Eastern Idaho Regional Solid Waste District

Municipal Solid Waste Landfill

Master Development Plan – Revision 1

December 2021

GreatWest ENGINEERING

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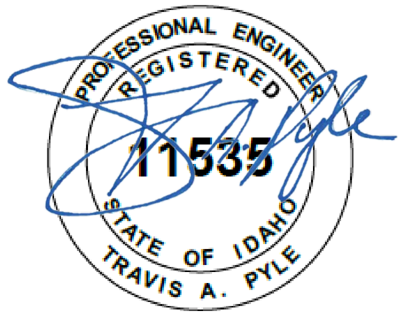

12/30/21

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1.0 Introduction

The Eastern Idaho Regional Solid Waste District (EIRSWD or "District") is proposing the development of a municipal solid waste (MSW) landfill in Madison County, Idaho. The EIRSWD is a municipal governmental entity consisting of participating members of Madison, Fremont, and Clark Counties. The District has the responsibility to achieve regulatory compliance, protect public health and the environment, provide adequate reserves, mitigate existing long-term environmental liability, eliminate future long-term environmental liability, and to protect the residents and businesses with a sustainable solid waste program.

The purpose of this Master Development Plan is to support the requirements of the Site Certification process following the requirements of the Idaho Solid Waste Facilities Act (Title 39, Chapter 74, Idaho Code). This Master Development Plan establishes the overall layout of the proposed MSW landfill facility with a fill sequencing plan and cut/fill balances for construction and soil cover needs (daily, interim, and final). This Plan also includes the general arrangement and sizes for support infrastructure such as leachate ponds, a shop building with an office space, access road(s), drainage systems, future landfill gas flare station, entrance facilities, and staging areas.

An important element of site certification process is the establishment of subsurface conditions as they relate to geology and hydrogeology. This Plan also provides an overview of these conditions based on initial test hole investigations and a desktop study of available literature. The general understanding of these conditions will establish the development of a Work Plan for the site investigation that will follow pending licensing of the site for a MSW landfill by the DEQ.

This Revision 1 to the Master Development Plan has been created to better optimize the size of the first landfill cell (Cell A) assuming regional partnership with only Teton County, Idaho. This revision also reduces the waste fill slopes and final cover slopes from 3H:1V (vertical to horizontal) to 4H:1V based on the current geotechnical recommendations for seismic stability. Engineer's opinions of probable construction costs have also been added to document the anticipated costs for each of the development phases and final closure of the landfill.

1.1 Background

1.1.1 Solid Waste Districts

The Idaho Legislature determined the disposal of solid waste and domestic septage within the State of Idaho is an important public purpose, and the creation of independent regional districts to administer solid waste disposal is an efficient and cost-effective method of meeting the State's solid waste disposal needs. Title 31, Chapter 49 of Idaho Code enables counties to establish regional solid waste districts for the purpose of providing a regional solution to solid waste disposal through the operation and maintenance of a regional solid waste system.

A regional solid waste district is formed when any two or more counties elect, by resolution of the commissioners of such counties, to become participating counties of such district. The boundaries of the regional solid waste district are coterminous with the boundaries of the participating counties. Counties within a district need not be contiguous to each other. The EIRSWD was formed June 23, 2010, serving a total population of 186,000 and covering an area of 6,500 square miles.

Solid waste is defined as any garbage or refuse, sludge from a wastewater treatment plant, or air pollution control facility and other discarded material including, solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities. Under the Idaho Solid Waste Facilities Act (Title 39, Chapter 74, Idaho Code) and IDAPA 58.01.06, the Idaho Department of Environmental Quality (DEQ) is designated as the state agency responsible for regulating solid waste management facilities in Idaho, including landfills, incinerators, transfer stations, processing facilities, and wood or mill yard debris facilities. Through a memorandum of understanding (MOU), local health districts in Idaho oversee the operation of MSW landfills.

Title 31, Chapter 44 of the Idaho Code imposes both the authority and the duty on counties to establish, maintain, and operate solid waste disposal systems to provide reasonable and convenient access to all citizens of a county.

1.1.2 Proposed Site Information

The District is in the process of acquiring property for a proposed MSW landfill site. The property is approximately 12 miles east of Rexburg, Idaho. The location of the site is shown in **Exhibit 1.** The existing site conditions are shown on the attached **Drawing 3**.

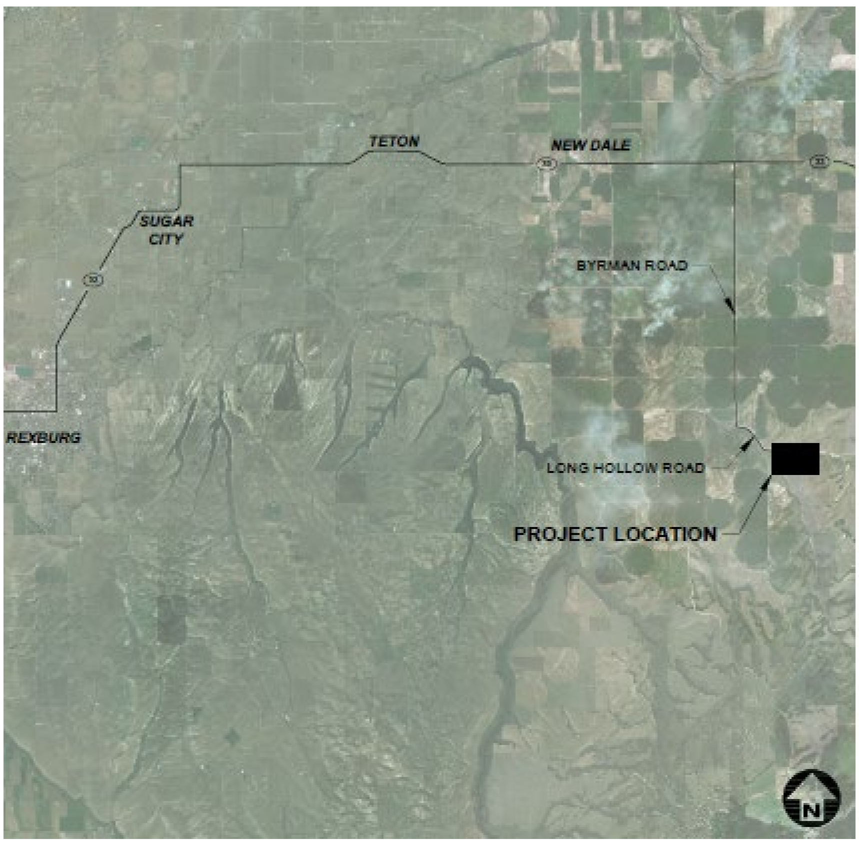

Exhibit 1 – Projection Location Map for the Proposed District Landfill

Primary access to the site is from Highway 33 and Byrman Road. The property consists of 92 acres with land on both the north and south sides of Long Hollow Road. The landfill area is proposed on the south side of Long Hollow Road and consists of approximately 45 acres. Refer to **Drawing 1 fo**r the project location map and **Drawing 4** for the overall site development plan.

2.0 Waste Generation Estimates

2.1 District-Only Waste Generation

2.1.1 Population Growth Estimate

Table 1 presents the population numbers for each of the member counties as reported by the U.S. Census Bureau, and the calculated annual growth rates between 1980 and 2020. Over this 40-year period, Clark County experienced a slightly negative growth rate of -0.1% per year while Fremont and Madison Counties experienced positive growth rates of 0.54% and 2.53% per year, respectively. Together, the average of all three counties averaged 1.02% per year. In the more recent past (2000 – 2020), the growth rates were slightly different. Clark County had an even lower growth rate of -2.55% while Freemont and Madison Counties increased to 0.63% and 6.67%. Madison has experienced a major population boom these past two decades.

Table 1 also presents the estimated population for the next 25-year and 50-year periods based on the longer term 40-year average annual growth rates. There is a chance the growth rates will continue to climb at record levels in the near term, but these rates are not likely sustainable. For this reason, the population forecasts assume an average growth based on the last 40 years (1980-2020).

Table 1 – District Landfill Contributing Population Estimates

County	2020 Population [(1)]	40-Year Annual Growth Rate (1980-2020)	20-Year Annual Growth Rate (2000-2020)	Future 25-yr Projection (2045)	Future 50-yr Projection (2070)
Clark	790	-0.01%	-2.55%	788	787
Fremont	13,338	0.54%	0.63%	15,304	17494
Madison	52,913	2.53%	3.33%	98,888	184,812
Total/Ave.	**67,091**	**1.02%**	**1.58%**	**69,274**	**88,575**

Notes:

1. Published U.S. Census Bureau figures (https://www.census.gov/quickfacts/fact/table/US/PST045219).

2.1.2 Per Capital Waste Generation

Per capita waste generation is a solid waste industry standard of practice to estimate current and future waste amounts. The national average per capita waste generation rates are published by the United States Environmental Protection Agency (USEPA) (refer to **Exhibit 2**).

Overall, the national generation rates have increased since the beginning of the reporting period (1968), peaking at 4.74 pounds per person per day (lbs/person/day) (2000). Since then, the generation rates have been relatively steady around 4.5 lbs/person/day, with the last reported year of 2018 climbing to 4.9 lbs/person/day.

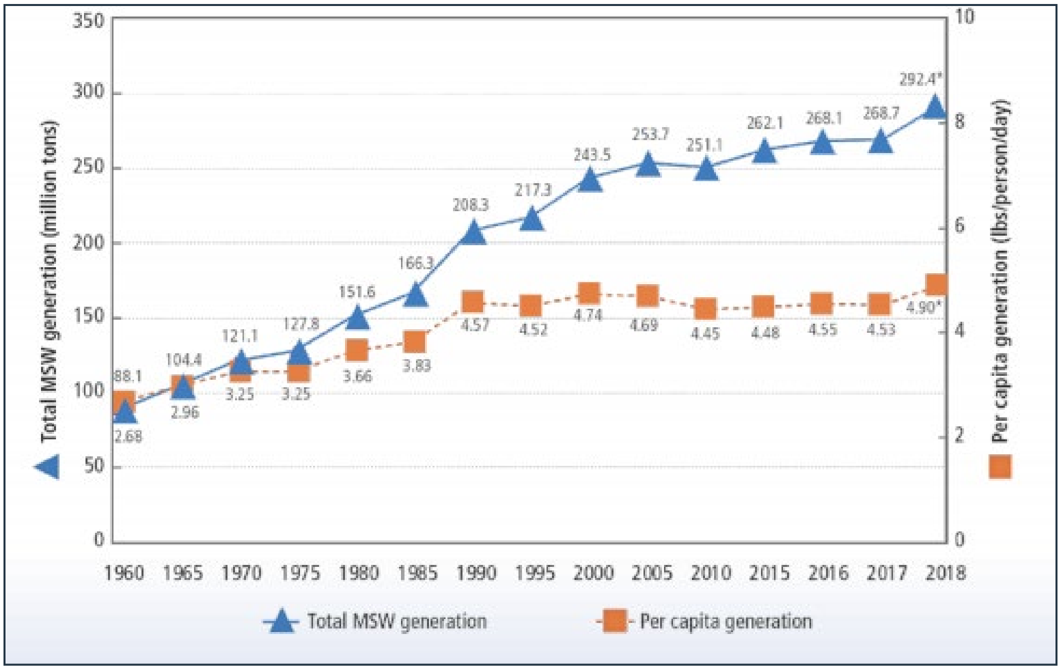

Exhibit 2 – Total MSW and Per Capita Generation Rates in the United States 1960-2018 (USEPA, 2020)

For each of the member counties, the per capita generation rates were calculated based on the 2020 population census data and the reported 2020 waste tonnages **(**refer to **Table 2**).

Table 2 – District Landfill Per Capita Waste Generation Estimates

District Member	2020 Census Population	Solid Waste (tons) [(1)]	Per Capita Generation (lbs/person/day)
Clark County	790	500	3.5
Fremont County	3,388	7,500	3.1
Madison County	52,913	32,000	3.3
Total/Ave.	**67,091**	**39,965**	**3.3**

Notes:

1. Reported 2020 waste tons by the District members.

The weighted average per capita generation rate for the District members of approximately 3.3 lbs/person/day based on 2020 figures is well below the 2018 national average 4.9 lbs/person/day. The difference between the national average and the District can be attributed to various contributors. The District's waste numbers are only for municipal solid waste (MSW) and does not include other wastes such as construction and demolition (C&D) waste that is diverted from the primary waste stream and disposed in non-municipal solid waste landfills. Other reasons for the difference might be attributed to better recycling programs in these communities as compared to average communities in the U.S. Nonetheless, these per capita generation rates are based on population census data for these three counties and actual waste tonnages for 2020, and therefore, these per capita generate rates are used to forecast waste generation in the future.

2.2 Waste Generation by Other Potential Waste Partners

Neighboring Teton County, Idaho is considering joining the District. The District also has been in discussions with Bingham County, Idaho. Both counties may end up joining the District at some point, or contract (partner) with the District for solid waste disposal. However, for now, the District has asked that we only consider Teton County in the analysis with hopes that they will join when the landfill opens.

2.2.1 Population Growth Estimate

Like Madison County, Teton County has experienced a relatively high population increase over the past 40-years, averaging 2.32% per year. However, in the last 20 years, the growth rate in Teton County has slowed down to 1.24% per year. For this assessment, the 40-year average growth rate of 2.32% per year was assumed.

2.2.2 Per Capita Waste Generation

In 2020, approximately 10,000 tons of MSW were generated by 23,331 people in Teton County. This equates to a per capita generation rate of 2.35 lbs/person/day. With a robust waste recycling program and waste diversion programs, this per capita generation rate for Teton County does not seem unreasonable. Like the member counties, this 2020 per capita generation rate was used for future waste generation forecasts.

2.3 Combined Waste Generation

Using the population projections and the 2020 per capita generation rates (with no change), the combined waste generation was calculated for District-Only and the District with Teton County (refer to **Table 3**). Note the 40-year average annual growth rates were used for all District member counties except for Clark County where it was assumed to be 0% growth rather than a slightly negative growth. A growth rate of 2.5% per year was used for Teton County as previously discussed. The waste tonnage values in **Table 3** are for the base year (2020) and projecting to the current year (2021) and then to the year the landfill is forecasted to open (2023). Projections use the 2020 waste tonnages with population growth estimates and per capita generation rates.

Table 3 – Combined District and Teton County Waste Tonnage Projections

Year	District Waste (tons)	With Teton County (tons)
Base (Year 2021)	39,965	49,971
Current Year Estimate (Year 2021)	40,814	51,052
Landfill Opens (Year 2023)	42,575	53,294

3.0 Site Hydrogeology

3.1 Background / Purpose

Site hydrogeology is important to understand for purposes of the groundwater monitoring system design and subsurface characterization. Owners of MSW landfill facilities under Idaho Rules must implement a groundwater detection monitoring program that is required throughout the active life (waste disposal activities) and during the post-closure care period. The detection monitoring program of the Idaho Rules [§39-7410(5)] cite the Federal Rules for detection monitoring as required under 40 Code of Federal Rule (CFR) 258.51, *Groundwater Monitoring Systems* and 40 CFR 258.54, *Detection Monitoring Program*. Collectively, these rules cite that a sufficient number of wells, installed at appropriate locations and depths in uppermost aquifer [groundwater], must be installed to yield groundwater samples that represent: (1) background conditions [interpreted as upgradient of the waste unit] and (2) quality of groundwater passing the relevant point of compliance or at the waste unit boundary [point-of-compliance, interpreted as downgradient of waste unit].

To characterize and determine groundwater surface elevation and flow direction, at least three (3) wells constructed in uppermost groundwater are needed to satisfy these regulations with respect to determination of groundwater flow direction and subsequent assignment of background/upgradient and downgradient conditions. The rationale to develop a monitoring network with more than three (3) wells may be appropriate if site conditions/hydrogeology are heterogenous, if there are seasonal shifts in groundwater levels/flow direction, and/or if temporal variability in groundwater quality is identified from background monitoring.

Background conditions are defined by Federal Rule (CFR 40 258.51(a)(1)) as groundwater quality that has not been affected by leakage (or construction) from a (waste) unit. If the waste unit has not been constructed, then all the groundwater characterization data prior to construction/waste placement are effective background conditions for the facility, to implement the detection monitoring program. In this scenario, background monitoring would be conducted from each well sampled at quarterly (three-month intervals) over a period of two (2) years to obtain at least eight (8) independent samples from each well. The rationale for at least eight (8) independent samples from each well to establish background conditions as described in EPA's Unified Guidance (USEPA, 2009), which notes that additional sampling is beneficial to strengthen the characterization of spatial and temporal variability, prior to the commencement of formal statistical testing to satisfy the detection monitoring requirements. That will be the intent of this program if time allows. If the sampling program needs to be condensed to less than two years, it will be included in a forthcoming Sampling and Analysis Plan (SAP) for DEQ's approval.

Once background conditions have been established and a statistical method is selected with approval from the DEQ, then formal detection phase monitoring and reporting will occur on a semi-annual (twice per year) basis during the active life and during post-closure care period.

3.2 Existing Site Conditions

Existing site conditions are based on published information to provide a general understanding of the hydrogeologic site conditions and to help guide the field investigation approach, which will be provided in a forthcoming Hydrogeologic Investigation Work Plan. The existing conditions were developed primarily from a review of published geologic mapping of the surrounding area by Idaho Geologic Survey (Lewis et al., 2012) (Phillips, 2016) and from lithology via nearby boring logs accessed in the site vicinity from the Idaho Department of Water Resources Well Log Viewer (www.idwr.idaho.gov/wells).

The following bullets formulate the generalized understanding of site hydrogeology:

- **Regional Physiographic and Geologic Setting.** The Snake River Plain is a major late Cenozoic tectonic/volcanic feature in the northern portion of the Basin and Range geologic region in south-southeast Idaho (Malde, 1991). The plain extends across southern Idaho for roughly 300 miles in a crescent shape. It is divided into two main sections identified as the western and eastern Snake River Plain. The study area lies within the eastern Snake River Plain. The approximate elevation of the study area is 5,800 to 5,900 feet (ft) above mean sea level (msl); higher elevation mountain peaks such as Ryan Mountain Range are located approximately 12 miles to the southeast of the site and rise to elevations upwards of 8,800 ft msl. Surface elevations to the west/northwest of study area gradually decrease to approximately 4,900 ft msl near the Snake River. Surface drainage patterns coming off the Ryan Mountain Range just east of the site are generally oriented to the northeast and draining towards the Snake River, which is the localized discharge area.

- **Stratigraphy.** Based on published geologic maps, the generalized stratigraphy of the study area consists of volcanic rocks associated with the Yellowstone tectonic/volcanic eruptions. From ground surface downward, the geologic units of the study area are mapped as rhyolite tuff (up to 80-ft thick), basalt (200-ft thick), and rhyolite tuff (over 2,000-ft thick). The rhyolite tuff is generally light grey to grey-pink, cemented, generally fine-grained or glassy appearance. The basalt unit is generally dense to vesicular and dark grey, fine-grained. The initial test hole investigations support this lithology (refer to **Appendix A** for the Geotechnical Report).

- **Groundwater**. The following are key points relevant to the study area for groundwater:

    - The proposed landfill site lies approximately 7 miles to the east and outside the boundary of the eastern Snake River Plain aquifer as mapped from the Idaho Department of Water Resources (IDWR).

    - There are several wells identified from the IDWR mapping tool located within several miles of the site. From a review of these logs, the depth to groundwater is variable depending on location but suggests uppermost groundwater may be encountered on the order of 400 to 600 ft below ground surface (bgs).

    - There is insufficient subsurface data for the site to know actual depth to groundwater and/or groundwater flow direction for uppermost groundwater. In concept, regional and localized groundwater flow characteristics are typically influenced from surface topography, orientation of surface drainages, and from the recharge (typically higher elevations) and discharge areas (typically lower elevations). Based on nearby wells and these generalized concepts, the depth to uppermost groundwater beneath the study area may be encountered at an estimated 400-600 ft bgs, and could be expected to flow generally to the west (or away from the higher elevation to the east/southeast), and could generally mimic or honor surface topography and flow towards the regional discharge area associated with the Snake River Plan (both the Snake River, and the Snake River aquifer to the east, etc.).

3.3 General Site Investigation Approach

The site investigation approach will be planned and implemented in at least <u>two phases</u> considering two fundamental data gaps, including: (1) the uncertainty in depth to uppermost groundwater and (2) the unknown of the groundwater flow direction. As such, Phase 1 objectives will be to characterize near surface conditions of areas that were not covered by the initial phase of test holes and to characterize lithology and depth to uppermost groundwater.

Findings from Phase 1 with respect to lithology and depth to uppermost groundwater will form the basis in which to plan out a subsequent Phase 2 field investigation effort. The Phase 2 objectives will be to expand areas of investigation from Phase 1, further characterize uppermost lithologic units, and to install groundwater monitoring wells in uppermost groundwater. The overall objective of Phase 2 will be to install a groundwater monitoring network that would consists of at least two (2) upgradient wells, and up to three (3) or four (4) downgradient wells. The rationale for additional wells will be based on findings from the initial phases of work, considering the degree of heterogeneity in lithology and the overall spatial and temporal variability. Ultimately, DEQ will need to approve the final detection monitoring design to satisfy the permitting requirements.

4.0 Conceptual Design Summary

4.1 Design Approach and Assumptions

The general approach and assumptions for the conceptual design of the proposed landfill for this Master Development Plan include:

- Utilize the natural topography for layout the proposed landfill staying within the confines of the south ridgeline and with natural drainage to the north off the low point in the northwest corner.
- Satisfy all locational restrictions – refer to **Section 4.2**.
- Provide an access road around the full perimeter of the landfill.
- Stay within the confines of the south ridgeline and outside the natural drainages.
- Target a minimum of approximately 7 million cubic yards (cy) of airspace with an effective (in-place) waste density of 1,200 pounds per cubic yard (lb/cy) to provide a minimum of 50 years of life with District only waste.
- Waste to soil ratio of 4:1 (20%) of airspace is daily and intermediate cover.
- Assume the landfill will be constructed no sooner than 2023.
- Optimize earthwork for landfill construction to have a surplus of soil, if possible, for use as final cover and daily / interim cover soil. Any shortage of soil material will need to be supplemented with onsite borrow or use of an alternative daily cover (ADC), such as tarps or a spray-on cover; use of ADCs will also increase the in-place effective density and provide more landfill life in the end.
- Waste fill slopes no steeper than 4H:1V (horizontal to vertical) for seismic stability
- Provide a maximum of 3H:1V slopes for the interior side slopes of the landfill and the exterior slope of the toe embankment fill.
- Provide 4H:1V slopes for the exterior fill slopes for seismic stability of the final cover with a finish grade of the final cap no less than 3% on the top deck.
- Stormwater management on the cover will be by run-off control berm/ditches that wrap around the surface of the cover system and discharge into perimeter ditches. Access road(s) from the perimeter to the top of the landfill will also be provided to break-up flow and intercept it in roadside ditches.
- Provide no more than 6% grades for the perimeter roadways for truck access.
- Provide a minimum of 2% cell floor grades sloping toward a central sump for in-cell leachate removal via a liner penetration with a drain to a vertical sump and lift station to pump leachate to the leachate evaporation ponds.
- Estimate sizing for leachate evaporation ponds to provide adequate collection and storage capacity. A two-pond system is typical for redundancy and maintenance.
- Provide space for an entrance road and maintenance shop building with an office (and restroom). Space to also be provided for an 80-ft scale (covered) and scalehouse near the entrance if the District decides to add these sometime in the future.

4.2 Location Restrictions

§39-7407, *Location Restrictions – Site Certification* establishes the requirements for locating a MSW landfill in Idaho. **Table 4** presents a summary of these restrictions and the applicability to the proposed District landfill.

Table 4 – Location Restrictions and Applicability to the District Landfill

Requirement	Applicability to District Landfill
Airport safety: (a) Shall not be located proximate to an airport runway except as provided in 40 CFR 258.10 §258.10 Airport safety. (a) Owners or operators of new MSWLF units, existing MSWLF units, and lateral expansions that are located within 10,000 feet (3,048 meters) of any airport runway end used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway end used by only piston-type aircraft must demonstrate that the units are designed and operated so that the MSWLF unit does not pose a bird hazard to aircraft. (b) Owners or operators proposing to site new MSWLF units and lateral expansions within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the Federal Aviation Administration (FAA). (c) The owner or operator must place the demonstration in paragraph (a) of this section in the operating record and notify the State Director that it has been placed in the operating record. (d) For purposes of this section: (1) *Airport* means public-use airport open to the public without prior permission and without restrictions within the physical capacities of available facilities. (2) *Bird hazard* means an increase in the likelihood of bird/aircraft collisions that may cause damage to the aircraft or injury to its occupants.	There are no airports within 10,000 feet of the proposed landfill. Refer to the Site Certification Application.
(b) Shall not be located in areas designated by the United States fish and wildlife service or the Idaho department of fish and game as critical habitat for endangered or threatened species of plants, fish, or wildlife, or designated as critical migratory routes for protectively managed species;	The landfill is not located in any critical habitat areas for endangered or threatened species. Refer to the Site Certification Application.
(c) Shall not be located so that the active portion is closer than two hundred (200) feet to the property line of adjacent land;	The edge of waste (inside edge of bottom liner system anchor trench is no less than 200 feet from the property line.
(d) Shall not be located so as to be at variance with any locally adopted land use plan or zoning requirement unless otherwise provided by local law or ordinance, provided that if no land use plan has been adopted by the local government which would have land use jurisdiction pursuant to chapter 65, title 67, Idaho Code, the site certification shall contain an analysis of the factors outlined in section 67-6508, Idaho Code, accompanied by findings and conclusions, setting forth the reasons therefore, entered by the local government with jurisdiction after a public hearing in accord with provisions of section 67-6509, Idaho Code, that the public interest would be served by locating a solid waste landfill on the site for which certification is sought;	The landfill is not located on property with land use or zoning requirements that are not compatible. Refer to the Site Certification Application.
(e) Shall not be located so that the active portion is any closer than one thousand (1,000) feet to any state or national park, or land reserved or withdrawn for scenic or natural use;	There are no state or national park or other restrictive lands within 1,000 feet of the landfill. Refer to the Site Certification Application.
(f) Shall not be located within a one hundred (100) year flood plain except as provided in 40 CFR 258.11; (g) Shall not be located in wetlands, except as provided in 40 CFR 258.12;	There are no known 100-yr flood plains or wetlands within the area of the landfill. Refer to the Site Certification Application.
(h) A MSWLF unit active portion shall not be located: (i) within three hundred (300) feet or the distance of the point of compliance, whichever is greater, upstream of a perennial stream, or river; and (ii) within one thousand (1,000) feet of any perennial lake or pond.	There are no perennial streams or rivers within 300 feet of the landfill nor lakes or ponds with 1,000 feet. Refer to the Site Certification Application.
(i) A MSWLF unit active portion shall not be located where the integrity of the site would be compromised by the presence of ground water which would interfere with construction or operation of the site;	Groundwater is anticipated to be several hundred feet deep well beyond the base grade of the landfill.

Requirement	Applicability to District Landfill
(j) A MSWLF unit shall not be located: (i) within two hundred (200) feet of a holocene fault as defined in 40 CFR 258.13 or adjacent to geologic features which could compromise the structural integrity of the MSWLF unit; and (ii) within seismic impact zones except as provided in 40 CFR 258.14; and	There are no known halocene faults or unstable areas within 200 feet of the landfill. Refer to the Site Certification Application.
A MSWLF unit active portion shall not be located on any site whose natural state would be considered unstable in that its undisturbed character would not permit establishment of an MSWLF unit without	There are no known unstable areas within the proposed active landfill area. Refer to the Site Certification Application.

4.3 Base Grading Plan

The base grades for the proposed District landfill (**Drawing 5**) generally makes use of the natural low area of the site. The cell interior side slopes are designed at 3H:1V (horizontal to vertical). The landfill is broken into four cells (Cells A-D) with 7 fill stages (refer to **Section 4.6** and **Drawing 7**). The first cell, Cell A, will occupy the north-west corner of the landfill. Subsequent cells and fill stages will be congruent with Cell A, moving first to the south-west corner and then in an easterly direction. The floor areas for each cell are provided in **Table 5**.

Table 5 – Landfill Cell Development Areas

Landfill Development Phase	Total Area (acres) (1)	Lined Area (acres) (2)
Cell A	16.1	11.8
Cell B	12.5	8.7
Cell C	10.2	9.3
Cell D	11.8	11.4
Total	**50.6**	**41.2**

Notes:

1. Total Area is the total flat construction area, including embankments and perimeter access road. This is a planar (2D) area for overall site development area.

2. Lined Area is the actual ("true") area accounting for slopes in 3D space for each of the development phases. These are consistent with the cost estimates.

A perimeter access road will be provided around the entire landfill. It will be built in phases as the cells are constructed and will provide access for both waste dumping and operations. A roadside ditch will be provided to capture and convey stormwater draining off the road and the landfill (after cover soil is applied). As the landfill cells are developed, control berms/ditches will be built to intercept run-on stormwater and direct it around lined areas. The berms will be designed to handle large stormwater events to prevent overtopping and control stormwater from entering the landfill and becoming leachate.

4.4 Earthwork Balance / Development Materials

Table 6 presents a summary of the cut/fill balance for the landfill. The construction of the landfill (Cells A-D) and ancillary facilities is estimated to generate a total of approximately 2,246,000 cy of soil. Of this, approximately 170,000 cy is estimated to be topsoil that will be set aside and stockpiled for landscaping and the final cover. Approximately 490,000 cy (accounting for shrinkage of 10%) will be used for constructing landfill cell embankments, roads, and the building pads when it is compacted. The remainder of the soil will be used for daily, interim, and final soil cover with only approximately 23,000 cy of general soil remaining after closure based on this estimate. Overall, the landfill construction and operations are balanced based on this estimate.

Table 6 – Cut/Fill Balance Summary for Cells A-D Construction and Final Closure

Development Phase	Total Excavation (cy)	Total Fill (Embankment or Cover Soil) (cy) (1)	Stripped Topsoil to Stockpile (cy) (2)	Remaining General Cut/Fill (cy)	Balance of General Soil Stockpile (cy)
Cell A Construction	**873,000**	**140,000**	**52,000**	**681,000**	**681,000**
Leachate Ponds, Ops Road / Shop	91,000	9,000	31,000	51,000	732,000
Main Access Road, Scale/Scalehouse	600	40,000	11,000	-50,400	681,600
Stormwater Ponds	2,100	300	8,900	-7,100	674,500
Stage 1 Daily and Interim Cover Soil (3)	---	165,000	---	-165,000	509,500
Cell B Construction	**38,100**	**208,000**	**40,000**	**-209,900**	**299,600**
Stage 2 Daily and Interim Cover Soil (3)	---	175,000	---	-175,000	124,600
Stage 3 Daily and Interim Cover Soil (3)	---	52,000	---	-52,000	72,600
Cell C Construction	**693,000**	**37,000**	**33,000**	**623,000**	**695,600**
Stage 4 Daily and Interim Cover Soil (3)	---	266,000	---	-266,000	429,600
Stage 5 Daily and Interim Cover Soil (3)	---	115,000	---	-115,000	314,600
Cell D Construction	**548,000**	**55,000**	**38,000**	**455,000**	**769,600**
Stage 6 Daily and Interim Cover Soil (3)	---	493,000	---	-493,000	276,600
Stage 7 Daily and Interim Cover Soil (3)	---	122,000	---	-122,000	154,600
Final Cover (24" low perm soil) (4)	**---**	**132,000**	**---**	**-132,000**	**22,600**
Final Cover (8" topsoil)	**----**	**44,000**	**-44,000**	**---**	**22,600**

Notes:

1. Assumes 10% shrinkage factor after embankment fill of excavated material. For example, Cell A has 873,000 cy of total cut (topsoil plus general ex) with embankment fill of 127,000 cy (or an equivalent 140,000 cy in the balance with an assumed 10% shrinkage factor when compacted), leaving 681,000 cy for general ex to stockpile (after 52,000 cy of topsoil stripping and stockpiling).
2. Assumes 2 feet of native topsoil depth based on preliminary test pits.
3. Daily/Interim soil cover is assumed to be approximately 20% of the total airspace for planning purposes.
4. Low permeability soil is assumed to be select native soil from the general soil stockpile. Some of this material may already be in place as part of interim soil cover; however, this estimate assumes fill placement of 24 inches to be conservative in the soil use to ensure enough soil is available.

4.5 Bottom Liner System

The bottom liner for the landfill is assumed to consist of a composite system, which by definition, means a system consisting of two components; the upper component must consist of a minimum 30-mil flexible membrane liner (FML), and the lower component must consist of at least a two-foot layer of compacted soil with a hydraulic conductivity of no more than 1×10^{-7} cm/sec. When the FML components consists of high-density polyethylene (HDPE) it shall be at least 60-mil thick. The FML component must be installed in direct and uniform contact with the compacted soil component. In lieu of the two-foot thick "clay" soil, a geosynthetic clay liner (GCL) is proposed, which is common practice in the State of Idaho. Therefore, the bottom liner system for the proposed landfill will consist of a 60-mil HDPE geosynthetic overlying a GCL.

4.6 Leachate Collection and Recovery System

The bottom liner will be covered by the leachate collection and recovery system (LCRS). The LCRS is designed to keep leachate buildup to no more than 12 inches on the bottom liner, in accordance with WAC 173-351-300(2)(a). The purpose of this requirement is to reduce the amount of leakage through the bottom liner in case there is a hole or defect. The LCRS will consist of a series of collection pipes (perforated HDPE pipe) and a drainage layer of sand or gravel supplemented with geosynthetics such as strip drains or composite drainage net.

During subsequent design, the amount of leachate generation will be estimated for each phase development using the *Hydrogeologic Evaluation of Landfill Performance*, Version 4.0 (HELP) model (USEPA, 2020). This is a quasi-two-dimensional, deterministic computer model utilizing the more modern platform of Microsoft Excel. The HELP model is designed to calculate a water balance for solid waste landfills over a preset simulation period, using site specific climatological and design data. The required input data includes climatological information representative of the site (precipitation, temperature, and solar radiation), and soil and design data. The leachate generation rates will be used to size the leachate ponds (refer to Section 4.9.1).

4.7 Phase Development Plan / Fill Staging Plan

The fill plan for the proposed landfill consists of the following seven stages:

- **Stage 1** – Fill Cell A to a sub-interim closure elevation of 5,850 feet; before reaching the sub-interim closure grade, design, permit, and build Cell B.
- **Stage 2 –** Fill Cell B to the sub-interim closure elevation of 5,850 feet to match the grade of adjacent Cell A.
- **Stage 3 –** Fill Cells A and B together up to an interim closure elevation of 5,875 feet; before reaching the interim closure grades of Cells A and B, design, permit, and build Cell C.
- **Stage 4 –** Fill Cell C to the interim closure elevation of 5,875 feet to match the grade of adjacent cells.
- **Stage 5 –** Fill Cells A-C together up to the pre-closure elevation of 5,915 feet; before reaching the pre-closure grade of these cells, design, permit, and build Cell D.
- **Stage 6** – Fill Cell D to the pre-closure elevation of 5,915 feet to match the grade of adjacent cells.
- **Stage 7 –** Fill all four cells together to the final closure elevation of 5,950± feet; before reaching the final grade, design and permit the final cover system. Also, at this stage if the District plans to build an adjacent landfill area, this area will need to be site certified and the first cell permitted, designed, and built before Cells A-D reach the final closure grade.

The overall closure plan is shown on **Drawing 6**. **Drawings 7 and 8** present overall cross sections of the landfill showing the base grades, final closure grades, and fill stages.

Table 7 presents the airspace volumes for each of the seven fill stages. These volumes represent the total volume between the top of the bottom liner system above the LCRS and the underside of the final cover system (top of waste) and, therefore, includes the volume consumed by waste, daily cover, and interim cover soil. The total airspace volume for all four cells and the seven fill stages is approximately 6,931,000 cy.

Table 7 – Cell Fill Sequencing and Airspace Availability

Fill Stage	Stage Volume (cy)	Cumulative Airspace (cy)
Stage 1 - Fill Cell A to Interim Closure Grade (5,850 ft)	827,000	827,000
Stage 2 - Fill Cell B to Interim Closure Grade (5,850 ft)	876,000	1,703,000
Stage 3 - Fill Cells A and B to Interim Closure Grade (5,875 ft)	262,000	1,965,000
Stage 4 - Fill Cell C to Interim Closure Grade (5,875 ft)	1,330,000	3,295,000
Stage 5 - Fill Cells A - C to Interim Closure Grade (5,915 ft)	575,000	3,870,000
Stage 6 - Fill Cell D to Interim Closure Grade (5,915 ft)	2,463,000	6,333,000
Stage 7 - Fill Cells A - D to Final Closure Grade (5,950 ft)	598,000	**6,931,000**

4.8 Projected Life Expectancy

4.8.1 Effective Waste Density

The effective waste density (also known as the airspace utilization density) measures the weight of waste that can be placed in a unit volume of airspace in the landfill. This measurement considers the volume lost through daily and interim soil cover, and the volume gained through settlement and waste decomposition. This density ratio is termed “effective” because it gives the landfill operator/owner an understanding of how much waste has been placed in a given volume (airspace), even though other materials such as soil cover can be present within the same volume.

The effective density will increase as the waste ages. This change is primarily a result of waste consolidation and biological decomposition of the organic fraction of the waste. Effective density may also increase with changes in operations, such as a reduction in soil cover material, use of alternative daily covers (ADCs) or inducing higher compaction rates with heavier compactors and/or improved compaction operations. The composition of the waste stream can also change the density of the waste. For example, aggressive recycling and organics diversion programs could lead to denser waste materials being placed in the landfill and a subsequent increase of density.

The density is expected to fluctuate from year to year as new waste areas open and as the waste settles. The first lift of waste (commonly referred to as the “fluff” layer) is loosely placed to protect the bottom liner system resulting in a relatively lower waste density. As the waste fill depth increases, compaction increases. Additionally, the waste settles due to it compressing under its own physical weight and the waste decomposes, which also condenses the waste and fills in void spaces. Eventually, however, these actions will level-off as the landfill stabilizes.

The long-term waste density will likely reach 1,300 to 1,400 lbs/cy if the District uses an 826 CAT waste compactor or equivalent and utilizes industry standard compaction techniques. Additional efficiency can be gained if the District uses an alternative daily cover (ADC) instead of soil. However, for this assessment, and as a conservative measure for the stage filling and phased development of the landfill, an in-place effective waste density of **1,200 pounds per cubic yard (lbs/cy)** is assumed.

4.8.2 Life Cycle

The life cycle uses the forecasted waste tonnages as shown above and projects them forward as needed for the future capacity of the landfill**.** Two scenarios were evaluated for the landfill life cycle – (1) District Only (without any waste partners) and (2) With non-district member Teton County, Idaho. Both scenarios use an airspace capacity of 6,931,000 cy and an in-place effective waste density of 1,200 lb/cy.

Table 8 presents a summary of the life cycle for both scenarios. The full life cycle analysis tables can be found in **Appendix B**.

Table 8 – Forecasted Life Cycle for District Regional Landfill (With and Without Waste Partner)

		Scenario 1 – No Waste Partners			Scenario 2 – With Teton County, Idaho		
Period	Year	In-Coming Waste (tons)	Waste Volume (cy) (1)	Cum. Waste Volume (cy)	In-Coming Waste (tons) (2)	Waste Volume (cy)	Cum. Waste Volume (cy)
1 (3)	2023	10,644	17,739	65,231	13,323	22,206	22,206
2	2024	43,488	72,479	133,724	54,455	90,758	112,964
3	2025	44,423	74,038	205,642	55,645	92,741	205,705
4	2026	45,380	75,634	281,155	56,863	94,771	300,476
5	2027	46,362	77,270	360,444	58,110	96,851	397,327
6	2028	47,367	78,945	443,697	59,388	98,980	496,307
7	2029	48,397	80,662	531,113	60,697	101,162	597,469
8	2030	49,452	82,420	622,900	62,038	103,396	700,865
9	2031	50,533	84,222	719,277	63,410	105,684	806,549
10	2032	51,640	86,067	820,472	64,817	108,028	914,577
11	2033	52,775	87,958	924,703	66,257	110,428	1,025,005
12	2034	53,938	89,896	1,032,060	67,732	112,887	1,137,892
13	2035	55,129	91,881	1,142,639	69,243	115,405	1,253,298
14	2036	56,349	93,915	1,256,535	70,791	117,985	1,371,283
15	2037	57,599	95,998	1,373,848	72,376	120,627	1,491,910
16	2038	58,880	98,134	1,494,680	74,000	123,334	1,615,244
17	2039	60,193	100,321	1,619,137	75,664	126,106	1,741,349
18	2040	61,538	102,563	1,747,328	77,367	128,945	1,870,295
19	2041	62,916	104,859	1,879,365	79,113	131,854	2,002,149
20	2042	64,327	107,212	2,015,362	80,900	134,834	2,136,983
21	2043	65,774	109,624	2,155,440	82,732	137,886	2,274,869
22	2044	67,257	114,626	2,299,720	84,607	141,012	2,415,881
23	2045	68,776	117,221	2,038,558	86,529	144,215	2,560,096
24	2046	70,332	119,879	2,155,779	88,498	147,496	2,707,592
25	2047	71,927	122,603	2,275,658	90,514	150,857	2,858,449
26	2048	73,562	125,395	2,398,261	92,580	154,299	3,012,748
27	2049	75,237	128,255	2,523,656	94,696	157,826	3,170,575
28	2050	76,953	131,187	2,651,911	96,864	161,439	3,332,014
29	2051	78,712	134,191	2,783,098	99,084	165,140	3,497,154
30	2052	80,514	137,269	2,917,288	101,359	168,932	3,666,087
31	2053	82,361	140,424	3,054,557	103,690	172,817	3,838,903
32	2054	84,254	143,656	3,194,981	106,078	176,796	4,015,699
33	2055	86,194	146,969	3,338,637	108,524	180,873	4,196,571
34	2056	88,182	150,365	3,485,607	111,029	185,049	4,381,620
35	2057	90,219	153,844	3,635,971	113,597	189,328	4,570,948
36	2058	92,306	157,410	3,789,816	116,227	193,711	4,764,659
37	2059	94,446	161,064	3,947,226	118,921	198,202	4,962,861
38	2060	96,639	164,810	4,108,290	121,682	202,803	5,165,664

		Scenario 1 – No Waste Partners			Scenario 2 – With Teton County, Idaho		
Period	Year	In-Coming Waste (tons)	Waste Volume (cy) (1)	Cum. Waste Volume (cy)	In-Coming Waste (tons) (2)	Waste Volume (cy)	Cum. Waste Volume (cy)
39	2061	98,886	168,648	4,273,100	124,510	207,516	5,373,180
40	2062	101,189	172,582	4,441,748	127,407	212,345	5,585,526
41	2063	103,549	176,613	4,614,330	130,376	217,293	5,802,819
42	2064	105,968	180,745	4,790,943	133,417	222,362	6,025,180
43	2065	108,447	184,980	4,971,689	136,533	227,555	6,252,736
44	2066	110,988	189,320	5,156,669	139,726	232,876	6,485,612
45	2067	113,592	193,769	5,345,989	142,996	238,327	6,723,939
46	2068	116,261	198,328	5,539,758	124,237	207,061	6,931,000
47	2069	118,997	203,000	5,738,085			
48	2070	121,800	207,790	5,941,086			
49	2071	124,674	212,698	6,148,875			
50	2072	127,619	217,729	6,361,573			
51	2073	130,637	222,886	6,579,302			
52	2074	133,731	222,886	6,802,188			
53	2075	77,288	128,813	6,931,000			

Notes:

1. Assumes an in-place effective waste density of 1,200 lbs/cy. Tons are converted to volume by first multiplying the tons by 2000 lbs/ton, and then dividing by the effective density of 1,2000 lbs/cy.
2. Assumes Teton County will contribute waste to the landfill beginning when it opens.
3. Period 1 (Year 2023) assumes one quarter or three months of waste disposal after the landfill is constructed and permitted that year.

Based on these assumptions, the proposed District landfill would provide approximately 53 years of waste filling capacity for District-only members. With Teton County, the landfill would 47 years. Although there may be a reduction in life with more regional partners joining the District, revenue will be generated faster, and costs would be shared. Further sharing of the costs would likely result in an overall lower tipping fee. The economics should be considered by the District as they move forward with the project. **Table 9** provides a summary of the filling stages and closure timelines for the District landfill for both scenarios.

Table 9 – District Landfill Fill Staging Timelines

Fill Stage	Scenario 1 – No Waste Partner	Scenario 2 – With Teton County
Open Cell A	2023	2023
Stage 1 - Fill Cell A to Sub-Interim Closure Grade (5,850 ft)	2033	2031
Stage 2 - Fill Cell B to Sub-Interim Closure Grade (5,850 ft)	2042	2038
Stage 3 - Fill Cells A and B to Interim Closure Grade (5,875 ft)	2044	2040
Stage 4 - Fill Cell C to Interim Closure Grade (5,875 ft)	2054	2049
Stage 5 - Fill Cells A - C to Pre-Closure Grade (5,915 ft)	2058	2053
Stage 6 - Fill Cell D to Pre- Closure Grade (5,915 ft)	2071	2065
Stage 7 - Fill Cells A - D to Final Closure Grade (5,950± ft)	2075	2068
Closure Design and Permitting (1-year before closure)	2074	2067
Closure Construction (year of final filling start and finish next year)	2075/2076	2068/2069

4.9 Supporting Infrastructure

4.9.1 Leachate Ponds

Sizing of the leachate pond system requires the development of a comprehensive water balance model where inputs and outputs into the pond(s) are tracked on a monthly basis. Peak precipitation events are simulated in the model to track recovery and storage needs for the sizing of the ponds. The goal of the modeling exercise is to empty the leachate ponds every year under average precipitation conditions, and following a storm year(s), return to normal conditions within the next two or three years. Like the leachate generation estimates (refer to Section 4.6), pond sizing will be conducted during subsequent design. In the meantime, two 1.75-acre ponds (total 3.5 acres) are assumed for general facility layout and space allocation. This pond size is based on leachate pond storage needs for similar landfills in the arid northwest.

4.9.2 Stormwater Ponds

Stormwater ponds will need to be sized to retain the 25 year, 24-hour storm event with controlled release of discharges that exceed the design storm event. Four ponds have been placed on the proposed site plan to show preliminary locations (refer to **Drawing 4**) and sizes. The final sizing and locations of the ponds will be determined during detailed design.

4.9.3 Future Infrastructure

Space has been set aside for a future entrance scale and scale house near the front entrance gate and a maintenance shop and office with a restroom. There is also space set aside for a future flare station (see Section 4.9.4 below).

4.9.4 Landfill Gas Flare Station

Landfills are subject to New Source Performance Standards (NSPS), the National Emission Standards for Hazardous Air Pollutants (NESHAP) for MSW landfills (subpart AAAA), and the associated Title V (Part 70/71) requirements for obtaining an operating permit. If the design capacity is more than 2.5 Mg (equal to 2.76 million U.S. tons) AND 2.5 million cubic meters (m^3) (equal 3.3 million cubic yards) the landfill is regulated under these rules. The next step is to determine if the landfill is required to have an active gas collection system under NSPS. If the non-methane organic compound (NMOC) mass emissions are 34 megagrams per year (Mg/yr) or greater, the landfill is required to install and have an operational gas collection system within 30 months of when the NMOC threshold is exceeded. NMOC emissions are determined by either a desktop calculation assuming a default NMOC concentration or by collecting field samples and using the *Landfill Gas Emissions Mode*l (LandGEM) v3.02 (USEPA, 2005).

The design capacity of the proposed District Landfill is approximately 6.9 million cubic yards (or 5.3 million cubic meters) with a waste mass of 4.2 million tons (or 3.8 million metric tons or megagrams), assuming an effective waste density of 1200 lbs/cy. Therefore, the design capacity of the landfill will exceed the NSPS / Title V threshold of 2.5/2.5, requiring the landfill to be regulated under these rules. The anticipated size of the proposed landfill will trigger active landfill gas collection and a flare station to mitigate fugitive gas surface emissions.

Landfill gas management systems typically consist of wells buried within the layers of the landfill (horizontal gas wells) or wells drilled into the waste body (vertical gas wells). The wells are equipped with wellheads to monitor and control gas collection rates. The wellheads are connected to a piping network to convey the gas to a biogas processing system. Landfill gas is saturated and warm and will condense when it is removed from the landfill. These liquids are managed by condensate stations where the vacuum pressure of the blowers is isolated from ambient air pressure and the condensate is “knocked out” and drained or pumped back into the landfill or to leachate ponds. The most common landfill gas system is as a flare station consisting of a blower skid and flare stack. Other biogas process systems include landfill gas to energy (LFGTE) plants where the gas is combusted in gensets or microturbines to create electricity. Other alternatives for beneficial reuse include scrubbing the gas and reinjecting it into a natural gas pipeline, using the gas for a compressed natural gas (CNG) fueling station, or burning it for heat for use at or near the facility.

For this design, it is assumed the processing system will be a flare station (blower skid and flare stack). Ancillary systems to support the flare station will include electricity to power the equipment, data acquisition and SCADA, remote monitoring and control systems, and condensate management.

4.10 Final Cover System

The final cover system will be designed to minimize infiltration and erosion. According to §258.60 – *Closure Criteria,* the final cover system must be designed and constructed to:

1. Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1×10^{-5} cm/sec, whichever is less, and
2. Minimize infiltration through the closed MSWLF by the use of an infiltration layer that contains a minimum 18-inches of earthen material, and
3. Minimize erosion of the final cover using an erosion control layer that contains a minimum 6-inches of earthen material that is capable of sustaining native plant growth.

It is noted that DEQ may approve an alternative final cover design. For purposes of this Master Development Plan, a prescriptive final cover system is assumed, consisting of the following (from top to bottom):

- 8-inch-thick topsoil layer (vegetated)
- 12-inch-thick drain sand layer enhanced with strip drains, or a geocomposite or a combination thereof
- 60-mil HDPE geomembrane[1]
- 24 inches of compacted soil (onsite silt) with permeability of no more than 1.0×10^{-5} cm/sec (with a gas collection layer) [2]

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[1] The District reserves the option to install linear low-density polyethylene (LLPDE) liner with a minimum thickness of 30 mils, or possibly an alternative geosynthetic such as a geosynthetic turf. LLDPE is much more resilient to settlement and is commonly used for final caps. Geosynthetic turf covers are growing in popularity and have been used elsewhere in the Northwest.

[2] A gas collection layer will need to be installed beneath the final cover system to control gases for cover stability.

5.0 Engineer's Opinions of Probable Construction Costs

The Engineer's opinions of probable construction costs are provided in **Table 10** (refer to **Appendix C** for cost breakdowns). The cost opinions are in 2021 dollars (2021$) and are considered Class 4 estimates ("Study of Feasibility") with a 15% contingency and a typical level of accuracy of -30% to +50%. Idaho Sales Tax is also included at a rate of 6.0% on materials, assuming one-third of the total construction costs are for materials.

The cost opinions assume the work will be done on a competitive bid basis and the construction contractors will have a reasonable amount of time to complete the work. The actual costs will depend on final design, competitive market conditions, actual labor and material costs, productivity, schedule, cost of living / inflation at the time of construction, and other factors. As such, these cost opinions need to be carefully considered when budgeting and making financial decisions.

Table 10 – Cell Development and Final Closure Opinions of Probable Construction Costs

Landfill Development Phase	Estimated Construction Cost (2021$) (1)	Engineering Fees (2021$) (2)	Estimated Total Cost (2021$)
Cell A	$6,403,000 (3)	$675,000	$7,078,000
Cell B	$3,060,000	$245,000	$3,305,000
Cell C	$4,032,000	$323,000	$4,355,000
Cell D	$4,049,000	$324,000	$4,373,000
Total Development Costs	**$17,544,000**	**$1,567,000**	**$19,111,000**
Final Closure Costs	$6,838,000	$547,000	$7,386,000
Project Total	**$24,382,000**	**$2,114,000**	**$26,497,000**

Notes:

1. Costs are in 2021 dollars. "Estimated Construction Costs" include a 15% contingency factor based on the level of design for the cells; a 25% contingency is included in the final closure costs. The costs do not include ancillary capital costs for infrastructure such as a future scale and scalehouse or flare station to manage landfill gas. Those elements should be considered for overall financial planning.

2. Costs are in 2021 dollars. Except for Cell A, the "Engineering Fees" for future cell developments and final closure are assumed to be 8% of the construction costs. These fees include estimated costs for permitting, design, and general construction oversight services. Engineering Fees for Cell A are based on current costs that have been contracted with the District for Cell A development.

3. Cell A construction costs include $4,838,000 for the cell construction plus $1,565,000 for support facilities (earthwork for building pads and the main entrance road and the construction of the leachate ponds). The Cell A estimates does not include costs associated with geotechnical borings and groundwater wells ($345,000), shop/office building ($1,150,000), fencing and landscaping ($250,000), site power ($50,000) and a domestic water well ($250,000), land purchase ($3,238,000), bond services ($300,000), or other incidental costs. These costs were not estimated by Great West Engineering and so are not included.

6.0 References

Lewis et al. (2012). *Geologic Map of Idaho*. Idaho Geological Survey.

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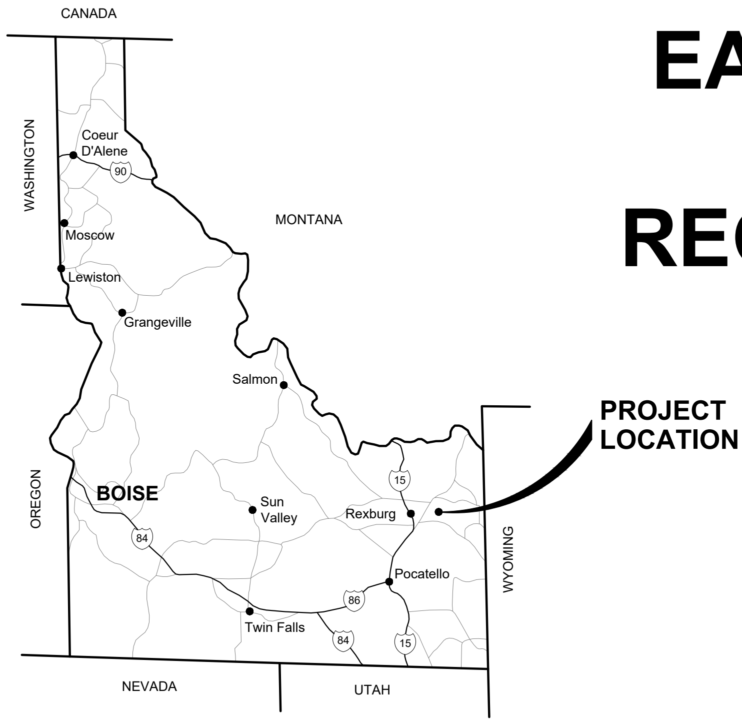
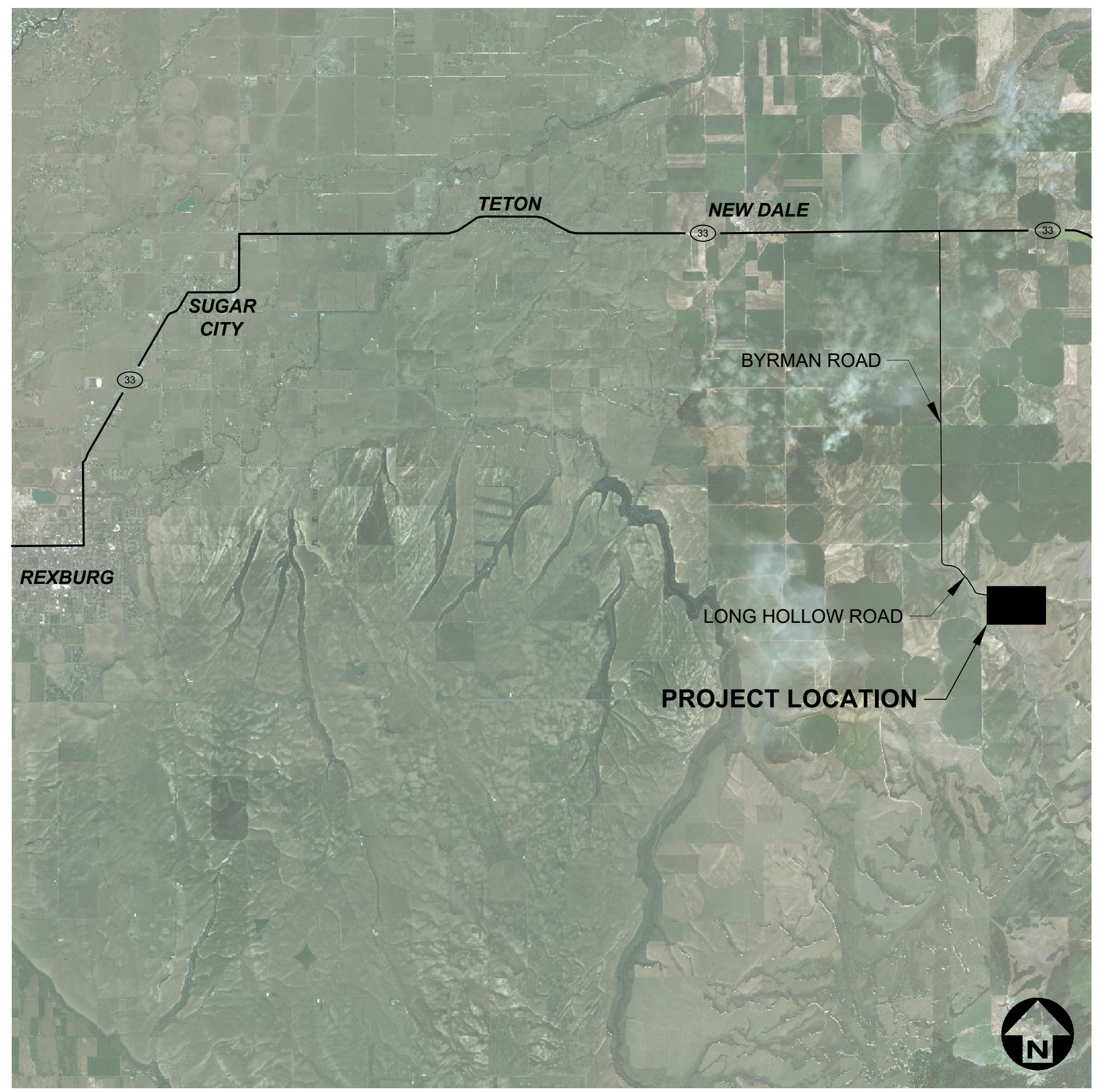
Drawings

EASTERN IDAHO REGIONAL SOLID WASTE DISTRICT
REGIONAL LANDFILL MASTER PLAN

NOT FOR CONSTRUCTION





NOT TO SCALE

SHEET INDEX

PROJECT: 4-20133

DATE: DECEMBER 2021

PLANS PREPARED FOR:

EASTERN IDAHO REGIONAL SOLID WASTE DISTRICT

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NO.	REVISION DESCRIPTION	BY	DATE
1	RE-GRADE/UPDATED PLAN DRAWINGS	TP	12-29-21

SET NO.

SHEET NO.
1

ABBREVIATIONS

@	AT
Δ	ANGLE OF DEFLECTION, DELTA ANGLE
<PT	ANGLE POINT
AB	ANCHOR BOLT
ABDN	ABANDON
AC	ASBESTOS CONCRETE
ADDN	ADDITIONAL
ADJ	ADJACENT
AFF	ABOVE FINISHED FLOOR
ALT	ALTERNATE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX	APPROXIMATE
APVD	APPROVED
ARCH	ARCHITECTURE, ARCHITECTURAL
ASPH	ASPHALT
AVE	AVENUE
AVG	AVERAGE
BFV	BUTTERFLY VALVE
BLDG	BUILDING
BLK	BLOCK
BLVD	BOULEVARD
BM	BEAM, BENCHMARK
BOT	BOTTOM
BRG	BEARING
BRKT	BRACKET
BVC	BEGIN VERTICAL CURVE
C-C	CENTER TO CENTER
CHAN	CHANNEL
CHK	CHECK
CI	CAST IRON
CIPC	CAST-IN-PLACE CONCRETE
CIRC	CIRCULAR
CJ	CONSTRUCTION JOINT, CONTROL JOINT
℄	CENTER LINE
CLR	CLEAR, CLEARANCE
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNITS
CO	CLEANOUT
COL	COLUMN
CONC	CONCRETE
CONSTR	CONSTRUCTION
CONT	CONTINUE, CONTINUED, CONTINUOUS
CONTR	CONTRACTOR
COORD	COORDINATE
CP	CONTROL PANEL, CONTROL POINT
CPLG	COUPLING
CTR	CENTER
CTV	CABLE TELEVISION
CU	CUBIC, COPPER
CF	CUBIC FEET
CULV	CULVERT
CY	CUBIC YARD
DET	DETAIL
DI	DUCTILE IRON, DRAIN INLET
DIA, Ø	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DR	DRIVE
DWG	DRAWING
E	EAST
EA	EACH
EL, ELEV	ELEVATION
ELB	ELBOW
ELEC	ELECTRIC, ELECTRICAL
ENCL	ENCLOSE
ENGR	ENGINEER
EOP	EDGE OF PAVEMENT
EQ	EQUAL, EQUALLY
EQ SP	EQUALLY SPACED
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
EVC	END VERTICAL CURVE
EW	EACH WAY
EXC	EXCAVATE
EXP	EXPANSION
EXP JT	EXPANSION JOINT
EXST	EXISTING
FCV	FLOW CONTROL VALVE
FD	FLOOR DRAIN
FDN	FOUNDATION
FES	FLARED END SECTION
FET	FLARED END TERMINAL
FF	FINISHED FLOOR
FG	FINISH GRADE
FHYD	FIRE HYDRANT
FJ	FLANGE JOINT
FL	FLOW LINE
FLEX	FLEXIBLE
FM	FORCEMAIN
FT	FOOT, FEET
FO	FIBER OPTIC
FTG	FOOTING, FITTING
G	NATURAL GAS
GA	GAGE, GAUGE
GAL	GALLON
GALV	GALVANIZED
GND	GROUND
GVL	GRAVEL
HB	HOSE BIB
HDPE	HIGH DENSITY POLYETHYLENE
HOR, HORIZ	HORIZONTAL
HWY	HIGHWAY
HYD	HYDRANT
ID	INSIDE DIAMETER
IE	INVERT ELEVATION
IN	INCH
INV	INVERT
JB	JUNCTION BOX
JT	JOINT
K	RATE OF VERTICAL CURVATURE
LBS	POUNDS
LF	LINEAR FEET
LN	LANE
LPG	LIQUID PROPANE GAS
LT	LEFT
MAX	MAXIMUM
MD	MEASURE DOWN
MFD	MANUFACTURED
MFR	MANUFACTURE, MANUFACTURER
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MOV	MOTOR OPERATED VALVE
MPWSS	MONTANA PUBLIC WORKS STANDARD SPECIFICATIONS
N	NORTH
NE	NORTHEAST
NG	NATURAL GAS
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NTS	NOT TO SCALE
NW	NORTHWEST
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OVERFLOW
OH	OVERHEAD
OHP	OVERHEAD POWER
OHT	OVERHEAD TELEPHONE
OPNG	OPENING
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PE	PLAIN END, POLYETHYLENE
PERP	PERPENDICULAR
PI	POINT OF INTERSECTION
PL	PROPERTY LINE
PNL	PANEL
PRC	POINT OF REVERSE CURVATURE
PREFAB	PREFABRICATED
PRELIM	PRELIMINARY
PREP	PREPARE, PREPARATION
PROP	PROPERTY
PRV	PRESSURE REDUCING VALVE
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT, POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
R, RAD	RADIUS
RC	REINFORCED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RD	ROAD
RDCR	REDUCER
REBAR	REINFORCEMENT BAR
REF	REFERENCE
REINF	REINFORCE
REQD	REQUIRED
RR	RAILROAD
RST	REINFORCING STEEL
RT	RIGHT
R/W	RIGHT-OF-WAY
S	SOUTH, SANITARY SEWER
SAN	SANITARY
SCH	SCHEDULE
SD	STORM DRAIN
SDWK	SIDEWALK
SE	SOUTHEAST
SECT	SECTION
SF	SQUARE FOOT
SHT	SHEET
SIM	SIMILAR
SLP	SLOPE
SPEC	SPECIFICATION
SQ	SQUARE
SSTL	STAINLESS STEEL
STA	STATION
SS	SANITARY SEWER SERVICE
STD	STANDARD
ST	STREET
STL	STEEL
STRUCT	STRUCTURE
SW	SOUTHWEST
SYM	SYMMETRICAL
TB	THRUST BLOCK
TBC	TOP BACK OF CURB
TBM	TEMPORARY BENCH MARK
TEL	TELEPHONE
TEMP	TEMPORARY
THRU	THROUGH
TYP	TYPICAL
UG	UNDERGROUND
UGP	UNDERGROUND POWER
UGT	UNDERGROUND TELEPHONE
UTIL	UTILITY
V	VALVE, VOLT
VB	VALVE BOX
VERT	VERTICAL
VOL	VOLUME
W	WEST, WATER
WTR	WATER
WD	WOOD
W/	WITH
W/O	WITHOUT
WL	WETLAND
WM	WIRE MESH, WATER METER
WS	WATERSTOP, WATER SURFACE, WATER SERVICE
WT	WEIGHT
WV	WATER VALVE
WWF	WELDED WIRE FABRIC
WWM	WELDED WIRE MESH
XFMR	TRANSFORMER
X-ING	CROSSING
XS	CROSS SECTION
YD	YARD

LEGEND

EXISTING	PROPOSED	DESCRIPTION
		MAJOR CONTOUR
		MINOR CONTOUR
OHT	OHT	OVERHEAD TELEPHONE
UGT	UGT	UNDERGROUND TELEPHONE
CTV	CTV	CABLE TELEVISION
FO	FO	FIBER OPTIC
G	G	NATURAL GAS
OHP	OHP	OVERHEAD POWER
UGP	UGP	UNDERGROUND POWER
S	S	SANITARY SEWER
SS SS	SS SS	SANITARY SEWER SERVICE
FM	FM	SANITARY SEWER FORCEMAIN
SD	SD	STORM DRAIN
		STORM CULVERT
W	W	WATER
WS WS	WS WS	WATER SERVICE
		CHAINLINK FENCE
X X X	X X X	BARBED WIRE FENCE
		WOOD FENCE
		PAVED ROAD
		GRAVEL ROAD
		PROPERTY/LOT LINE
		PROPERTY EASEMENT
		PROPERTY SETBACK
		RIGHT-OF-WAY
		CITY LIMIT/DISTRICT BOUNDARY
		RAILROAD
		DITCH
		WATER EDGE
WL		WETLAND
		BUILDING
		BENCHMARK
		CONTROL POINT
		PROPERTY PIN
		BORING
		MONITORING WELL
		TEST PIT
		BOLLARD
		MAIL BOX
		SIGN

EXISTING	PROPOSED	DESCRIPTION
		STUMP
		SHRUB/BUSH
		TREE-CONIFER
		TREE-DECIDUOUS
		TREE LINE
		COMMUNICATION MANHOLE
		COMMUNICATION VAULT
		TELEPHONE RISER
		CABLE TV RISER
		NATURAL GAS METER
		NATURAL GAS RISER
		NATURAL GAS VALVE
		LIGHT POLE
		STREET LIGHT POLE
		POWER RISER
		PAD MOUNTED TRANSFORMER
		POWER VAULT
		UTILITY POLE
		GUY WIRE
		SANITARY MANHOLE
		SANITARY CLEANOUT
		SANITARY LAMPHOLE
		STORM MANHOLE
		STORM ROUND INLET
		STORM SQUARE INLET
		STORM CATCH BASIN
		11.25° ELBOW
		22.50° ELBOW
		45° ELBOW
		90° ELBOW
		TEE
		CROSS
		CAP
		FIRE HYDRANT
		GATE VALVE
		REDUCER
		WATER METER
		WELL
		CURB STOP
		FROST FREE HYDRANT

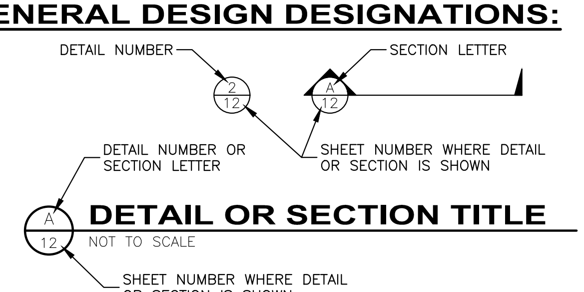
GENERAL NOTES:

1. THIS IS A STANDARD LEGEND AND ABBREVIATION LIST. THEREFORE, NOT ALL SYMBOLS AND ABBREVIATIONS MAY BE USED ON THIS PROJECT.

PROJECT NOTES:

1. TOPOGRAPHICAL SURVEY BY FORSGREN ASSOCIATES, INC., DATED APRIL 19, 2021.
2. SURVEY BASED ON IDAHO STATE PLANE COORDINATE SYSTEM, EAST ZONE, NAD83.

GENERAL DESIGN DESIGNATIONS:



NO.	REVISION DESCRIPTION	BY	DATE
1	RE-GRADE/UPDATED PLAN DRAWINGS	TP	12-29-21

PROJECT: 4-20133
DESIGNED: ML
DRAWN: DB
CHECKED: ML
APPROVED: TP
DATE: DECEMBER 2021

NOT FOR CONSTRUCTION

GreatWest ENGINEERING
3050 N. LAKEHARBOR LANE SUITE 201
BOISE, ID 83703
(208)576-6646

EASTERN IDAHO REGIONAL SOLID WASTE DISTRICT
REGIONAL LANDFILL MASTER PLAN

GENERAL NOTES

SHEET NO.
2
OF 8

SHEET NOTES:

1. TEST PITS SHOWN ARE FROM INITIAL SUBSURFACE EXPLORATIONS IN MARCH 2021 FOR THE SITE CERTIFICATION PERMIT.

LEGEND

⊗	TEST PIT LOCATION (MARCH 2021)
— — —	PROPERTY BOUNDARY
———	PROJECT GRADING BOUNDARY

NORTH

0 150 300
SCALE IN FEET

NO.	REVISION DESCRIPTION	BY	DATE
1	RE-GRADE/UPDATED PLAN DRAWINGS	TP	12-29-21

PROJECT: 4-20133
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DRAWN: DB
CHECKED: ML
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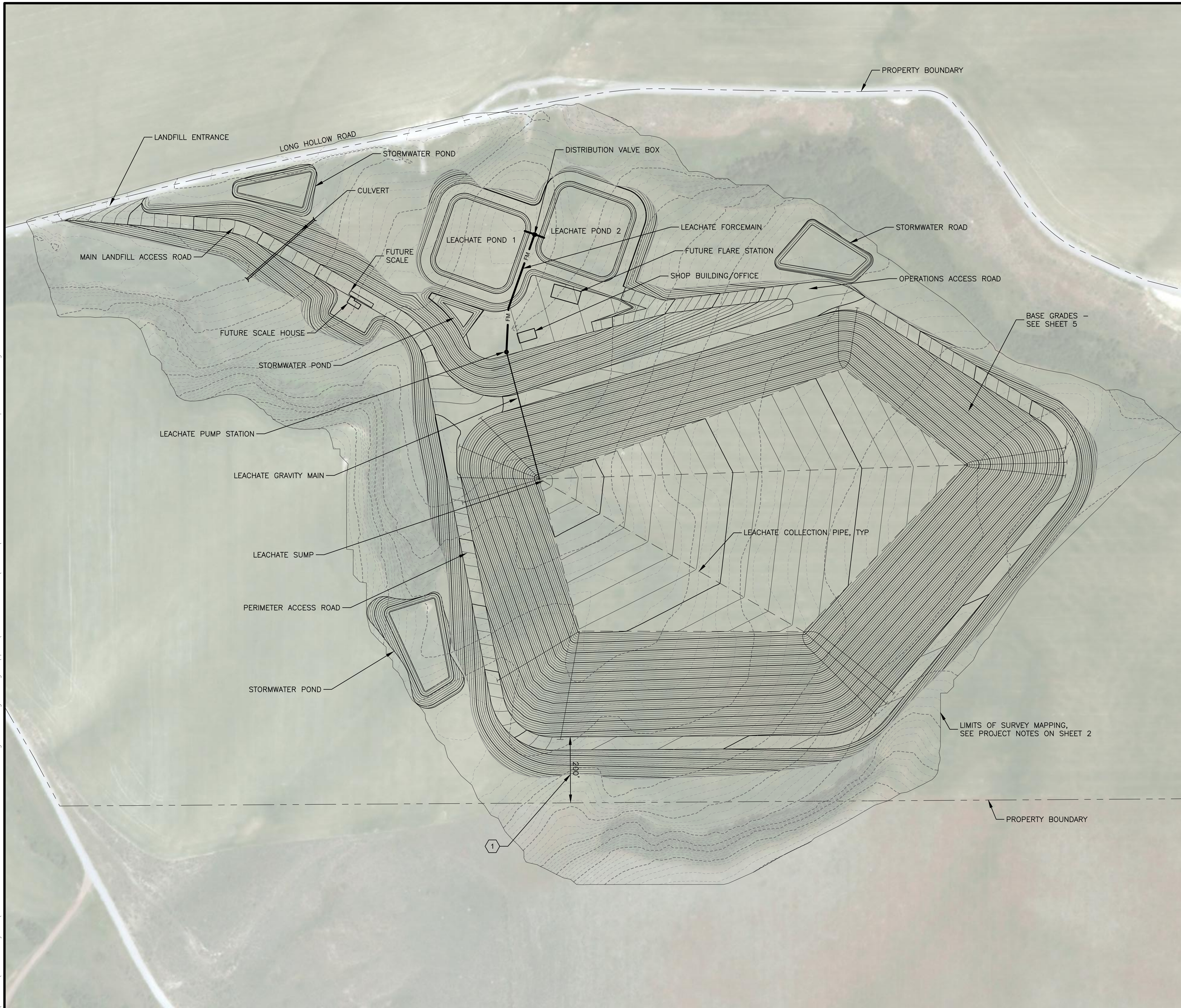
(208)576-6646

EASTERN IDAHO REGIONAL SOLID WASTE DISTRICT
REGIONAL LANDFILL MASTER PLAN

EXISTING SITE PLAN



KEYED NOTES:

1. MINIMUM OFFSET FROM WASTE TO PROPERTY LINE

LEGEND

PROPERTY BOUNDARY

PROJECT GRADING BOUNDARY

NORTH

0 150 300

SCALE IN FEET

NO.	REVISION DESCRIPTION	BY	DATE
1	RE-GRADE/UPDATED PLAN DRAWINGS	TP	12-29-21

PROJECT: 4-20133
DESIGNED: ML
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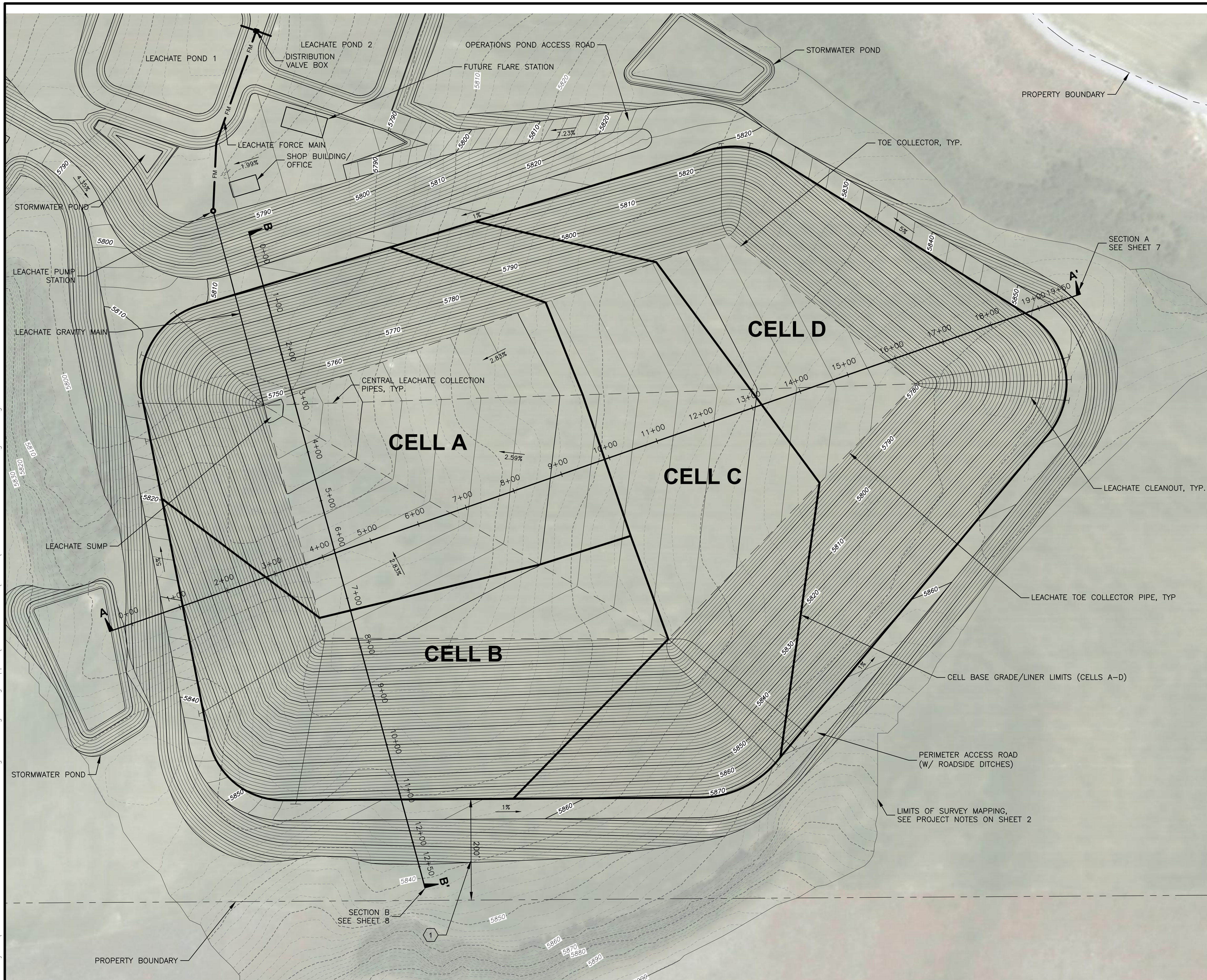
EASTERN IDAHO REGIONAL SOLID WASTE DISTRICT
REGIONAL LANDFILL MASTER PLAN

OVERALL SITE DEVELOPMENT PLAN

SHEET NO.
4
OF 8

Y:\Shared\Boise Projects\4-20133-E Idaho SW District Landfill Design And Engineering Support\CADD 4-20133\Sheets\4-20133-04-Overall Site Development Plan.dwg



Y:\Shared\Boise Projects\4-20133-E Idaho SW District Landfill Design And Engineering Support\CADD 4-20133\Sheets\4-20133-05-Base Grading Plan.dwg

SHEET NOTES:

1. GRADES SHOWN ARE ON TOP OF LINER.

KEYED NOTES:

1. MINIMUM OFFSET FROM WASTE TO PROPERTY LINE.

LEGEND

- LEACHATE PIPE CLEANOUT
- LEACHATE COLLECTOR PIPE
- LEACHATE FORCE MAIN
- LEACHATE GRAVITY MAIN
- PROPERTY BOUNDARY
- PROJECT GRADING BOUNDARY

NORTH

0 100 200
SCALE IN FEET

NO.	REVISION DESCRIPTION	BY	DATE
1	RE-GRADE/UPDATED PLAN DRAWINGS	TP	12-29-21

PROJECT: 4-20133
DESIGNED: ML
DRAWN: DB
CHECKED: ML
APPROVED: TP
DATE: DECEMBER 2021

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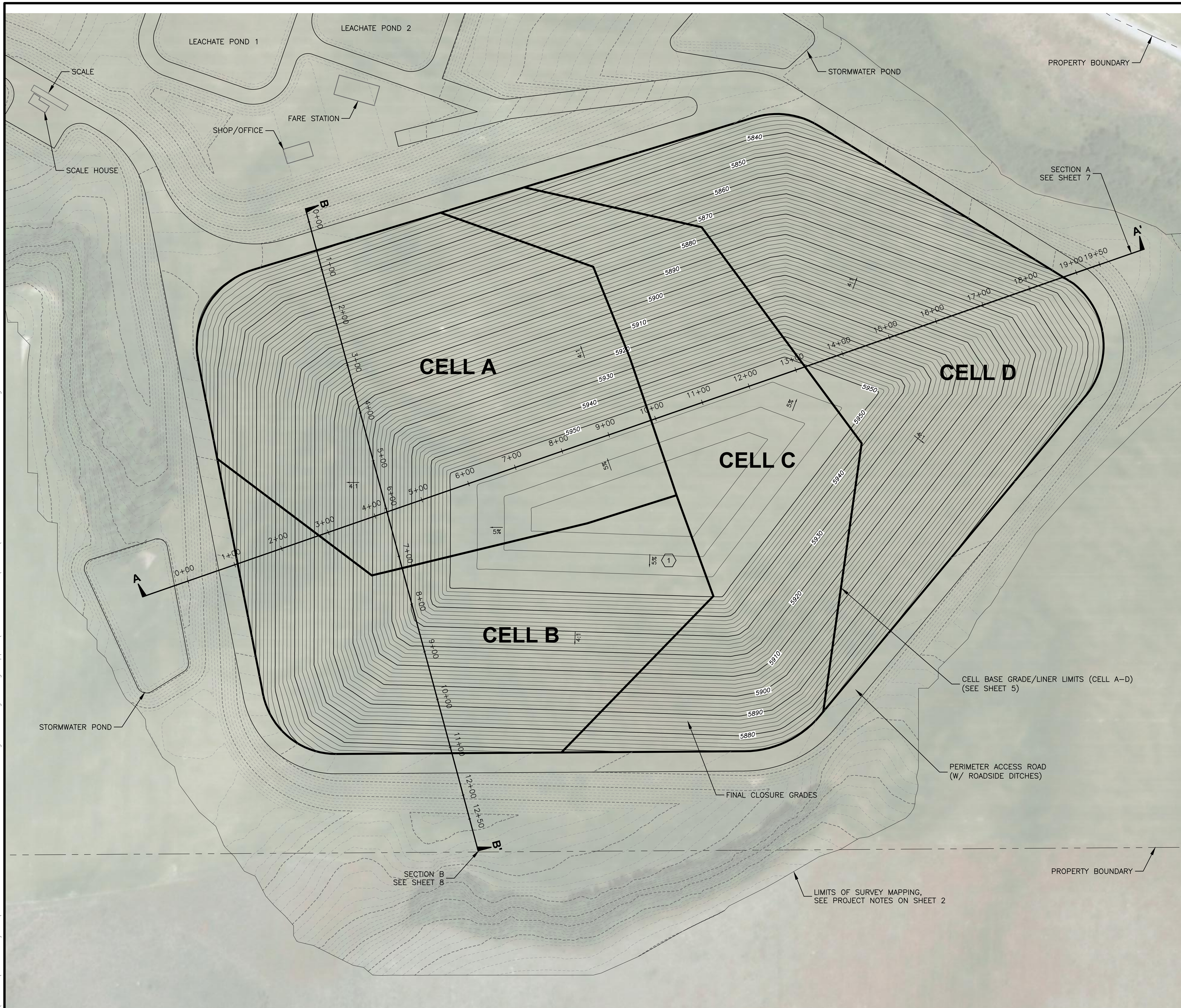
EASTERN IDAHO REGIONAL SOLID WASTE DISTRICT
REGIONAL LANDFILL MASTER PLAN

BASE GRADING PLAN

SHEET NO.
5
OF 8



SHEET NOTES:

1. GRADES SHOWN ARE ON TOP OF WASTE

KEYED NOTES:

1. FINAL CLOSURE GRADES TOP DECK MIN 3% (DESIGN 5% FOR FUTURE SETTLEMENT).

LEGEND

- — — — PROPERTY BOUNDARY
- ——— PROJECT GRADING BOUNDARY

NORTH

0 100 200
SCALE IN FEET

NO.	REVISION DESCRIPTION	BY	DATE
1	RE-GRADE/UPDATED PLAN DRAWINGS	TP	12-29-21

PROJECT: 4-20133
DESIGNED: ML
DRAWN: DB
CHECKED: ML
APPROVED: TP
DATE: DECEMBER 2021

NOT FOR CONSTRUCTION

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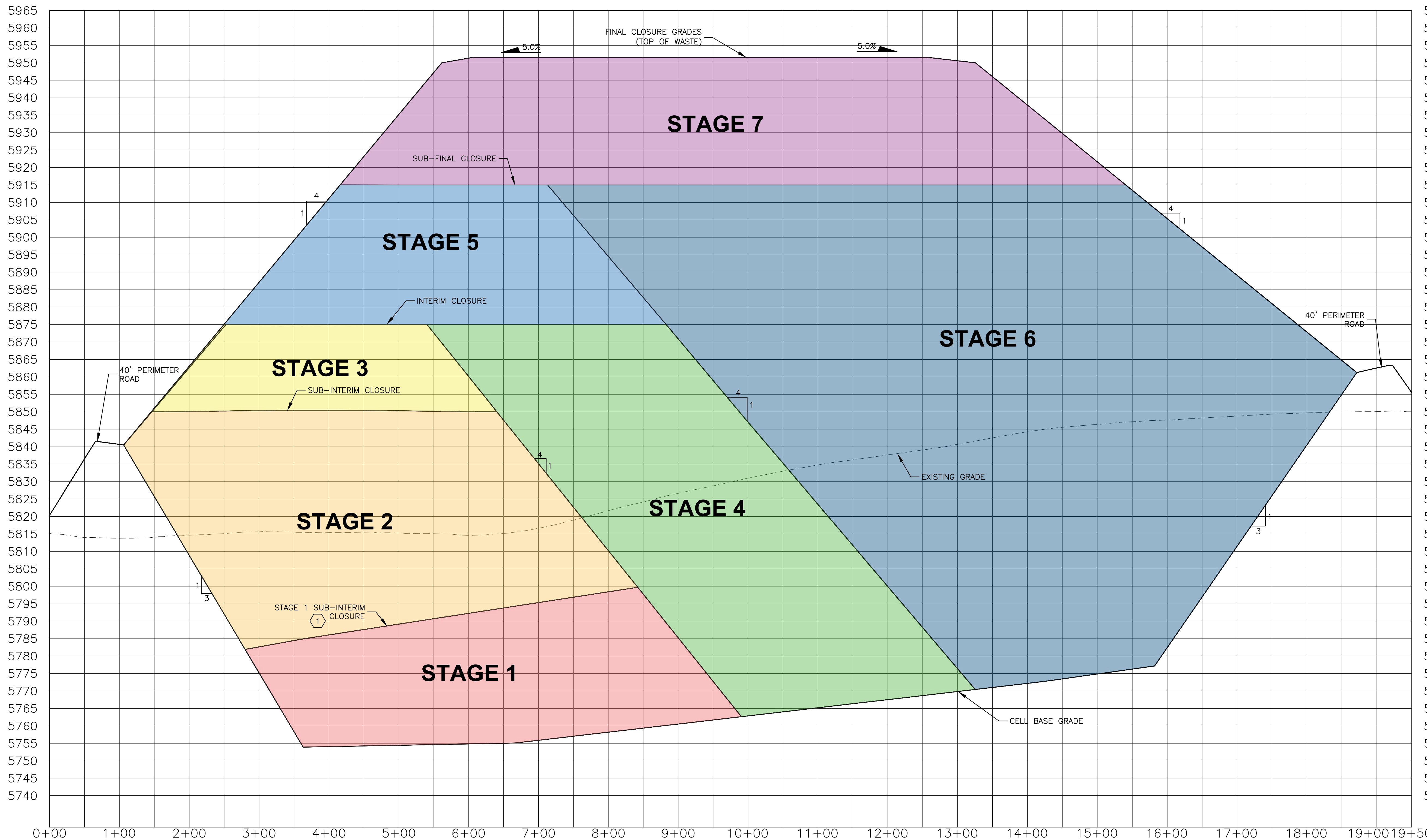
BOISE, ID 83703
(208)576-6646

EASTERN IDAHO REGIONAL SOLID WASTE DISTRICT
REGIONAL LANDFILL MASTER PLAN

FINAL CLOSURE GRADES



SECTION A-A' - STA. 0+00 TO STA. 19+50

HORIZONTAL SCALE: 1" = 150'
VERTICAL SCALE: 1" = 30'

KEYED NOTES:

1. THIS GRADE IS SHOWN LOWER THAN 5850' BECAUSE IT IS CUT ON THE NORTH BACK-SLOPE OF CELL A, MISSING THE TOP FILL GRADE.

NO.	REVISION DESCRIPTION	BY	DATE
1	RE-GRADE/UPDATED PLAN DRAWINGS	TP	12-29-21

PROJECT: 4-20133
DESIGNED: ML
DRAWN: DB
CHECKED: ML
APPROVED: TP
DATE: DECEMBER 2021

NOT FOR CONSTRUCTION

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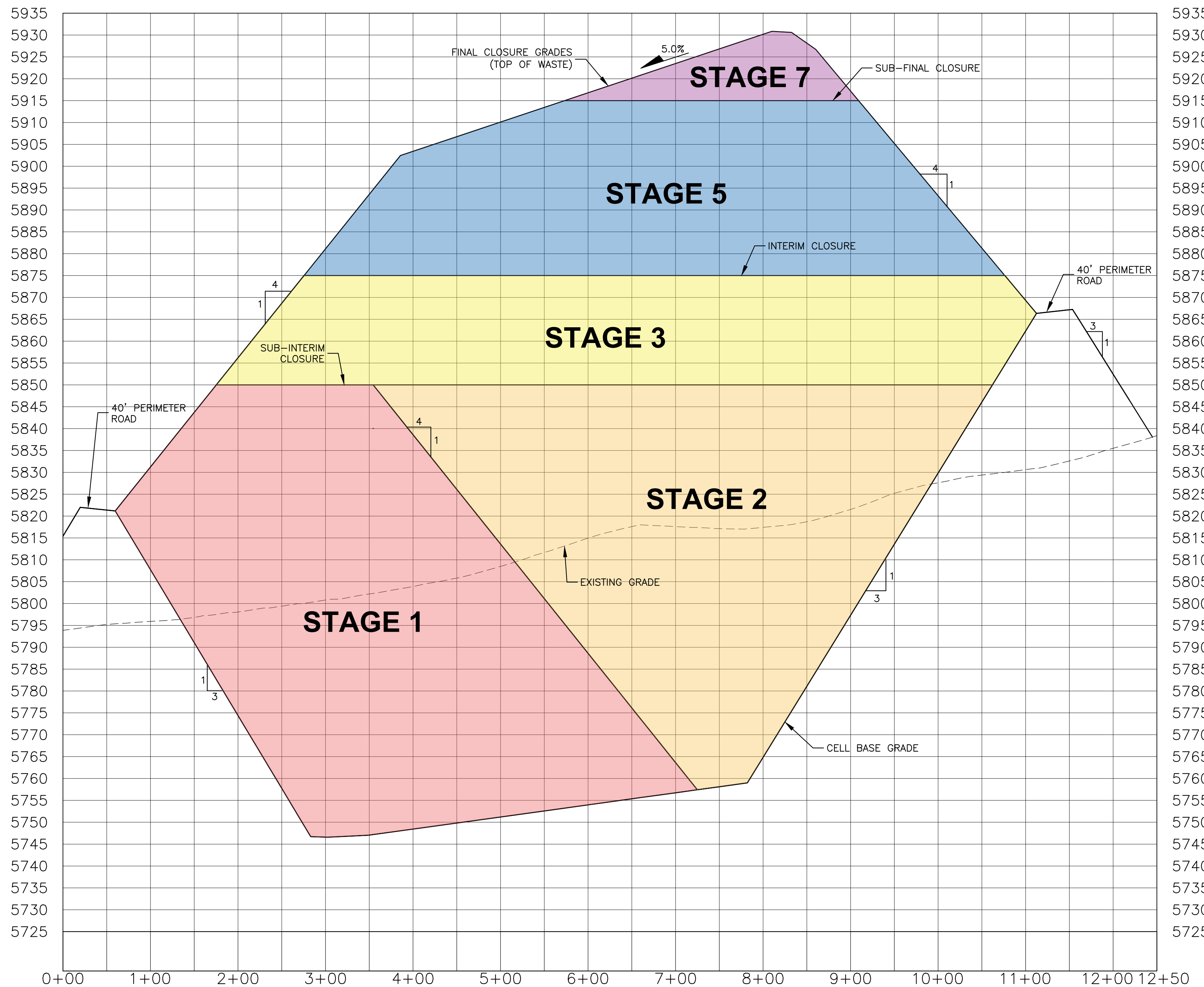
BOISE, ID 83703
(208)576-6646

EASTERN IDAHO REGIONAL SOLID WASTE DISTRICT REGIONAL LANDFILL MASTER PLAN

SECTION A-A'



SECTION B-B' - STA. 0+00 TO STA. 12+50

HORIZONTAL SCALE: 1" = 150'
VERTICAL SCALE: 1" = 30'

SHEET NOTES:

1. STAGES 4 AND 6 ARE NOT SHOWN IN THIS SECTION CUT. SEE SHEET 7.

NO.	REVISION DESCRIPTION	BY	DATE
1	RE-GRADE/UPDATED PLAN DRAWINGS	TP	12-29-21

PROJECT: 4-20133
DESIGNED: ML
DRAWN: DB
CHECKED: ML
APPROVED: TP
DATE: DECEMBER 2021

NOT FOR CONSTRUCTION

GreatWest ENGINEERING
3050 N. LAKEHARBOR LANE SUITE 201
BOISE, ID 83703
(208)576-6646

EASTERN IDAHO REGIONAL SOLID WASTE DISTRICT
REGIONAL LANDFILL MASTER PLAN

SECTION B-B'

Appendices

Appendix A

Geotechnical Investigation Report

Xcell Engineering, LLC
260 Laurel Lane
Chubbuck, ID 83202
Phone (208) 237-5900
Fax (208) 237-5925
E-mail: paul@xcelleng.com

March 9, 2021
P21009

Mr. Kevin Harris
Forsgren Associates
350 North 2nd East
Rexburg, ID 83440

RE: **NEWDALE LANDFILL**
Test Pit Profile and sample
Newdale, Idaho

Kevin:

At your request I have logged and sampled soil from 30 test pits at the subject site. The samples were returned to your office for testing and I have been in contact with your lab manager to discuss sample identification and potential testing. The following summarizes our findings. Please call if you have questions or comments.

Sincerely,

Xcell Engineering, LLC

J. Paul Bastian, PE
Project Engineer

TEST PITS
Soil conditions in this summary are identified in accordance with the Unified Soil Classification System (USCS). The soil profile observed in the test pits was relatively consistent with respect to type of materials encountered. However, there is considerable variability in the geometry of the subsurface profile. Materials consisted of 0.5 to 3.5 feet of clayey, dark brown fine sandy silt underlain by 3 to 16+ feet of light brown fine sandy silt. Clay content in the upper dark brown material and in the underlying lighter material was variable. Maximum clay content in the light brown material was thought to be encountered in test pit 125 as will be verified by laboratory testing. The site is underlain by soft sedimentary sandstone bedrock at depths of 5 to more than 16 feet. In areas where it was encountered the sandstone was observed to be highly fractured exhibiting irregular block failure. The following table provides the depths or profile of the soil/rock types mentioned above by test pit location.

Test Pit No.	Thickness of Topsoil layer (ft)	Depth to rock Contact (ft)	Sampled at Depth (ft)
100	1.5	9	4
101	3.0	15+ No Rock	3 & 6
102	2.5	15+ No Rock	
103	3.5	16+ No Rock	3 & 8
104	2	9.5	1.5
105	2	11	
106	2	14.5	6
107	2	16+ No Rock	8
108	1	12	
109	0.5	16+ No Rock	
110	2	9	
111	2	15 No Rock	8
112	1	8	
113	2	15	
114	2.5	6.3	2 & 4
115	1	6	
116	2	11	2
117	2	16 No Rock	8
118	2	16 No Rock	10
119	2	6.5	
120	2	8	6
121	2	11	7
122	3	5	
123	3	9.5	2
124	2	12	2 & 6
125	2	16 No Rock	
126	2	16 No Rock	
127	2	14	
128	2	16 No Rock	10
129	2.5	16 No Rock	8

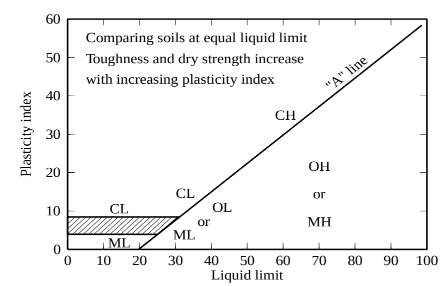
Competence and rock quality designation (RQD) of the underlying bedrock increased within the upper 2-3 feet. Based on the materials observed the rock may be excavated with difficulty using conventional excavation equipment. Composition of the underlying bedrock was uniform in locations where it was encountered. Based on the composition and uniformity of material it is highly probable that the entire site is underlain by the rock. Absence of rock in the test pits is only an indicator that depth to rock exceeds the maximum depth of exploration (16’) possible by the track hoe used to excavate the test pits. This information is provided as “preliminary in nature” and is indicative of surface conditions on the site. Prior to plan preparation deeper and more detailed exploration is recommended. If, during testing, there are questions or you require more information, please call.

Paul

Unified Soil Classification

Field Identification Procedures - (Excluding particles larger than three inches and basing fractions on estimated weights)				Group Symbol (a)	Typical Names	Information Required for Describing Soils	Laboratory Classification Criteria		
Coarse Grained Soils: More than half of material is larger than No. 200 Sieve Size (b)	Gravels - More than half coarse fraction is larger than 1/4 "	Clean Gravels - (little or no fines)	Wide Range in grain size and substantial amounts of all intermediate particle sizes	GW	Well graded gravels, gravel sand mixtures, little or no fines	Give typical name;indicate approximate percentages of sand and gravel; maximum size; angularity, surface condition and hardness of the coarse grains; local geologic name and other pertinent descriptive information; symbols in ( ). For undisturbed soils add information on stratification, condition, cementation and moisture. EXAMPLE: Silty SAND - (SM) - Light brown, medium dense to dense, damp to moist. Moderately cemented from 2-3 feet, roots to 1 foot.	Use grain size distribution curve to verify fractions as identified in the field	Determine percentages of gravel and sand from grain size distribution curve. Depending on percentage passing the No. 200 sieve soils are classified as follows: Less than 5% = GW, GP, SW, SP More than 12% = GM, GC, SM, SC 5% to 12% are borderline cases requiring use of dual symbols	(Cu=D60/D10)>4 Cc=(D30)^2/(D10*D60) between 1&3
			Predominantly one size or a range of sizes with intermediate sizes missing	GP	Poorly graded gravels, gravel sand mixtures, little or no fines				Not meeting all the requirements for GW
		Gravels with fines- (appreciable amount of fines)	Non plastic fines (for identification procedure see ML below)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures				Atterberg limits below "A" line or PI<4; Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
			Plastic fines (for identification procedure see CL below)	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures				Atterberg limits above "A" line with PI>7
	Sands - More than half coarse fraction is smaller than 1/4 "	Clean Sands (little or no fines)	Wide Range in grain size and substantial amounts of all intermediate particle sizes	SW	Well graded sands, gravelly sands, little or no fines				(Cu=D60/D10)>6 Cc=(D30)^2/(D10*D60) between 1&3
			Predominantly one size or a range of sizes with intermediate sizes missing	SP	Poorly graded sands, gravelly sands, little or no fines				Not meeting all the requirements for SW
		Sands with fines (appreciable amount of fines)	Non plastic fines (for identification procedure see ML below)	SM	Silty sands, poorly graded sand-silt mixtures				Atterberg limits below "A" line or PI<4; Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
			Plastic fines (for identification procedure see CL below)	SC	Clayey sands, poorly graded sand-clay mixtures				Atterberg limits below "A" line with PI>7

Fine-grained soils: More than half the material is smaller than the No. 200 sieve	Identification Procedures on Fraction Smaller than No. 40 Seive	Dry Strength	Dilatancy	Toughness	Group Symbol	Typical Names	Information Required for Describing Soils
	Silts and clays liquid limit less than 50	None to slight	Quick to slow	None	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sand with slight plasticity	Give typical name;indicate degree and character of plasticity, amount and max size of coarse grains; color when wet, odor, local geologic name, any other information. For undisturbed soil add information on structure, stratification, consistency in undisturbed and remolded states and moisture. EXAMPLE: Clayey SILT -(ML)- brown, stiff to very stiff, moist, (loess).
		Medium to high	None to very slow	Medium	CL	Inorganic clays of low to medium plasticity, lean clays, may be gravelly, sandy or silty.	
		Slight to medium	Slow	Slight	OL	Organic silts and organic silt-clays of low plasticity	
	Silts and clays liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium	MH	Inorganic silts micaceous or diatomaceous fine sandy or silty soils, elastic silts	
		High to very high	None	High	CH	Inorganic clay of high plasticity, fat clays	
		Medium to high	None to very slow	Slight to medium	OH	Organic clays of medium to high plasticity	
Highly Organic Soils	Readily identified by color, odor, spongy feel and frequently y fibrous texture				Pt	Peat and other highly organic soils	



Plasticity chart
for laboratory classification of fine grained soils

XCELL ENGINEERING LLC

"Building on Excellence"

USCS: Plate 2

Appendix B

Life Cycle Analysis

EIRSWD Landfill

District-Only (W/ No Waste Partners)

GreatWest ENGINEERING

Inputs/Assumptions (Color Coded):

In-place Waste Density = 1,200

Description	Volume	Fill Sequence
Airspace in Cell A to El. 5,840' (cy) =	827,000	Stage 1
Airspace in Cell B to El. 5,840' (cy) =	876,000	Stage 2
Airspace Cells A & B to El. 5,865' (cy) =	262,000	Stage 3
Airspace in Cell C to El. 5,865' (cy) =	1,330,000	Stage 4
Airspace Cells A - C to El. 5,905' (cy) =	575,000	Stage 5
Airspace in Cell D to El. 5905' (cy) =	2,463,000	Stage 6
Airspace Cells A - D to Final Closure (cy) =	598,000	Stage 7
Total Airspace in Landfill (cy) =	6,931,000	

Period	Year End	Waste Disposed (tons)	Waste Vol (cy)	Cumulative Waste Vol (cy)	Est. Stage Airspace Remaining (cy)	Est. Total Landfill Airspace Remaining (cy)
1	2023	10,644	17,739	17,739	**809,261**	6,913,261
2	2024	43,488	72,479	90,219	736,781	6,840,781
3	2025	44,423	74,038	164,256	662,744	6,766,744
4	2026	45,380	75,634	239,891	587,109	6,691,109
5	2027	46,362	77,270	317,160	509,840	6,613,840
6	2028	47,367	78,945	396,105	430,895	6,534,895
7	2029	48,397	80,662	476,767	350,233	6,454,233
8	2030	49,452	82,420	559,187	267,813	6,371,813
9	2031	50,533	84,222	643,409	183,591	6,287,591
10	2032	51,640	86,067	729,476	97,524	6,201,524
11	2033	52,775	87,958	817,435	9,565	6,113,565
12	2034	53,938	89,896	907,331	**795,669**	6,023,669
13	2035	55,129	91,881	999,212	703,788	5,931,788
14	2036	56,349	93,915	1,093,126	609,874	5,837,874
15	2037	57,599	95,998	1,189,125	513,875	5,741,875
16	2038	58,880	98,134	1,287,258	415,742	5,643,742
17	2039	60,193	100,321	1,387,579	315,421	5,543,421
18	2040	61,538	102,563	1,490,142	212,858	5,440,858
19	2041	62,916	104,859	1,595,001	107,999	5,335,999
20	2042	64,327	107,212	1,702,214	786	5,228,786
21	2043	65,774	109,624	1,811,837	**153,163**	5,119,163
22	2044	67,257	112,095	1,923,932	41,068	5,007,068
23	2045	68,776	114,626	2,038,558	**1,256,442**	4,892,442
24	2046	70,332	117,221	2,155,779	1,139,221	4,775,221
25	2047	71,927	119,879	2,275,658	1,019,342	4,655,342
26	2048	73,562	122,603	2,398,261	896,739	4,532,739
27	2049	75,237	125,395	2,523,656	771,344	4,407,344
28	2050	76,953	128,255	2,651,911	643,089	4,279,089
29	2051	78,712	131,187	2,783,098	511,902	4,147,902
30	2052	80,514	134,191	2,917,288	377,712	4,013,712
31	2053	82,361	137,269	3,054,557	240,443	3,876,443
32	2054	84,254	140,424	3,194,981	100,019	3,736,019
33	2055	86,194	143,656	3,338,637	**531,363**	3,592,363
34	2056	88,182	146,969	3,485,607	384,393	3,445,393
35	2057	90,219	150,365	3,635,971	234,029	3,295,029
36	2058	92,306	153,844	3,789,816	80,184	3,141,184
37	2059	94,446	157,410	3,947,226	**2,385,774**	2,983,774
38	2060	96,639	161,064	4,108,290	2,224,710	2,822,710
39	2061	98,886	164,810	4,273,100	2,059,900	2,657,900
40	2062	101,189	168,648	4,441,748	1,891,252	2,489,252
41	2063	103,549	172,582	4,614,330	1,718,670	2,316,670
42	2064	105,968	176,613	4,790,943	1,542,057	2,140,057
43	2065	108,447	180,745	4,971,689	1,361,311	1,959,311
44	2066	110,988	184,980	5,156,669	1,176,331	1,774,331
45	2067	113,592	189,320	5,345,989	987,011	1,585,011
46	2068	116,261	193,769	5,539,758	793,242	1,391,242
47	2069	118,997	198,328	5,738,085	594,915	1,192,915
48	2070	121,800	203,000	5,941,086	391,914	989,914
49	2071	124,674	207,790	6,148,875	184,125	782,125
50	2072	127,619	212,698	6,361,573	**569,427**	569,427
51	2073	130,637	217,729	6,579,302	351,698	351,698
52	2074	133,731	222,886	6,802,188	128,812	128,812
53	2075	**77,288**	128,813	6,931,000	0	0

EIRSWD Landfill

District W/ Waste Partner (Teton County, ID)

Inputs/Assumptions (Color Coded):

In-place Waste Density = 1,200

Description	Volume	Fill Sequence
Airspace in Cell A to El. 5,840' (cy) =	827,000	Stage 1
Airspace in Cell B to El. 5,840' (cy) =	876,000	Stage 2
Airspace Cells A & B to El. 5,865' (cy) =	262,000	Stage 3
Airspace in Cell C to El. 5,865' (cy) =	1,330,000	Stage 4
Airspace Cells A - C to El. 5,905' (cy) =	575,000	Stage 5
Airspace in Cell D to El. 5905' (cy) =	2,463,000	Stage 6
Airspace Cells A - D to Final Closure (cy) =	598,000	Stage 7
Total Airspace in Landfill (cy) =	6,931,000	

Period	Year End	Waste Disposed (tons)	Waste Vol (cy)	Cumulative Waste Vol (cy)	Est. Stage Airspace Remaining (cy)	Est. Total Landfill Airspace Remaining (cy)
1	2023	13,323	22,206	22,206	**804,794**	6,908,794
2	2024	54,455	90,758	112,964	714,036	6,818,036
3	2025	55,645	92,741	205,705	621,295	6,725,295
4	2026	56,863	94,771	300,476	526,524	6,630,524
5	2027	58,110	96,851	397,327	429,673	6,533,673
6	2028	59,388	98,980	496,307	330,693	6,434,693
7	2029	60,697	101,162	597,469	229,531	6,333,531
8	2030	62,038	103,396	700,865	126,135	6,230,135
9	2031	63,410	105,684	806,549	20,451	6,124,451
10	2032	64,817	108,028	914,577	**788,423**	6,016,423
11	2033	66,257	110,428	1,025,005	677,995	5,905,995
12	2034	67,732	112,887	1,137,892	565,108	5,793,108
13	2035	69,243	115,405	1,253,298	449,702	5,677,702
14	2036	70,791	117,985	1,371,283	331,717	5,559,717
15	2037	72,376	120,627	1,491,910	211,090	5,439,090
16	2038	74,000	123,334	1,615,244	87,756	5,315,756
17	2039	75,664	126,106	1,741,349	**223,651**	5,189,651
18	2040	77,367	128,945	1,870,295	94,705	5,060,705
19	2041	79,113	131,854	2,002,149	**1,292,851**	4,928,851
20	2042	80,900	134,834	2,136,983	1,158,017	4,794,017
21	2043	82,732	137,886	2,274,869	1,020,131	4,656,131
22	2044	84,607	141,012	2,415,881	879,119	4,515,119
23	2045	86,529	144,215	2,560,096	734,904	4,370,904
24	2046	88,498	147,496	2,707,592	587,408	4,223,408
25	2047	90,514	150,857	2,858,449	436,551	4,072,551
26	2048	92,580	154,299	3,012,748	282,252	3,918,252
27	2049	94,696	157,826	3,170,575	124,425	3,760,425
28	2050	96,864	161,439	3,332,014	**537,986**	3,598,986
29	2051	99,084	165,140	3,497,154	372,846	3,433,846
30	2052	101,359	168,932	3,666,087	203,913	3,264,913
31	2053	103,690	172,817	3,838,903	31,097	3,092,097
32	2054	106,078	176,796	4,015,699	**2,317,301**	2,915,301
33	2055	108,524	180,873	4,196,571	2,136,429	2,734,429
34	2056	111,029	185,049	4,381,620	1,951,380	2,549,380
35	2057	113,597	189,328	4,570,948	1,762,052	2,360,052
36	2058	116,227	193,711	4,764,659	1,568,341	2,166,341
37	2059	118,921	198,202	4,962,861	1,370,139	1,968,139
38	2060	121,682	202,803	5,165,664	1,167,336	1,765,336
39	2061	124,510	207,516	5,373,180	959,820	1,557,820
40	2062	127,407	212,345	5,585,526	747,474	1,345,474
41	2063	130,376	217,293	5,802,819	530,181	1,128,181
42	2064	133,417	222,362	6,025,180	307,820	905,820
43	2065	136,533	227,555	6,252,736	80,264	678,264
44	2066	139,726	232,876	6,485,612	**445,388**	445,388
45	2067	142,996	238,327	6,723,939	207,061	207,061
46	2068	**124,237**	207,061	6,931,000	0	0

Appendix C

Engineer's Opinions of Probable Construction Costs

OPINION OF PROBABLE CONSTRUCTION COST

GreatWest ENGINEERING

PROJECT	PROJECT NO.	DATE
EIRSWD Landfill Cell A	**4-20133**	**12/30/2021**

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
	General Conditions				
1	Bonds, Insurance, Mobe, Demobe, and Contract Closeout	1	LS	$ 189,000	$ 189,000
2	Temporary Facilities, Controls, Survey, Contractor's QC	1	LS	$ 151,000	$ 151,000
	Subtotal				**$ 340,000**
	Landfill Cell A				
3	Site Clearing and Preparation	16	ACRE	$ 2,500	$ 40,250
4	Topsoil Stripping and Stockpiling	52,000	CY	$ 1.35	$ 70,200
5	General Excavation	820,556	CY	$ 1.25	$ 1,025,695
6	Embankment Fill	127,199	CY	$ 2.25	$ 286,198
7	General Stockpile Fill	693,357	CY	$ 1.00	$ 693,357
8	Subgrade Preparation for Liner	56,901	SY	$ 0.50	$ 28,451
9	60-mil HDPE Geomembrane	56,901	SY	$ 5.50	$ 312,956
10	GCL	56,901	SY	$ 5.75	$ 327,181
11	Sand Drainage Layer (w/ Strip Drains)	28,451	CY	$ 20.00	$ 569,010
12	Leachate Collection Trenches (Toes and Central)	1,955	LF	$ 65.00	$ 127,075
13	Leachate Cleanouts	950	LF	$ 30.00	$ 28,500
14	Leachate Pump Station	1	LS	$ 40,000	$ 40,000
15	Leachate Gravity Main	400	LF	$ 75.00	$ 30,000
16	Leachate Forcemain Main	350	LF	$ 30.00	$ 10,500
17	Electrical Systems and Controls (Allowance)	1	LS	$ 25,000	$ 25,000
18	Build Perimeter Access Roads / Road Side Ditches	4,444	SY	$ 22.00	$ 97,778
19	Stormwater / Drainage Controls (Allowance)	1	LS	$ 50,000	$ 50,000
20	Hydroseed / Permanent Stabilization	10	ACRE	$ 2,200	$ 22,000
	Subtotal				**$ 3,784,149**

CONSTRUCTION SUBTOTAL		**$ 4,124,149**
CONTINGENCY	15.0%	$ 618,622
DIRECT CONSTRUCTION COSTS		**$ 4,742,772**
ID Sales Tax	6.0%	$ 94,855
Total Project (rounded)		**$ 4,838,000**

Travis Pyle, PE

ESTIMATE BY:

Michelle Langdon, PE

CHECKED BY:

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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT	PROJECT NO.	DATE
EIRSWD Landfill - Leachate Ponds / Support Fac.	4-20133	12/30/2021

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
	General Conditions				
1	Bonds, Insurance, Mobe, Demobe, and Contract Closeout	1	LS	$ 62,000	$ 62,000
2	Temporary Facilities, Controls, Survey, Contractor's QC	1	LS	$ 49,000	$ 49,000
	Subtotal				**$ 111,000**
	Leachate Ponds/Ops Road/Shop Area Earthwork		Leachate Ponds (Acres) =		3
3	Site Clearing and Preparation	10	ACRE	$ 2,500	$ 24,000
4	Stockpile Stripping and Stockpiling	31,000	CY	$ 1.35	$ 41,850
5	General Excavation	60,000	CY	$ 1.25	$ 75,000
6	Embankment Fill	9,200	CY	$ 1.75	$ 16,100
7	Stockpile Fill	50,800	CY	$ 1.25	$ 63,500
8	Subgrade Preparation for Liner	14,520	SY	$ 0.50	$ 7,260
9	60-mil HDPE Geomembrane (Primary)	14,520	SY	$ 5.50	$ 79,860
10	Composite Drainage Net	14,520	SY	$ 7.00	$ 101,640
11	60-mil HDPE Geomembrane (Secondary)	14,520	SY	$ 5.50	$ 79,860
12	Secondary Containment Manhole / Leak Detection System	1	LS	$ 20,000	$ 20,000
13	Electrical Systems and Controls (Allowance)	1	LS	$ 25,000	$ 25,000
14	Build Ops Access Roads / Road Side Ditches	11,556	SY	$ 22.00	$ 254,222
15	Stormwater / Drainage Controls (Allowance)	1	LS	$ 20,000	$ 20,000
16	Hydroseed / Permanent Stabilization	3	ACRE	$ 2,200	$ 6,600
	Subtotal				**$ 808,292**
	Main Access Road / Scale/Scalehouse				
17	Site Clearing and Preparation	5	ACRE	$ 2,500	$ 13,000
18	Stockpile Stripping and Stockpiling	17,000	CY	$ 1.25	$ 21,250
19	General Excavation	0	CY	$ 1.25	$ -
20	Embankment Fill	128,000	CY	$ 1.75	$ 224,000
21	Stockpile Fill	0	CY	$ 1.25	$ -
22	Electrical Systems and Controls (Allowance)	1	LS	$ 35,000	$ 35,000
23	Build Access Roads / Road Side Ditches	6,000	SY	$ 22.00	$ 132,000
24	Stormwater / Drainage Controls (Allowance)	1	LS	$ 15,000	$ 15,000
25	Hydroseed / Permanent Stabilization	4	ACRE	$ 2,200.00	$ 8,800
	Subtotal				**$ 414,800**

CONSTRUCTION SUBTOTAL		**$ 1,334,092**
CONTINGENCY	15.0%	$ 200,114
DIRECT CONSTRUCTION COSTS		**$ 1,534,206.06**
ID Sales Tax	6.0%	$ 30,684
Total Project (rounded)		**$ 1,565,000**

Travis Pyle, PE

ESTIMATE BY:

Michelle Langdon, PE

CHECKED BY:

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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT	PROJECT NO.	DATE
EIRSWD Landfill Cell B	4-20133	12/30/2021

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
	General Conditions				
1	Bonds, Insurance, Mobe, Demobe, and Contract Closeout	1	LS	$ 120,000	$ 120,000
2	Temporary Facilities, Controls, Survey, Contractor's QC	1	LS	$ 96,000	$ 96,000
	Subtotal				**$ 216,000**
	Landfill Cell B				
3	Site Clearing and Preparation	12.5	ACRE	$ 2,500	$ 31,250
4	Topsoil Stripping and Stockpiling	40,000	CY	$ 1.35	$ 54,000
5	General Excavation	447,000	CY	$ 1.25	$ 558,750
6	Embankment Fill	108,000	CY	$ 2.25	$ 243,000
7	General Stockpile Fill	341,000	CY	$ 1.00	$ 341,000
8	Subgrade Preparation for Liner	41,952	SY	$ 0.50	$ 20,976
9	60-mil HDPE Geomembrane	41,952	SY	$ 5.50	$ 230,736
10	GCL	41,952	SY	$ 5.75	$ 241,224
11	Sand Drainage Layer (w/ Strip Drains)	20,976	CY	$ 20.00	$ 419,520
12	Leachate Collection Trenches (Toes and Central)	1,025	LF	$ 65.00	$ 66,625
13	Leachate Cleanouts	1,250	LF	$ 30.00	$ 37,500
14	Leachate Pump Station	0	LS	$ 40,000	$ -
15	Leachate Gravity Main	0	LF	$ 75.00	$ -
16	Leachate Forcemain Main	0	LF	$ 30.00	$ -
17	Electrical Systems and Controls (Allowance)	0	LS	$ 25,000	$ -
18	Build Perimeter Access Roads / Road Side Ditches	5,333	SY	$ 22.00	$ 117,333
19	Stormwater / Drainage Controls (Allowance)	1	LS	$ 20,000	$ 20,000
20	Hydroseed / Permanent Stabilization	5	ACRE	$ 2,200	$ 11,000
	Subtotal				**$ 2,392,914**

CONSTRUCTION SUBTOTAL		**$ 2,608,914**
CONTINGENCY	15.0%	$ 391,337
DIRECT CONSTRUCTION COSTS		**$ 3,000,251**
ID Sales Tax	6.0%	$ 60,005
Total Project (rounded)		**$ 3,060,000**

Travis Pyle, PE

ESTIMATE BY:

Michelle Langdon, PE

CHECKED BY:

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GreatWest ENGINEERING

OPINION OF PROBABLE CONSTRUCTION COST

PROJECT	PROJECT NO.	DATE
EIRSWD Landfill Cell C	4-20133	12/30/2021

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
	General Conditions				
1	Bonds, Insurance, Mobe, Demobe, and Contract Closeout	1	LS	$ 158,000	$ 158,000
2	Temporary Facilities, Controls, Survey, Contractor's QC	1	LS	$ 126,000	$ 126,000
	Subtotal				**$ 284,000**
	Landfill Cell C				
3	Site Clearing and Preparation	10.2	ACRE	$ 2,500	$ 25,500
4	Topsoil Stripping and Stockpiling	33,000	CY	$ 1.35	$ 44,550
5	General Excavation	796,000	CY	$ 1.25	$ 995,000
6	Embankment Fill	108,000	CY	$ 2.25	$ 243,000
7	General Stockpile Fill	689,000	CY	$ 1.00	$ 689,000
8	Subgrade Preparation for Liner	44,975	SY	$ 0.50	$ 22,488
9	60-mil HDPE Geomembrane	44,975	SY	$ 5.50	$ 247,363
10	GCL	44,975	SY	$ 5.75	$ 258,606
11	Sand Drainage Layer (w/ Strip Drains)	22,488	CY	$ 20.00	$ 449,750
12	Leachate Collection Trenches (Toes and Central)	1,000	LF	$ 65.00	$ 65,000
13	Leachate Cleanouts	350	LF	$ 30.00	$ 10,500
14	Leachate Pump Station	0	LS	$ 40,000	$ -
15	Leachate Gravity Main	0	LF	$ 75.00	$ -
16	Leachate Forcemain Main	0	LF	$ 30.00	$ -
17	Electrical Systems and Controls (Allowance)	0	LS	$ 25,000	$ -
18	Build Perimeter Access Roads / Road Side Ditches	3,556	SY	$ 22.00	$ 78,222
19	Stormwater / Drainage Controls (Allowance)	1	LS	$ 20,000	$ 20,000
20	Hydroseed / Permanent Stabilization	2	ACRE	$ 2,200	$ 4,400
	Subtotal				**$ 3,153,378.47**

CONSTRUCTION SUBTOTAL		**$ 3,437,378.47**
CONTINGENCY	15.0%	$ 515,607
DIRECT CONSTRUCTION COSTS		**$ 3,952,985.24**
ID Sales Tax	6.0%	$ 79,060
Total Project (rounded)		**$ 4,032,000**

Travis Pyle, PE

ESTIMATE BY:

Michelle Langdon, PE

CHECKED BY:

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OPINION OF PROBABLE CONSTRUCTION COST

GreatWest ENGINEERING

PROJECT	PROJECT NO.	DATE
EIRSWD Landfill Cell D	4-20133	12/30/2021

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
	General Conditions				
1	Bonds, Insurance, Mobe, Demobe, and Contract Closeout	1	LS	$ 159,000	$ 159,000
2	Temporary Facilities, Controls, Survey, Contractor's QC	1	LS	$ 127,000	$ 127,000
	Subtotal				**$ 286,000**
	Landfill Cell D				
3	Site Clearing and Preparation	11.8	ACRE	$ 2,500	$ 29,500
4	Topsoil Stripping and Stockpiling	38,000	CY	$ 1.35	$ 51,300
5	General Excavation	658,000	CY	$ 1.25	$ 822,500
6	Embankment Fill	14,000	CY	$ 2.25	$ 31,500
7	General Stockpile Fill	646,000	CY	$ 1.00	$ 646,000
8	Subgrade Preparation for Liner	55,125	SY	$ 0.50	$ 27,563
9	60-mil HDPE Geomembrane	55,125	SY	$ 5.50	$ 303,188
10	GCL	55,125	SY	$ 5.75	$ 316,969
11	Sand Drainage Layer (w/ Strip Drains)	27,563	CY	$ 20.00	$ 551,250
12	Leachate Collection Trenches (Toes and Central)	1,250	LF	$ 65.00	$ 81,250
13	Leachate Cleanouts	1,200	LF	$ 30.00	$ 36,000
14	Leachate Pump Station	0	LS	$ 40,000	$ -
15	Leachate Gravity Main	0	LF	$ 75.00	$ -
16	Leachate Forcemain Main	0	LF	$ 30.00	$ -
17	Electrical Systems and Controls (Allowance)	0	LS	$ 25,000	$ -
18	Build Perimeter Access Roads / Road Side Ditches	11,111	SY	$ 22.00	$ 244,444
19	Stormwater / Drainage Controls (Allowance)	1	LS	$ 20,000	$ 20,000
20	Hydroseed / Permanent Stabilization	2	ACRE	$ 2,200	$ 4,400
	Subtotal				**$ 3,165,863.19**

CONSTRUCTION SUBTOTAL		**$ 3,451,863.19**
CONTINGENCY	15.0%	$ 517,779
DIRECT CONSTRUCTION COSTS		**$ 3,969,642.67**
ID Sales Tax	6.0%	$ 79,393
Total Project (rounded)		**$ 4,049,000**

Travis Pyle, PE

ESTIMATE BY:

Michelle Langdon, PE

CHECKED BY:

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OPINION OF PROBABLE CONSTRUCTION COST

PROJECT	PROJECT NO.	DATE
EIRSWD Landfill Closure	**4-20133**	**12/30/2021**

ITEM NO.	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	TOTAL PRICE
	General Conditions				
1	Bonds, Insurance, Mobe, Demobe, and Contract Closeout	1	LS	$ 246,000	$ 246,000
2	Temporary Facilities, Controls, Survey, Contractor's QC	1	LS	$ 197,000	$ 197,000
	Subtotal				**$ 443,000**
	Closure				
3	Site Clearing and Preparation	40.8	ACRE	$ 2,500	$ 102,000
4	Low Perm Soil Layer	132,000	CY	$ 8.00	$ 1,056,000
5	Drain Sand (w/ Strip Drains)	99,000	CY	$ 20.00	$ 1,980,000
6	Topsoil	32,912	CY	$ 5.00	$ 164,560
7	HDPE Cover Liner	197,500	CY	$ 5.50	$ 1,086,250
8	Cover System Anchor Trench	5,025	LF	$ 7.50	$ 37,688
9	Stormwater Control Berms	7,200	LF	$ 22.00	$ 158,400
10	Perimeter Road Grading and Surfacing	22,300	SY	$ 11.00	$ 245,300
11	Hydroseed / Permanent Stabilization	40.8	ACRE	$ 2,200.00	$ 89,760
	Subtotal				**$ 4,919,957.50**

CONSTRUCTION SUBTOTAL		**$ 5,362,957.50**
CONTINGENCY	25.0%	$ 1,340,739
DIRECT CONSTRUCTION COSTS		**$ 6,703,696.88**
ID Sales Tax	6.0%	$ 134,074
Total Project (rounded)		**$ 6,838,000**

Travis Pyle, PE

ESTIMATE BY:

Michelle Langdon, PE

CHECKED BY:

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