree removal) for business and industrial districts in City Code Title 10 Ch 30A Sections 8-10
General City, County and State Requirements					
Dakota County weight restrictions	Spring load restrictions for weight per axle of vehicles on some County highways during spring months. After spring load restrictions are lifted, Dakota County highways are restricted to 9-10 ton per axle.	County highways in Dakota County	Dakota County website	Applicable	
MnDOT weight restrictions	Load limits for vehicles based on weight per axle and time of year	Metro area as defined by MnDOT	MnDOT website	Applicable	
MnDOT county and city utility easement permitting	Permit required	Work in MnDOT, county or city easements		Applicable	
MN State Building and Fire Code	Standard for construction of all buildings in the state		2015 MN State Fire Code, Minnesota Department of Public Safety, 2015 Minnesota State Building Codes	Applicable	

Table 2-5
Potential Federal and State Chemical-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Soil					
Addressing dioxin in soil at CERCLA and RCRA sites.	Recommend preliminary PRGs of starting points for cleanup levels at CERCLA and RCRA sites.	CERCLA/RCRA site with dioxin contamination.	OSWER Directive 9200.4-26, April 13, 1998	TBC	See above dioxin comment
Evaluating human health risk caused by exposure to contaminated soil.	Tier 1 and Tier 2 Soil Reference Values (SRVs)	Incidental soil ingestion, dermal contact with soil, and inhalation of outdoor vapors and particulates from soil.	Risk-Based Guidance for the Soil – Human Health Pathway, MPCA Risk-Based Site Evaluation Manual	TBC	Existing site soil reuse and soil import will consider
Evaluating the risk to groundwater at sites form the soil-to-groundwater pathway	Tier 1 and Tier 2 Soil Leaching Values (SLVs)	Contaminants leaching to groundwater and potential exposure to groundwater.	Risk-Based Guidance for Evaluating the Soil Leaching Pathway, MPCA Risk-Based Site Evaluation Manual	TBC	The FFS relates to evaluation of interim waste management alternative. Other pathways/media to be evaluated in later phase of project.
Groundwater					
Groundwater, public water supplies	Meet National Primary Standards for maximum contaminant levels (MCLs)	Drinking water source at tap	Safe Drinking Water Act (SDWA); 40 CFR 141 40 CFR 142 40 CFR 143	Deferred	The FFS relates to evaluation of interim waste management alternative. Other pathways/media to be evaluated in later phase of project.
Hazardous substances in groundwater	Establishes human health based groundwater standards (MDH) known as Health Risk Limits (HRLs)	Potential exposure to groundwater	Minnesota Rules Ch. 4717.7500 and 4717.7801 to 4717.7900	Deferred	The FFS relates to evaluation of interim waste management alternative. Other pathways/media to be evaluated in later phase of project.
Hazardous substances in groundwater	Framework for evaluating groundwater contamination and managing remediation decisions.	Use of groundwater for domestic purposes.	Groundwater Guidance Document, MPCA Risk-Based Site Evaluation Manual Drinking Water Criteria Spreadsheet (rev. 9/08)	Deferred	The FFS relates to evaluation of interim waste management alternative. Other pathways/media to be evaluated in later phase of project.
Surface Water					
Surface Water	Ambient Water Quality Criteria established to protect aquatic life and human consumers of water or aquatic life.	Activities that affect or may affect surface water.	40 CFR 131, Water Quality Standards	Deferred	The FFS relates to evaluation of interim waste management alternative. Other pathways/media to be evaluated in later phase of projects
Surface Water Screening Criteria	Establishes human health-based and ecological surface water criteria	Activities that affect or may affect the surface water.	Surface Water Pathway Evaluation User's Guide, Tables 1 and 11, MPCA Risk-based Site Evaluation Manual	Deferred	The FFS relates to evaluation of interim waste management alternative. Other pathways/media to be evaluated in later phase of projects.

Table 2-5
Potential Federal and State Chemical-Specific ARARs and TBCs
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Standard	Requirement	Prerequisite	Citation	Potential ARAR	Comments
Air					
Ambient Air Quality Standards	Establishes acceptable air concentrations	Activity that affects air quality.	Minnesota Rules Ch. 7009	Applicable	
Standards for Stationary Sources	Limits on visible emissions	Activities that generate visible emissions not otherwise regulated.	Minnesota Rules Ch. 7011.0100 through 7011.0120	Applicable	
Standards for Stationary Sources	Limits on particulate matter	Activities that generate particulate matter.	Minnesota Rules Ch. 7011.0150	Applicable	
Standards for Hazardous Air Pollutants: MSW Landfills	Establishes emissions limitations and work practice standards for hazardous air pollutants emitted from MSW Landfills	Emission of hazardous air pollutants.	Minnesota Rules Ch. 7011.7390, adopts 40 CFR 63 Subpart AAAA, by reference	TBC	Will be an ARAR if site is subject to 40 CFR 60, subp. WWW/XXX
Standards for Hazardous Air Pollutants: Site Remediation	Establishes emissions limitations and work practice standards for hazardous air pollutants emitted from site remediation activities.	Emission of hazardous air pollutants.	Minnesota Rules Ch. 7011.8010, adopts 40 CFR 63 Subpart GGGGG, by reference	TBC	
Intrusion Screening Values (ISV) (September 24, 2008)	For evaluating the potential risks to human health caused by exposure to volatile compounds in buildings	Presence of volatile compounds in soil or shallow groundwater.	Risk-Based Guidance for the Vapor Intrusion Pathway, MPCA Risk-Based Site Evaluation Manual	Deferred	The FFS relates to evaluation of interim waste management alternatives. Other pathways/media to be evaluated in later phase of project.
All Media					
Carcinogenic PAHs in media	Estimating health risks from carcinogenic PAHs.	Potential PAH exposure to humans	MDH guidance Document, July 2, 2004.	Deferred	The FFS relates to evaluation of interim waste management alternatives. Other pathways/media to be evaluated in later phase of project
Dioxin-like compounds in media	Estimating health risks from dioxin- like compounds.	Potential dioxin-like compound exposure to humans	MDH Guidance Document October 2006.	Deferred	The FFS relates to evaluation of interim waste management alternatives. Other pathways/media to be evaluated in later phase of project.
Hazardous substances in media	Guidelines and criteria for screening human health and ecological risks.	Potential hazardous substance exposure to humans and ecology	April 26, 1996 Working Site Screening Evaluation Guidelines. MPCA Risk-Based Site Evaluation Manual	Deferred	The FFS relates to evaluation of interim waste management alternatives. Other pathways/media to be evaluated in later phase of project.

Table 3-1
Liner Evaluation
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

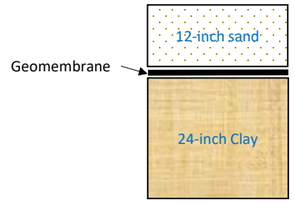
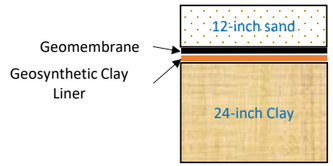
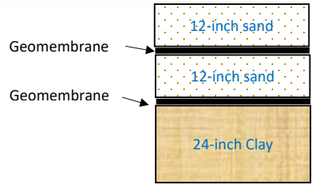
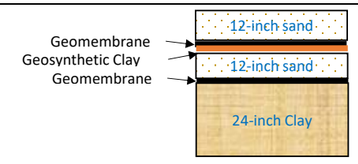
Option	Liner Description	Visual Depiction	Estimated Cost/Acre	Advantages	Disadvantages
1 - Base	Composite liner (two layer)		$120,000 - $190,000	- Meets MSW liner standards - Geomembrane provides extremely low permeability - Clay minimizes leaks from geomembrane defects - Clay thickness provides protection against object puncturing the entire thickness of the composite liner; depth of any puncture likely to be contained within clay liner segment - Clay resists inflow through geomembrane defects during elevated groundwater/flood condition - Accommodates use of 30-inch or 36-inch clay layer if desired and/or needed to reduce/prevent water inflow during high water/flood conditions; a consideration for sub-flood elevation portion of liner	- Some undetected defects likely in any geomembrane (common disadvantage for all options) - Clay can have construction defects (higher permeability zones, rocks that damage geomebrane), but these are generally overcome by detailed specifications, clay thickness, and detailed construction quality control (common disadvantage for all options) - Clay is susceptible to freeze/thaw degradation near top of perimeter berm (common disadvantage for all options) - Potential for rocks (if present) in underlying clay to puncture geomembrane (common disadvantage for all options) - Less efficient than other options, but still highly efficient (meets current MSW standards)
2	Composite liner (three layer)		$160,000 - $240,000	Same advantages as Option 1, plus: - GCL swells/seals beneath leaks in geomembrane, increasing efficiency - GCL adds manufactured clay, minimizing defects - GCL resistant to freeze/thaw degradation - GCL provides excellent contact with geomembrane over entire footprint - GCL protects geomembrane from puncture from rocks in underlying clay	- Adds significant increment in cost relative to Option 1 - Increases liner complexity
3	Liner (one layer) / Composite liner (two layer)		$200,000 - $300,000	Same advantages as Option 1, plus: - Second geomembrane provides increased efficiency - Option to replace lower 12-inch sand layer with geocomposite, which would accelerate construction, reduce risk of construction damage to lower geomembrane, reduce air space consumption, and may be more cost effective compared to 12-inch sand layer	- Adds significant increment in cost relative to Options 1 and 2, including increased maintenance cost due to likelihood of need to remove water from between liners after closure - More difficult to construct than Options 1 or 2; adds 1 to 2 years to duration - Increases liner complexity; must consider details such as interface friction angles more carefully - Liquid capture in lower sand layer (e.g., from adjacent river floods, etc.) may be perceived as "liner failure" - Likelihood of entraining water in lower sand layer due to liner leakage, periodic river flooding, and anticipated future rise in groundwater table, which presents challenges and potentially significant costs, especially if water requires pre-treatment - Efficiency drops to that of Option 1 if liquid from lower sand layer is not continuously evacuated from interstitial space
4	Double composite (two-layer) liner		$230,000 - $350,000	Same advantages as Option 2, plus: - Second composite liner provides increased efficiency compared to Option 3 - Option to replace lower 12-inch sand layer with geocomposite (same advantages as noted in Option 3 description)	- Adds significant increment in cost relative to Options 1, 2, and 3 - Increased maintenance cost relative to Options 1 and 2 (but potentially less than Option 3) due to likelihood of water to remove from between liners after closure - More difficult to construct than Options 1 or 2; adds 1 to 2 years to duration - Increases liner complexity; must consider details such as interface friction angles more carefully - Liquid capture in lower sand layer (e.g., from adjacent river floods, etc.) may be perceived as "liner failure" - Efficiency drops to that of Option 1 if liquid from lower sand layer is not continuously evacuated from interstitial space

Table 4-1
Waste Quantity Summary
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Item	Project Area	Existing Conditions (Alternative1 1)	Quantity Removed (Alternatives 2 and 3)	Quantity Remaining (Alternatives 2 and 3)
Waste Volume (cy)[1]	Dump	790,000	760,000	30,000
	Landfill	5,300,000	5,200,000	100,000
Waste Area (acre)[2]	Dump	34	31	3
	Landfill	140	135	5

Notes

1 - Includes 1 foot of soil from beneath waste extent. Includes waste that extends onto adjacent properties

2 - Includes area of waste that extends onto adjacent properties

Table 4-2
Future Land Condition Summary
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

Quantity	Project Area	Existing Conditions (Alternative 1)	Alternative 2a	Alternative 2b	Alternative 2c	Alternative 3
Max Elevation (ft MSL)	Dump	730	TBD[4]	TBD[4]	TBD[4]	TBD[4]
	Landfill	750	850	778	785	TBD[4]
Liner Footprint (acres)	Landfill	0	60	90	75	0
Area Not Needed for Landfill (acres)[1]	Dump[2]	0	28	28	28	28
	Landfill[3]	0	40	10	20	138

Notes

1 - Property owned by Site Owner, cleared of waste, and outside of landfill offset

2 - Assumed to be entire property owned by Site Owner

3 - Area outside of lined extent, leachate/stormwater ponds, and 200' offset. For Alternativeernative 3, assumed to include entirety of parcels owned by Site Owner except for Transfer Station and Quarry properties

4 - Future land use is outside of scope of FFS. For the purpose of estimating costs, in the FFS, it is assumed that fill will be placed to an elevation slightly above surroundings

Table 5-1
Cost Estimate Summary
Freeway Landfill Focused Feasibility Study
Burnsville, Minnesota

Item No.	Item	Alt 1 - No Action	Alt 2a - Min Footprint (Tallest)	Alt 2b - Min Height (Largest Footprint)	Alt 2c - Mod Height / Mod Footprint (Hybrid)	Alt 3 - Offsite Disposal (Low Range)	Alt 3 - Offsite Disposal (High Range)
1	Mobilization & Demobilization	$0	$2,847,482	$3,572,861	$3,244,369	$3,000,000	$3,000,000
2	Erosion Protection	$0	$900,000	$1,200,000	$1,050,000	$600,000	$600,000
3	CQA Surveying/Soil Testing	$0	$600,000	$900,000	$750,000	$0	$0
4	Mass Excavation, Embankment Construction and Perimeter Grading	$0	$8,264,000	$9,586,000	$9,450,000	$3,540,000	$3,540,000
5	Landfill Liner	$0	$9,389,600	$14,084,400	$11,737,000	$0	$0
6	Leachate Collection, Storage, and Transfer	$0	$2,806,560	$4,187,600	$3,592,080	$0	$0
7	Waste Excavation and Onsite Transport	$0	$19,080,000	$19,080,000	$19,080,000	$0	$0
8	Waste Transfer Off Site	$0	$0	$0	$0	$19,260,000	$90,400,000
9	Tipping Fees	$0	$0	$0	$0	$119,200,000	$238,400,000
10	City Host Fees / Taxes	$0	$0	$0	$0	$0	$23,840,000
11	County Fees	$0	$0	$0	$0	$0	$59,600,000
12	State Fees (Metro Landfill Fee)	$0	$0	$0	$0	$0	$41,720,000
13	State Taxes	$0	$0	$0	$0	$0	$23,840,000
14	Landfill Cap	$0	$7,802,080	$11,703,120	$9,752,600	$0	$0
15	Gas Extraction	$0	$1,500,000	$2,250,000	$1,875,000	$0	$0
16	Stormwater Management	$0	$900,000	$1,300,000	$1,150,000	$0	$0
17	Water Management	$0	$1,900,000	$2,850,000	$2,375,000	$0	$0
18	Road Surfacing	$0	$1,396,600	$1,474,900	$1,443,700	$585,200	$585,200
19	Turf Establishment	$0	$950,800	$1,241,200	$1,096,000	$370,000	$370,000
20	Miscellaneous Items (Electrical, Traffic Control, Fence)	$0	$1,460,000	$1,600,000	$1,536,000	$200,000	$200,000
21	Engineering, Permitting, CQA	$0	$7,200,000	$9,000,000	$8,200,000	$3,300,000	$3,300,000
22	30 Year O&M (NPV, 5% interest rate)	$770,000	$3,070,000	$4,610,000	$3,840,000	$0	$0
	Estimated Sub-Total Cost:	$770,000	$70,067,122	$88,640,081	$80,171,749	$150,055,200	$489,395,200
	20% Contingency:	$154,000	$14,013,424	$17,728,016	$16,034,350	$30,011,040	$97,879,040
	Estimated Total Cost:	**$1,000,000**	**$85,000,000**	**$107,000,000**	**$97,000,000**	**$181,000,000**	**$588,000,000**
Cost Range	Estimated Total Cost (-20%):	$800,000	$68,000,000	$86,000,000	$77,000,000	$145,000,000	$470,000,000
	Estimated Total Cost (+30%):	$1,300,000	$110,000,000	$139,000,000	$126,000,000	$235,000,000	$764,000,000

Notes:

1) Cost estimate represents American Association of Cost Estimators (AACE) Class 4 classification (-20% to +30%) with a project definition less than 30%
2) Basis of unit costs include RS Means, bid results from similar local projects, and professional judgement.
3) Engineering and Permitting cost estimate is assumed to be 4% of construction costs (excluding line items 9 through 13).
4) CQA cost estimate is assumed to be 8% of construction costs (excluding line items 9 through 13).

Disposal Fees & Taxes Detail (items 8 - 13)

	Low	High
Trucking	$3 to $3.50/ton	$15/ton
Tipping	$20/ton	$40/ton
City Fees / Taxes	$0/ton	$7/ton
County Fees	$0/ton	$10/ton
State Fees	$0/ton	$7/ton
State Taxes	$0/ton	$4/ton
Total:	**$23 to $23.50/ton**	**$80/ton**

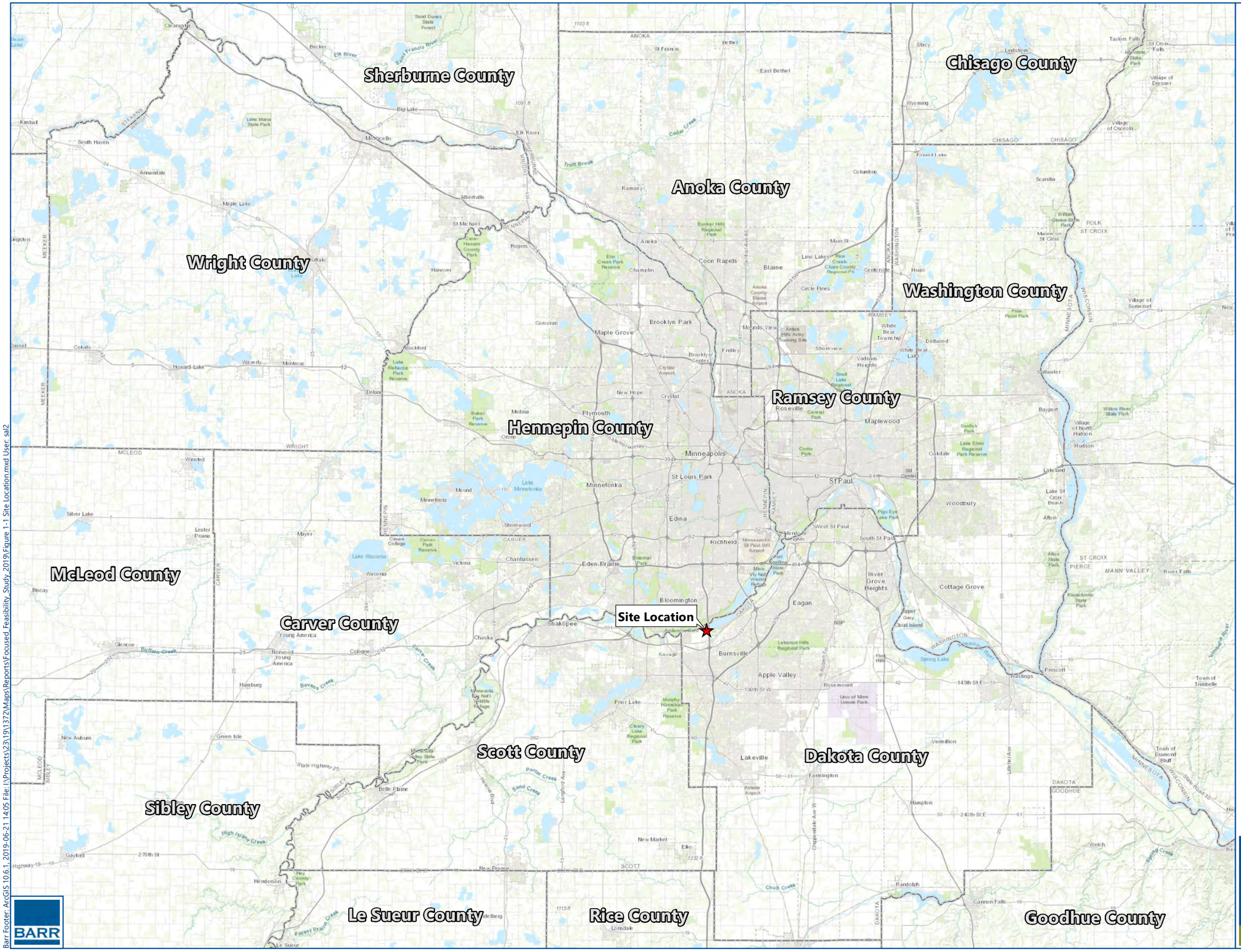
Table 5-2
Comparative Analysis of Alternatives
Freeway Landfill and Freeway Dump
Burnsville, Minnesota

		Threshold Criteria		Balancing Criteria					Modifying Criteria	
		Overall protection of human health and the environment	**Compliance with ARARs**	**Long-term effectiveness and performance**	**Reduction of toxicity, mobility, or volume (TMV) of hazardous substances**	**Short-term effectiveness**	**Implementability**	**Cost effectiveness (1)**	**Acceptance by State**	**Acceptance by community (2)**
Alternative 1 - No Action		Not protective	Not Compliant	Not effective. Un-lined waste will come into contact with future groundwater, adjacent to Minnesota River and future lake that will form in the existing quarry	No TMV reductions, no future migration control of groundwater and landfill gas (LFG)	Limited concerns related to short-term effectiveness as there would be no additional construction or remedial activities.	Requires no additional action.	Estimated Cost: $1.0 MM (30 years of O&M) +30 to -20%: $800k - $1.3 MM	No	No
Alternative 2 - Excavate Waste with On-Site Lined Landfill	Alternative 2a - Minimal Area/Highest Peak	Protective	Compliant, assuming Haz Waste, local ordinance, and emerging contaminants (EC) in leachate topics are settled	Established approach for managing MSW inside appropriately designed, built, monitored, and maintained facility	No TMV reductions for the MSW, but new landfill would restrict future mobility of LFG and groundwater plumes generated from the MSW	Potential for impacts to air, groundwater, site workers, and neighboring properties would need to be controlled during the significant/multi-year MSW relocation project. This is anticipated to include standard remedial construction practices and monitoring during construction. **Shortest duration for on-site alternatives**	The alternative would employ earthwork and landfill construction methods that are commonly used - assuming that construction is completed while adjacent dewatering is still occurring. The completed landfill would follow standard long-term operation, maintenance, and monitoring practices.	Estimated Cost: $80 MM +30 to -20%: $64 MM - $104 MM		Greatest visual impact concerns for Bloomington and Burnsville related to height of proposed on-site landfill. However, represents the largest potential redevelopment area of the on-site MSW management alternatives (which is desired by Burnsville and County).
	Alternative 2b - Largest Area/Lowest Peak	Protective	Compliant, assuming Haz Waste, local ordinance, and EC in leachate topics are settled	Established approach for managing MSW inside appropriately designed, built, monitored, and maintained facility	No TMV reductions for the MSW, but new landfill would restrict future mobility of LFG and groundwater plumes generated from the MSW	Potential for impacts to air, groundwater, site workers, and neighboring properties would need to be controlled during the significant/multi-year MSW relocation project. This is anticipated to include standard remedial construction practices and monitoring during construction. **Longest duration for on-site alternatives**	The alternative would employ earthwork and landfill construction methods that are commonly used- assuming that construction is completed while adjacent dewatering is occurring. The completed landfill would follow standard long-term operation, maintenance, and monitoring practices.	Estimated Cost: $101 MM +30 to -20%: $81 MM - $131 MM	The additional cost for the larger landfill footprint with no resulting improvement for the Threshold or Balancing Criteria reduces the State's acceptance for this Alternative	Visual impact concerns for Bloomington and Burnsville related to height of proposed on-site landfill. Also, there would be no redevelopment area west of I-35W which would be a concern for Burnsville and County.
	Alternative 2c - Moderate Area/Moderate Peak (Hybrid)	Protective	Compliant, assuming Haz Waste, local ordinance, and EC in leachate topics are settled	Established approach for managing MSW inside appropriately designed, built, monitored, and maintained facility	No TMV reductions for the MSW, but new landfill would restrict future mobility of LFG and groundwater plumes generated from the MSW	Potential for impacts to air, groundwater, site workers, and neighboring properties would need to be controlled during the significant/multi-year MSW relocation project. This is anticipated to include standard remedial construction practices and monitoring during construction.	The alternative would employ earthwork and landfill construction methods that are commonly used- assuming that construction is completed while adjacent dewatering is occurring. The completed landfill would follow standard long-term operation, maintenance, and monitoring practices.	Estimated Cost: $91 MM +30 to -20%: $73 MM - $118 MM		Visual impact concerns for Bloomington and Burnsville related to height of proposed on-site landfill. However, allows some potential redevelopment area (which is desired by Burnsville and County).
Alternative 3 - Excavate Waste with Off-Site Disposal		Protective	Compliant, assuming Haz Waste, local ordinance, and EC in leachate topics are settled	Established approach for managing MSW inside appropriately designed, built, monitored, and maintained facility.	No TMV reductions for the MSW, but receiving landfill would restrict future mobility of LFG and groundwater plumes generated from the MSW	Potential for impacts to air, groundwater, site workers, and neighboring properties would need to be controlled during the significant/multi-year MSW relocation project. This is anticipated to include standard remedial construction practices and monitoring during construction. **This Alternative has the shortest duration for on-site impacts during construction, but carries a potentially wide range of transportation-related impacts depending on the distance to the receiving landfill.** ***As a result, this Alternative ranges from "more favorable" to "less favorable."***	**The alternative would employ earthwork and landfill construction methods that are commonly used. The completed landfill would follow standard long-term operation, maintenance, and monitoring practices. There is some uncertainties around the availability of off-site landfill capacity in Dakota County.** ***As a result, the implementability for this Alternative ranges from "more favorable" to "less favorable."***	***This Alternative has the most significant uncertainties in cost, which could change the cell shading range from "neutral to "less favorable." Cost estimates with more and less favorable assumptions were developed, as represented below by "low" and "high"*** Estimated Cost (low): $179 MM Estimated Cost (high): $586 MM Range (low): $143 MM - $232 MM Range (high): $469 MM - $762 MM	Potentially acceptable if very significant uncertainties around transport costs and potential local fees can be settled	City of Burnsville's preferred option. No visual impacts and maximizes potential redevelopment area. Depending on the off-site facility used, there are potentially significant impacts/uncertainties related to City and County fees that will need to be settled as part of this alternative, which could affect the local community's views on this alternative.

Color Key
Less Favorable
Neutral
More Favorable

Footnotes: (1) Costs assume MPCA's minimum liner assumption (additional costs may be incurred for enhanced liner designs)
(2) The text in this column attempts to capture the context of discussions that have occurred in public forums over the past several years

Figures



Site Location

County Boundary

N

0 6 12

Miles

SITE LOCATION
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 1-1

BARR

Barr Footer: ArcGIS 10.6.1, 2019-06-21 14:05 File: I:\Projects\23\19\1372\Maps\Reports\Focused_Feasibility_Study_2019\Figure 1-1 Site Location.mxd User: sal2

Hennepin County

BLOOMINGTON

Minnesota River

MINNESOTA VALLEY NATIONAL WILDLIFE REFUGE

Dakota County

Kraemer Quarry

BURNSVILLE

Burnsville Sanitary Landfill

SAVAGE

Scott County

206171

207689

206176

206177

229107

206178

206172

150359

206179

206174

35W

32

5

13

Project Areas

Municipal Drinking Water Supply Wells/Intakes

Burnsville Drinking Water Protection Overlay (Approx)

Minnesota Valley National Wildlife Refuge

Municipal Boundary

County Boundary

Major River

N

0 1,200 2,400

Feet

SITE SETTING

Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 1-2

Barr Footer: ArcGIS 10.6.1, 2019-06-27 10:23 File: I:\Projects\23\19.1372\Maps\Reports\Focused_Feasibility_Study_2019\Figure 1-2_Site Setting.mxd User: MJM3

Project Areas
Parcel Boundary
County Boundary

N

0 500 1,000
Feet

SITE OVERVIEW
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 1-3

BARR

Barr Footer: ArcGIS 10.6.1, 2019-06-21 15:56 File: I:\Projects\23\19\1372\Maps\Reports\Focused_Feasibility_Study_2019\Figure 1-3 Site Overview.mxd User: sal2

Hennepin County
Dakota County
Minnesota River
Black Dog Lake
U.S. SALT INC
037-020280001013
PORT MARILYN LLC
037-020280001012
PORT MARILYN LLC
037-021560000040
FREEWAY
TRANSFER INC
037-021560000050
FREEWAY
TRANSFER INC
037-021560000030
FREEWAY
TRANSFER INC
037-021560000010
R B MCGOWAN
CO INC
037-021560000060
FREEWAY
TRANSFER INC
037-021560001010
FREEWAY
TRANSFER INC
037-028349001010
NORTHERN STATES
POWER CO
037-021560002020
QUARRY
PROPERTY LLC
037-021560002010
R B MCGOWAN
CO INC
037-021560000020
R B MCGOWAN
CO INC
35W
037-020280051011
KRAEMER MINING &
MATERIALS INC
037-020330040010
KRAEMER MINING
& MATERIALS INC
037-020330020010
KRAEMER MINING
& MATERIALS INC
037-020330010010
KRAEMER MINING
& MATERIALS INC
037-020330043010
KRAEMER MINING &
MATERIALS INC
037-020330043010
KRAEMER MINING
& MATERIALS INC
037-020330010030
KRAEMER MINING
& MATERIALS INC
037-020330010052
KRAEMER MINING
& MATERIALS INC
037-020330010051
LUTHER CO LP
037-020330015010
LUTHER CO LP
037-020330001030
LUTHER CO LP
037-020330036010
KRAEMER MINING
& MATERIALS INC
037-020341038010
MCGOWAN MICHAEL B
TSTE ANN TSTE WASSON
037-020341026020
UNITED STATES
OF AMERICA
037-020341026015
UNITED STATES
OF AMERICA
037-020341026017
UNITED STATES
OF AMERICA
037-021562301010
BURNSVILLE STORAGE
COMPANY-MN LP
037-020341026019
BURY & CARLSON
037-028347501010
ASTLEFORD FAMILY
LTD PTNSHP
037-021562201010
BURNSVILLE STORAGE
COMPANY-MN LP

Parcel Boundary
County Boundary

N

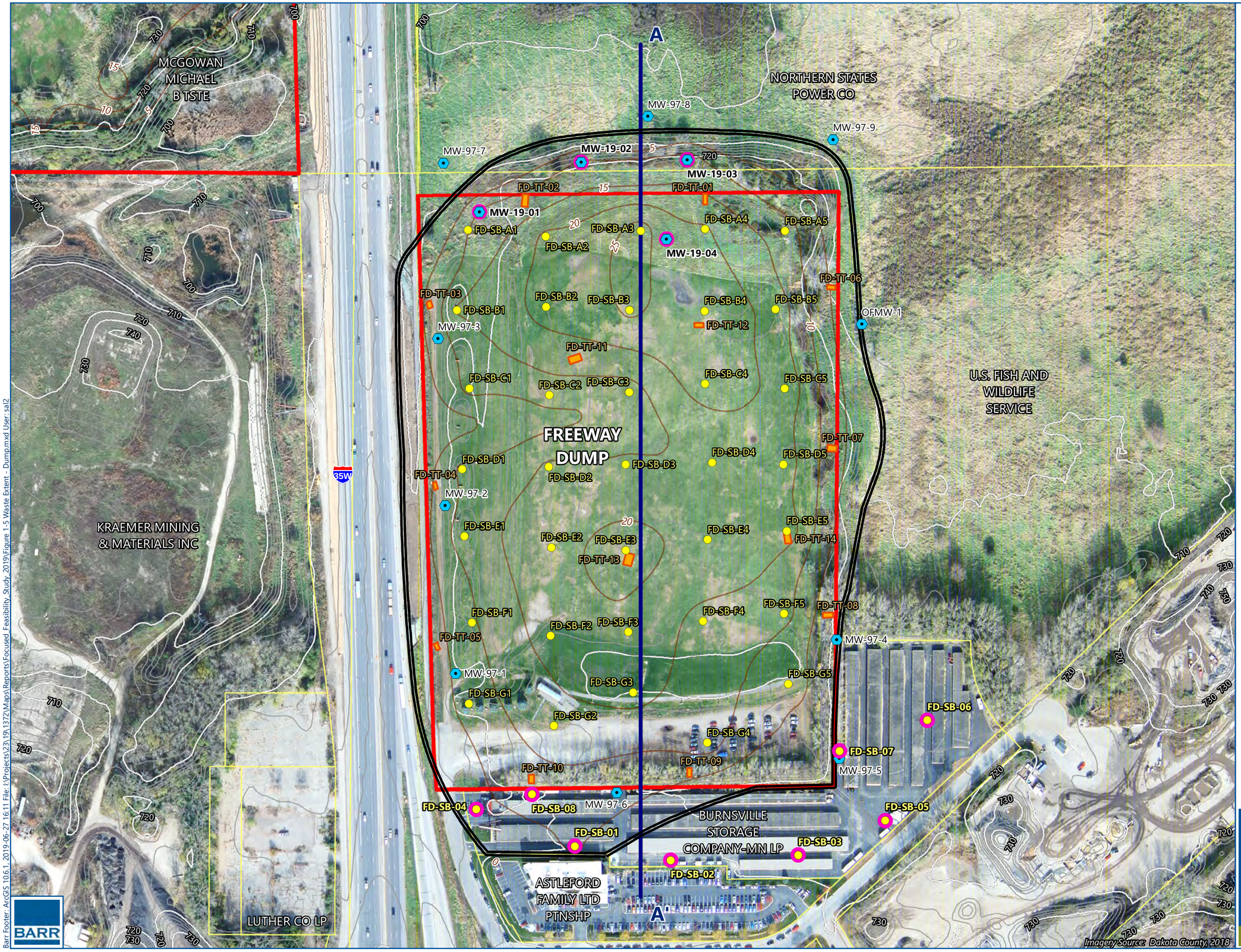
0 500 1,000
Feet

PROPERTY OWNERSHIP
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 1-4

BARR

Barr Footer: ArcGIS 10.6.1, 2019-06-21 15:55 File: I:\Projects\23\19\1372\Maps\Reports\Focused_Feasibility_Study_2019\Figure 1-3 Site Overview.mxd User: sal2



Phase B Investigation Locations (2019)
- Monitoring Wells
- Borings

Phase A Investigation Locations (2018)
- Borings
- Test Trenches

Previous Investigation Locations
- Active Monitoring Well

- Inferred Waste Extent
- Waste Thickness 5ft Contours

Elevation Contours, Dakota County, 2011
- 10-Foot Contour
- 2-Foot Contour

- Cross Section Location (additional cross sections provided in Remedial Investigation Report)
- Project Areas
- Parcel Boundary

Elevation Data Source: Fugro Horizons, Inc. and the Minnesota Department of Natural Resources. LiDAR Elevation, Twin Cities Metro Region, Minnesota, 2011. The Minnesota Elevation Mapping Project.

See Focused Remedial Investigation Report for additional detail on waste extent delineation.

N

0 200 400
Feet

WASTE EXTENT
Freeway Dump
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 1-5

BARR

Barr Footer: ArcGIS 10.6.1 2019-06-27 16:11 File: I:\Projects\23\19.1372\Maps\Reports\Focused_Feasibility_Study_2019\Figure 1-5 Waste Extent - Dump.mxd User: sal2

Phase B Investigation Locations (2019)
- Monitoring Wells
- Borings
- Seep Sample
- Test Trenches

Phase A Investigation Locations (2018)
- Borings
- Test Trenches

Previous Investigation Locations
- Active Monitoring Well
- Historical Borings

- Inferred Waste Extent
- Waste Thickness 5ft Contours

Elevation Contours, Dakota County, 2011
- 10-Foot Contour

- Cross Section Location (additional cross sections provided in Remedial Investigation Report)
- Project Areas
- Parcel Boundary

Elevation Data Source:
Fugro Horizons, Inc. and the Minnesota Department of Natural Resources. LiDAR Elevation, Twin Cities Metro Region, Minnesota, 2011. The Minnesota Elevation Mapping Project.

See Focused Remedial Investigation Report for additional detail on waste extent delineation.

N

0 350 700
Feet

WASTE EXTENT
Freeway Landfill
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 1-6

BARR

A
NORTH

A'
SOUTH

Freeway Dump

Northern States Power Company

US Fish and Wildlife

Burnsville Storage Company

730 —
720 —
710 —
700 —
690 —
680 —

MW-19-03
FD-SB-A3
MW-19-04
FD-SB-B3
FD-SB-C3
FD-SB-D3
FD-SB-E3
FD-TT-13
FD-SB-F3
FD-SB-G3
FD-TT-09
MW97-6
FD-SB-02
MW97-8

FILL
ASH
MSW/CD
NATIVE
BEDROCK
(PRAIRIE DU CHIEN)
Wetland

LEGEND

- Geologic Contact
- Inferred Geologic Contact
- Measured Water Level, June 17, 2019
- Monitoring Well Screen
- Soil Boring/Piezometer
- Test Trench
- Parcel Boundary

0 150
Approximate Horizontal Scale in Feet
15X Vertical Exaggeration

MSW/CD - Municipal Solid Waste / Construction Debris
*Approximate river elevation on June 17, 2019 was 699 ft MSL
**Unable to measure. Water level inferred.

BARR

Figure 1-7

CROSS SECTION A-A'
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, MN

P:\Mpls\23 MN\19\23191372 Freeway Landfill Pollution Inv\WorkFiles\Focused RI\02 - Figures\New cross sections\Dump\A-A'\A-A'_2019_v3.ai

F
NORTHEAST

F'
SOUTHWEST

Freeway Landfill

Kraemer Mining and Materials, Inc.

750 —
725 —
700 —
675 —
650 —
625 —
600 —

Minnesota River*
WT-09
FL-TT-06
FL-TT-09
MW-13
FL-TT-05
51
52
D2
37
MW-08
MW-08D
28
FL-SB-09
B3
29
FL-SB-12
22
15
WT-14
JT-14
8

FILL
MSW/CD
NATIVE
NATIVE
FILL

BEDROCK
(PRAIRIE DU CHEIN)

Seep in Bedrock

Jordan contact at 155' bgs
Open borehole 160 - 180' bgs

LEGEND

- Geologic Contact
- Inferred Geologic Contact
- Measured Water Level, June 17, 2019
- Monitoring Well Screen
- Soil Boring
- Test Trench
- Parcel Boundary
- Open Borehole

0 375
Approximate Horizontal Scale in Feet
15X Vertical Exaggeration

MSW/CD - Municipal Solid Waste / Construction Debris
*Approximate river elevation on June 17, 2019 was 699 ft MSL

BARR

Figure 1-8

GEOLOGIC CROSS SECTION F-F'
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

\\barr.com\projects\Mpls\23 MN\19\23191372 Freeway Landfill Pollution Inv\WorkFiles\Focused Feasibility Study\01 - FFS Report\Figures\aIF-F'_2019_v4.ai

- Project Areas
- Inferred Waste
- Approximate Limits of Waste Removal (Alternatives 2 and 3)
- Approximate Limits of Waste to Remain (Alternatives 2 and 3)
- Parcel Boundary
- County Boundary
- Haul route from Freeway Dump to Freeway Landfill

N

0 500 1,000

Feet

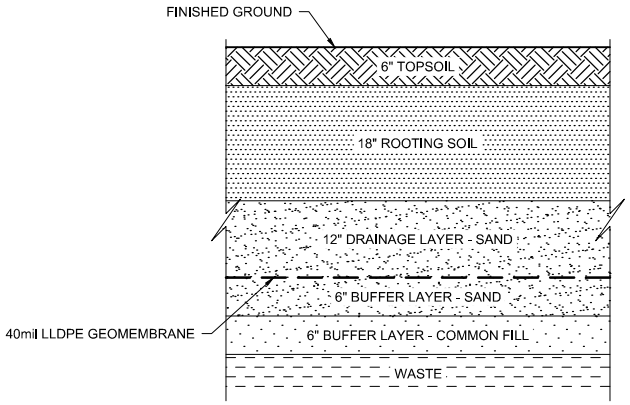
PROJECT AREA FOR INTERIM REMEDIAL ACTION

Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

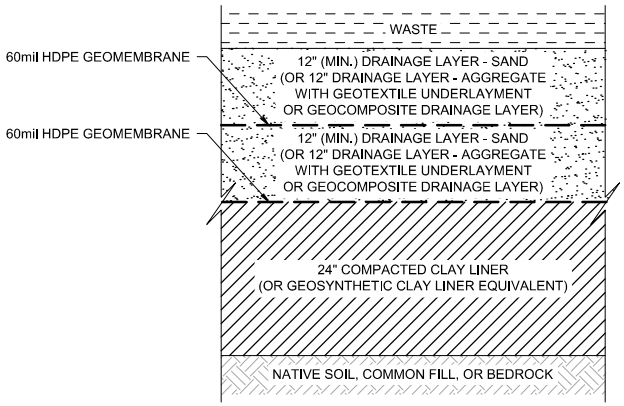
FIGURE 2-1

BARR

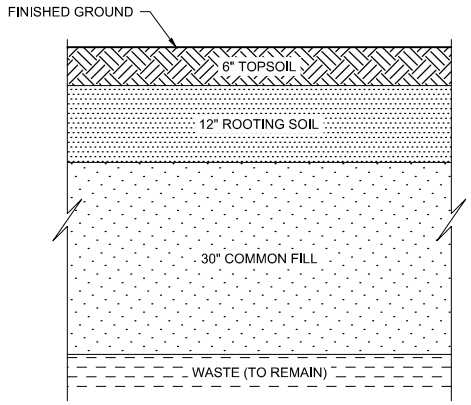
Barr Footer: ArcGIS 10.6.1, 2019-06-28 11:05 File: I:\Projects\23\19\1372\Maps\Reports\Focused_Feasibility_Study_2019\Figure 2-1 Project Area for Interim Remedial Action.mxd User: sal2



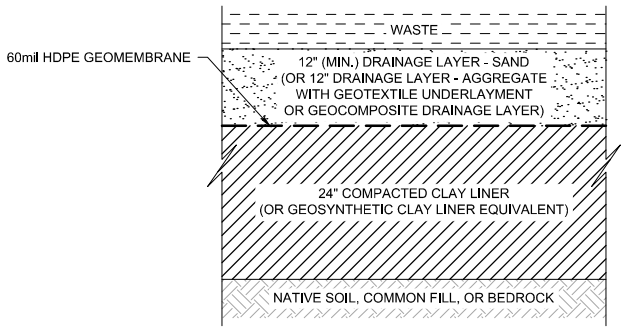
DETAIL: LANDFILL CAP
NOT TO SCALE



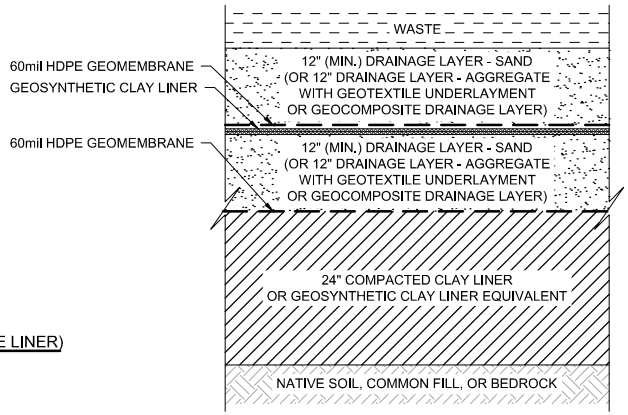
DETAIL: LANDIFLL LINER - ENHANCED (DOUBLE LINER)
NOT TO SCALE



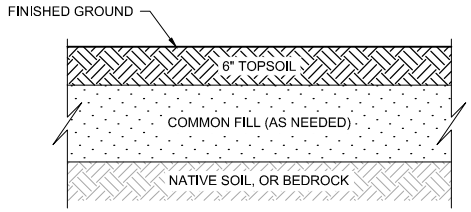
DETAIL: REMAINING WASTE COVER
NOT TO SCALE



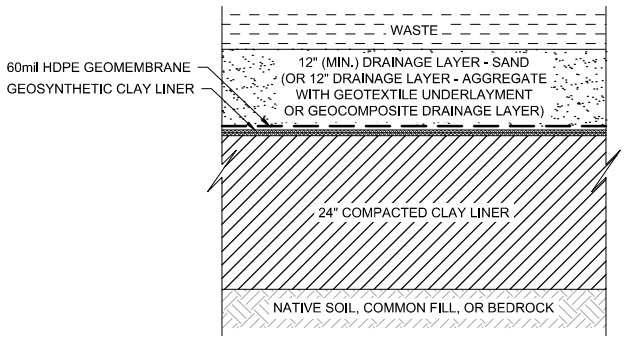
DETAIL: LANDFILL LINER - BASE CASE (TWO LAYER - COMPOSITE LINER)
NOT TO SCALE



DETAIL: LANDFILL LINER - ENHANCED (DOUBLE COMPOSITE LINER)
NOT TO SCALE



DETAIL: RESTORATION AREA
NOT TO SCALE



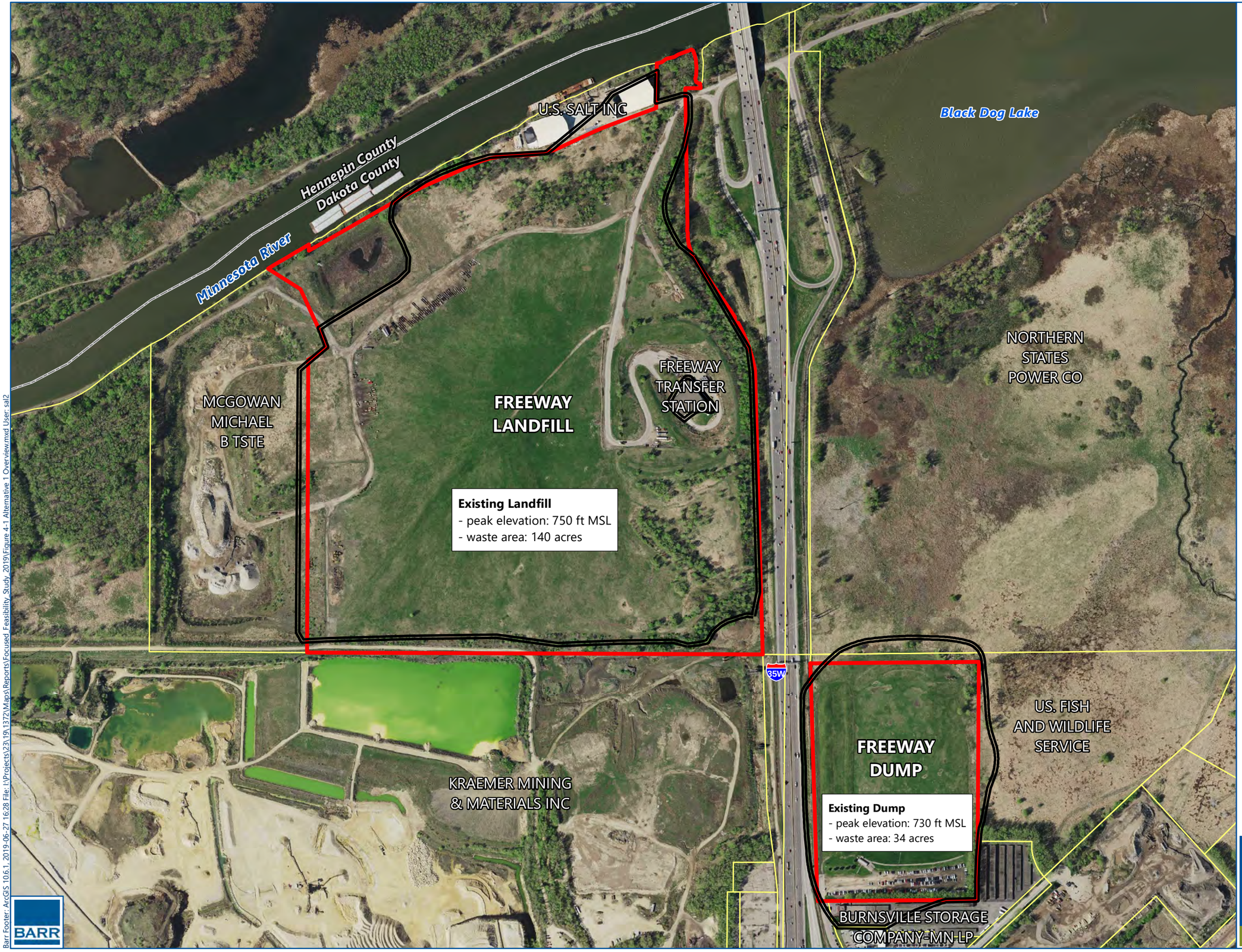
DETAIL: LANDFILL LINER - ENHANCED (THREE LAYER - COMPOSITE LINER)
NOT TO SCALE

NOTES:

1. LANDFILL CAP: COVER SYSTEM TO BE PLACED OVER CONSOLIDATED WASTE.
2. LANDFILL LINER: BASE LINER SYSTEM TO BE CONSTRUCTED BENEATH CONSOLIDATED WASTE.
3. REMAINING WASTE COVER: SOIL COVER (MIN. 4') TO BE PLACED IN AREAS WHERE FULL WASTE REMOVAL IS IMPRACTICAL (E.G., DUE TO SLOPING OF EXCAVATIONS ADJACENT TO INFRASTRUCTURE).
4. RESTORATION AREA: SOIL AND VEGETATED COVER TO BE PLACED IN AREAS OF FULL WASTE REMOVAL.

BARR

TYPICAL LINER, CAP, AND COVER DETAILS
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota
FIGURE 3-1



- Project Areas
- Parcel Boundary
- County Boundary
- Inferred Waste Extent (all waste to remain)

N

0 500 1,000

Feet

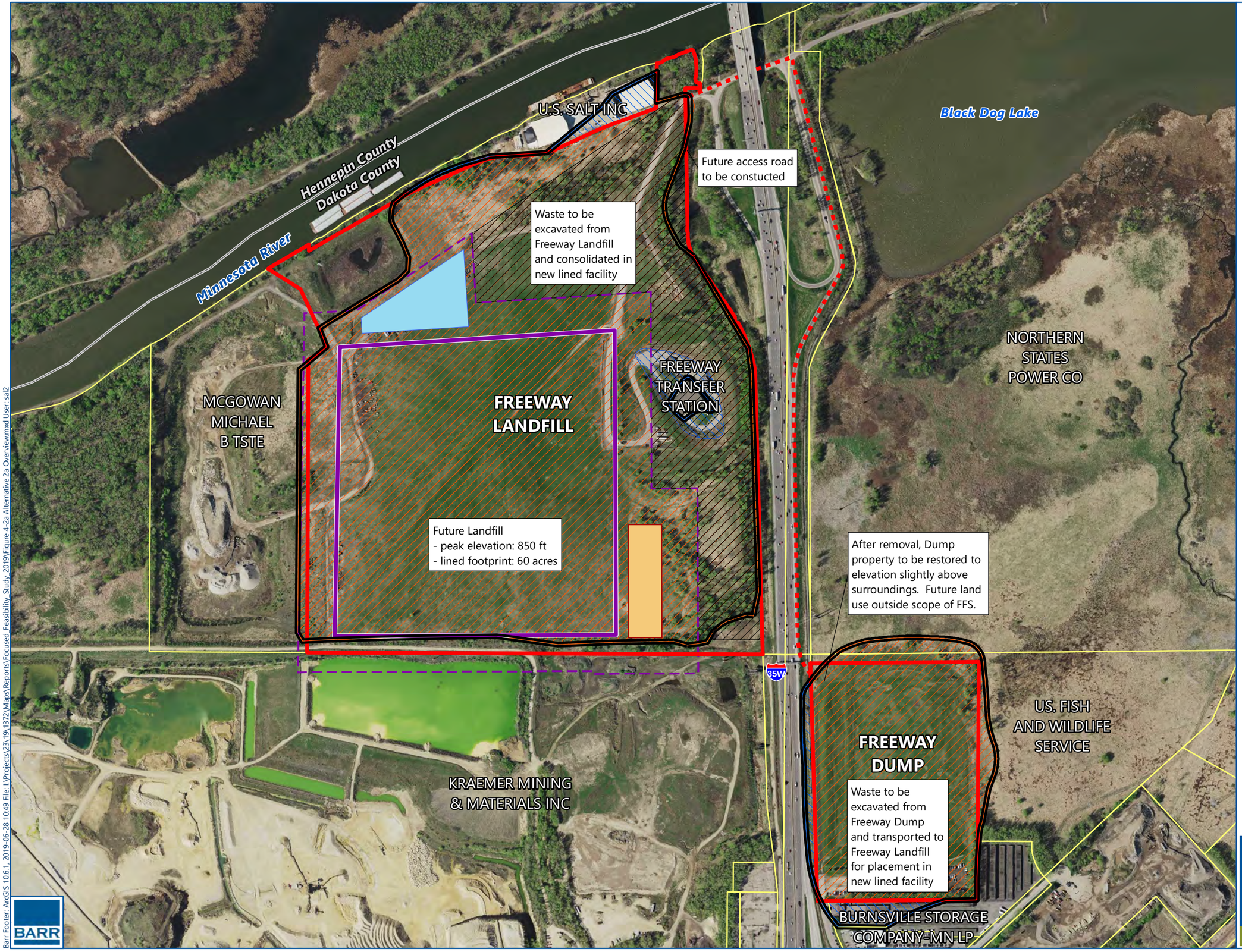
ALTERNATIVE 1 OVERVIEW

Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 4-1

BARR

Barr Footer: ArcGIS 10.6.1, 2019-06-27 16:28 File: I:\Projects\23\19\1372\Maps\Reports\Focused_Feasibility_Study_2019\Figure 4-1 Alternative 1 Overview.mxd User: sal2



Alternative 2a

- Landfill Liner Limits
- 200' Landfill Offset
- Leachate Pond
- Stormwater Pond
- Approximate Limits of Waste to Remain
- Land Not Needed For Landfill
- Approximate Limits of Waste Removal
- Project Areas
- Parcel Boundary
- County Boundary
- Haul route from Freeway Dump to Freeway Landfill
- Inferred Waste Extent

N

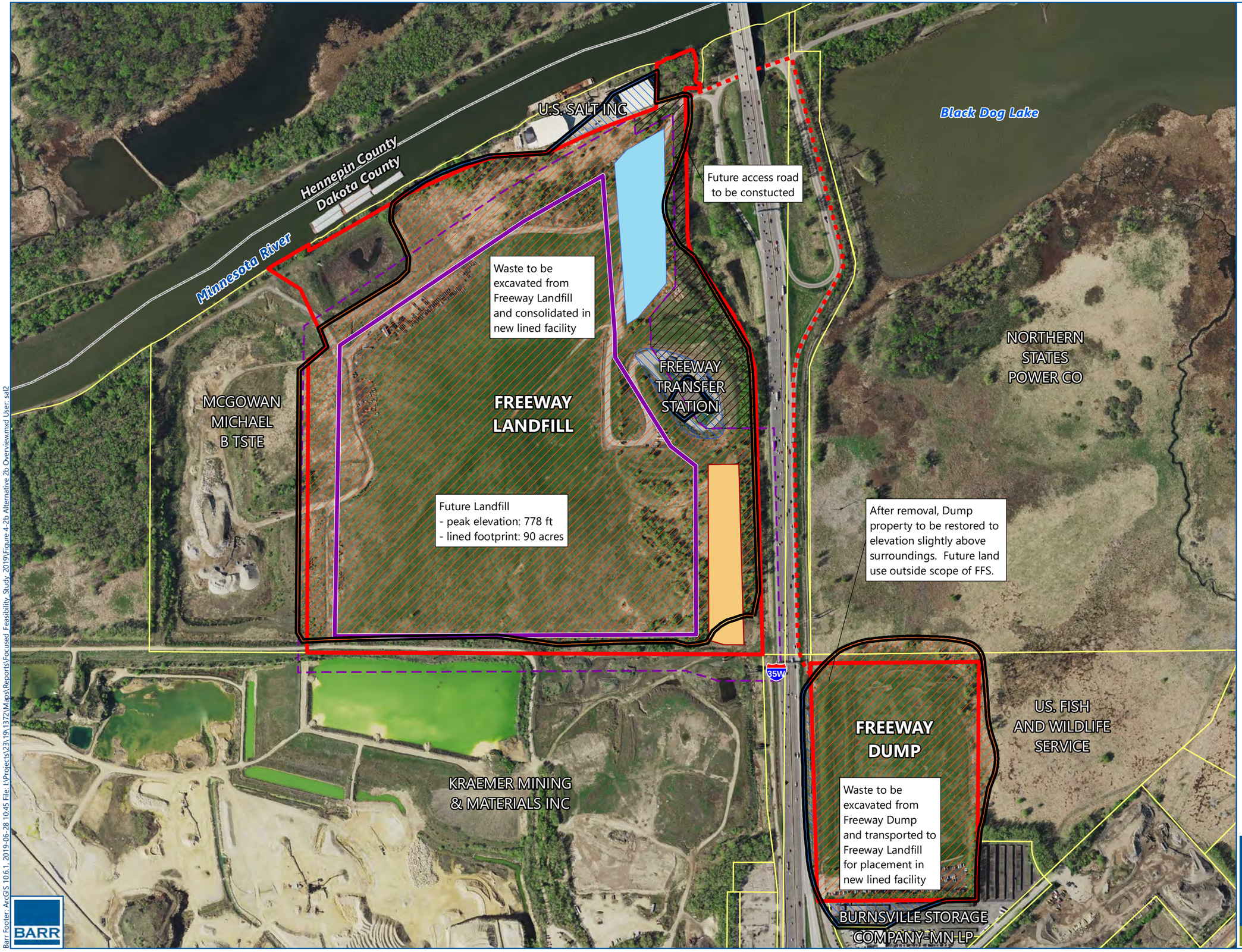
0 500 1,000

Feet

ALTERNATIVE 2a OVERVIEW

Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 4-2A



Alternative 2b

- Landfill Liner Limits
- 200' Landfill Offset
- Leachate Pond
- Stormwater Pond
- Approximate Limits of Waste to Remain
- Land Not Needed For Landfill
- Approximate Limits of Waste Removal
- Project Areas
- Parcel Boundary
- County Boundary
- Haul route from Freeway Dump to Freeway Landfill
- Inferred Waste Extent

N

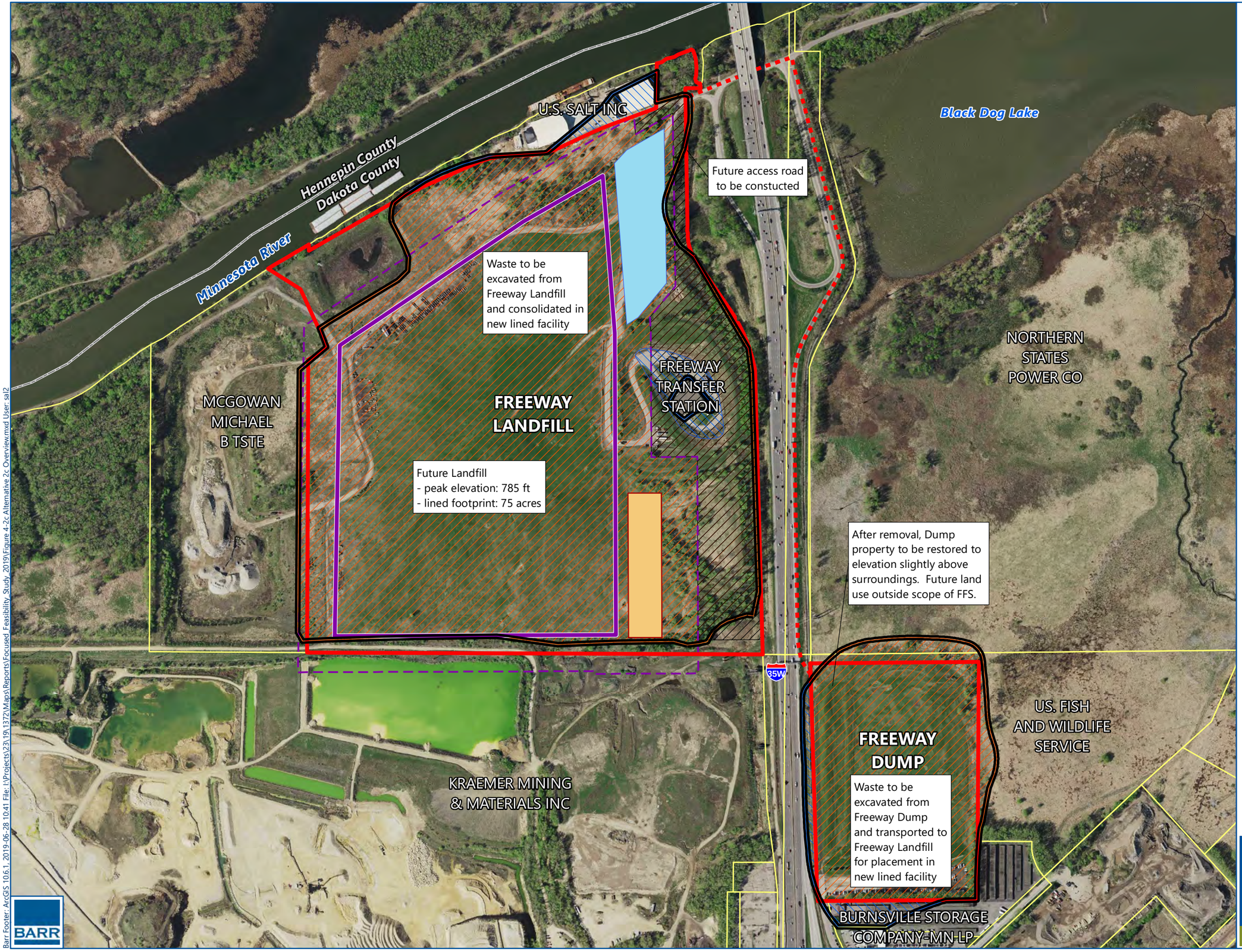
0 500 1,000

Feet

ALTERNATIVE 2b OVERVIEW

Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 4-2B



Alternative 2c

- Landfill Liner Limits
- 200' Landfill Offset
- Leachate Pond
- Stormwater Pond
- Approximate Limits of Waste to Remain
- Land Not Needed For Landfill
- Approximate Limits of Waste Removal
- Project Areas
- Parcel Boundary
- County Boundary
- Haul route from Freeway Dump to Freeway Landfill
- Inferred Waste Extent

N

0 500 1,000

Feet

ALTERNATIVE 2c OVERVIEW
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

FIGURE 4-2C

BARR

Barr Footer: ArcGIS 10.6.1, 2019-06-28 10:41 File: I:\Projects\23\19\1372\Maps\Reports\Focused_Feasibility_Study_2019\Figure 4-2c Alternative 2c Overview.mxd User: sal2

U.S. SALT INC

Hennepin County
Dakota County

Minnesota River

Black Dog Lake

After removal, Landfill property to be restored to elevation slightly above surroundings. Future land use outside scope of FFS.

MCGOWAN MICHAEL B TSTE

FREEWAY LANDFILL

FREEWAY TRANSFER STATION

NORTHERN STATES POWER CO

Waste to be excavated from Freeway Dump and Freeway Landfill and transported to off-site facility for disposal.

After removal, Dump property to be restored to elevation slightly above surroundings. Future land use outside scope of FFS.

35W

KRAEMER MINING & MATERIALS INC

FREEWAY DUMP

US. FISH AND WILDLIFE SERVICE

BURNSVILLE STORAGE COMPANY-MN-LP-

Project Areas
Parcel Boundary
County Boundary
Approximate Limits of Waste Removal
Approximate Limits of Waste to Remain

N

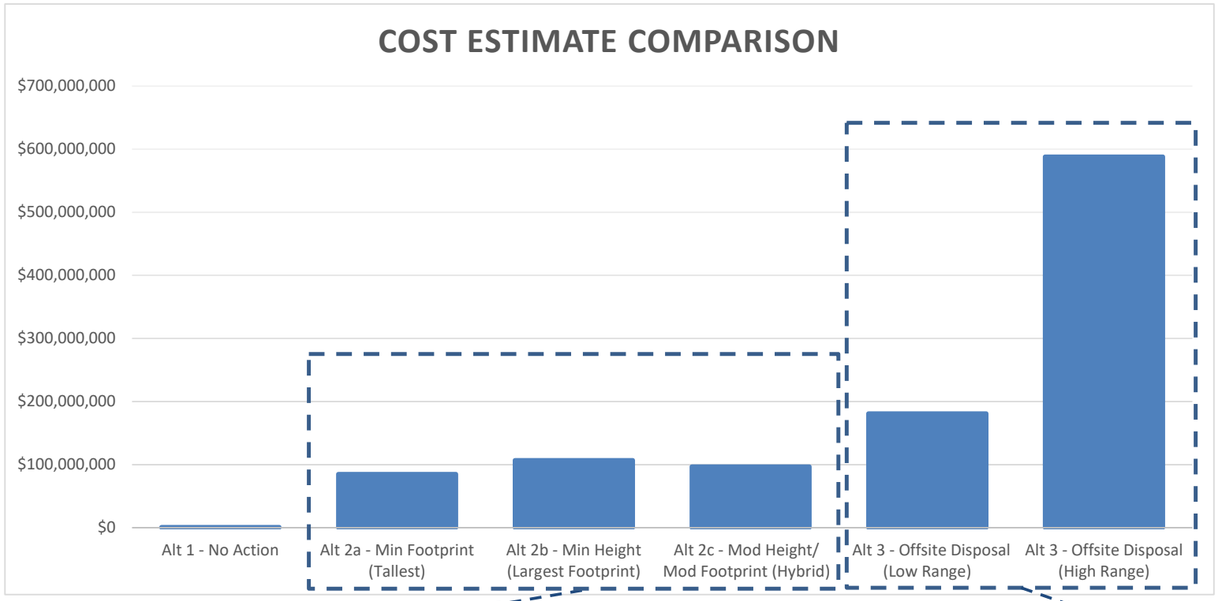
0 500 1,000
Feet

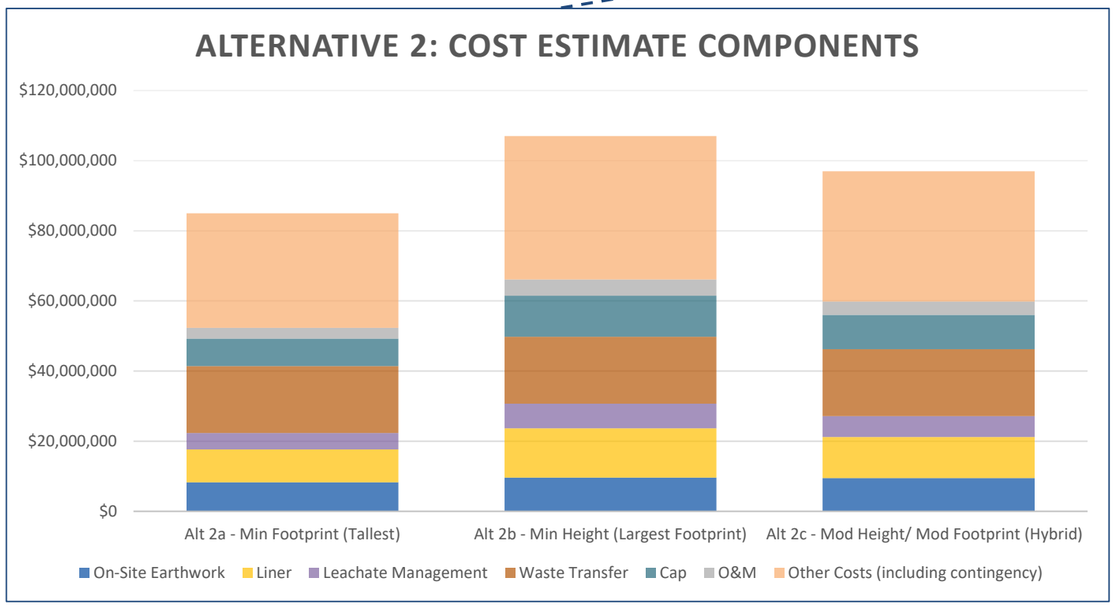
ALTERNATIVE 3 OVERVIEW
Focused Feasibility Study
Freeway Landfill and Dump
Burnsville, Minnesota

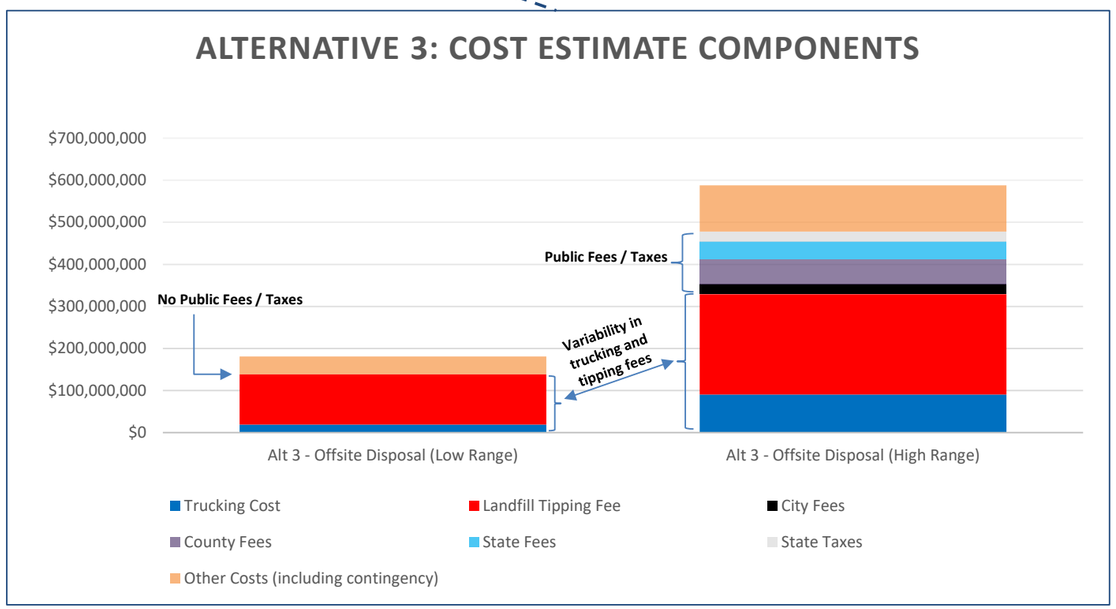
FIGURE 4-3

Barr Footer: ArcGIS 10.6.1, 2019-06-28 11:09 File: I:\Projects\23\19\1372\Maps\Reports\Focused_Feasibility_Study_2019\Figure 4-3 Alternative 3 Overview.mxd User: sal2

Figure 5-1
Alternative Cost Comparison Charts
Freeway Landfill and Freeway Dump
Burnsville, Minnesota







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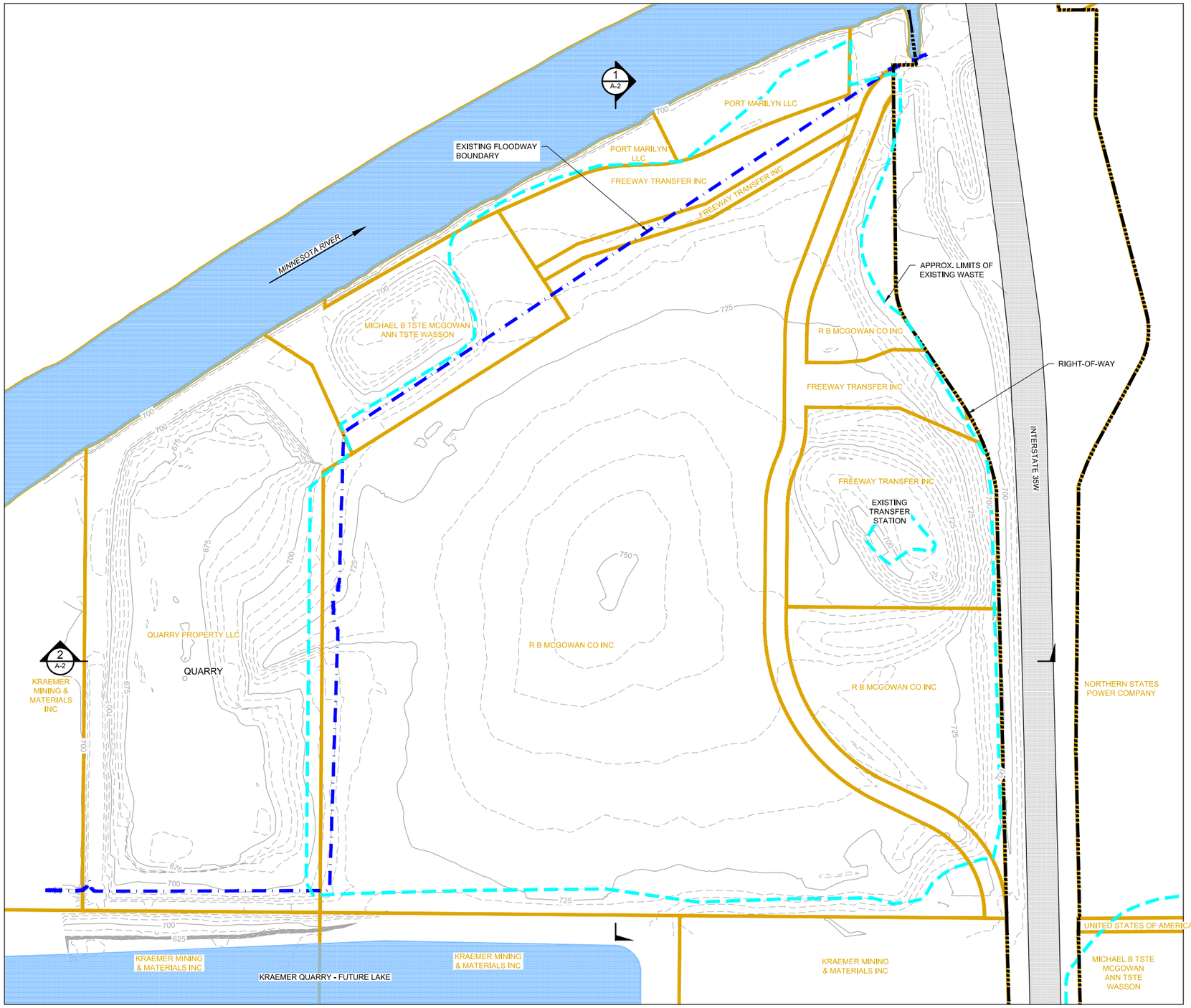
Appendices

Appendix A

Alternative Details

Appendix A
Alternative Details
Table of Contents



1 PLAN: EXISTING CONDITIONS
SCALE IN FEET
0 200 400

N

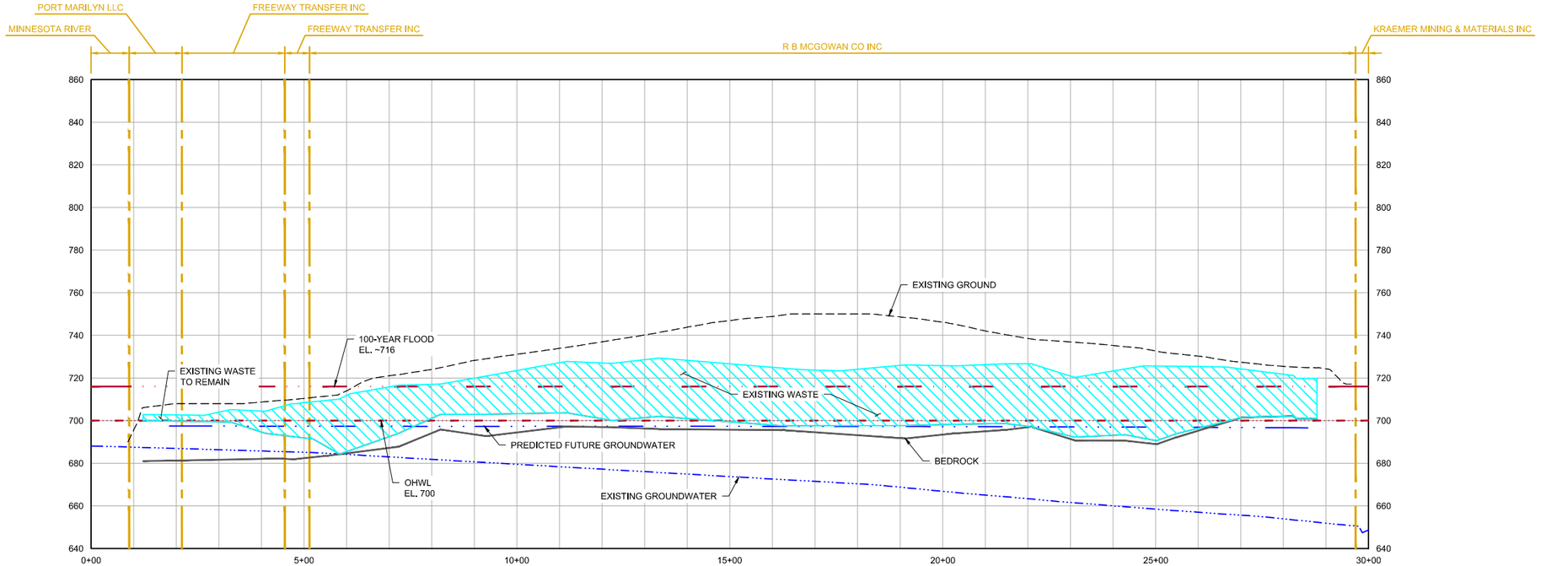
LEGEND

- 700 — EXISTING TWENTY FIVE-FOOT CONTOUR
- EXISTING FIVE-FOOT CONTOUR
- EXISTING FLOODWAY BOUNDARY
- PARCEL BOUNDARY
- INTERSTATE 35W RIGHT-OF-WAY
- APPROXIMATE LIMITS OF WASTE

BARR

APPENDIX A-1

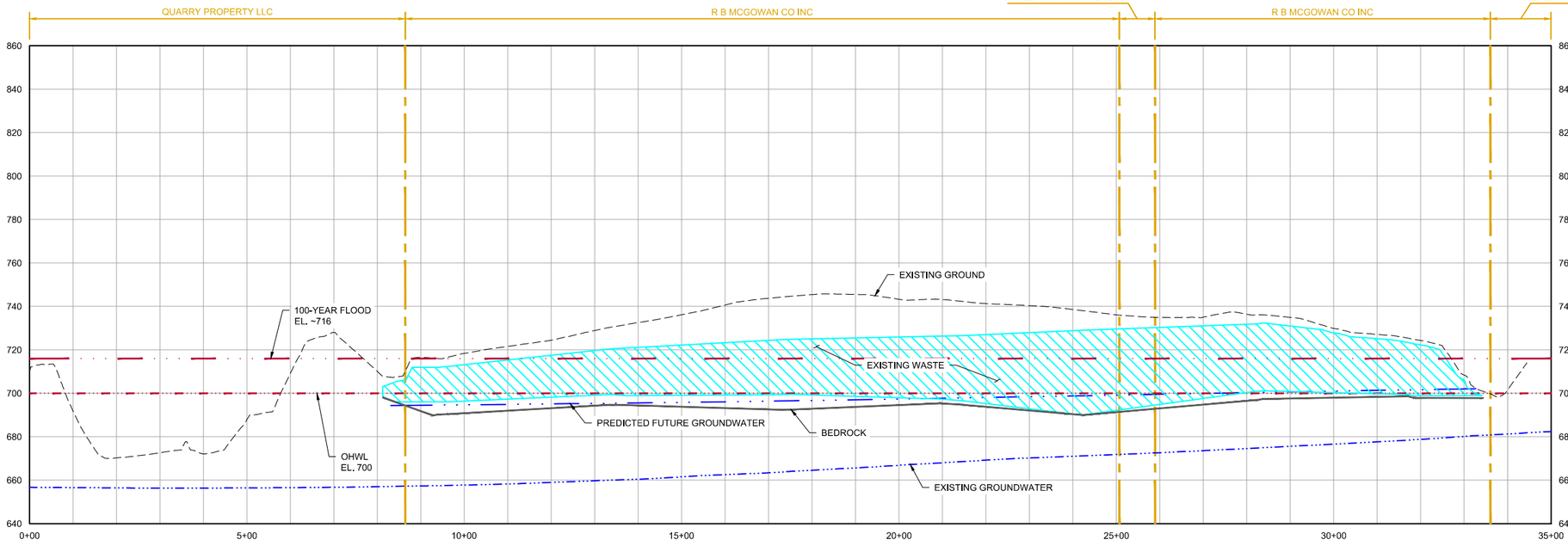
FREEWAY LANDFILL
EXISTING CONDITIONS - PLAN VIEW
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



1 A-1 SECTION: OVERALL EXISTING CONDITIONS - NORTH TO SOUTH

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET



2 A-1 SECTION: OVERALL EXISTING CONDTIONS - WEST TO EAST

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

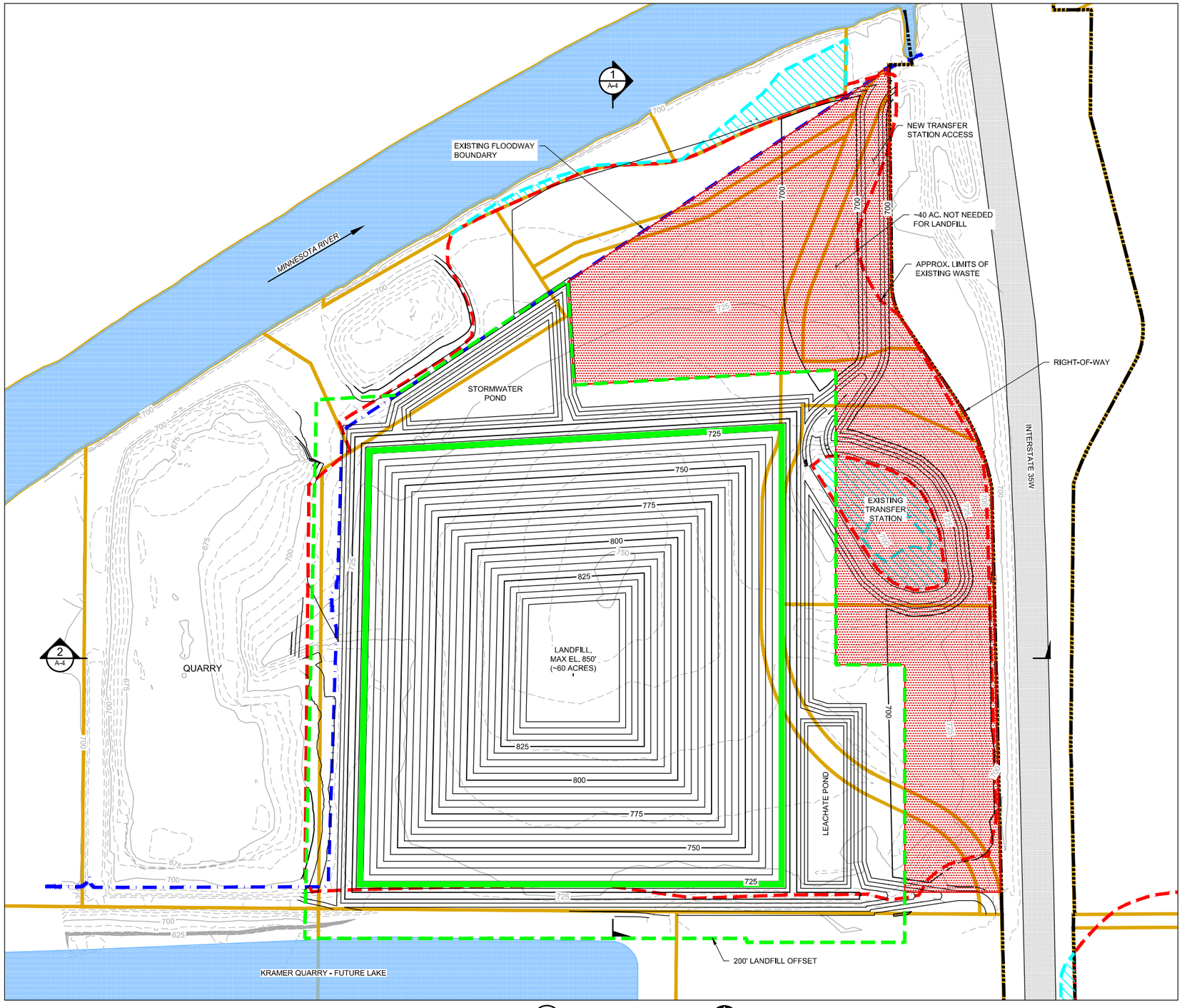
LEGEND

- EXISTING GROUND
- EXISTING GROUNDWATER
- PREDICTED FUTURE GROUNDWATER
- ORDINARY HIGH WATER LEVEL
- 100-YEAR FLOOD ELEVATION
- EXISTING BEDROCK
- PARCEL BOUNDARY
- APPROXIMATE WASTE LIMITS

BARR

APPENDIX A-2

FREEWAY LANDFILL
EXISTING CONDITIONS - OVERALL SECTIONS
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



1 PLAN: ALTERNATIVE 2A

0 200 400

SCALE IN FEET

N

LEGEND

- 700 — EXISTING TWENTY FIVE-FOOT CONTOUR
- EXISTING FIVE-FOOT CONTOUR
- EXISTING FLOODWAY BOUNDARY
- PARCEL BOUNDARY
- INTERSTATE 35W RIGHT-OF-WAY
- APPROXIMATE LIMITS OF WASTE REMOVAL
- APPROXIMATE LIMITS OF WASTE TO REMAIN
- 700 — PROPOSED TWENTY FIVE-FOOT CONTOUR
- PROPOSED FIVE-FOOT CONTOUR
- PROPOSED WASTE LIMITS
- 200' LANDFILL OFFSET
- LAND NOT NEEDED FOR LANDFILL

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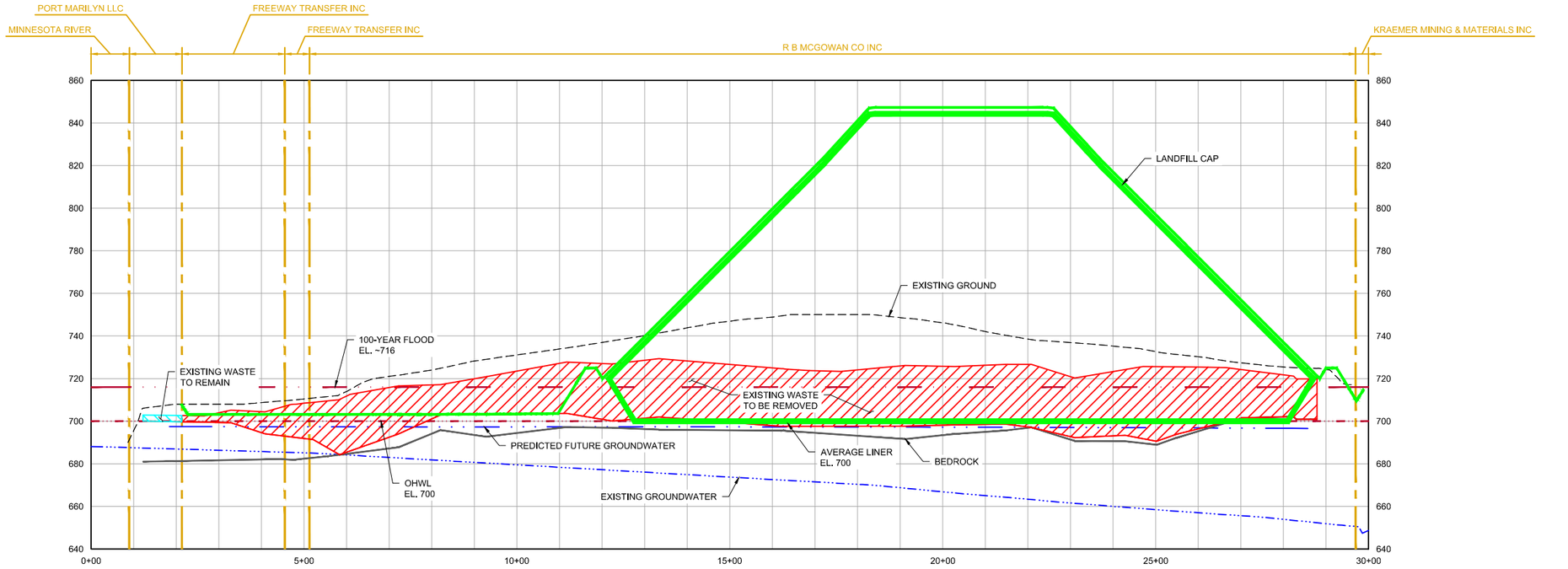
APPENDIX A-3

FREEWAY LANDFILL
ALTERNATIVE 2A - PLAN VIEW
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



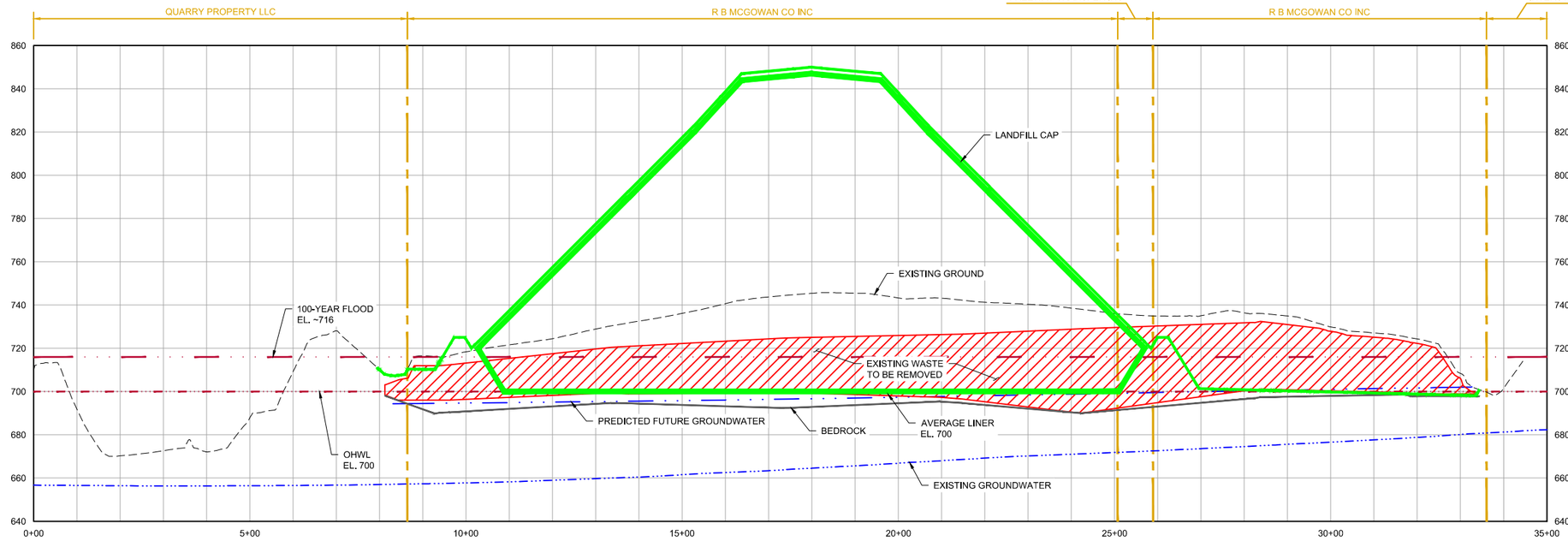
1 A-3 SECTION: OVERALL ALTERNATIVE 2A - NORTH TO SOUTH

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

LEGEND

- EXISTING GROUND
- EXISTING GROUNDWATER
- PREDICTED FUTURE GROUNDWATER
- ORDINARY HIGH WATER LEVEL
- 100-YEAR FLOOD ELEVATION
- EXISTING BEDROCK
- PARCEL BOUNDARY
- APPROXIMATE WASTE TO BE REMOVED
- APPROXIMATE WASTE TO REMAIN
- FINISHED GROUND
- LANDFILL CAP



2 A-3 SECTION: OVERALL ALTERNATIVE 2A - WEST TO EAST

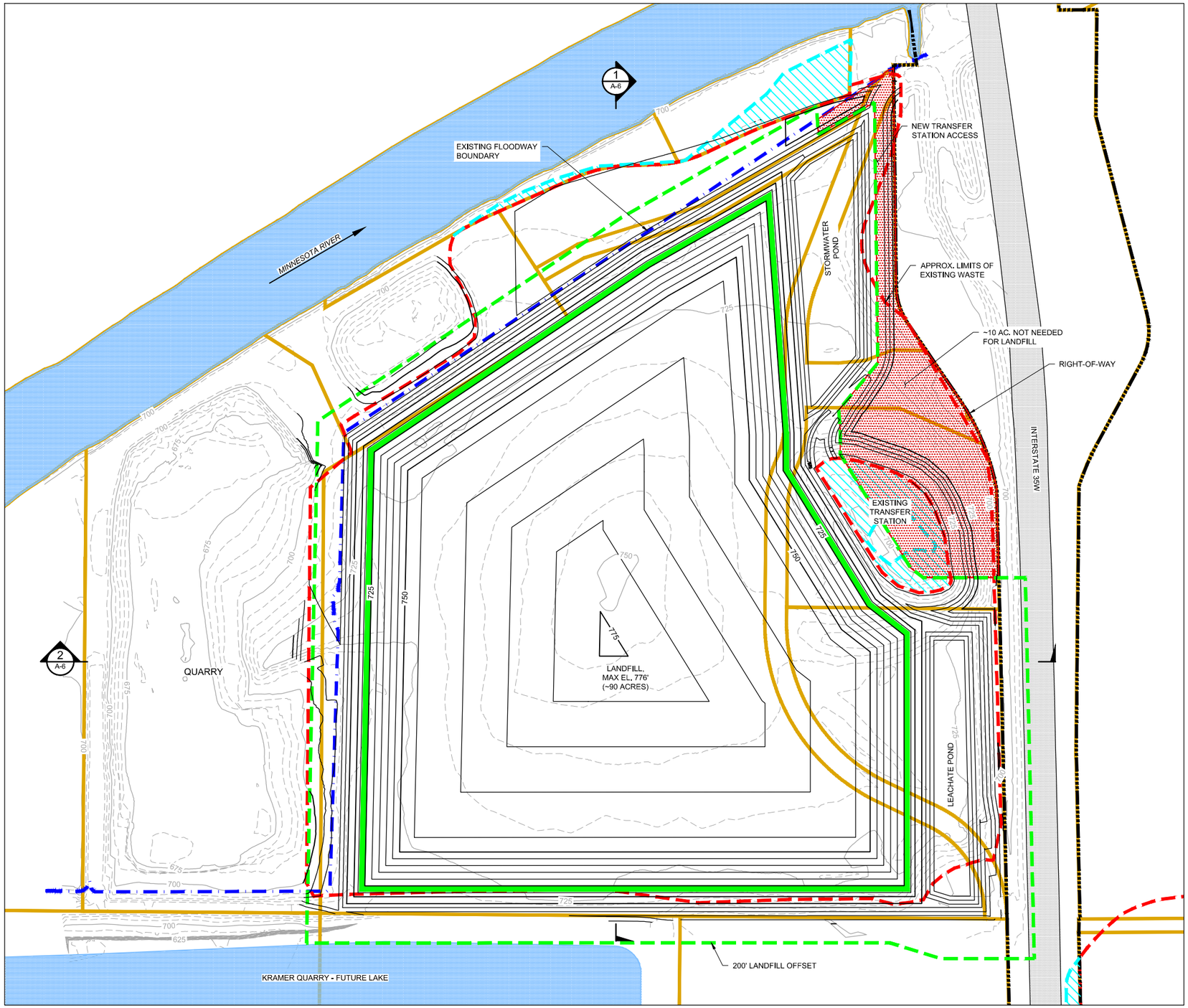
0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

BARR

APPENDIX A-4

FREEWAY LANDFILL
ALTERNATIVE 2A - OVERALL SECTIONS
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



1 - PLAN: ALTERNATIVE 2B

0 200 400

SCALE IN FEET

N

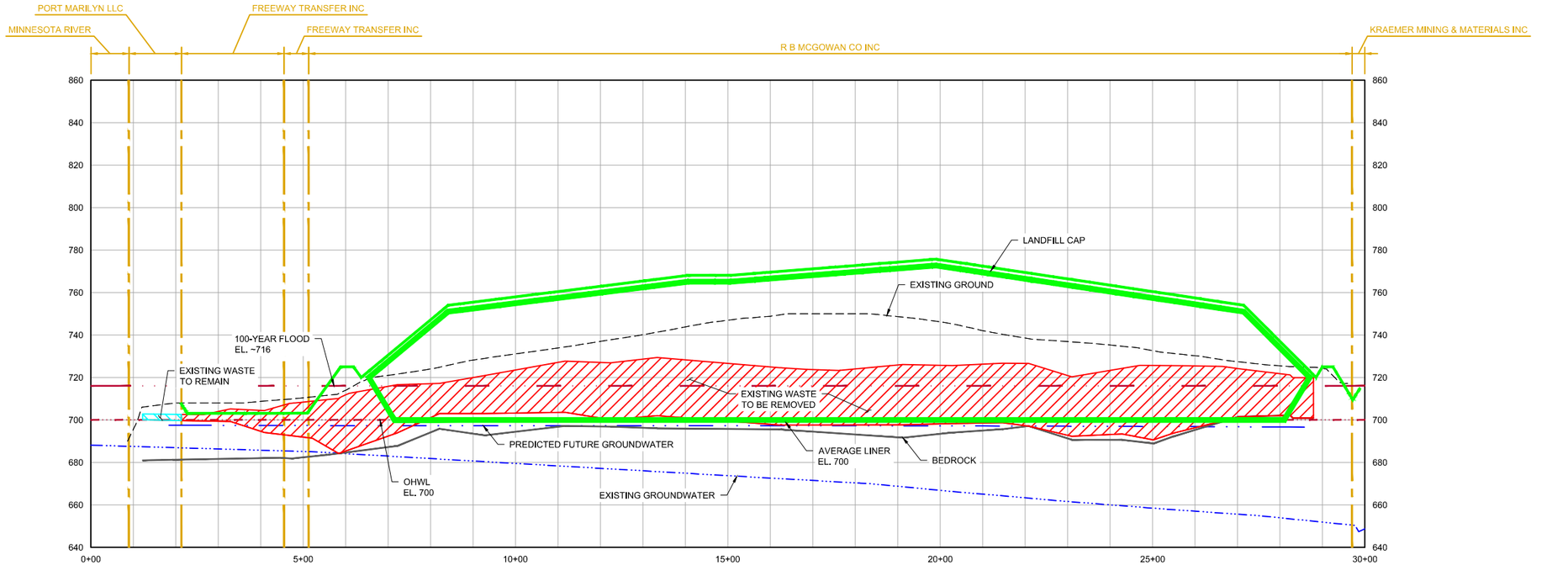
LEGEND

- 700 — EXISTING TWENTY FIVE-FOOT CONTOUR
- EXISTING FIVE-FOOT CONTOUR
- EXISTING FLOODWAY BOUNDARY
- PARCEL BOUNDARY
- INTERSTATE 35W RIGHT-OF-WAY
- APPROXIMATE LIMITS OF WASTE REMOVAL
- APPROXIMATE LIMITS OF WASTE TO REMAIN
- 700 — PROPOSED TWENTY FIVE-FOOT CONTOUR
- PROPOSED FIVE-FOOT CONTOUR
- PROPOSED WASTE LIMITS
- 200' LANDFILL OFFSET
- LAND NOT NEEDED FOR LANDFILL

BARR

APPENDIX A-5

FREEWAY LANDFILL
ALTERNATIVE 2B - PLAN VIEW
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



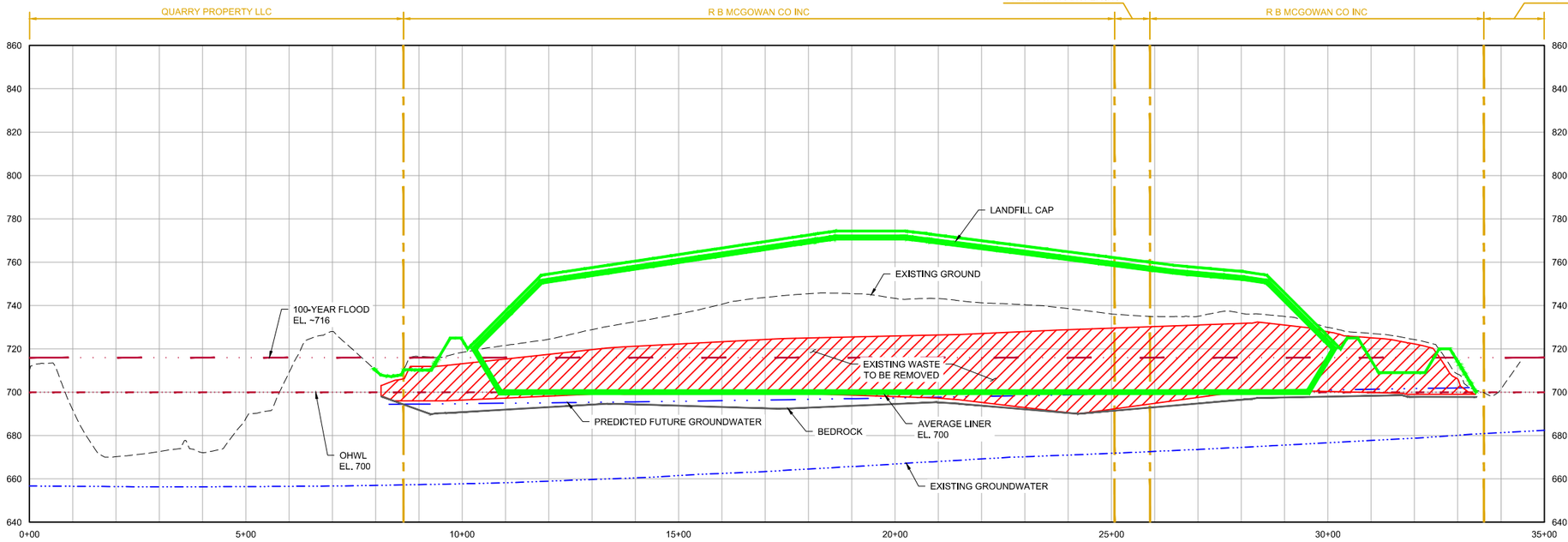
1 A-5 SECTION: OVERALL ALTERNATIVE 2B - NORTH TO SOUTH

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

LEGEND

- EXISTING GROUND
- EXISTING GROUNDWATER
- PREDICTED FUTURE GROUNDWATER
- ORDINARY HIGH WATER LEVEL
- 100-YEAR FLOOD ELEVATION
- EXISTING BEDROCK
- PARCEL BOUNDARY
- APPROXIMATE WASTE TO BE REMOVED
- APPROXIMATE WASTE TO REMAIN
- FINISHED GROUND
- LANDFILL CAP



2 A-5 SECTION: OVERALL ALTERNATIVE 2B - WEST TO EAST

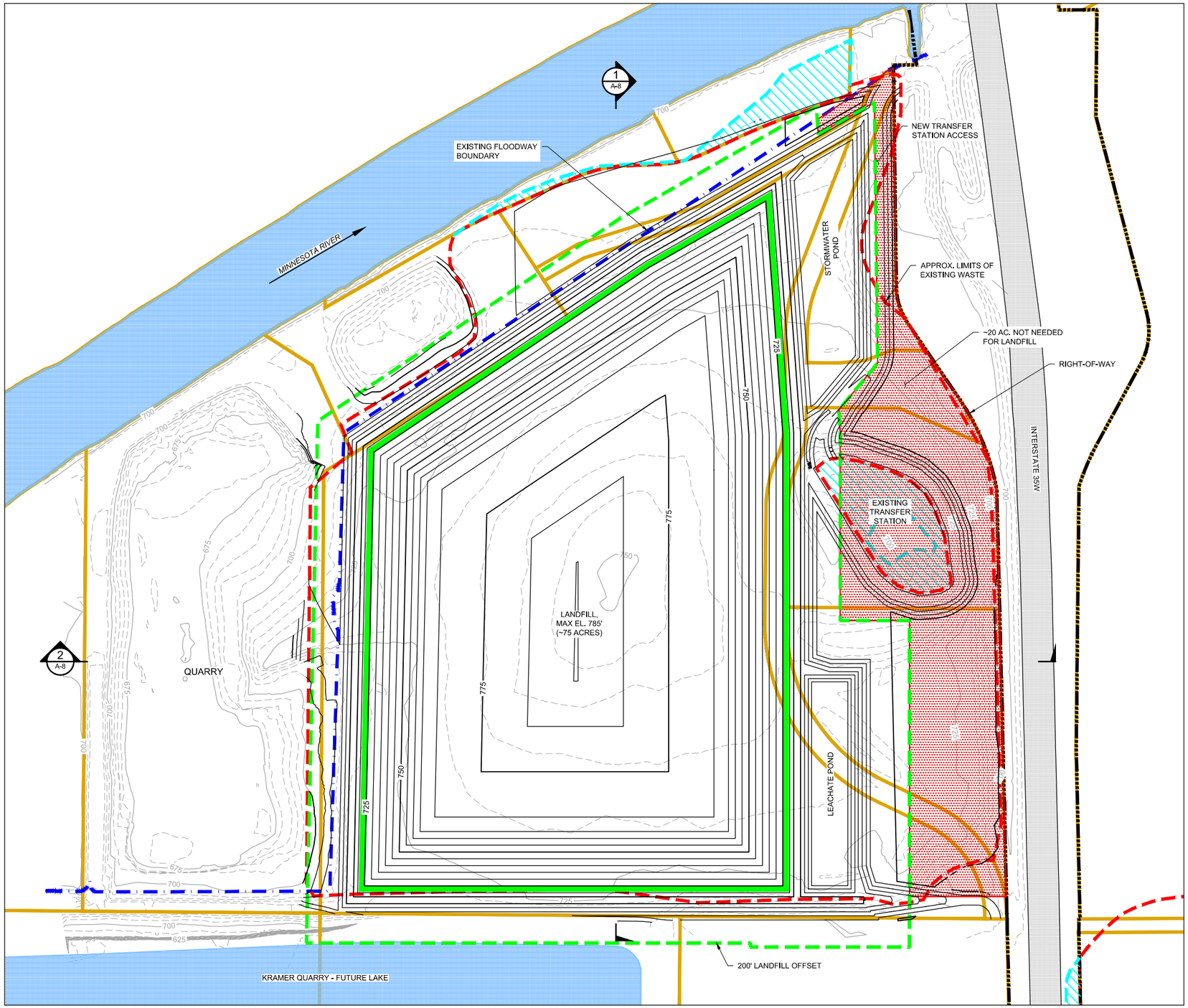
0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

BARR

APPENDIX A-6

FREEWAY LANDFILL
ALTERNATIVE 2B - OVERALL SECTIONS
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



1 PLAN: ALTERNATIVE 2C
0 200 400
SCALE IN FEET

LEGEND

- EXISTING TWENTY FIVE-FOOT CONTOUR
- EXISTING FIVE-FOOT CONTOUR
- EXISTING FLOODWAY BOUNDARY
- PARCEL BOUNDARY
- INTERSTATE 35W RIGHT-OF-WAY
- APPROXIMATE LIMITS OF WASTE REMOVAL
- APPROXIMATE LIMITS OF WASTE TO REMAIN
- PROPOSED TWENTY FIVE-FOOT CONTOUR
- PROPOSED FIVE-FOOT CONTOUR
- PROPOSED WASTE LIMITS
- 200' LANDFILL OFFSET
- LAND NOT NEEDED FOR LANDFILL

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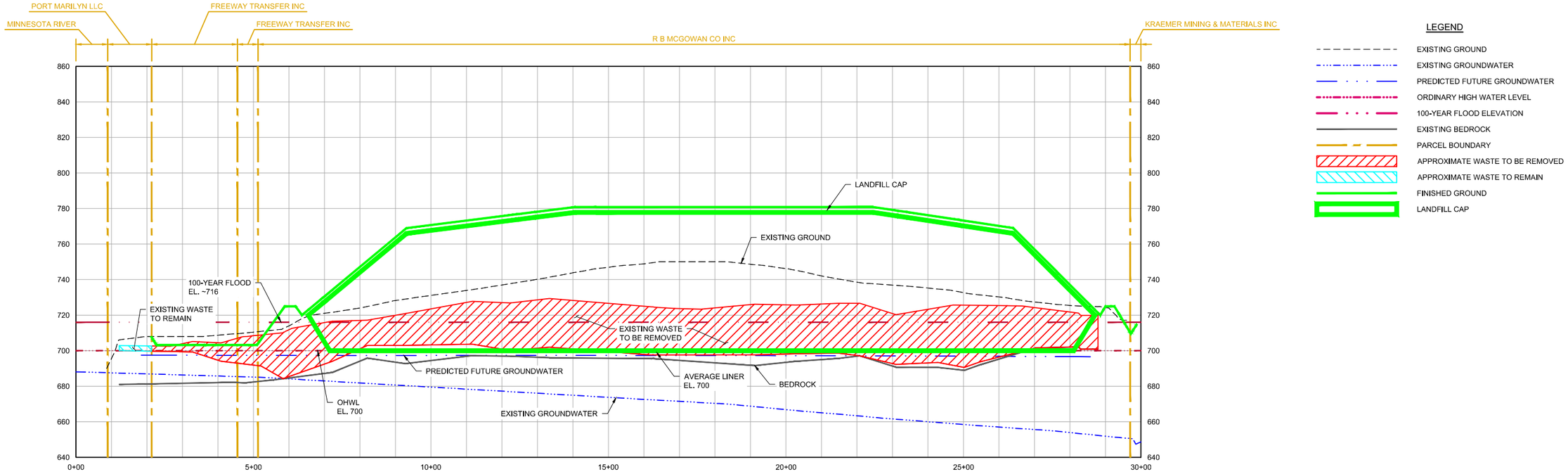
APPENDIX A-7

FREEWAY LANDFILL
ALTERNATIVE 2C - PLAN VIEW
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



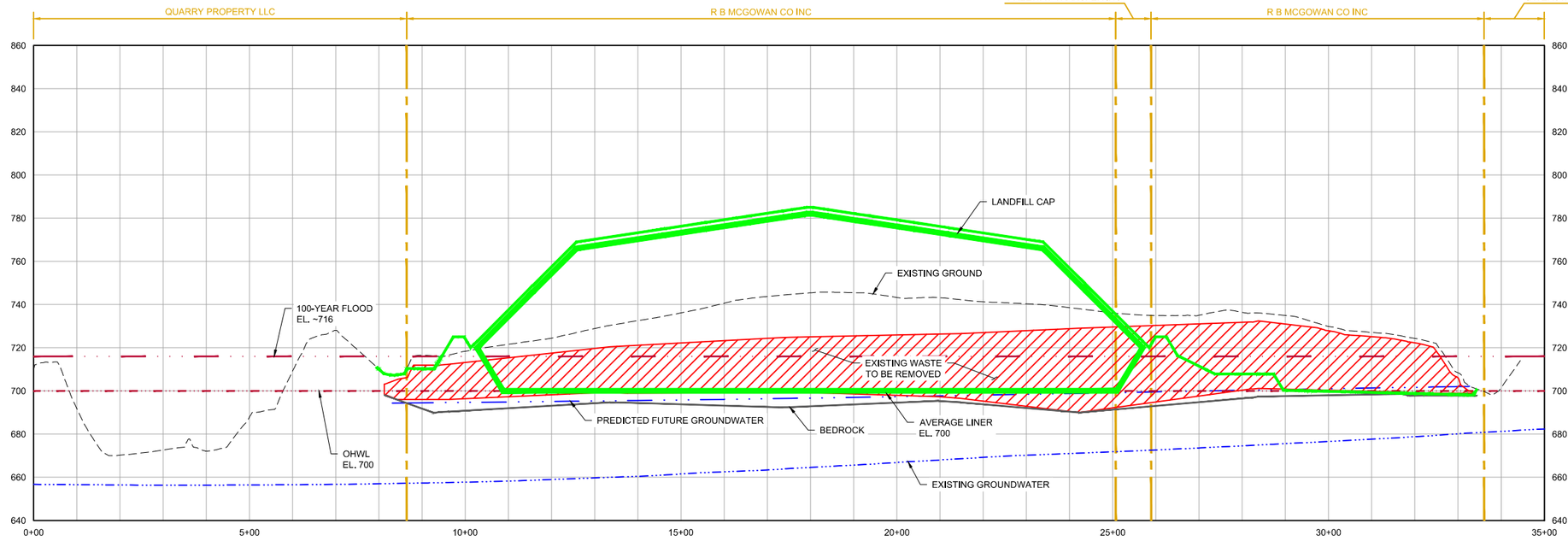
1 A-7 SECTION: OVERALL ALTERNATIVE 2C - NORTH TO SOUTH

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

LEGEND

- EXISTING GROUND
- EXISTING GROUNDWATER
- PREDICTED FUTURE GROUNDWATER
- ORDINARY HIGH WATER LEVEL
- 100-YEAR FLOOD ELEVATION
- EXISTING BEDROCK
- PARCEL BOUNDARY
- APPROXIMATE WASTE TO BE REMOVED
- APPROXIMATE WASTE TO REMAIN
- FINISHED GROUND
- LANDFILL CAP



2 A-7 SECTION: OVERALL ALTERNATIVE 2C - WEST TO EAST

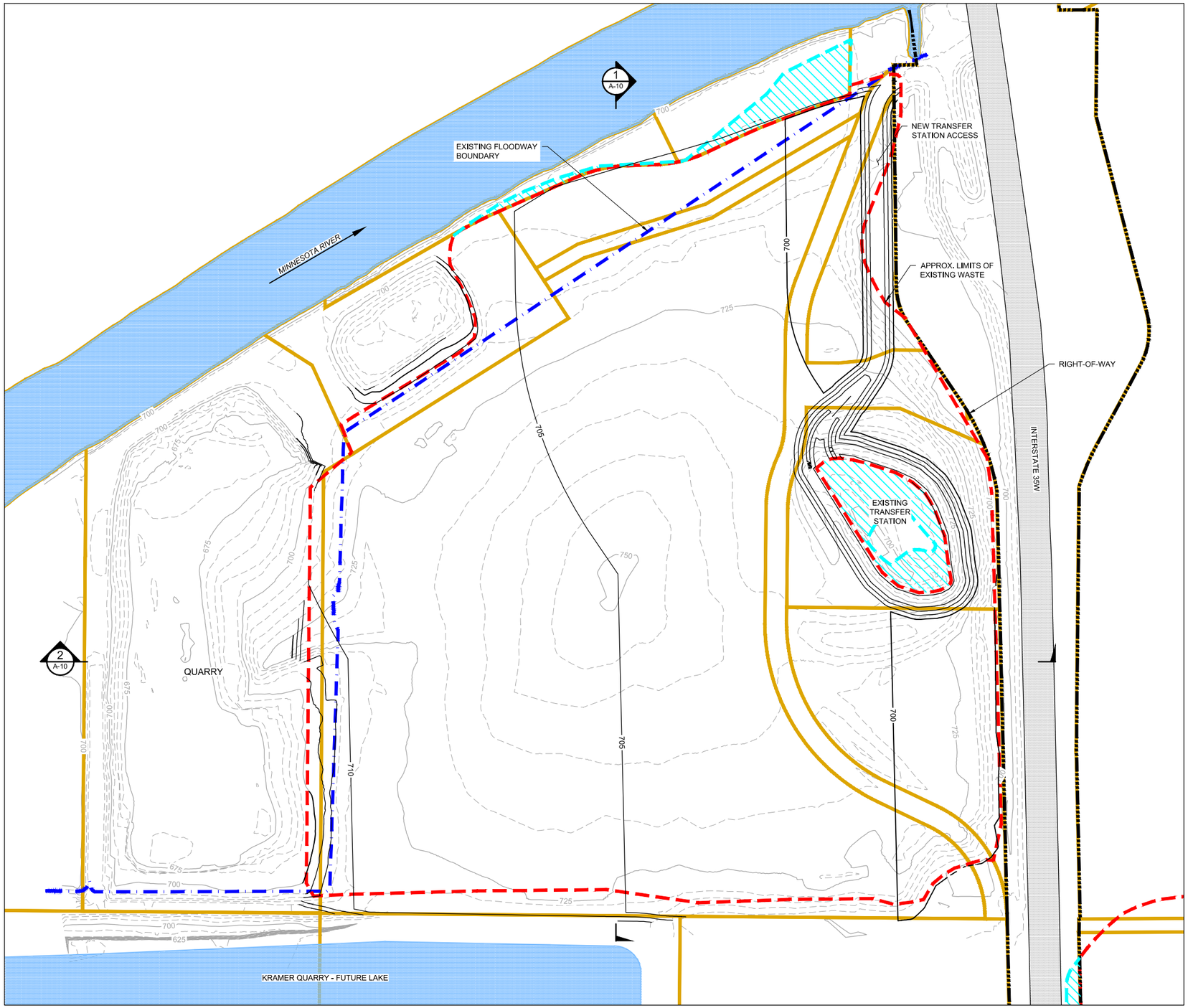
0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

BARR

APPENDIX A-8

FREEWAY LANDFILL
ALTERNATIVE 2C - OVERALL SECTIONS
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



1 - PLAN: ALTERNATIVE 3

0 200 400

SCALE IN FEET

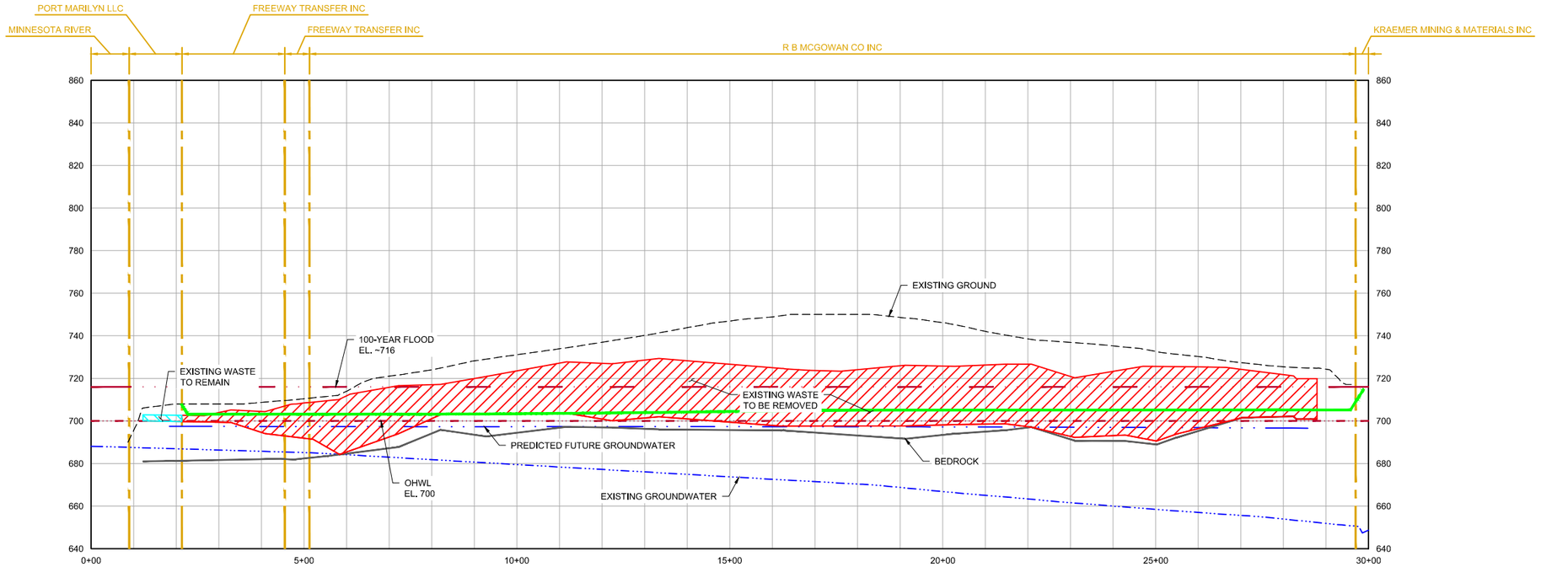
LEGEND

- 700 — EXISTING TWENTY FIVE-FOOT CONTOUR
- EXISTING FIVE-FOOT CONTOUR
- EXISTING FLOODWAY BOUNDARY
- PARCEL BOUNDARY
- INTERSTATE 35W RIGHT-OF-WAY
- APPROXIMATE LIMITS OF WASTE REMOVAL
- APPROXIMATE LIMITS OF WASTE TO REMAIN
- 700 — PROPOSED TWENTY FIVE-FOOT CONTOUR
- PROPOSED FIVE-FOOT CONTOUR

BARR

APPENDIX A-9

FREEWAY LANDFILL
ALTERNATIVE 3 - PLAN VIEW
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



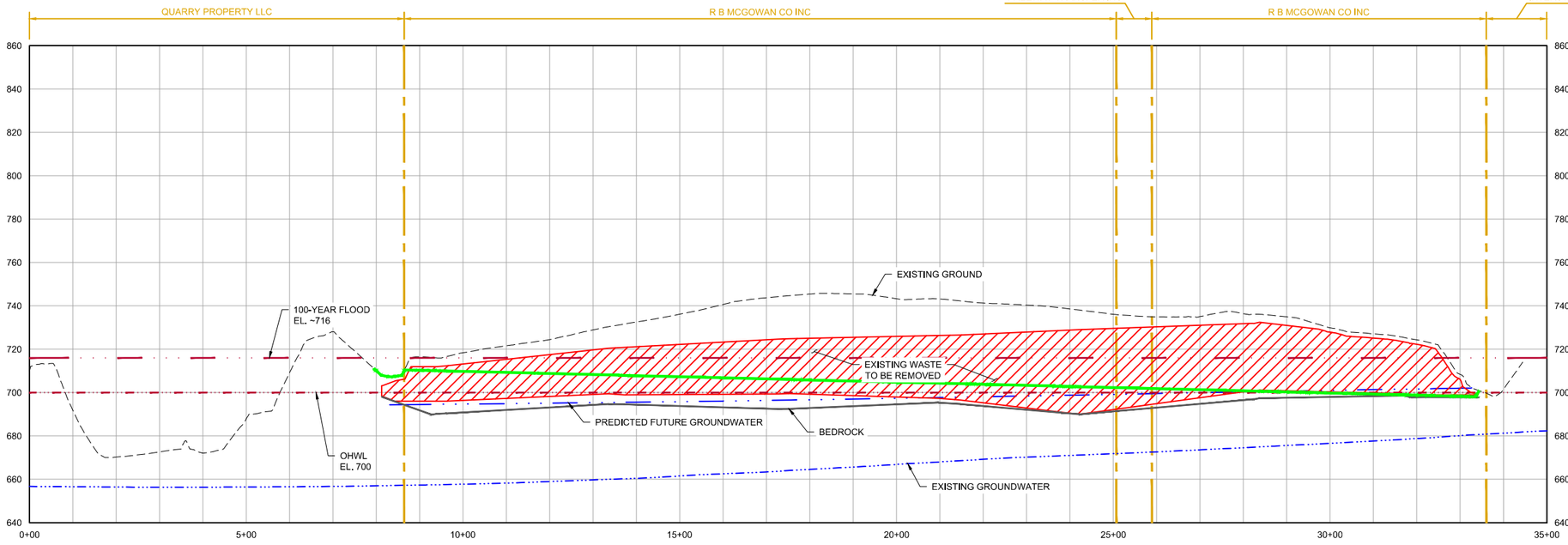
1 A-9 SECTION: OVERALL ALTERNATIVE 3 - NORTH TO SOUTH

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

LEGEND

- EXISTING GROUND
- EXISTING GROUNDWATER
- PREDICTED FUTURE GROUNDWATER
- ORDINARY HIGH WATER LEVEL
- 100-YEAR FLOOD ELEVATION
- EXISTING BEDROCK
- PARCEL BOUNDARY
- APPROXIMATE WASTE TO BE REMOVED
- APPROXIMATE WASTE TO REMAIN
- FINISHED GROUND



2 A-9 SECTION: OVERALL ALTERNATIVE 3 - WEST TO EAST

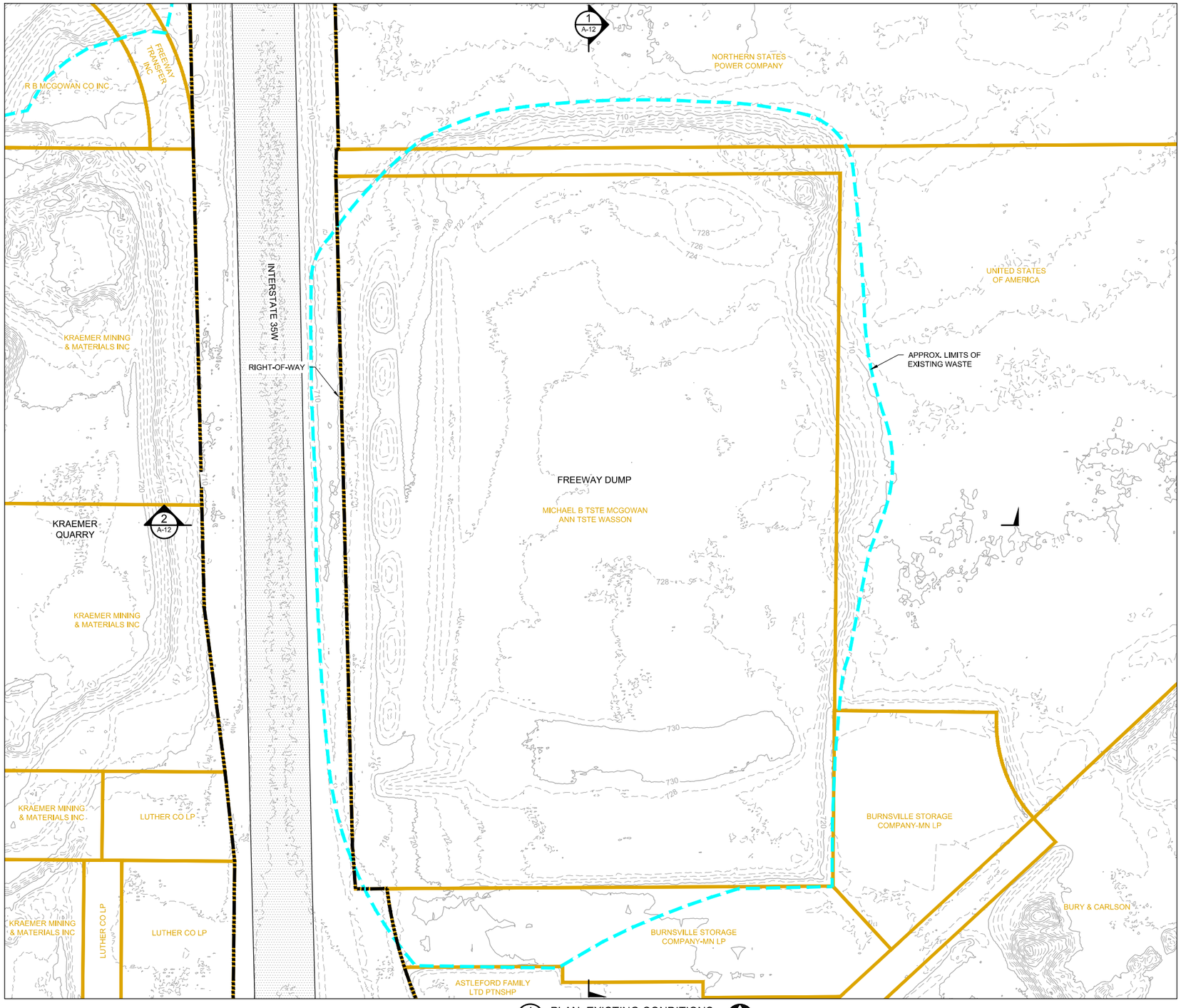
0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

BARR

APPENDIX A-10

FREEWAY LANDFILL
ALTERNATIVE 3 - OVERALL SECTIONS
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



1 - PLAN: EXISTING CONDITIONS

0 100 200

SCALE IN FEET

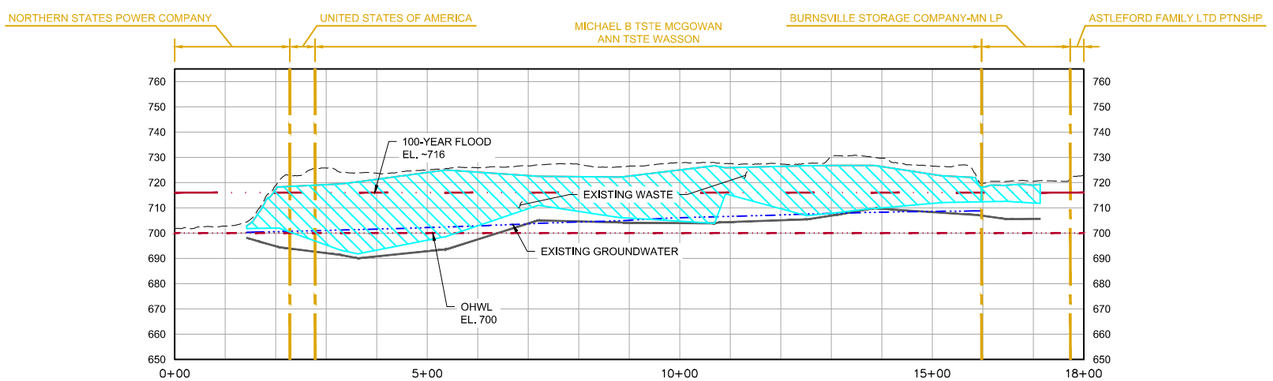
LEGEND

- 700 — EXISTING TWENTY FIVE-FOOT CONTOUR
- EXISTING FIVE-FOOT CONTOUR
- PARCEL BOUNDARY
- INTERSTATE 35W RIGHT-OF-WAY
- APPROXIMATE LIMITS OF WASTE

BARR

APPENDIX A-11

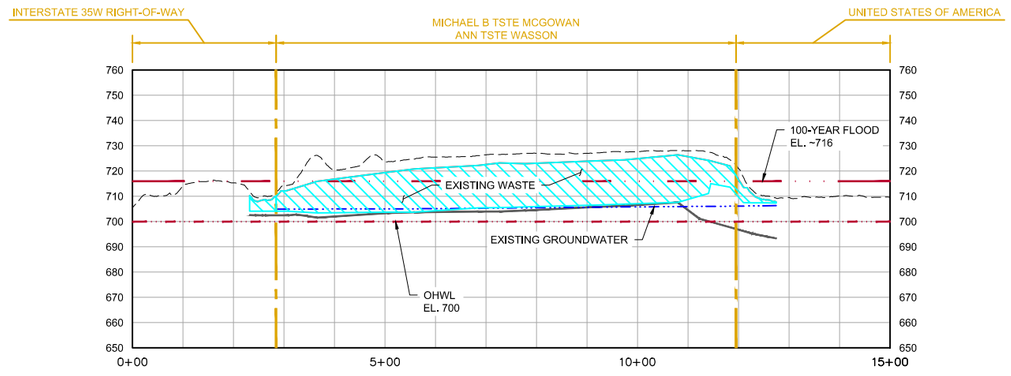
FREEWAY DUMP
EXISTING CONDITIONS - PLAN VIEW
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



1 A-11 SECTION: OVERALL EXISTING CONDITIONS - NORTH TO SOUTH

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET



2 A-11 SECTION: OVERALL EXISTING CONDTIONS - WEST TO EAST

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

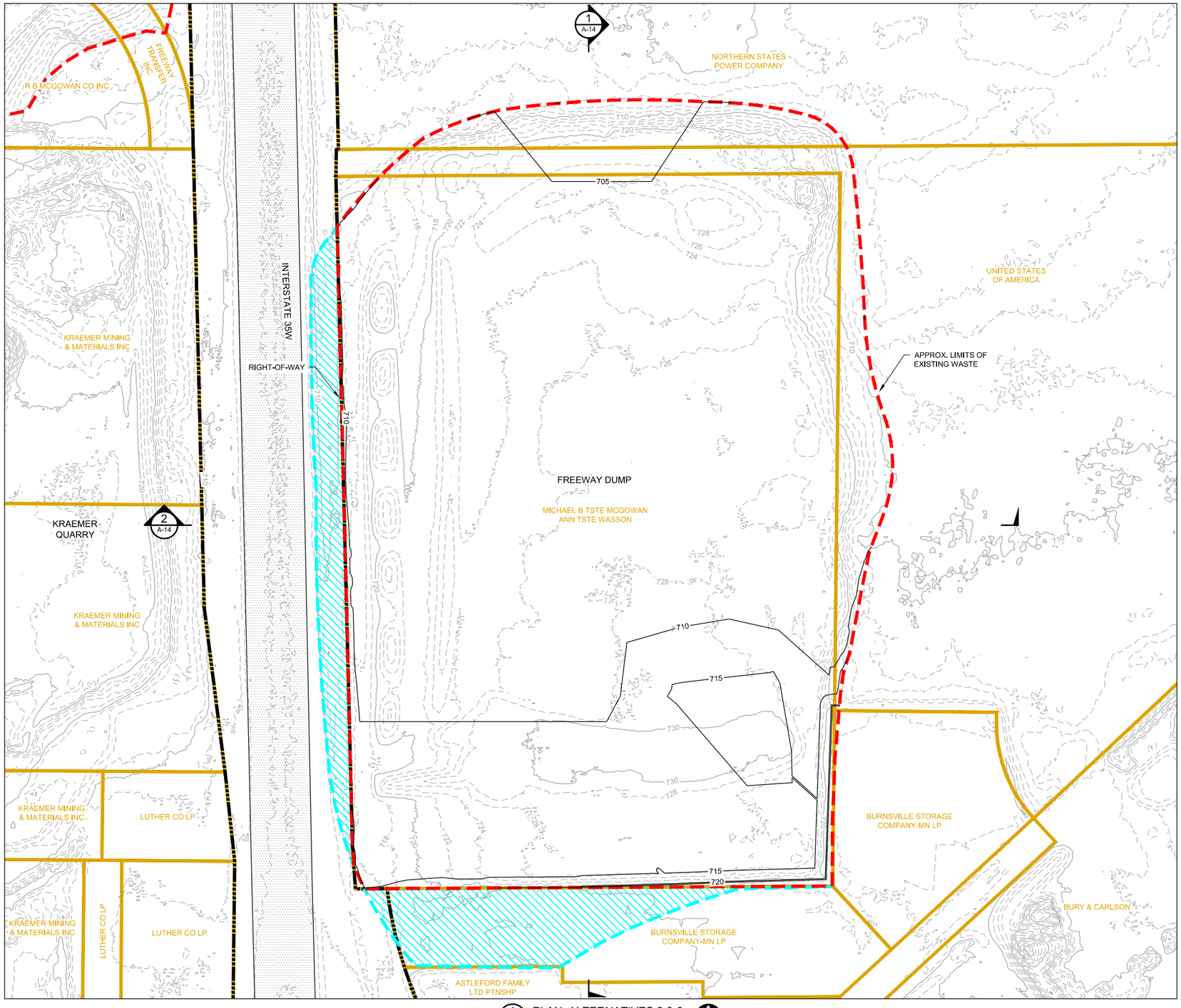
LEGEND

- EXISTING GROUND
- EXISTING GROUNDWATER
- ORDINARY HIGH WATER LEVEL
- 100-YEAR FLOOD ELEVATION
- EXISTING BEDROCK
- PARCEL BOUNDARY
- APPROXIMATE WASTE LIMITS

BARR

APPENDIX A-12

FREEWAY DUMP
EXISTING CONDITIONS -
OVERALL SECTIONS
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



1 - PLAN: ALTERNATIVES 2 & 3

0 100 200

SCALE IN FEET

N

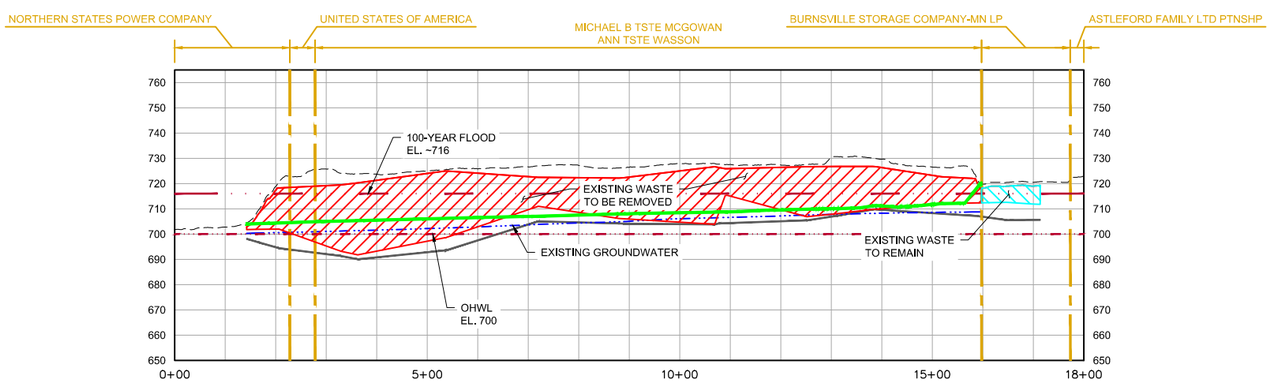
LEGEND

- 700 — EXISTING TWENTY FIVE-FOOT CONTOUR
- EXISTING FIVE-FOOT CONTOUR
- PARCEL BOUNDARY
- INTERSTATE 35W RIGHT-OF-WAY
- APPROXIMATE LIMITS OF WASTE REMOVAL
- APPROXIMATE LIMITS OF WASTE TO REMAIN
- 700 — PROPOSED TWENTY FIVE-FOOT CONTOUR
- PROPOSED FIVE-FOOT CONTOUR

BARR

APPENDIX A-13

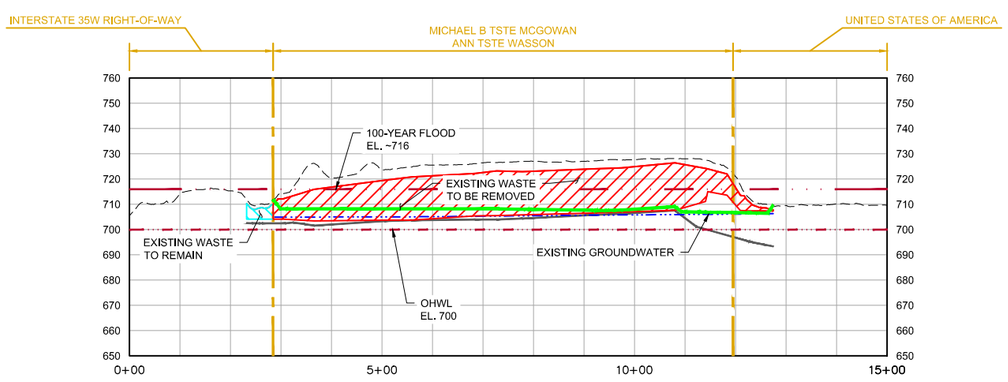
FREEWAY DUMP
ALTERNATIVES 2 & 3 - PLAN VIEW
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



1 A-13 SECTION: OVERALL ALTERNATIVES 2 & 3 - NORTH TO SOUTH

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET



2 A-13 SECTION: OVERALL ALTERNATIVES 2 & 3 - WEST TO EAST

0 150 300 HORZ. SCALE IN FEET

0 30 60 VERT. SCALE IN FEET

LEGEND

- EXISTING GROUND
- EXISTING GROUNDWATER
- ORDINARY HIGH WATER LEVEL
- 100-YEAR FLOOD ELEVATION
- EXISTING BEDROCK
- PARCEL BOUNDARY
- APPROXIMATE WASTE TO BE REMOVED
- APPROXIMATE WASTE TO REMAIN
- FINISHED GROUND

BARR

APPENDIX A-14

FREEWAY DUMP
ALTERNATIVES 2 & 3 -
OVERALL SECTIONS
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA

1 PLAN: DUMP TO LANDFILL ROUTING

0 400 800

SCALE IN FEET

LEGEND

PARCEL BOUNDARY

FREEWAY DUMP TO FREEWAY LANDFILL HAUL ROUTE

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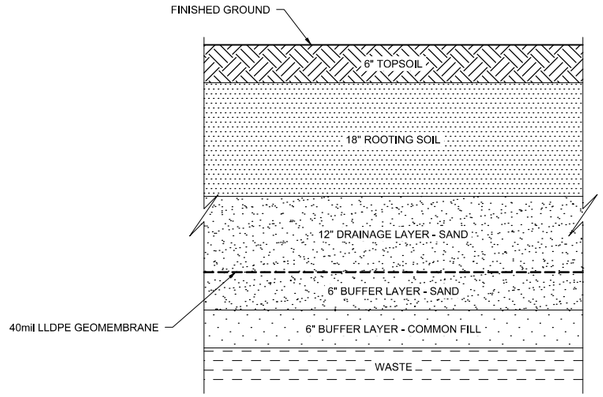
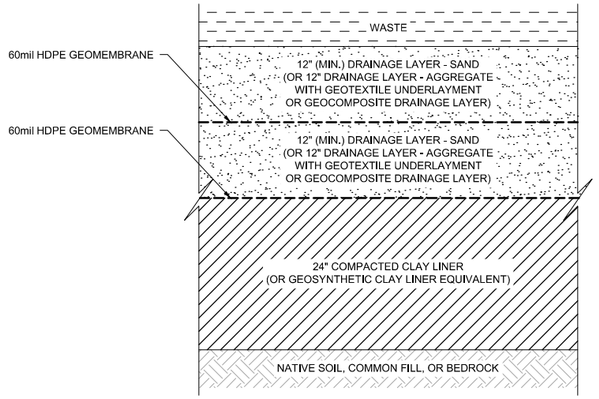
APPENDIX A-15

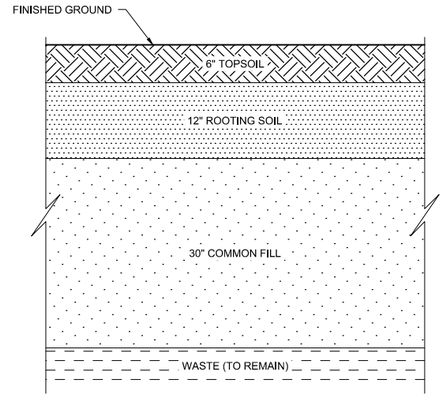
FREEWAY LANDFILL
DUMP TO LANDFILL ROUTING
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA



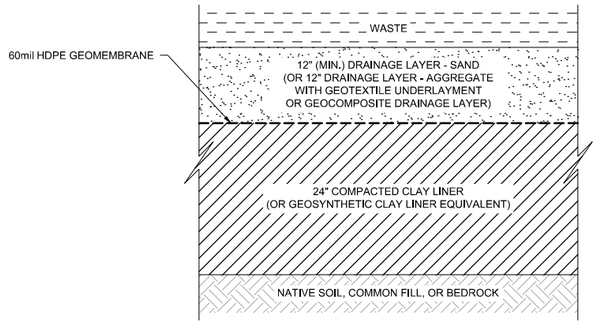
1 DETAIL: LANDFILL CAP
NOT TO SCALE



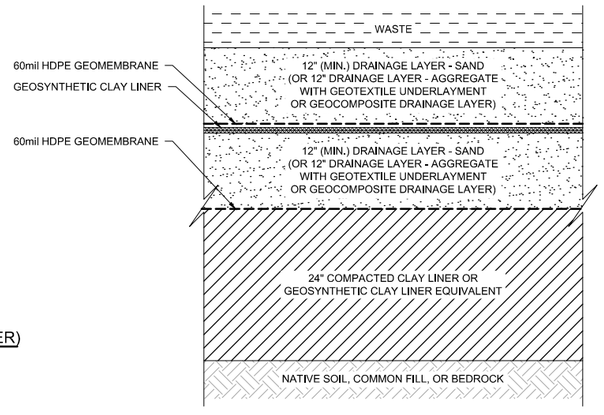
2C DETAIL: LANDIFLL LINER - ENHANCED (DOUBLE LINER)
NOT TO SCALE



3 DETAIL: REMAINING WASTE COVER
NOT TO SCALE

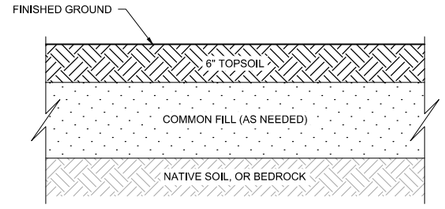


2A DETAIL: LANDFILL LINER - BASE CASE (TWO LAYER - COMPOSITE LINER)
NOT TO SCALE



2D DETAIL: LANDFILL LINER - ENHANCED (DOUBLE COMPOSITE LINER)
NOT TO SCALE

2B DETAIL: LANDFILL LINER - ENHANCED (THREE LAYER - COMPOSITE LINER)
NOT TO SCALE



4 DETAIL: RESTORATION AREA
NOT TO SCALE

NOTES:

1. LANDFILL CAP: COVER SYSTEM TO BE PLACED OVER CONSOLIDATED WASTE.
2. LANDFILL LINER: BASE LINER SYSTEM TO BE CONSTRUCTED BENEATH CONSOLIDATED WASTE.
3. REMAINING WASTE COVER: SOIL COVER (MIN. 4') TO BE PLACED IN AREAS WHERE FULL WASTE REMOVAL IS IMPRACTICAL (E.G., DUE TO SLOPING OF EXCAVATIONS ADJACENT TO INFRASTRUCTURE).
4. RESTORATION AREA: SOIL AND VEGETATED COVER TO BE PLACED IN AREAS OF FULL WASTE REMOVAL.

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APPENDIX A-16

FREEWAY LANDFILL
TYPICAL DETAILS
MINNESOTA POLLUTION CONTROL AGENCY
BURNSVILLE, MINNESOTA

Appendix B

Detailed Cost Estimates

PREPARED BY: BARR ENGINEERING COMPANY

SHEET	1	OF	1
BY:	BDP	DATE:	7/25/2019
CHECKED BY:	SWH	DATE:	7/25/2019
APPROVED BY:		DATE:	
ISSUED:		DATE:	
ISSUED:		DATE:	

Freeway Landfill - Construction Cost Estimate
PROJECT: Freeway Landfill
LOCATION: Burnsville, Minnesota
PROJECT #: 23/19-1372.00

Construction Cost Estimate - Alternative 1 - No Action

Pay Item No.		Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)
1	**Mobilization & Demobilization**		**LS**	**0**	**$ -**	**$ -**
2	**Erosion Protection**		**LS**	**0**	**$ -**	**$ -**
	a	Erosion Protection	YR	0	$ 300,000.00	$ -
3	**CQA Surveying/Soil Testing**		**LS**	**0**	**$ -**	**$ -**
	a	CQA Surveying/Soil Testing	AC	0	$ 10,000.00	$ -
4	**Mass Excavation, Embankment Construction and Perimeter Grading**		**LS**	**0**	**$ -**	**$ -**
	a	Site Clearing	AC	0	$ 10,000.00	$ -
	b	Strip Cover Soils - Landfill	CY	0	$ 2.00	$ -
	c	Strip Cover Soils - Dump	CY	0	$ 2.00	$ -
	d	Strip Cover Soils - Landfill Double Handle	CY	0	$ 2.00	$ -
	e	Strip Cover Soils - Dump Double Handle	CY	0	$ 2.00	$ -
	f	Common Excavation/Placement	CY	0	$ 2.00	$ -
	g	Common Borrow Placement - Import	CY	0	$ 12.00	$ -
	h	Liner Subgrade Preparation - Import	CY	0	$ 12.00	$ -
	i	Riprap - Embankment	CY	0	$ 60.00	$ -
5	**Landfill Liner**		**LS**	**0**	**$ -**	**$ -**
	a	Compacted Clay Liner	AC	0	$ 64,533.33	$ -
	b	60mil HDPE Geomembrane Liner	AC	0	$ 43,560.00	$ -
	c	Drainage Layer Placement	AC	0	$ 48,400.00	$ -
6	**Leachate Collection, Storage, and Transfer**		**LS**	**0**	**$ -**	**$ -**
	a	Leachate Collection Piping	AC	0	$ 10,000.00	$ -
	b	Aggregate	AC	0	$ 10,000.00	$ -
	c	Common Excavation/Placement	CY	0	$ 2.00	$ -
	d	Leachate Pond - Compacted Clay Liner	AC	0	$ 43,560.00	$ -
	e	Leachate Pond - 60mil HDPE Geomembrane Liner	AC	0	$ 43,560.00	$ -
	f	Leachate Pond - Drainage Layer Placement	AC	0	$ 48,400.00	$ -
	g	Pumps and Sumps	EA	0	$ 150,000.00	$ -
	h	Sanitary Forcemain	LF	0	$ 100.00	$ -
	i	Leachate Transfer/Treatment - Sanitary Sewer Hookup	LS	0	$ 100,000.00	$ -
7	**Waste Excavation and Onsite Transport**		**LS**	**0**	**$ -**	**$ -**
	a	Waste Excavation and Placement - Landfill	CY	0	$ 2.50	$ -
	b	Waste Excavation and Placement (Cover Soil Loss)	CY	0	$ 2.50	$ -
	c	Waste Excavation and Placement - Landfill Double Handle	CY	0	$ 2.50	$ -
	d	Waste Excavation and Placement - Dump	CY	0	$ 3.00	$ -
	e	Bike Path Improvements	LS	0	$ 1,000,000.00	$ -
8	**Waste Transfer Off Site**		**LS**	**0**	**$ -**	**$ -**
	a	Waste Transfer Off Site (Near By, Landfill)	TON	0	$ 3.00	$ -
	b	Waste Transfer Off Site (Near By, Dump)	TON	0	$ 3.50	$ -
	c	Waste Transfer Off Site (Distant)	TON	0	$ 15.00	$ -
	d	Bike Path Improvements	LS	0	$ 1,000,000.00	$ -
9	**Tipping Fees**		**LS**	**0**	**$ -**	**$ -**
	a	Tipping Fees (Low Range)	TON	0	$ 20.00	$ -
	b	Tipping Fees (High Range)	TON	0	$ 40.00	$ -
10	**City Fees / Taxes**		**LS**	**0**	**$ -**	**$ -**
	a	City Fees / Taxes (Low Range)	TON	0	$ -	$ -
	b	City Fees / Taxes (High Range)	TON	0	$ 4.00	$ -
11	**County Fees**		**LS**	**0**	**$ -**	**$ -**
	a	County Fees (Low Range)	TON	0	$ -	$ -
	b	County Fees (High Range)	TON	0	$ 10.00	$ -
12	**State Fees**		**LS**	**0**	**$ -**	**$ -**
	a	State Fees (Low Range)	TON	0	$ -	$ -
	b	State Fees (High Range)	TON	0	$ 7.00	$ -
13	**State Taxes**		**LS**	**0**	**$ -**	**$ -**
	a	State Taxes (Low Range)	TON	0	$ -	$ -
	b	State Taxes (High Range)	TON	0	$ 4.00	$ -
14	**Landfill Cap**		**LS**	**0**	**$ -**	**$ -**
	a	Topsoil Placement	AC	0	$ 16,133.33	$ -
	b	Rooting Soil Placement	AC	0	$ 4,840.00	$ -
	c	Drainage Layer Placement	AC	0	$ 48,400.00	$ -
	d	40mil LLDPE Geomembrane Liner	AC	0	$ 34,848.00	$ -
	e	Buffer Layer Material - Sand	AC	0	$ 24,200.00	$ -
	f	Buffer Layer Material - Common Fill	AC	0	$ 1,613.33	$ -
15	**Gas Extraction**		**LS**	**0**	**$ -**	**$ -**
	a	Gas Extraction	AC	0	$ 25,000.00	$ -
16	**Stormwater Management**		**LS**	**0**	**$ -**	**$ -**
	a	Common Excavation/Placement	CY	0	$ 2.00	$ -
	b	Piping	EA	0	$ 100,000.00	$ -
	c	Final Cover Routing	AC	0	$ 10,000.00	$ -
17	**Water Management**		**LS**	**0**	**$ -**	**$ -**
	a	Groundwater Management System	AC	0	$ 15,000.00	$ -
	b	Leachate Transfer/Treatment - Sanitary Sewer	MGAL	0	$ 50,000.00	$ -
18	**Road Surfacing**		**LS**	**0**	**$ -**	**$ -**
	a	Access Road Improvements	LS	0	$ -	$ -
	b	Gravel Surfacing - Landfill Access Road	CY	0	$ 30.00	$ -
	c	Geotextile - Landfill Access Road	SY	0	$ 3.00	$ -
	d	Gravel Surfacing - Transfer Station Access Road	CY	0	$ 30.00	$ -
	e	Geotextile - Transfer Station Access Road	SY	0	$ 3.00	$ -
19	**Turf Establishment**		**LS**	**0**	**$ -**	**$ -**
	a	Seeding, Mulching, and Fertilizing - Landfill	AC	0	$ 2,000.00	$ -
	b	Seeding, Mulching, and Fertilizing - Dump	AC	0	$ 2,000.00	$ -
	c	Erosion Control Blanket (Landfill Cap)	AC	0	$ 9,680.00	$ -
20	**Miscellaneous Items (Electrical, Traffic Control, Fence)**		**LS**	**0**	**$ -**	**$ -**
	a	Electrical	LS	0	$ 1,000,000.00	$ -
	b	Traffic Control	YR	0	$ 100,000.00	$ -
	c	Fence	LF	0	$ 20.00	$ -
21	**Engineering, Permitting, CQA**		**LS**	**0**	**$ -**	**$ -**
	a	Engineering and Permitting	LS	0	$ -	$ -
	b	CQA	LS	0	$ -	$ -
22	**30 Year O&M (NPV, 5% interest rate)**		**LS**	**1**	**$ 770,000**	**$ 770,000**
	a	30 Year O&M (NPV, 5% interest rate)	LS	1	$ 770,000.00	$ 770,000

Estimated Sub-Total Cost:	$	770,000
20% Contingency:	$	154,000
Estimated Total Cost (-20%):	$	800,000
Estimated Total Cost:	**$**	**1,000,000**
Estimated Total Cost (+30%):	$	1,300,000

Notes:
1) Cost estimate represents American Association of Cost Estimators (AACE) Class 4 classification (-20% to +30%) with a project definition of less than 30%.
2) Basis of unit costs include RS Means, bid results from similar local projects, and professional judgement.
3) Engineering and Permitting cost estimate is assumed to be 4% of construction costs (excluding line items 9 through 13).
4) CQA cost estimate is assumed to be 8% of construction costs (excluding line items 9 through 13).

PREPARED BY: BARR ENGINEERING COMPANY

SHEET	1	OF	1
BY:	BDP	DATE:	7/25/2019
CHECKED BY:	SWH	DATE:	7/25/2019
APPROVED BY:		DATE:	
ISSUED:		DATE:	
ISSUED:		DATE:	

Freeway Landfill - Construction Cost Estimate
PROJECT: Freeway Landfill
LOCATION: Burnsville, Minnesota
PROJECT #: 23/19-1372.00

Construction Cost Estimate - Alternative 2a - Minimum Footprint (Tallest)

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Pay Item No.		Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)
1	**Mobilization & Demobilization**		**LS**	**1**	**$ 2,847,482**	**$ 2,847,482**
2	**Erosion Protection**		**LS**	**1**	**$ 900,000**	**$ 900,000**
	a	Erosion Protection	YR	3	$ 300,000.00	$ 900,000
3	**CQA Surveying/Soil Testing**		**LS**	**1**	**$ 600,000**	**$ 600,000**
	a	CQA Surveying/Soil Testing	AC	60	$ 10,000.00	$ 600,000
4	**Mass Excavation, Embankment Construction and Perimeter Grading**		**LS**	**1**	**$ 8,264,000**	**$ 8,264,000**
	a	Site Clearing	AC	20	$ 10,000.00	$ 200,000
	b	Strip Cover Soils - Landfill	CY	1,500,000	$ 2.00	$ 3,000,000
	c	Strip Cover Soils - Dump	CY	170,000	$ 2.00	$ 340,000
	d	Strip Cover Soils - Landfill Double Handle	CY	375,000	$ 2.00	$ 750,000
	e	Strip Cover Soils - Dump Double Handle	CY	85,000	$ 2.00	$ 170,000
	f	Common Excavation/Placement	CY	72,000	$ 2.00	$ 144,000
	g	Common Borrow Placement - Import	CY	40,000	$ 12.00	$ 480,000
	h	Liner Subgrade Preparation - Import	CY	190,000	$ 12.00	$ 2,280,000
	i	Riprap - Embankment	CY	15,000	$ 60.00	$ 900,000
5	**Landfill Liner**		**LS**	**1**	**$ 9,389,600**	**$ 9,389,600**
	a	Compacted Clay Liner	AC	60	$ 64,533.33	$ 3,872,000
	b	60mil HDPE Geomembrane Liner	AC	60	$ 43,560.00	$ 2,613,600
	c	Drainage Layer Placement	AC	60	$ 48,400.00	$ 2,904,000
6	**Leachate Collection, Storage, and Transfer**		**LS**	**1**	**$ 2,806,560**	**$ 2,806,560**
	a	Leachate Collection Piping	AC	60	$ 10,000.00	$ 600,000
	b	Aggregate	AC	60	$ 10,000.00	$ 600,000
	c	Common Excavation/Placement	CY	50,000	$ 2.00	$ 100,000
	d	Leachate Pond - Compacted Clay Liner	AC	3	$ 43,560.00	$ 130,680
	e	Leachate Pond - 60mil HDPE Geomembrane Liner	AC	3	$ 43,560.00	$ 130,680
	f	Leachate Pond - Drainage Layer Placement	AC	3	$ 48,400.00	$ 145,200
	g	Pumps and Sumps	EA	6	$ 150,000.00	$ 900,000
	h	Sanitary Forcemain	LF	1,000	$ 100.00	$ 100,000
	i	Leachate Transfer/Treatment - Sanitary Sewer Hookup	LS	1	$ 100,000.00	$ 100,000
7	**Waste Excavation and Onsite Transport**		**LS**	**1**	**$ 19,080,000**	**$ 19,080,000**
	a	Waste Excavation and Placement - Landfill	CY	5,200,000	$ 2.50	$ 13,000,000
	b	Waste Excavation and Placement (Cover Soil Loss)	CY	80,000	$ 2.50	$ 200,000
	c	Waste Excavation and Placement - Landfill Double Handle	CY	1,040,000	$ 2.50	$ 2,600,000
	d	Waste Excavation and Placement - Dump	CY	760,000	$ 3.00	$ 2,280,000
	e	Bike Path Improvements	LS	1	$ 1,000,000.00	$ 1,000,000
8	**Waste Transfer Off Site**		**LS**	**0**	**$ -**	**$ -**
	a	Waste Transfer Off Site (Near By, Landfill)	TON	0	$ 3.00	$ -
	b	Waste Transfer Off Site (Near By, Dump)	TON	0	$ 3.50	$ -
	c	Waste Transfer Off Site (Distant)	TON	0	$ 15.00	$ -
	d	Bike Path Improvements	LS	0	$ 1,000,000.00	$ -
9	**Tipping Fees**		**LS**	**0**	**$ -**	**$ -**
	a	Tipping Fees (Low Range)	TON	0	$ 20.00	$ -
	b	Tipping Fees (High Range)	TON	0	$ 40.00	$ -
10	**City Fees / Taxes**		**LS**	**0**	**$ -**	**$ -**
	a	City Fees / Taxes (Low Range)	TON	0	$ -	$ -
	b	City Fees / Taxes (High Range)	TON	0	$ 4.00	$ -
11	**County Fees**		**LS**	**0**	**$ -**	**$ -**
	a	County Fees (Low Range)	TON	0	$ -	$ -
	b	County Fees (High Range)	TON	0	$ 10.00	$ -
12	**State Fees**		**LS**	**0**	**$ -**	**$ -**
	a	State Fees (Low Range)	TON	0	$ -	$ -
	b	State Fees (High Range)	TON	0	$ 7.00	$ -
13	**State Taxes**		**LS**	**0**	**$ -**	**$ -**
	a	State Taxes (Low Range)	TON	0	$ -	$ -
	b	State Taxes (High Range)	TON	0	$ 4.00	$ -
14	**Landfill Cap**		**LS**	**1**	**$ 7,802,080**	**$ 7,802,080**
	a	Topsoil Placement	AC	60	$ 16,133.33	$ 968,000
	b	Rooting Soil Placement	AC	60	$ 4,840.00	$ 290,400
	c	Drainage Layer Placement	AC	60	$ 48,400.00	$ 2,904,000
	d	40mil LLDPE Geomembrane Liner	AC	60	$ 34,848.00	$ 2,090,880
	e	Buffer Layer Material - Sand	AC	60	$ 24,200.00	$ 1,452,000
	f	Buffer Layer Material - Common Fill	AC	60	$ 1,613.33	$ 96,800
15	**Gas Extraction**		**LS**	**1**	**$ 1,500,000**	**$ 1,500,000**
	a	Gas Extraction	AC	60	$ 25,000.00	$ 1,500,000
16	**Stormwater Management**		**LS**	**1**	**$ 900,000**	**$ 900,000**
	a	Common Excavation/Placement	CY	50,000	$ 2.00	$ 100,000
	b	Piping	EA	2	$ 100,000.00	$ 200,000
	c	Final Cover Routing	AC	60	$ 10,000.00	$ 600,000
17	**Water Management**		**LS**	**1**	**$ 1,900,000**	**$ 1,900,000**
	a	Groundwater Management System	AC	60	$ 15,000.00	$ 900,000
	b	Leachate Transfer/Treatment - Sanitary Sewer	MGAL	20	$ 50,000.00	$ 1,000,000
18	**Road Surfacing**		**LS**	**1**	**$ 1,396,600**	**$ 1,396,600**
	a	Access Road Improvements	LS	1	$ 1,000,000.00	$ 1,000,000
	b	Gravel Surfacing - Landfill Access Road	CY	8,000	$ 30.00	$ 240,000
	c	Geotextile - Landfill Access Road	SY	23,800	$ 3.00	$ 71,400
	d	Gravel Surfacing - Transfer Station Access Road	CY	2,300	$ 30.00	$ 69,000
	e	Geotextile - Transfer Station Access Road	SY	5,400	$ 3.00	$ 16,200
19	**Turf Establishment**		**LS**	**1**	**$ 950,800**	**$ 950,800**
	a	Seeding, Mulching, and Fertilizing - Landfill	AC	150	$ 2,000.00	$ 300,000
	b	Seeding, Mulching, and Fertilizing - Dump	AC	35	$ 2,000.00	$ 70,000
	c	Erosion Control Blanket (Landfill Cap)	AC	60	$ 9,680.00	$ 580,800
20	**Miscellaneous Items (Electrical, Traffic Control, Fence)**		**LS**	**1**	**$ 1,460,000**	**$ 1,460,000**
	a	Electrical	LS	1	$ 1,000,000.00	$ 1,000,000
	b	Traffic Control	YR	3	$ 100,000.00	$ 300,000
	c	Fence	LF	8,000	$ 20.00	$ 160,000
21	**Engineering, Permitting, CQA**		**LS**	**1**	**$ 7,200,000**	**$ 7,200,000**
	a	Engineering and Permitting	LS	1	$ 2,400,000.00	$ 2,400,000
	b	CQA	LS	1	$ 4,800,000.00	$ 4,800,000
22	**30 Year O&M (NPV, 5% interest rate)**		**LS**	**1**	**$ 3,070,000**	**$ 3,070,000**
	a	30 Year O&M (NPV, 5% interest rate)	LS	1	$ 3,070,000.00	$ 3,070,000

Estimated Sub-Total Cost:	$	70,067,122
20% Contingency:	$	14,013,424
Estimated Total Cost (-20%):	$	68,000,000
Estimated Total Cost:	**$**	**85,000,000**
Estimated Total Cost (+30%):	$	110,000,000

Notes:
1) Cost estimate represents American Association of Cost Estimators (AACE) Class 4 classification (-20% to +30%) with a project definition of less than 30%.
2) Basis of unit costs include RS Means, bid results from similar local projects, and professional judgement.
3) Engineering and Permitting cost estimate is assumed to be 4% of construction costs (excluding line items 9 through 13).
4) CQA cost estimate is assumed to be 8% of construction costs (excluding line items 9 through 13).

PREPARED BY: BARR ENGINEERING COMPANY

Freeway Landfill - Construction Cost Estimate
PROJECT: Freeway Landfill
LOCATION: Burnsville, Minnesota
PROJECT #: 23/19-1372.00

SHEET	1	OF	1
BY:	BDP	DATE:	7/25/2019
CHECKED BY:	SWH	DATE:	7/25/2019
APPROVED BY:		DATE:	
ISSUED:		DATE:	
ISSUED:		DATE:	

Construction Cost Estimate - Alternative 2b - Minimum Height (Largest Footprint)

Pay Item No.		Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)
1	**Mobilization & Demobilization**		**LS**	**1**	**$ 3,572,861**	**$ 3,572,861**
2	**Erosion Protection**		**LS**	**1**	**$ 1,200,000**	**$ 1,200,000**
	a	Erosion Protection	YR	4	$ 300,000.00	$ 1,200,000
3	**CQA Surveying/Soil Testing**		**LS**	**1**	**$ 900,000**	**$ 900,000**
	a	CQA Surveying/Soil Testing	AC	90	$ 10,000.00	$ 900,000
4	**Mass Excavation, Embankment Construction and Perimeter Grading**		**LS**	**1**	**$ 9,586,000**	**$ 9,586,000**
	a	Site Clearing	AC	20	$ 10,000.00	$ 200,000
	b	Strip Cover Soils - Landfill	CY	1,500,000	$ 2.00	$ 3,000,000
	c	Strip Cover Soils - Dump	CY	170,000	$ 2.00	$ 340,000
	d	Strip Cover Soils - Landfill Double Handle	CY	375,000	$ 2.00	$ 750,000
	e	Strip Cover Soils - Dump Double Handle	CY	85,000	$ 2.00	$ 170,000
	f	Common Excavation/Placement	CY	193,000	$ 2.00	$ 386,000
	g	Common Borrow Placement - Import	CY	30,000	$ 12.00	$ 360,000
	h	Liner Subgrade Preparation - Import	CY	290,000	$ 12.00	$ 3,480,000
	i	Riprap - Embankment	CY	15,000	$ 60.00	$ 900,000
5	**Landfill Liner**		**LS**	**1**	**$ 14,084,400**	**$ 14,084,400**
	a	Compacted Clay Liner	AC	90	$ 64,533.33	$ 5,808,000
	b	60mil HDPE Geomembrane Liner	AC	90	$ 43,560.00	$ 3,920,400
	c	Drainage Layer Placement	AC	90	$ 48,400.00	$ 4,356,000
6	**Leachate Collection, Storage, and Transfer**		**LS**	**1**	**$ 4,187,600**	**$ 4,187,600**
	a	Leachate Collection Piping	AC	90	$ 10,000.00	$ 900,000
	b	Aggregate	AC	90	$ 10,000.00	$ 900,000
	c	Common Excavation/Placement	CY	100,000	$ 2.00	$ 200,000
	d	Leachate Pond - Compacted Clay Liner	AC	5	$ 43,560.00	$ 217,800
	e	Leachate Pond - 60mil HDPE Geomembrane Liner	AC	5	$ 43,560.00	$ 217,800
	f	Leachate Pond - Drainage Layer Placement	AC	5	$ 48,400.00	$ 242,000
	g	Pumps and Sumps	EA	9	$ 150,000.00	$ 1,350,000
	h	Sanitary Forcemain	LF	600	$ 100.00	$ 60,000
	i	Leachate Transfer/Treatment - Sanitary Sewer Hookup	LS	1	$ 100,000.00	$ 100,000
7	**Waste Excavation and Onsite Transport**		**LS**	**1**	**$ 19,080,000**	**$ 19,080,000**
	a	Waste Excavation and Placement - Landfill	CY	5,200,000	$ 2.50	$ 13,000,000
	b	Waste Excavation and Placement (Cover Soil Loss)	CY	80,000	$ 2.50	$ 200,000
	c	Waste Excavation and Placement - Landfill Double Handle	CY	1,040,000	$ 2.50	$ 2,600,000
	d	Waste Excavation and Placement - Dump	CY	760,000	$ 3.00	$ 2,280,000
	e	Bike Path Improvements	LS	1	$ 1,000,000.00	$ 1,000,000
8	**Waste Transfer Off Site**		**LS**	**0**	**$ -**	**$ -**
	a	Waste Transfer Off Site (Near By, Landfill)	TON	0	$ 3.00	$ -
	b	Waste Transfer Off Site (Near By, Dump)	TON	0	$ 3.50	$ -
	c	Waste Transfer Off Site (Distant)	TON	0	$ 15.00	$ -
	d	Bike Path Improvements	LS	0	$ 1,000,000.00	$ -
9	**Tipping Fees**		**LS**	**0**	**$ -**	**$ -**
	a	Tipping Fees (Low Range)	TON	0	$ 20.00	$ -
	b	Tipping Fees (High Range)	TON	0	$ 40.00	$ -
10	**City Fees / Taxes**		**LS**	**0**	**$ -**	**$ -**
	a	City Fees / Taxes (Low Range)	TON	0	$ -	$ -
	b	City Fees / Taxes (High Range)	TON	0	$ 4.00	$ -
11	**County Fees**		**LS**	**0**	**$ -**	**$ -**
	a	County Fees (Low Range)	TON	0	$ -	$ -
	b	County Fees (High Range)	TON	0	$ 10.00	$ -
12	**State Fees**		**LS**	**0**	**$ -**	**$ -**
	a	State Fees (Low Range)	TON	0	$ -	$ -
	b	State Fees (High Range)	TON	0	$ 7.00	$ -
13	**State Taxes**		**LS**	**0**	**$ -**	**$ -**
	a	State Taxes (Low Range)	TON	0	$ -	$ -
	b	State Taxes (High Range)	TON	0	$ 4.00	$ -
14	**Landfill Cap**		**LS**	**1**	**$ 11,703,120**	**$ 11,703,120**
	a	Topsoil Placement	AC	90	$ 16,133.33	$ 1,452,000
	b	Rooting Soil Placement	AC	90	$ 4,840.00	$ 435,600
	c	Drainage Layer Placement	AC	90	$ 48,400.00	$ 4,356,000
	d	40mil LLDPE Geomembrane Liner	AC	90	$ 34,848.00	$ 3,136,320
	e	Buffer Layer Material - Sand	AC	90	$ 24,200.00	$ 2,178,000
	f	Buffer Layer Material - Common Fill	AC	90	$ 1,613.33	$ 145,200
15	**Gas Extraction**		**LS**	**1**	**$ 2,250,000**	**$ 2,250,000**
	a	Gas Extraction	AC	90	$ 25,000.00	$ 2,250,000
16	**Stormwater Management**		**LS**	**1**	**$ 1,300,000**	**$ 1,300,000**
	a	Common Excavation/Placement	CY	100,000	$ 2.00	$ 200,000
	b	Piping	EA	2	$ 100,000.00	$ 200,000
	c	Final Cover Routing	AC	90	$ 10,000.00	$ 900,000
17	**Water Management**		**LS**	**1**	**$ 2,850,000**	**$ 2,850,000**
	a	Groundwater Management System	AC	90	$ 15,000.00	$ 1,350,000
	b	Leachate Transfer/Treatment - Sanitary Sewer	MGAL	30	$ 50,000.00	$ 1,500,000
18	**Road Surfacing**		**LS**	**1**	**$ 1,474,900**	**$ 1,474,900**
	a	Access Road Improvements	LS	1	$ 1,000,000.00	$ 1,000,000
	b	Gravel Surfacing - Landfill Access Road	CY	10,000	$ 30.00	$ 300,000
	c	Geotextile - Landfill Access Road	SY	29,900	$ 3.00	$ 89,700
	d	Gravel Surfacing - Transfer Station Access Road	CY	2,300	$ 30.00	$ 69,000
	e	Geotextile - Transfer Station Access Road	SY	5,400	$ 3.00	$ 16,200
19	**Turf Establishment**		**LS**	**1**	**$ 1,241,200**	**$ 1,241,200**
	a	Seeding, Mulching, and Fertilizing - Landfill	AC	150	$ 2,000.00	$ 300,000
	b	Seeding, Mulching, and Fertilizing - Dump	AC	35	$ 2,000.00	$ 70,000
	c	Erosion Control Blanket (Landfill Cap)	AC	90	$ 9,680.00	$ 871,200
20	**Miscellaneous Items (Electrical, Traffic Control, Fence)**		**LS**	**1**	**$ 1,600,000**	**$ 1,600,000**
	a	Electrical	LS	1	$ 1,000,000.00	$ 1,000,000
	b	Traffic Control	YR	4	$ 100,000.00	$ 400,000
	c	Fence	LF	10,000	$ 20.00	$ 200,000
21	**Engineering, Permitting, CQA**		**LS**	**1**	**$ 9,000,000**	**$ 9,000,000**
	a	Engineering and Permitting	LS	1	$ 3,000,000.00	$ 3,000,000
	b	CQA	LS	1	$ 6,000,000.00	$ 6,000,000
22	**30 Year O&M (NPV, 5% interest rate)**		**LS**	**1**	**$ 4,610,000**	**$ 4,610,000**
	a	30 Year O&M (NPV, 5% interest rate)	LS	1	$ 4,610,000.00	$ 4,610,000

Estimated Sub-Total Cost:	$	88,640,081
20% Contingency:	$	17,728,016
Estimated Total Cost (-20%):	$	86,000,000
Estimated Total Cost:	**$**	**107,000,000**
Estimated Total Cost (+30%):	$	139,000,000

Notes:
1) Cost estimate represents American Association of Cost Estimators (AACE) Class 4 classification (-20% to +30%) with a project definition of less than 30%.
2) Basis of unit costs include RS Means, bid results from similar local projects, and professional judgement.
3) Engineering and Permitting cost estimate is assumed to be 4% of construction costs (excluding line items 9 through 13).
4) CQA cost estimate is assumed to be 8% of construction costs (excluding line items 9 through 13).

PREPARED BY: BARR ENGINEERING COMPANY

SHEET	1	OF	1
BY:	BDP	DATE:	7/25/2019
CHECKED BY:	SWH	DATE:	7/25/2019
APPROVED BY:		DATE:	
ISSUED:		DATE:	
ISSUED:		DATE:	

Freeway Landfill - Construction Cost Estimate
PROJECT: Freeway Landfill
LOCATION: Burnsville, Minnesota
PROJECT #: 23/19-1372.00

Construction Cost Estimate - Alternative 2c - Moderate Height / Moderate Footprint (Hybrid)

Pay Item No.		Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)
1	**Mobilization & Demobilization**		**LS**	**1**	**$ 3,244,369**	**$ 3,244,369**
2	**Erosion Protection**		**LS**	**1**	**$ 1,050,000**	**$ 1,050,000**
	a	Erosion Protection	YR	3.5	$ 300,000.00	$ 1,050,000
3	**CQA Surveying/Soil Testing**		**LS**	**1**	**$ 750,000**	**$ 750,000**
	a	CQA Surveying/Soil Testing	AC	75	$ 10,000.00	$ 750,000
4	**Mass Excavation, Embankment Construction and Perimeter Grading**		**LS**	**1**	**$ 9,450,000**	**$ 9,450,000**
	a	Site Clearing	AC	20	$ 10,000.00	$ 200,000
	b	Strip Cover Soils - Landfill	CY	1,500,000	$ 2.00	$ 3,000,000
	c	Strip Cover Soils - Dump	CY	170,000	$ 2.00	$ 340,000
	d	Strip Cover Soils - Landfill Double Handle	CY	375,000	$ 2.00	$ 750,000
	e	Strip Cover Soils - Dump Double Handle	CY	85,000	$ 2.00	$ 170,000
	f	Common Excavation/Placement	CY	125,000	$ 2.00	$ 250,000
	g	Common Borrow Placement - Import	CY	80,000	$ 12.00	$ 960,000
	h	Liner Subgrade Preparation - Import	CY	240,000	$ 12.00	$ 2,880,000
	i	Riprap - Embankment	CY	15,000	$ 60.00	$ 900,000
5	**Landfill Liner**		**LS**	**1**	**$ 11,737,000**	**$ 11,737,000**
	a	Compacted Clay Liner	AC	75	$ 64,533.33	$ 4,840,000
	b	60mil HDPE Geomembrane Liner	AC	75	$ 43,560.00	$ 3,267,000
	c	Drainage Layer Placement	AC	75	$ 48,400.00	$ 3,630,000
6	**Leachate Collection, Storage, and Transfer**		**LS**	**1**	**$ 3,592,080**	**$ 3,592,080**
	a	Leachate Collection Piping	AC	75	$ 10,000.00	$ 750,000
	b	Aggregate	AC	75	$ 10,000.00	$ 750,000
	c	Common Excavation/Placement	CY	75,000	$ 2.00	$ 150,000
	d	Leachate Pond - Compacted Clay Liner	AC	4	$ 43,560.00	$ 174,240
	e	Leachate Pond - 60mil HDPE Geomembrane Liner	AC	4	$ 43,560.00	$ 174,240
	f	Leachate Pond - Drainage Layer Placement	AC	4	$ 48,400.00	$ 193,600
	g	Pumps and Sumps	EA	8	$ 150,000.00	$ 1,200,000
	h	Sanitary Forcemain	LF	1,000	$ 100.00	$ 100,000
	i	Leachate Transfer/Treatment - Sanitary Sewer Hookup	LS	1	$ 100,000.00	$ 100,000
7	**Waste Excavation and Onsite Transport**		**LS**	**1**	**$ 19,080,000**	**$ 19,080,000**
	a	Waste Excavation and Placement - Landfill	CY	5,200,000	$ 2.50	$ 13,000,000
	b	Waste Excavation and Placement (Cover Soil Loss)	CY	80,000	$ 2.50	$ 200,000
	c	Waste Excavation and Placement - Landfill Double Handle	CY	1,040,000	$ 2.50	$ 2,600,000
	d	Waste Excavation and Placement - Dump	CY	760,000	$ 3.00	$ 2,280,000
	e	Bike Path Improvements	LS	1	$ 1,000,000.00	$ 1,000,000
8	**Waste Transfer Off Site**		**LS**	**0**	**$ -**	**$ -**
	a	Waste Transfer Off Site (Near By, Landfill)	TON	0	$ 3.00	$ -
	b	Waste Transfer Off Site (Near By, Dump)	TON	0	$ 3.50	$ -
	c	Waste Transfer Off Site (Distant)	TON	0	$ 15.00	$ -
	d	Bike Path Improvements	LS	0	$ 1,000,000.00	$ -
9	**Tipping Fees**		**LS**	**0**	**$ -**	**$ -**
	a	Tipping Fees (Low Range)	TON	0	$ 20.00	$ -
	b	Tipping Fees (High Range)	TON	0	$ 40.00	$ -
10	**City Fees / Taxes**		**LS**	**0**	**$ -**	**$ -**
	a	City Fees / Taxes (Low Range)	TON	0	$ -	$ -
	b	City Fees / Taxes (High Range)	TON	0	$ 4.00	$ -
11	**County Fees**		**LS**	**0**	**$ -**	**$ -**
	a	County Fees (Low Range)	TON	0	$ -	$ -
	b	County Fees (High Range)	TON	0	$ 10.00	$ -
12	**State Fees**		**LS**	**0**	**$ -**	**$ -**
	a	State Fees (Low Range)	TON	0	$ -	$ -
	b	State Fees (High Range)	TON	0	$ 7.00	$ -
13	**State Taxes**		**LS**	**0**	**$ -**	**$ -**
	a	State Taxes (Low Range)	TON	0	$ -	$ -
	b	State Taxes (High Range)	TON	0	$ 4.00	$ -
14	**Landfill Cap**		**LS**	**1**	**$ 9,752,600**	**$ 9,752,600**
	a	Topsoil Placement	AC	75	$ 16,133.33	$ 1,210,000
	b	Rooting Soil Placement	AC	75	$ 4,840.00	$ 363,000
	c	Drainage Layer Placement	AC	75	$ 48,400.00	$ 3,630,000
	d	40mil LLDPE Geomembrane Liner	AC	75	$ 34,848.00	$ 2,613,600
	e	Buffer Layer Material - Sand	AC	75	$ 24,200.00	$ 1,815,000
	f	Buffer Layer Material - Common Fill	AC	75	$ 1,613.33	$ 121,000
15	**Gas Extraction**		**LS**	**1**	**$ 1,875,000**	**$ 1,875,000**
	a	Gas Extraction	AC	75	$ 25,000.00	$ 1,875,000
16	**Stormwater Management**		**LS**	**1**	**$ 1,150,000**	**$ 1,150,000**
	a	Common Excavation/Placement	CY	100,000	$ 2.00	$ 200,000
	b	Piping	EA	2	$ 100,000.00	$ 200,000
	c	Final Cover Routing	AC	75	$ 10,000.00	$ 750,000
17	**Water Management**		**LS**	**1**	**$ 2,375,000**	**$ 2,375,000**
	a	Groundwater Management System	AC	75	$ 15,000.00	$ 1,125,000
	b	Leachate Transfer/Treatment - Sanitary Sewer	MGAL	25	$ 50,000.00	$ 1,250,000
18	**Road Surfacing**		**LS**	**1**	**$ 1,443,700**	**$ 1,443,700**
	a	Access Road Improvements	LS	1	$ 1,000,000.00	$ 1,000,000
	b	Gravel Surfacing - Landfill Access Road	CY	9,200	$ 30.00	$ 276,000
	c	Geotextile - Landfill Access Road	SY	27,500	$ 3.00	$ 82,500
	d	Gravel Surfacing - Transfer Station Access Road	CY	2,300	$ 30.00	$ 69,000
	e	Geotextile - Transfer Station Access Road	SY	5,400	$ 3.00	$ 16,200
19	**Turf Establishment**		**LS**	**1**	**$ 1,096,000**	**$ 1,096,000**
	a	Seeding, Mulching, and Fertilizing - Landfill	AC	150	$ 2,000.00	$ 300,000
	b	Seeding, Mulching, and Fertilizing - Dump	AC	35	$ 2,000.00	$ 70,000
	c	Erosion Control Blanket (Landfill Cap)	AC	75	$ 9,680.00	$ 726,000
20	**Miscellaneous Items (Electrical, Traffic Control, Fence)**		**LS**	**1**	**$ 1,536,000**	**$ 1,536,000**
	a	Electrical	LS	1	$ 1,000,000.00	$ 1,000,000
	b	Traffic Control	YR	3.5	$ 100,000.00	$ 350,000
	c	Fence	LF	9,300	$ 20.00	$ 186,000
21	**Engineering, Permitting, CQA**		**LS**	**1**	**$ 8,200,000**	**$ 8,200,000**
	a	Engineering and Permitting	LS	1	$ 2,700,000.00	$ 2,700,000
	b	CQA	LS	1.0	$ 5,500,000.00	$ 5,500,000
22	**30 Year O&M (NPV, 5% interest rate)**		**LS**	**1**	**$ 3,840,000**	**$ 3,840,000**
	a	30 Year O&M (NPV, 5% interest rate)	LS	1	$ 3,840,000.00	$ 3,840,000

Estimated Sub-Total Cost:	$	80,171,749
20% Contingency:	$	16,034,350
Estimated Total Cost (-20%):	$	77,000,000
Estimated Total Cost:	**$**	**97,000,000**
Estimated Total Cost (+30%):	$	126,000,000

Notes:
1) Cost estimate represents American Association of Cost Estimators (AACE) Class 4 classification (-20% to +30%) with a project definition of less than 30%.
2) Basis of unit costs include RS Means, bid results from similar local projects, and professional judgement.
3) Engineering and Permitting cost estimate is assumed to be 4% of construction costs (excluding line items 9 through 13).
4) CQA cost estimate is assumed to be 8% of construction costs (excluding line items 9 through 13).

PREPARED BY: BARR ENGINEERING COMPANY

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Freeway Landfill - Construction Cost Estimate
PROJECT: Freeway Landfill
LOCATION: Burnsville, Minnesota
PROJECT #: 23/19-1372.00

Construction Cost Estimate - Alternative 3 - Offsite Disposal (Low Range)

Pay Item No.		Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)
1	**Mobilization & Demobilization**		**LS**	**1**	**$ 3,000,000**	**$ 3,000,000**
2	**Erosion Protection**		**LS**	**1**	**$ 600,000**	**$ 600,000**
	a	Erosion Protection	YR	2	$ 300,000.00	$ 600,000
3	**CQA Surveying/Soil Testing**		**LS**	**0**	**$ -**	**$ -**
	a	CQA Surveying/Soil Testing	AC	0	$ 10,000.00	$ -
4	**Mass Excavation, Embankment Construction and Perimeter Grading**		**LS**	**1**	**$ 3,540,000**	**$ 3,540,000**
	a	Site Clearing	AC	20	$ 10,000.00	$ 200,000
	b	Strip Cover Soils - Landfill	CY	1,500,000	$ 2.00	$ 3,000,000
	c	Strip Cover Soils - Dump	CY	170,000	$ 2.00	$ 340,000
	d	Strip Cover Soils - Landfill Double Handle	CY	0	$ 2.00	$ -
	e	Strip Cover Soils - Dump Double Handle	CY	0	$ 2.00	$ -
	f	Common Excavation/Placement	CY	0	$ 2.00	$ -
	g	Common Borrow Placement - Import	CY	0	$ 12.00	$ -
	h	Liner Subgrade Preparation - Import	CY	0	$ 12.00	$ -
	i	Riprap - Embankment	CY	0	$ 60.00	$ -
5	**Landfill Liner**		**LS**	**0**	**$ -**	**$ -**
	a	Compacted Clay Liner	AC	0	$ 64,533.33	$ -
	b	60mil HDPE Geomembrane Liner	AC	0	$ 43,560.00	$ -
	c	Drainage Layer Placement	AC	0	$ 48,400.00	$ -
6	**Leachate Collection, Storage, and Transfer**		**LS**	**0**	**$ -**	**$ -**
	a	Leachate Collection Piping	AC	0	$ 10,000.00	$ -
	b	Aggregate	AC	0	$ 10,000.00	$ -
	c	Common Excavation/Placement	CY	0	$ 2.00	$ -
	d	Leachate Pond - Compacted Clay Liner	AC	0	$ 43,560.00	$ -
	e	Leachate Pond - 60mil HDPE Geomembrane Liner	AC	0	$ 43,560.00	$ -
	f	Leachate Pond - Drainage Layer Placement	AC	0	$ 48,400.00	$ -
	g	Pumps and Sumps	EA	0	$ 150,000.00	$ -
	h	Sanitary Forcemain	LF	0	$ 100.00	$ -
	i	Leachate Transfer/Treatment - Sanitary Sewer Hookup	LS	0	$ 100,000.00	$ -
7	**Waste Excavation and Onsite Transport**		**LS**	**0**	**$ -**	**$ -**
	a	Waste Excavation and Placement - Landfill	CY	0	$ 2.50	$ -
	b	Waste Excavation and Placement (Cover Soil Loss)	CY	0	$ 2.50	$ -
	c	Waste Excavation and Placement - Landfill Double Handle	CY	0	$ 2.50	$ -
	d	Waste Excavation and Placement - Dump	CY	0	$ 3.00	$ -
	e	Bike Path Improvements	LS	0	$ 1,000,000.00	$ -
8	**Waste Transfer Off Site**		**LS**	**1**	**$ 19,260,000**	**$ 19,260,000**
	a	Waste Transfer Off Site (Near By, Landfill)	TON	5,200,000	$ 3.00	$ 15,600,000
	b	Waste Transfer Off Site (Near By, Dump)	TON	760,000	$ 3.50	$ 2,660,000
	c	Waste Transfer Off Site (Distant)	TON	0	$ 15.00	$ -
	d	Bike Path Improvements	LS	1	$ 1,000,000.00	$ 1,000,000
9	**Tipping Fees**		**LS**	**1**	**$ 119,200,000**	**$ 119,200,000**
	a	Tipping Fees (Low Range)	TON	5,960,000	$ 20.00	$ 119,200,000
	b	Tipping Fees (High Range)	TON	0	$ 40.00	$ -
10	**City Fees / Taxes**		**LS**	**1**	**$ -**	**$ -**
	a	City Fees / Taxes (Low Range)	TON	5,960,000	$ -	$ -
	b	City Fees / Taxes (High Range)	TON	0	$ 4.00	$ -
11	**County Fees**		**LS**	**1**	**$ -**	**$ -**
	a	County Fees (Low Range)	TON	5,960,000	$ -	$ -
	b	County Fees (High Range)	TON	0	$ 10.00	$ -
12	**State Fees**		**LS**	**1**	**$ -**	**$ -**
	a	State Fees (Low Range)	TON	5,960,000	$ -	$ -
	b	State Fees (High Range)	TON	0	$ 7.00	$ -
13	**State Taxes**		**LS**	**1**	**$ -**	**$ -**
	a	State Taxes (Low Range)	TON	5,960,000	$ -	$ -
	b	State Taxes (High Range)	TON	0	$ 4.00	$ -
14	**Landfill Cap**		**LS**	**0**	**$ -**	**$ -**
	a	Topsoil Placement	AC	0	$ 16,133.33	$ -
	b	Rooting Soil Placement	AC	0	$ 4,840.00	$ -
	c	Drainage Layer Placement	AC	0	$ 48,400.00	$ -
	d	40mil LLDPE Geomembrane Liner	AC	0	$ 34,848.00	$ -
	e	Buffer Layer Material - Sand	AC	0	$ 24,200.00	$ -
	f	Buffer Layer Material - Common Fill	AC	0	$ 1,613.33	$ -
15	**Gas Extraction**		**LS**	**0**	**$ -**	**$ -**
	a	Gas Extraction	AC	0	$ 25,000.00	$ -
16	**Stormwater Management**		**LS**	**0**	**$ -**	**$ -**
	a	Common Excavation/Placement	CY	0	$ 2.00	$ -
	b	Piping	EA	0	$ 100,000.00	$ -
	c	Final Cover Routing	AC	0	$ 10,000.00	$ -
17	**Water Management**		**LS**	**0**	**$ -**	**$ -**
	a	Groundwater Management System	AC	0	$ 15,000.00	$ -
	b	Leachate Transfer/Treatment - Sanitary Sewer	MGAL	0	$ 50,000.00	$ -
18	**Road Surfacing**		**LS**	**1**	**$ 585,200**	**$ 585,200**
	a	Access Road Improvements	LS	1	$ 500,000.00	$ 500,000
	b	Gravel Surfacing - Landfill Access Road	CY	0	$ 30.00	$ -
	c	Geotextile - Landfill Access Road	SY	0	$ 3.00	$ -
	d	Gravel Surfacing - Transfer Station Access Road	CY	2,300	$ 30.00	$ 69,000
	e	Geotextile - Transfer Station Access Road	SY	5,400	$ 3.00	$ 16,200
19	**Turf Establishment**		**LS**	**1**	**$ 370,000**	**$ 370,000**
	a	Seeding, Mulching, and Fertilizing - Landfill	AC	150	$ 2,000.00	$ 300,000
	b	Seeding, Mulching, and Fertilizing - Dump	AC	35	$ 2,000.00	$ 70,000
	c	Erosion Control Blanket (Landfill Cap)	AC	0	$ 9,680.00	$ -
20	**Miscellaneous Items (Electrical, Traffic Control, Fence)**		**LS**	**1**	**$ 200,000**	**$ 200,000**
	a	Electrical	LS	0	$ 1,000,000.00	$ -
	b	Traffic Control	YR	2	$ 100,000.00	$ 200,000
	c	Fence	LF	0	$ 20.00	$ -
21	**Engineering, Permitting, CQA**		**LS**	**1**	**$ 3,300,000**	**$ 3,300,000**
	a	Engineering and Permitting	LS	1	$ 1,100,000.00	$ 1,100,000
	b	CQA	LS	1	$ 2,200,000.00	$ 2,200,000
22	**30 Year O&M (NPV, 5% interest rate)**		**LS**	**0**	**$ -**	**$ -**
	a	30 Year O&M (NPV, 5% interest rate)	LS	0	$ -	$ -

Estimated Sub-Total Cost:	$ 150,055,200
20% Contingency:	$ 30,011,040
Estimated Total Cost (-20%):	$ 145,000,000
Estimated Total Cost:	**$ 181,000,000**
Estimated Total Cost (+30%):	$ 235,000,000

Notes:
1) Cost estimate represents American Association of Cost Estimators (AACE) Class 4 classification (-20% to +30%) with a project definition of less than 30%.
2) Basis of unit costs include RS Means, bid results from similar local projects, and professional judgement.
3) Engineering and Permitting cost estimate is assumed to be 4% of construction costs (excluding line items 9 through 13).
4) CQA cost estimate is assumed to be 8% of construction costs (excluding line items 9 through 13).

PREPARED BY: BARR ENGINEERING COMPANY

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BY:	BDP	DATE:	7/25/2019
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Freeway Landfill - Construction Cost Estimate
PROJECT: Freeway Landfill
LOCATION: Burnsville, Minnesota
PROJECT #: 23/19-1372.00

Construction Cost Estimate - Alternative 3 - Offsite Disposal (High Range)

Pay Item No.		Pay Item	Unit	Estimated Quantity	Unit Cost ($)	Total Cost ($)
1	**Mobilization & Demobilization**		**LS**	**1**	**$ 3,000,000**	**$ 3,000,000**
2	**Erosion Protection**		**LS**	**1**	**$ 600,000**	**$ 600,000**
	a	Erosion Protection	YR	2	$ 300,000.00	$ 600,000
3	**CQA Surveying/Soil Testing**		**LS**	**0**	**$ -**	**$ -**
	a	CQA Surveying/Soil Testing	AC	0	$ 10,000.00	$ -
4	**Mass Excavation, Embankment Construction and Perimeter Grading**		**LS**	**1**	**$ 3,540,000**	**$ 3,540,000**
	a	Site Clearing	AC	20	$ 10,000.00	$ 200,000
	b	Strip Cover Soils - Landfill	CY	1,500,000	$ 2.00	$ 3,000,000
	c	Strip Cover Soils - Dump	CY	170,000	$ 2.00	$ 340,000
	d	Strip Cover Soils - Landfill Double Handle	CY	0	$ 2.00	$ -
	e	Strip Cover Soils - Dump Double Handle	CY	0	$ 2.00	$ -
	f	Common Excavation/Placement	CY	0	$ 2.00	$ -
	g	Common Borrow Placement - Import	CY	0	$ 12.00	$ -
	h	Liner Subgrade Preparation - Import	CY	0	$ 12.00	$ -
	i	Riprap - Embankment	CY	0	$ 60.00	$ -
5	**Landfill Liner**		**LS**	**0**	**$ -**	**$ -**
	a	Compacted Clay Liner	AC	0	$ 64,533.33	$ -
	b	60mil HDPE Geomembrane Liner	AC	0	$ 43,560.00	$ -
	c	Drainage Layer Placement	AC	0	$ 48,400.00	$ -
6	**Leachate Collection, Storage, and Transfer**		**LS**	**0**	**$ -**	**$ -**
	a	Leachate Collection Piping	AC	0	$ 10,000.00	$ -
	b	Aggregate	AC	0	$ 10,000.00	$ -
	c	Common Excavation/Placement	CY	0	$ 2.00	$ -
	d	Leachate Pond - Compacted Clay Liner	AC	0	$ 43,560.00	$ -
	e	Leachate Pond - 60mil HDPE Geomembrane Liner	AC	0	$ 43,560.00	$ -
	f	Leachate Pond - Drainage Layer Placement	AC	0	$ 48,400.00	$ -
	g	Pumps and Sumps	EA	0	$ 150,000.00	$ -
	h	Sanitary Forcemain	LF	0	$ 100.00	$ -
	i	Leachate Transfer/Treatment - Sanitary Sewer Hookup	LS	0	$ 100,000.00	$ -
7	**Waste Excavation and Onsite Transport**		**LS**	**0**	**$ -**	**$ -**
	a	Waste Excavation and Placement - Landfill	CY	0	$ 2.50	$ -
	b	Waste Excavation and Placement (Cover Soil Loss)	CY	0	$ 2.50	$ -
	c	Waste Excavation and Placement - Landfill Double Handle	CY	0	$ 2.50	$ -
	d	Waste Excavation and Placement - Dump	CY	0	$ 3.00	$ -
	e	Bike Path Improvements	LS	0	$ 1,000,000.00	$ -
8	**Waste Transfer Off Site**		**LS**	**1**	**$ 90,400,000**	**$ 90,400,000**
	a	Waste Transfer Off Site (Near By, Landfill)	TON	0	$ 3.00	$ -
	b	Waste Transfer Off Site (Near By, Dump)	TON	0	$ 3.50	$ -
	c	Waste Transfer Off Site (Distant)	TON	5,960,000	$ 15.00	$ 89,400,000
	d	Bike Path Improvements	LS	1	$ 1,000,000.00	$ 1,000,000
9	**Tipping Fees**		**LS**	**1**	**$ 238,400,000**	**$ 238,400,000**
	a	Tipping Fees (Low Range)	TON	0	$ 20.00	$ -
	b	Tipping Fees (High Range)	TON	5,960,000	$ 40.00	$ 238,400,000
10	**City Fees / Taxes**		**LS**	**1**	**$ 23,840,000**	**$ 23,840,000**
	a	City Fees / Taxes (Low Range)	TON	0	$ -	$ -
	b	City Fees / Taxes (High Range)	TON	5,960,000	$ 4.00	$ 23,840,000
11	**County Fees**		**LS**	**1**	**$ 59,600,000**	**$ 59,600,000**
	a	County Fees (Low Range)	TON	0	$ -	$ -
	b	County Fees (High Range)	TON	5,960,000	$ 10.00	$ 59,600,000
12	**State Fees**		**LS**	**1**	**$ 41,720,000**	**$ 41,720,000**
	a	State Fees (Low Range)	TON	0	$ -	$ -
	b	State Fees (High Range)	TON	5,960,000	$ 7.00	$ 41,720,000
13	**State Taxes**		**LS**	**1**	**$ 23,840,000**	**$ 23,840,000**
	a	State Taxes (Low Range)	TON	0	$ -	$ -
	b	State Taxes (High Range)	TON	5,960,000	$ 4.00	$ 23,840,000
14	**Landfill Cap**		**LS**	**0**	**$ -**	**$ -**
	a	Topsoil Placement	AC	0	$ 16,133.33	$ -
	b	Rooting Soil Placement	AC	0	$ 4,840.00	$ -
	c	Drainage Layer Placement	AC	0	$ 48,400.00	$ -
	d	40mil LLDPE Geomembrane Liner	AC	0	$ 34,848.00	$ -
	e	Buffer Layer Material - Sand	AC	0	$ 24,200.00	$ -
	f	Buffer Layer Material - Common Fill	AC	0	$ 1,613.33	$ -
15	**Gas Extraction**		**LS**	**0**	**$ -**	**$ -**
	a	Gas Extraction	AC	0	$ 25,000.00	$ -
16	**Stormwater Management**		**LS**	**0**	**$ -**	**$ -**
	a	Common Excavation/Placement	CY	0	$ 2.00	$ -
	b	Piping	EA	0	$ 100,000.00	$ -
	c	Final Cover Routing	AC	0	$ 10,000.00	$ -
17	**Water Management**		**LS**	**0**	**$ -**	**$ -**
	a	Groundwater Management System	AC	0	$ 15,000.00	$ -
	b	Leachate Transfer/Treatment - Sanitary Sewer	MGAL	0	$ 50,000.00	$ -
18	**Road Surfacing**		**LS**	**1**	**$ 585,200**	**$ 585,200**
	a	Access Road Improvements	LS	1	$ 500,000.00	$ 500,000
	b	Gravel Surfacing - Landfill Access Road	CY	0	$ 30.00	$ -
	c	Geotextile - Landfill Access Road	SY	0	$ 3.00	$ -
	d	Gravel Surfacing - Transfer Station Access Road	CY	2,300	$ 30.00	$ 69,000
	e	Geotextile - Transfer Station Access Road	SY	5,400	$ 3.00	$ 16,200
19	**Turf Establishment**		**LS**	**1**	**$ 370,000**	**$ 370,000**
	a	Seeding, Mulching, and Fertilizing - Landfill	AC	150	$ 2,000.00	$ 300,000
	b	Seeding, Mulching, and Fertilizing - Dump	AC	35	$ 2,000.00	$ 70,000
	c	Erosion Control Blanket (Landfill Cap)	AC	0	$ 9,680.00	$ -
20	**Miscellaneous Items (Electrical, Traffic Control, Fence)**		**LS**	**1**	**$ 200,000**	**$ 200,000**
	a	Electrical	LS	0	$ 1,000,000.00	$ -
	b	Traffic Control	YR	2	$ 100,000.00	$ 200,000
	c	Fence	LF	0	$ 20.00	$ -
21	**Engineering, Permitting, CQA**		**LS**	**1**	**$ 3,300,000**	**$ 3,300,000**
	a	Engineering and Permitting	LS	1	$ 1,100,000.00	$ 1,100,000
	b	CQA	LS	1	$ 2,200,000.00	$ 2,200,000
22	**30 Year O&M (NPV, 5% interest rate)**		**LS**	**0**	**$ -**	**$ -**
	a	30 Year O&M (NPV, 5% interest rate)	LS	0	$ -	$ -

Estimated Sub-Total Cost:	$ 489,395,200
20% Contingency:	$ 97,879,040
Estimated Total Cost (-20%):	$ 470,000,000
Estimated Total Cost:	**$ 588,000,000**
Estimated Total Cost (+30%):	$ 764,000,000

Notes:
1) Cost estimate represents American Association of Cost Estimators (AACE) Class 4 classification (-20% to +30%) with a project definition of less than 30%.
2) Basis of unit costs include RS Means, bid results from similar local projects, and professional judgement.
3) Engineering and Permitting cost estimate is assumed to be 4% of construction costs (excluding line items 9 through 13).
4) CQA cost estimate is assumed to be 8% of construction costs (excluding line items 9 through 13).