LAYON MUNICIPAL SANITARY LANDFILL
ENTRANCE AREA FACILITIES
AND CELLS #1 and #2
LAYON, INARAJAN, GUAM
PROJECT NO. SWMD-09-02

BOOK 4

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Prepared For:
DIVISION OF SOLID WASTE MANAGEMENT
DEPARTMENT OF PUBLIC WORKS
GOVERNMENT OF GUAM

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Pursuant to the Order of the United States District Court of Guam
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LAYON MUNICIPAL SOLID WASTE LANDFILL

Layon, Inarajan, Guam

Prepared for

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DEFINITIONS

ADC	Alternate Daily Cover
GEPA	Guam Environmental Protection Agency
GCCS	Gas Collection and Control System
HDPE	High Density Polyethylene
HELP	Hydraulic Evaluation of Landfill Performance
LCRS	Leachate Collection and Removal System
LFG	Landfill Gas
LL	Liquid Limit
MOLO	Manager of Landfill Operations
MSL	Mean Sea Level
MSW	Municipal Solid Waste
MW	Megawatt
MW-XX	Monitoring Well
NPDES	Non-Point Discharge Elimination System
PI	Plastic Limit
RSL	Regional Screening Levels
Tare Wt	Weight of a vehicle when it is empty
USEPA	United States Environmental Protection Agency
WWTP	Wastewater Treatment Plant

OPERATING PLAN
LAYON MUNICIPAL SOLID WASTE LANDFILL

1. INTRODUCTION

1.1 Purpose and Organization

This Operating Plan has been prepared to provide operating guidelines for the proposed Layon Municipal Solid Waste Landfill. It addresses all operational requirements for solid waste landfills as set forth in the Rules and Regulations of Guam Environmental Protection Agency (GEPA for solid waste landfills (Title 22, Division 4, Chapter 23). The Plan is organized in the following sections

Section 2	General Site Description
Section 3	Site Development Plan
Section 4	Personnel and Equipment
Section 5	Operational Procedures
Section 6	Maintenance and Control
Section 7	Emergency Procedures
Section 8	Inspections
Section 9	Record Keeping
Section 10	Reporting

Significant secondary documents are contained as appendices at the back of the Plan.

1.2 Regulatory Compliance

Layon Municipal Solid Waste Landfill will operate in compliance with all applicable regulatory requirements and permits including the following:

Permit	Agency	Permit No.	Date Issued
Solid Waste Facility Permit	Guam Environmental Protection Agency	TBD	TBD
Air Pollution Control Permit	Guam Environmental Protection Agency	TBD	TBD
Surface Water Discharge (NPDES) Permit	Guam Environmental Protection Agency	TBD	TBD

2. GENERAL SITE DESCRIPTION

2.1 Location

Layon Municipal Solid Waste Landfill is located approximately 1.5 miles west of the village of Maloloj in Inarajan, Guam. Layon is located in the higher badland areas on the west side of the Dandan parcel, southwest of the former NASA tracking station. The landfill site will be accessed from Route 4 by approximately 3.3 miles of reconstructed or new road consisting of two segments:

- Approximately 1.3 miles of existing Dandan Road that will be reconstructed to provide safe and suitable access for heavy trucks; and
- Approximately 2.0 miles of new road.

2.2 Owner and Operator

The site owner at the present time is the Government of Guam, Department of Public Works. The site operator is yet to be determined as of May 2009.

2.3 User Population

Layon Landfill will receive waste from throughout Guam, primarily by transfer trucks delivering waste from transfer stations located at various locations around the island. The site will also be capable of receiving waste from public and commercial collection vehicles. In the event public convenience centers or transfer stations are unable to serve the needs of residential self-haulers, the landfill may also accept refuse from the public.

2.4 Site Size, Elevation and Limits

The site selected for the Layon Municipal Solid Waste Landfill is approximately 317-acres in size. The refuse footprint is designed to cover 127.4 acres, with the balance used for facilities, stormwater ponds and buffer area. Pre-development topography is irregular, with elevations ranging from approximately 280 feet to 400 feet above mean sea level (msl). Proposed final grades of the landfill will reach a maximum elevation of 470 feet msl.

2.5 Types and Quantities of Waste

Layon Landfill proposes to be permitted to accept for disposal non-hazardous municipal solid waste (MSW). MSW will be received from residential, commercial and industrial sources.

Layon Landfill also proposes to be permitted to receive for disposal certain non-hazardous wastes managed under special operating procedures. These special wastes

include, but are not limited to, wastewater treatment sludge, treated medical waste, grit, and non-hazardous, inorganic filter cake.

The site is projected to begin operations in mid-2010 with waste volumes at an annual rate of approximately 152,000 tons per year, which is equivalent to approximately 485 tons per day on a 6 day/week basis. Total capacity of the site is estimated at 9,485,276 tons of waste based on the data presented in Table 1.

It is anticipated that minor amounts of non-disposable unacceptable wastes will be delivered to the site in mixed waste loads. Such wastes, including bulk green waste, tires, and white goods (major appliances), will be temporarily stored and removed from the site as described in Section 5.7 below.

2.6 Climate

Rainfall totals in the vicinity of the proposed landfill site average between 90 and 105 inches per year. Guam has distinct wet and dry seasons. Approximately 70 percent of the rainfall is recorded during the wet season (July through December) with the remainder during the dry season (January through June).

The design storm for purposes of surface water management requirements GEPA regulations §23309, consisting of the 24-hour, 25-year return event, is 20 inches of rain.

2.7 Surrounding Area

Layon Landfill is located on and surrounded by undeveloped property approximately ½ mile from the former NASA tracking station and about 1.5 mile from Malolojo village. The nearest developed property is the former NASA station and agricultural areas located to the east.

2.8 Topography and Surface Features

The site ranges from gentle sloping and hilly savannah to steeply incised erosional features with no vegetation. The savannah is covered with thick, tall grasses and shows evidence of former farming in the gently sloping areas. There exist small patches of isolated forest trees and associated vegetation along the western mid-section of the site with wetlands in the northwestern and northeastern areas. Large areas of the central and southern parts of the site consist, however, primarily of deeply weathered exposures of basaltic lava flows with little to no vegetation present.

Ground elevations on the proposed landfill property range from 270 feet to 400 feet above mean sea level (MSL). Prevailing elevations generally slope from approximately 350 feet at the north boundary to approximately 270 feet MSL at the south boundary. The most prominent topographic feature is a steeply eroded hill area in the central east side of the site, rising to approximately 400 feet MSL.

Site investigations identified eight (8) wetland areas surrounding the site, as shown on Figure 1. The site is also proximate to three identified intermittent riverbeds. A portion of the Fintasa River lies within the westerly site boundary; the Tinago River originates and runs just outside the easterly boundary; and the Fensol River is shown on maps to originate in the southeast corner of the landfill property. All three of these designated streams are intermittent in the vicinity of the site, containing flow only during the rainy season

2.9 Geology and Soils

The geology at the site is comprised of the Umatac Formation (Tracey, et al., 1964). Of the four members within this formation, only the Bolanos pyroclastic member is present at the site. The Bolanos member consists of thick-bedded to massive water-laden tuff breccia, thin-bedded tuffaceous sandstone, and lenses of volcanic conglomerate. In the Dandan area, bedded tuffaceous sandstone and lenses of volcanic conglomerate are common.

The lava flows of the Dandan member are especially prominent at the site. Major lava boulder fields are thought to be residuals of the weathered flows and occupy a significant portion of the highest elevations at the site. The existing boulders range in diameter from less than one foot to more than 20 feet and show that the flows covered most of the area from the crest of the nearby mountains to the limestone that fringes the coast.

The site is generally underlain by a weathered soil of volcanic origin, consisting of a reddish brown to mottled reddish purple to yellow orange green brown black clayey silt. Near-surface soils generally range from soft to very stiff in the upper approximately 30 feet of depth below existing ground surface. Limited areas of the site contain substantially harder soils between approximate elevation 345 to 300 feet MSL. Unweathered hard volcanic rock generally underlies the site at depths below elevations 3000 to 270 feet MSL.

Soils are generally characterized by relatively high in-situ moisture content, or about 40 to 80 percent, and low dry unit weights, or about 50 to 80 pcf. Fines contents range from approximately 50 to nearly 100 percent. Liquid Limit (LL) values range from approximately 60 to 90 while Plastic Limit (PL) values were range from approximately 22 to 50. In most cases the soils are fine-grained soils classified as elastic silt (MH).

2.10 Hydrogeologic Conditions

Groundwater elevations below the site are generally shallow, ranging from elevations 330 to 290 based on the findings of the hydrogeologic investigations by the TG Engineers team Groundwater elevations generally decrease from north to south across the site. The northerly half of the site also appears to overlie a groundwater mound, with elevations decreasing from the center of the site toward the east, west and south.

Detailed information on hydrogeology of the site is contained in the Final Integrated Hydrogeologic Assessment, dated 11/26/2008, by AMEC Geomatrix, Inc.[1]

Groundwater samples collected during the Geomatrix field program during 2007 provide a preliminary indication of groundwater quality below the site. The study concluded that shallow groundwater conditions beneath the planned landfill footprint can generally be described as reducing, as evidenced by negative ORP (oxygen reduction/redox potential) and low dissolved oxygen values, and the elevated concentrations of iron and manganese. Shallow groundwater at several wells (MW-12, MW-13, MW-14A, MW-15, MW-16, and MW-20) has iron and manganese concentrations that exceed the U.S. EPA and/or the World Health Organization secondary drinking water criteria for these elements. The iron concentration at MW-22 also exceeds these criteria, and manganese exceeds the criteria at MW-19A.

Groundwater samples collected at shallow/deep monitoring wells MW-17A/MW-17B exceed the U.S. EPA and WHO primary drinking water criteria for arsenic with concentrations of 0.012 mg/L and 0.024 mg/L, respectively. The concentrations of boron, barium, and nickel, measured at well MW-16, also exceed the WHO criteria set for these elements. However, the concentrations are very close to the standards and the iron concentration at MW-16 was very high (310 mg/L), which could potentially have biased the analytical results. No VOCs, organochlorine pesticides, chlorinated herbicides, mercury, or cyanide were detected in any of the wells.

Several new groundwater monitoring wells will be established, and additional sampling and analysis of background levels of groundwater quality will be conducted prior to operation of the landfill, in conformance with the Site-Specific Groundwater Monitoring Plan.[2]

[1] AMEC Geomatrix, Inc. Final Integrated Hydrogeologic Assessment, Layon Municipal Sanitary Landfill Site, Inarajan, Guam. November 26, 2008.
[2] TGE Engineers, PC. Site-Specific Groundwater Monitoring Plan, Layon Municipal Sanitary Landfill, Inarajan, Guam. May 2009

3. SITE DEVELOPMENT PLAN

3.1 Landfill Master Plan

3.1.1 Landfill Footprint and Site Boundary

The proposed landfill footprint is shown on Figure 1, the overall site plan. It is generally based on conceptual layouts presented in the site selection and environmental documents, with adjustments made primarily to avoid impacting the identified wetland areas. The total area within the waste footprint is approximately 127.4 acres, slightly less than that listed for design Alternative 3 in the Final Supplemental Environmental Impact Statement.

The total site area is approximately 317-acres, which provides a buffer zone of approximately 200 to 500 feet around most of the landfill waste footprint.

3.1.2 Base and Final Grading Plan

Liner Grades

Figure 2 shows the liner grades for the complete refuse footprint, divided into 11 "cells" and 5 drainage areas for leachate collection. The floor is graded at 1% in the direction of the leachate collection trenches and pipes, and over 2% on cross-slopes. Liner sideslopes are constructed at 3:1 grades. Leachate collection sumps are designed at elevations below the surrounding liner floor elevation, as described in Section 3.4 below.

The landfill bottom is generally designed to follow the underlying shallow groundwater contours. Separation between groundwater and the liner system will be maintained by a system of subdrains installed below the liner system as described in Section 3.5 below.

Figure 2 also shows the conceptual grading for perimeter roads and for sedimentation ponds to be constructed around the periphery of the waste footprint to manage surface water runoff.

Final Grades

Figure 3 shows the recommended final refuse grades for the entire site. It indicates 4:1 sideslopes and a top deck graded at 4%. The maximum elevation is 470 feet MSL, including final cover soil.

3.1.3 Disposal Capacity

The total airspace capacity of the landfill as represented by the final grades of Figure 3 is approximately 15.8 million cubic yards, exceeding project requirements of a minimum of 14 million cubic yards. Disposal capacity was estimated by computing the volume contained between the final grades and liner grades using earthwork design software, and

then calculating the waste disposal capacity taking into account the volume that will be occupied by final cover soil, leachate collection gravel and protective cover soil above the liner. The results are as follows:

Gross airspace	17,247,565cubic yards
Less final cover	(822,155)
Less protective soil 127.4 acres @ 3 ft	(616,616)
Net airspace	15,808,794 cubic yards

3.1.4 Soil Balance

The soil excavation and fill quantities required to construct the liner grades, perimeter roads and sedimentation ponds shown on Figure 2 are calculated using earthwork design software. Results are as follows:

Cut	4,886,000 cubic yards
Fill	628,000
Net cut	4,258,000 cubic yards

The soil balance for the site is computed assuming a 4:1 ratio of waste to cover soil (5:1 airspace: cover soil), as follows.

Airspace available for waste and cover soil	15,809,000 cubic yards
Cover soil required (20% of total airspace)	3,162,000
Final cover soil	822,000
Protective cover soil over liner	617,000
Total soil requirement	4,601,000 cubic yards
Soil available from excavation	4,258,000
Net soil surplus (deficit)	(343,000) cubic yards

This is an acceptably close balance at this stage of design and project development, well within the range of uncertainties in the assumptions and calculations going into the analysis. Soil balance computations will be frequently updated during the life of the site based on annual surveys of airspace and soil usage, with grading and fill plans adjusted accordingly.

3.2 **Landfill Phasing Plan**

This section describes the phasing plan for development of the landfill. It includes an analysis of airspace and capacity for each phase of development, estimated soil stockpile volumes and a projected schedule of cell development construction projects.

Initial construction will include disposal Cells 1 and 2, and sedimentation Ponds 2 and 3-A. Subsequent disposal cells will be constructed in sequence, at intervals of 2 to 5 years.

Airspace capacity for each phase was calculated assuming 4:1 interim slopes and maximum final grades as indicated for the entire site in Figure 3. Earthwork quantities required for excavation of each cell were computed assuming 3:1 cut and fill slopes. Soil quantities required for daily and intermediate cover were computed assuming 20% of the airspace is occupied by cover soil. Disposal capacity and life of each phase was calculated assuming waste disposal volumes provided by DPW and an in-place waste density of 1,200 pounds of solid waste per cubic yard of airspace consumed.

Table 1 presents the projected waste volumes for air airspace use by year, based on estimates by the Guam Department of Public Works. Estimates of capacity, earthwork and soil stockpile requirements for each phase are presented in Table 2, including the approximate year when each phase would be constructed.

Among the information provided in Table 2 is the soil stockpile volume that should be planned for. During the initial construction of Cells 1 and 2, a stockpile will be constructed in the areas of Cell 5 and Cell 7. This soil will be used as cover during fill operations in Cells 1-4. Stockpile requirements will be negligible until construction of Cell 8, at which time a second stockpile will be placed above the final refuse grades of Cells 1-6. This stockpile will be used for partial final closures and eventual final closure of the entire landfill.

Figures 13.1 Thru 13.12 indicate the cell filling sequence and the attached table on each figure indicates the cumulative volume of waste towards the end of each year.

3.3 Liner System

The liner system selected for the facility in consultation with USEPA and Guam EPA provides two liners and leachate collection systems, and exceeds Guam and federal design requirements for environmental protection. Figure 4 presents details showing the enhanced composite liner systems on the cell floor, side slopes and leachate collection sump areas, as described below.

3.3.1 Floor Liner System

The floor liner and LCRS system consists of the following layers, listed from bottom to top:

- Prepared subgrade below the subdrain system
- Geocomposite subdrain drainage layer
- 12 inches compacted native soil
- 24 inches low-permeability soil (maximum 1.0×10^{-6} cm/sec)
- 60-mil HDPE geomembrane
- Geocomposite secondary LCRS drainage layer
- 80-mil HDPE geomembrane
- Geocomposite primary LCRS drainage layer

- 3 ft. protective soil layer
- 12-mil scrim-reinforced polyethylene rain cap

3.3.2 Slope Liner

The slope liner system consists of the following layers, listed from bottom to top:

- Prepared subgrade
- 24 inches low-permeability soil (maximum 1.0 x 10^{-6} cm/sec)
- 60-mil HDPE geomembrane
- Geocomposite secondary LCRS drainage layer
- 80-mil HDPE geomembrane
- Geocomposite primary LCRS drainage layer
- 3 ft. protective soil layer
- 12-mil scrim-reinforced polyethylene rain cap

3.3.3 Leachate Collection Sumps

The five leachate collection sumps indicated on Figure 2 are composed of the following layers, from bottom to top:

- Prepared subgrade below the subdrain system
- 48 inches low-permeability soil (maximum 1.0 x 10^{-6} cm/sec)
- Two layers of 60-mil HDPE geomembrane
- 16-ounce per square yard non-woven geotextile
- 18 inches of 1½ inch minus gravel (secondary LCRS sump)
- Two layers of 80-mil HDPE geomembrane
- 16-ounce per square yard non-woven geotextile
- Five (five) feet of 1½ inch minus gravel (primary LCRS sump)
- 16-ounce per square yard non-woven geotextile
- Protective soil or soil plug to elevation of adjacent perimeter road in immediate vicinity of the LCRS riser pipes.

3.4 Leachate Collection and Management System

3.4.1 Leachate Collection

Prior to the 2006 design submittal, the TGE team evaluated two alternative approaches for the leachate collection and removal system (LCRS) on the floor of the lined disposal cells. The first system considered was use of a 12-inch thick granular drainage layer consisting of 2-inch-minus gravel. This conventional system is generally preferred wherever acceptable aggregate material is available at reasonable cost. However, all aggregate produced on Guam is created by crushing limestone rock. The resulting material contains carbonate that is subject to degradation under the acidic conditions

created by landfill leachate. Accordingly, the design is based on constructing the LCRS using geosynthetic materials.

The primary LCRS design as shown on Figure 4 consists of a geocomposite drainage blanket above the floor and slope liner systems, with interception trenches containing gravel and perforated pipes at intervals on the floor. The secondary LCRS is a geocomposite located between the upper and lower geomembranes, and also has interception trenches and pipes located below the primary LCRS trenches. Gravel in the LCRS trenches will be specified as "non-carbonaceous", and will likely have to be imported from off-island.

Based on computer modeling using the USEPA-sanctioned HELP Model, the facility is expected to produce a maximum of approximately 39,300 gallons per day of leachate during the operational life of the landfill. The peak leachate volume from Phase 1 during the first 5 years of operation is estimated to be approximately 13,500 gallons per day, with average values substantially less.

Of the total leachate produced, based on the computer modeling an average of approximately 8 percent is expected to pass through the primary geomembrane liner and be collected in the secondary LCRS. This is a normally expected event, due to the absence of a second layer of liner material below the primary liner, which is placed directly above the secondary LCRS geocomposite. All leachate collected in the secondary LCRS will be commingled with liquid from the primary LCRS and piped to the Inarajan Treatment Plant.

The system as designed is capable of maintaining hydraulic head of less than 12 inches above the liner system under all conditions. Three feet of protective soil will be placed above the geocomposite on the floor, and two feet of protective soil will be placed above the geocomposite on the sideslopes.

3.4.2 Leachate Collection Sump and Riser

As shown on Figure 2, five (5) sumps will be constructed to serve the eleven cells. The sump bottoms will be depressed below the surrounding elevation of the cell, and each sump will be sized to hold a liquid volume equal to or greater than the estimated peak daily leachate generation, and a minimum of one week's average leachate generation from the tributary area of the sump. The initial sump to be constructed to serve Cells 1 and 2 has been designed based on analysis using the HELP (Hydraulic Evaluation of Landfill Performance) computer model using Guam weather data and assumptions approximating those under which the leachate generation would be maximized. Subsequent sumps will be designed using leachate generation data from actual operations at the site.

An enhanced liner system will be installed below the sump to compensate for the potential of the sump to contain more than 12 inches of leachate. The thickness of the low-permeability soil liner will be increased from two feet to four feet, and two layers of

60-mil HDPE geomembrane will be installed. The secondary LCRS collection area is covered with18 inches of non-calcareous gravel. The secondary LCRS sump is equipped with a 10-inch HDPE sideslope riser pipe.

Above the gravel in the secondary sump are a layer of geotextile, two layers of 80-mil HDPE geomembrane and a layer of 16-ounce per square yard geotextile. Five feet of a non-calcareous granular drainage media is placed above the geotextile to form the collection area for the primary LCRS. A vertical leachate collection riser pipe will be installed in the primary LCRS sump area, supported by a reinforced concrete foundation placed above the gravel bed. A berm of compacted soil is placed above the sump gravel next to the riser pipe to fully encase the pipe to the elevation of the adjacent liner anchor trench, creating an operational pad between the riser and the liner edge. All leachate handling activities will be performed in this area, which is located above the composite liner system. Figure 5 illustrates the sump and riser pipe design as applied to the sump serving Cells 1 and 2.

3.4.3 Leachate Management

Submersible pumps will be placed at the bottom of the primary and secondary sump riser pipes to remove leachate from the sump and transfer it to an above-ground, 12,000-gal holding tank located on the adjacent operational pad created by the soil berm. Leachate will be transferred from the tank to the Inarajan Sewage Treatment Plant (STP) by a new pipeline, with combined gravity and pumped sections, to be constructed as part of the landfill project. An automatic control system will be installed to operate the submersible pumps to maintain acceptable liquid levels in the sump, to prevent overfilling of the leachate tanks, and to attempt to equalize the leachate flow on the STP. Refer to Appendix G, subsections 5.3 - 5.5 for the storage, pumping system and control concepts. The construction contractor will be required to complete the final design with the selected equipment manufacturer and provide details with shop drawings.

Regarding LCRS sump storage capacity and system redundancy, the LCRS facilities have significant storage capacity in the sump areas as noted in 5.4.2 (Appendix G, Book 2). Using the numbers from the LCRS Addendum 1 Memorandum, the primary LCRS sump has storage capacity approximately equal to approximately 15-days assuming peak leachate flow rates. The above-ground, 12,000-gal holding tank was sized equal to approximately 1-day of peak leachate flow, this volume is sufficient since there is the large storage capacity available in the sump. Pump Station No. 1, beginning the new pipeline from the sump to the Inarajan WWTP, has a duplex pump system with the 2-pumps alternating operations and providing backup in the event one pump is temporarily down.

The Inarajan STP is anticipated to receive and treat all leachate generated from the landfill throughout its foreseeable life. Improvements to the Inarajan STP will be made prior to discharge of leachate at the plant. Pretreatment at the landfill is not required prior to discharge to the Guam Waterworks Authority (GWA) System. As soon as available, and prior to the issuance of the Final Solid Waste Facility Permit, an agreement

between GWA and the Permittee concerning the terms and conditions for accepting the leachate will be provided to GEPA.

Based on oral discussion with GWA, the anticipated agreement is expected to include the following principles:

1. Long Term Normal Operations – The Inarajan STP will receive all leachate generated at the landfill without pretreatment at the landfill.
2. Changes in GWA/Permittee Agreement that result in pretreatment, other management practices, or changes at the Layon Facility - The Permittee will work with GWA to develop an implementation schedule for compliance with changes that are required by GWA. If such changes result in consequent revisions to this operations plan for the landfill, pending GEPA approval or permit modification, the Permittee expects GWA will continue receiving leachate from the landfill at the Inarajan STP or other GWA facility.

For short term emergency events which halt or interrupt the Long Term Normal Operations, above, the Permittee will implement one or all of the following short term contingency measures:

1. Onsite storage of Leachate in existing leachate storage tanks.
2. Onsite storage of Leachate in the existing LCRS sump. The leachate will be stored within the existing LCRS sump for a period not to exceed 15 peak flow day volumes (13,500 gallons per day) during the operation of Cells 1 and 2. Storage will not be allowed to exceed the regulatory standard of 30 centimeters of head over the liner.
3. Off -Site Trucking. Once the onsite storage volume is met, the Permittee expects that the Inarajan STP shall resume receiving trucked leachate from the landfill at this or another GWA facility.

The Permittee will amend this operation plan, as appropriate or as required by GEPA to reflect any changes in the management of leachate.

The peak time for leachate generation is when rainy periods coincide with the first stage of operations in a newly constructed cell, before a significant thickness of waste and daily cover soil is placed across the cell floor. To minimize leachate during these times, each new cell will be covered with a sacrificial geomembrane rain cover. Waste disposal operations will begin in the up-slope areas of each new cell, with the rain cover in the active area removed or destroyed in place by landfill equipment before waste is placed over it. Soil berms will be maintained in the active area to prevent runoff that has contacted waste from running onto the remaining intact rain cover. Stormwater runoff on the rain cover will be collected at the low point of the cell and pumped to the stormwater system.

Once the entire cell floor is covered with an initial lift of refuse, subsequent rainfall will create far less leachate than if significant areas are covered only with protective soil, allowing percolating rainfall to enter the LCRS sump.

3.5 **Subdrains**

Subdrains will be installed below the liner system to manage shallow groundwater and maintain a minimum of 6 feet of separation between the groundwater surface and refuse. Figures 6 and 7 show the proposed subdrain system for Cells 1 and 2.

Due to the low hydraulic conductivity of on-site soils (on the order of 0.0005 cm/sec), the subdrain system has been designed using a continuous geocomposite drainage blanket across the entire cell floor. Water collected in the geocomposite will drain toward gravel-filled trenches with perforated HDPE pipes locate below the LCRS trenches and sumps.

Subdrain construction will proceed in the following steps:

- The cell floor will be excavated to grades one foot below the design bottom of the low-permeability soil liner (three feet below the liner grades shown on the drawings).
- Perimeter and interceptor trenches will be excavated.
- Geotextile lining will be placed in the trenches, followed by the perforated HDPE subdrain pipe.
- Geocomposite will be deployed across the cell floor, terminating inside the interception trenches.
- Trenches will be backfilled with gravel, and a layer of geotextile placed over them.
- A one-foot layer of native soil will be placed over the geocomposite and trenches.
- The 2-feet thick low-permeability soil liner will then be constructed.

This system will ensure a separation between groundwater and overlying units as follows:

- One foot from the bottom of the soil liner;
- Three feet from the geomembrane; and
- Six feet from refuse

Subdrain pipes installed in the trenches will be of perforated HDPE. The Phase 1 pipe will become a solid pipe after it passes under the lowest point of the cell (under the sump), and continue to a temporary, 5,000-gal storage tank. The storage tank will provide the ability to sample and test the subdrain liquid for potential leachate contamination and allow controlled release of the subdrain liquid.

3.6 Landfill Gas Management

3.6.1 Master Plan

Landfill gas will be managed by installation of horizontal collectors and vertical wells within the refuse, developing a main loop header system, and delivering gas to a central blower and flare station located in the entrance area.

The landfill gas (LFG) Master Plan (A-Mehr, Inc., November 2008) provides details of the methodology and proposed facilities for managing LFG over the life of the site. The plan is summarized below.

The TGE team used the USEPA Landfill Gas Emissions Model (LandGEM), Version 3.02, to estimate the LFG generation potential for the Layon Landfill. LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model inputs are based on USEPA recommendations for wet landfills. The waste disposal volume was assumed to be as presented in Table 1.

The computer modeling results indicate that significant landfill gas generation will begin as early as the second year of operations, and increase sharply thereafter. The model projects a peak generation rate of approximately 4,100 cfm of LFG, of which approximately 50% is expected to be methane, at the end of the site's active life. The volume would then decline quickly during the post-closure years.

LFG will be managed by a collection system expected to collect approximately 75 percent of the gas generated. The collection system will consist of horizontal collectors, placed on the floor of the disposal cells before placement of waste begins, and vertical extraction wells. Gas will be drawn under vacuum from these wells and collectors into a piping network delivering the LFG to a blower system that transfers it to a flare and (eventually) energy recovery facility. Based on projected flows, the primary elements of the piping system will be a 12-inch HDPE gas header loop around the perimeter of the landfill, connected to an 18-inch main that terminates at the blower

The TGE team recommends use of a single flare with a capacity of 4,100 scfm of landfill gas to manage gas by combustion. The flare is able to operate efficiently at 10 percent of its rated maximum capacity, so that its installation can be scheduled relatively early in the life of the site. The initial installation would include two 1,350-scfm blowers capable of handling 2/3 of the total capacity of the flare, with a third blower to be added when the gas generation volume exceeds 50% of the flare capacity.

The following is a potential implementation schedule for the flare installation for the first 25 years of operation:

- 2010 Landfill begins operation
- 2013 Install flare and first two blowers
- 2034 Install third blower

Obviously, the timing and configuration of an energy recovery system will depend on the actual rate of LFG generation, which will be determined on an ongoing basis during the site's operating life.

3.6.2 Phase I Gas Management Facilities

The only gas management facilities to be installed during initial landfill construction will be horizontal collectors consisting of perforated pipes placed within a gravel bed in the protective soil layer on the floor of cells. Figure 8 shows the horizontal collectors planned for Cell 1 and Cell 2. Horizontal collectors provide a means of collecting gas generated in the early stages of filling each new cell. They also help minimize the migration of gas into the leachate collection and removal system (LCRS) below the protective soil

Horizontal collectors are 4-inch perforated HDPE pipes placed above the protective cover soil before waste is placed in the cell. Pipes are placed 150 feet apart across the cell floor, and perforations are spaced to provide uniform vacuum and collection rates across the length of the collector. Each collector has a solid pipe section running up the side slope of the cell, and has a valve and sample port at the location where it ties into the gas header pipe.

Piping systems to collect and deliver gas from the Phase 1 horizontal collectors will be constructed at the time the flare system is installed. This is projected to occur in the fourth year of site operations, or approximately 2013 based on the landfill gas generation estimates.

3.7 **Perimeter Roads and Drainage Facilities**

Two major roads will be developed in the landfill footprint area. During the initial mass grading construction project planned for 2009, a temporary landfill operations road will be constructed generally through the center of the site to provide access from the entrance facility to the Phase 1 disposal area. This road will have two 12-ft. wide travel lanes with 4 ft. shoulders, surfaced with asphalt treated base, and will serve as the primary landfill haul road for at least 10 years, until construction of Cell 5. At that time it will likely be continued for landfill access to disposal areas until completion of the perimeter road system.

A 60-feet wide perimeter road corridor will be constructed in stages as the landfill develops to from the south toward the entrance area. This facility will to serve the following uses:

- Liner anchor trench
- Final cover anchor trench
- Access road surfaced with asphalt-treated base material
- Primary drainage conveyance for landfill runoff (rip-rap lined swales and concrete trapezoidal channels)
- Electric power, leachate, landfill gas and condensate pipe headers placement

Grading for the road is designed as needed to carry stormwater runoff from the landfill footprint to the appropriately located sedimentation basin. The road is designed with the same structural details as the main access road into the site, as described in the following section.

3.8 Surface Water Management

3.8.1 Design Basis

The stormwater conveyance systems will be designed to maintain peak discharges from the landfill site at flow volumes estimated for existing (pre-development) conditions. The flow rate used for this analysis is a 25-year/24-hour storm event that generates 20-inches of rainfall in a 24-hour period (ref: Table 3.3, Guam Stormwater Management Criteria 7/30/04).

3.8.2 Detention / Sedimentation Ponds Design

Final Site Development

As the site develops a total of four sedimentation basins will be constructed adjacent to the perimeter road around the base of the landfill. The discharge from these basins consists of the following:

- Pond 1, Pond 2 and Pond 3A (the westerly half of Pond 3) drain into the Fintasa River watershed
- Ponds 3B will flow into the Fensol River watershed
- Pond 4 will have two discharges, one each to the Tinago and Fensol River watersheds

The tributary areas and peak flows into each pond are estimated as follows:

Pond	Tributary Acres	Peak Flow (cfs)
Pond 1	26	273
Pond 2	46	404
Pond 3A	33	400
Pond 3B	22	184
Pond 4	64	578

Initial construction of Phase 1 of the landfill will include Pond 2 and Pond 3A, which will receive runoff from the constructed landfill area of Cells 1 and 2. Pond 3B will be constructed when Cells 3 and 4 are developed. Ponds 1 and 4 will be developed in the future as landfill cell construction and the permanent perimeter road system are extended northward.

3.8.3 Stormwater Conveyances Design

Final Site Development

Final landfill grades will be constructed at a 4:1 slope from the top deck to the perimeter road. The design will be refined to include benches at 50 foot elevation intervals starting at contour 450 near the top of slope. These features will allow for intermediate collection of runoff to be directed to paved down drain swales that will be designed to reduce flow velocity and ultimately discharge into the roadside ditch. One or more paved and curbed roads will be constructed to the top deck, and will double as access routes and major conveyances for stormwater. These roads and other major downdrains will discharge to culverts leading directly to stormwater ponds.

The perimeter road will have rip-rap lined drainage swales on the inside and outside edges to channel runoff toward the ponds. Cross-drains or swales will be provided to discharge the swales to the ponds. Where warranted, concrete trapezoidal channels will be installed at the outside edge of the perimeter road. Detailed design of drainage structures for future phases will be done as landfill development continues after Phase 1 is placed in operation.

Phase I Site Development

Initial construction of Phase 1 will include disposal Cells 1 and 2, the segments of permanent perimeter road adjacent to them, Pond 2 and Pond 3A. Several cross-drains of the perimeter road drainage swales will be provided to transfer water to the ponds, and a collection basin and culvert will be provided at the discharge point of a future major drainage road to the top deck of the landfill. This structure is being provided with the initial construction in order to avoid future disruption of the electric power and leachate transfer lines being installed in the roadway as part of Phase 1 development.

3.8.4 Erosion and Sediment Control

In addition to the construction and use of sedimentation basins to minimize the discharge of sediment from the site, landfill operations will implement an ongoing program of erosion control best management practices to control erosion and prevent sediment from entering the stormwater system. These practices will be detailed in an annual stormwater management plan to be developed by the operator before the onset of the rainy season each year. Typical measures to be implemented may include the following:

Stockpile Maintenance - Soil stockpiles initially placed during construction phases will be surrounded by silt fencing installed by the contractor. This fencing must be maintained throughout the life of the stockpile, with broken support posts and torn or degraded fabric replaced annually. Soil removed from stockpiles for cover or other uses should be excavated from the top in order to minimize disturbance to sideslopes which are most sensitive to erosion.

Maintenance of Benches on Fill Slopes

As refuse is placed in the landfill, 15-foot wide drainage benches are to be constructed at minimum intervals of 50 vertical feet. Benches are to be sloped inward at a nominal cross-fall of 2 percent and graded at 3 to 5 percent toward a downdrain pipe or drainage road. A graded drainage swale at the toe of the slope should have a sandbag check dam placed at 50 to 100-feet intervals to slow down flow and allow sediment to be deposited. Swales should be cleared of sediment at least once during the rainy season, or as needed.

Fill Slope Erosion Control

Measures should be taken to reduce erosion of cover soil placed on landfill side slopes. This begins with ensuring that interim cover on slopes is thoroughly track-walked with a bulldozer as it is placed. Additional measures should be taken as early as possible in the development process. If shredded green waste mulch is available as excess material from waste diversion programs, it can be spread as an excellent means of erosion control. Mulch is also helpful in establishing temporary vegetation on the slopes.

Sediment Control at Refuse Slope Toe

Silt fencing should be installed at the toe of refuse slopes, both along the landfill perimeter and along temporary interior slopes, to trap sediment eroded from the cover on the side slope and prevent it entering the surface water system. When installed, silt fence must be placed outside the limits of liner, i.e. beyond the anchor trench on the landfill perimeter or beyond the temporary liner termination for temporary interior slopes.

Rain Cap Material Installation on Interim Final Slopes

As cells or areas of the site reach interim capacity, and disposal operations move to newly constructed cells for a period of months or years, the unused areas must be covered with rain cap geomembrane material, both to prevent soil erosion and to minimize leachate generation. Temporary rain cap must be installed according to manufacturers recommendations and design plans prepared by a qualified engineer, based on the actual area to be covered. Typical design features to be specified include anchor trenches (both along and transverse to the slope) and rope-line sandbag anchorages. Where feasible, rain cap material should also be installed on unused top deck interim fill areas.

Temporary Landfill Access Road Sediment Control

The temporary landfill access road is constructed through the center of the undeveloped parts of the future landfill footprint. It contains several culverts that allow surface water from upslope areas, generally on the east side of the road, to drain toward downslope areas and continue the existing natural sheet flow drainage patterns on the site. Annual inspections should identify any erosion rills developing on either side of the culverts, and measures taken to eliminate them. Appropriate measures include placement of sandbag check dams or other obstacles to force drainage to spread out and minimize flow concentrations that cause erosion, or constructing vegetated drainage swales.

3.9 **Ancillary Facilities**

Figure 9 shows the general arrangement of the entrance area where major site facilities will be located. A general discussion of these facilities is presented in the following sections.

3.9.1 Scalehouse / Administration Building

The entrance area will be equipped with two scales in order to serve a full range of customers including commercial refuse collection vehicles, transfer trucks and public self-haulers, if required.

It is anticipated that most vehicles using the site will be repeat customers, and that vehicle tare weights will be established during an initial visit and then kept on file for use in subsequent weighing and billing. Accordingly, a dedicated outbound scale is not needed, and any vehicles needing outbound weighing will circle around the scalehouse for re-weighing on the inbound scales. The entrance area circulation system is designed to accommodate this practice.

The entrance area layout features an integrated scalehouse and administration building. The scale attendant will be stationed adjacent to a window constructed adjacent to the scales at an appropriate height to allow transactions to occur without the truck driver leaving the vehicle. The attendant will be able to perform other administrative functions in addition to scale operation during periods when no truck is at the scales.

In addition to scales and associated computer equipment for records and billing, the scalehouse area of the building will contain the following:

- Closed-circuit television cameras, monitors and recording equipment for surveillance of scalehouse operations. One camera will be mounted to view the vehicle from the front, and another is be mounted on the building or adjacent light pole to view the waste load from the top. The video images are recorded and retained for a minimum 30-day period for use in audits of scalehouse performance or investigations of unauthorized waste delivered to the landfill.

- Radiation monitoring equipment. A detector unit is mounted in the wall of the building or on an external pole, at an elevation and location suitable to detect any significant radioactive source in the incoming waste load. A meter and alarm system alert the scale attendant, who then implements inspection procedures that will be specified in the site's operations manual.

3.9.2 Maintenance Facilities

An area of approximately 4 acres is set aside at the entrance area for maintenance functions. Within this area the following facilities will be provided according to a layout to be developed during final design:

- Maintenance shop containing a minimum of two roofed bays for maintenance and repairs of landfill operating equipment, plus parts storage areas, lubricant storage and dispensing equipment, maintenance manager office and a locker area for mechanics.
- Locker room, restrooms and a meeting / break area for landfill operating personnel including a private office for the landfill operations manager or lead supervisor. These areas would typically be combined with similar functions for maintenance personnel in the maintenance shop building.

- Fueling area, including a storage tank and dispenser for diesel fuel.

- Equipment wash pad with an appropriate wastewater handling system including sediment removal and oil separation.

3.9.3 Water Storage and Emergency Electric Power Generation

A reliable water supply will be needed for potable water needs, sanitary facilities, dust control, construction and fire protection on the site. To accommodate this requirement a water storage tank with 200,000 gallons capacity is to be provided. A nearby pumphouse will supply necessary pressure and flow for fire protection and service requirements to the distribution system.

An emergency power source is being provided to ensure continued and safe operation of the site during power outages. A diesel generator set will be provided at the location of the pumphouse, with necessary controls, switchgear and fuel storage.

3.9.4 Gas Management Facilities

An area of approximately one acre is reserved for installation of equipment for treatment of landfill gas and gas condensate. The landfill gas management facility will include blowers, condensate separation, and a thermal flare for incineration of gas and condensate. Initial elements of this facility are expected to be installed in the third year of site operations (2013 based on a 2010 start date), with additional capacity added from

time to time. The landfill gas master plan also projects establishing a future energy recovery facility in the area.

3.9.5 Entrance Area Roads

The two-way main access road enters the site at a main gate in a chain link fence at the front property line, then splits into separate inbound and outbound roadways. Refuse delivery vehicles proceed directly to the scales, with sufficient length between the gate and the scales to queue as many as 15 large trucks. Visitors or employees make a left turn leading to the parking areas for the administration building or the maintenance building.

From the scales, refuse delivery trucks proceed directly to the main landfill access road from which they access the perimeter road as it is developed, or temporary roads leading to the landfill working face. After discharging their load they return to the perimeter road or landfill access road, thence to the paved exit road between the administration building and maintenance area.

A connecting loop from the outbound road back to the inbound road leading to the scales is provided near the main gate for refuse vehicles needing an outbound tare weight. After the second weighing, the trucks can proceed back to the exit road to leave the site.

Access to maintenance areas and the leachate and gas management area is provided from the landfill access or perimeter roads. The maintenance area will be surfaced with a combination of asphalt paving and gravel travel routes and parking areas for all-weather use by both tracked and wheeled vehicles and equipment, and will be surrounded by a chain link fence.

3.9.6 Site Fencing and Signage

The perimeter of the site will be enclosed by a 6-foot high chain link fence. Additional internal chain link fencing will secure the entrance area.. These fences will deter and prevent unauthorized entry to the site during times with the site is closed. Signs will be placed on perimeter fence at appropriate intervals identifying the site as a restricted entry area.

A sign installed at the gate to the entrance facility will be maintained in good condition and appearance. The sign will identify the site by name, indicate the operating days and hours, waste materials not accepted, disposal rates and the name, address and telephone number of the site operator. It will state that all people entering the facility must check in at the office.

Appropriate directional and safety information will be provided on signs throughout the site. Road signage will indicate direction of traffic flow, warn of heavy equipment crossings and designate speed limits.

3.9.7 Monitoring Facilities

Groundwater Monitoring

The recommended groundwater detection monitoring system for Phase 1 is shown on Figure 10 and described in the Site Specific Groundwater Monitoring Plan. As recommended therein, a groundwater monitoring well network consisting of 13-wells will be installed for the initial phase of development of the landfill. Additional wells will be added to the system as the landfill footprint expands. At full buildout the monitoring network would consist of 12 wells. The initial wells will be installed in 2009 and sampled on a quarterly basis prior to beginning site operations in order to establish the statistical database for the detection monitoring program. In addition, subdrain water discharge points will be monitored at the same frequency as groundwater wells as part of the program.

Surface Water Monitoring

The Site Specific Groundwater Monitoring Plan identifies two stream monitoring locations to be sampled a minimum of four times prior to initiation of site operations. These points, one on the Fintasa River and one on the Fensol River, will continue to be monitored on a quarterly basis, provided they are flowing, after disposal operations begin on the landfill.
Additional surface water monitoring will be conducted as provided in the site's approved Storm Water Pollution Prevention Plan and NPDES permit.

Landfill Gas Monitoring

Figure 11 shows the proposed landfill gas monitoring network to be installed at full buildout. Gas probes are located near the site boundary at intervals of approximately 1,000 feet. Each probe is completed to a depth corresponding to the elevation of the nearest area of the landfill floor. Probes located where the surface elevation is within 10 feet of the bottom elevation of waste will be completed with a single screened section located 5 to 10 feet below ground. Probes at higher elevations will be constructed with two screened sections separated by a bentonite plug, with one at 5 to 10 feet below surface and the other at the elevation of nearest waste or 20 feet below surface, whichever is deeper. All gas probes will be constructed above the expected highest elevation of groundwater. Initial site development will include installation of three gas monitoring probes (GP-1 through GP-3) as shown on Figure 11.

4. PERSONNEL AND EQUIPMENT

4.1 Personnel

4.1.1 Type and Number of Personnel

The site operator will provide sufficient operating personnel to safely and efficiently receive, compact and cover the waste received, maintain site facilities in good working condition, and meet all regulatory performance and reporting requirements. The following list is a suggested staffing assignment for the facility

General Manager	1
Operations Manager	1
Environmental Engineer	1
Lead Operator / Supervisor	1
Heavy Equipment Operators	2
Utility (Light Equipment) Operator	2
Laborers / spotters	3
Mechanic	1
Scalehouse Attendant / Clerk	3
Total Personnel	15

Section 4.2.2 below specifies the minimum number of operating personnel who must be assigned to the active disposal area at various levels of waste intake. Appendix A contains descriptions for the above positions, including information on the duties and qualifications for each.

4.1.2 Training

As part of its management responsibilities, the operator should provide training for all new employees and conduct annual refresher training sessions for all employees to establish and maintain a high level of employee understanding of safety procedures, waste acceptance policies and emergency action plans.

Annual training for supervisors, equipment operators, spotters and other personnel involved in disposal site operations and maintenance will include sessions to familiarize them with the contents of the Operations Plan. Copies of applicable portions of the Operations Plan will be available for employees to review and refer to as needed, and employees will be informed of their responsibilities to implement procedures specified in the Plan.

Specific topics for training for all employees shall include:

- Identification and management of hazardous waste and unacceptable wastes;

- Management of asbestos-contaminated materials
- Health, safety and security;
- Emergency response;
- Environmental compliance

Specialized training will be provided to operational personnel with primary or backup responsibilities for:

- Scalehouse operations;
- Waste compaction and covering;
- Leachate management system operations and maintenance;
- Landfill gas management; and
- Environmental monitoring

Key supervisory personnel will receive advanced training in landfill management. The site shall be supervised at all times by an individual who has completed the Manager of Landfill Operations (MOLO) training provided by the Solid Waste Association of North America, or its equivalent in educational or experience as approved by Guam EPA.

4.2 Equipment

4.2.1 Equipment Inventory

The inventory of equipment at Layon Landfill must be adequate to handle the daily volume of waste accepted for disposal at the site, and to conduct the ongoing transport and application of cover soil. Recommended equipment, including spare units for critical equipment, is:

- Two (2) Caterpillar 826C compactors or equivalent – used to push and compact MSW prior to application of daily cover.

- Two (2) Caterpillar D-8 bulldozers or equivalent – used to push, compact and cover MSW, and for excavation and construction activities.

- Two (2) dump trucks – used to deliver cover soil to the active face and for general construction and utility work on the site.

- One (1) Front end loader – used to load cover soil into dump trucks and for general construction and utility work on the site.

- One (1) Motor grader – used for maintenance of roads, drainage ditches, berms and other site features.

- One (1) Water truck – used for dust control on roads and the landfill area, and for fire control.

- Auxiliary equipment – portable light plants, pickup trucks, pumps, etc.

4.2.2 Equipment Deployed at the Working Face

The Operations Manager is responsible for ensuring that sufficient units of equipment and operators are assigned to the active disposal area in order to handle the incoming waste stream safely and efficiently. Inadequate numbers of equipment result in unsatisfactory conditions, including slower unloading by customer vehicles, poor compaction, and excessive litter. The operator should implement the following guidelines to ensure that sufficient equipment and personnel are deployed each day.

During periods when the weekly average waste volume is 400 tons per day or less, one bulldozer and one compactor should be located at the working face ready for operation. The working face will typically be about 50 feet wide when the average load is 400 tons per day or less, providing tipping lanes for up to three vehicles to unload at one time. Operators will be assigned to both machines and they will operated during peak hours when it is normal for more than two refuse trucks to be unloading at the same time. During hours when there generally are only one or two trucks unloading at a time, only one dozer or compactor needs to be operated; the other may be parked out of the way and its operator assigned to other duties.

In addition to the dozer and compactor, a water truck and operator should be assigned to the working face throughout the day except on rainy days, to keep the waste and the working area from becoming too dusty. A spotter is also required at all times to direct traffic and monitor incoming waste loads for unacceptable wastes.

If the average daily volume increases to more than 400 tons per day, the working face is expanded and additional tipping lanes provided. Under these conditions, an additional bulldozer or compactor shall be assigned to the working face.

4.2.3 Maintenance

A preventive maintenance program will be implemented in order to minimize equipment downtime and ensure the availability of adequate equipment to manage the waste load. The program will be based on recommendations of the manufacturer of each item of equipment.

5. OPERATIONAL PROCEDURES

The key elements of landfill daily operations include controlling public access, material acceptance, traffic control, waste unloading, compaction and application of cover material.

5.1 Access Control

The Layon Landfill site perimeter will be enclosed by chain link fence. The gate to the main access road is locked when the site is closed. Customers proceed directly to the scalehouse, from which they are directed to the appropriate disposal area where waste is unloaded under the supervision of site personnel. Other visitors are directed to the administrative office. Records of entries by residential and commercial customers are maintained in scale ticket data, and all other visitors are registered on a visitor's sign-in log sheet maintained at the administrative office as a record of entries.

5.2 Hours of Operation

Layon Landfill expects to be open to receive waste seven days per week between the hours of 7:00 a.m. and 5:00 p.m. The site will be closed on Government of Guam Holidays.

5.3 Material Acceptance

This section describes procedures for accepting waste, screening special wastes and excluding hazardous and other unacceptable wastes from disposal at Layon Landfill.

5.3.1 General

When waste transporters arrive at the landfill scalehouse, if the scale attendant has any doubt or concern regarding the acceptability of the material, site supervision is summoned to the scalehouse to inspect the load and determine its acceptability. Section 5.4 describes the Unacceptable Waste Exclusion Program used to prevent the disposal of unacceptable wastes including, but not limited to, hazardous waste, PCB contaminated waste, pesticide containers, liquid waste and asbestos waste. Once a waste load has been determined acceptable, it is weighed and the data entered into the scalehouse records, and the customer is directed to the appropriate disposal area.

5.3.2 Special Wastes

The following types of special waste will be accepted at Layon Landfill only after review and approval by the operator of a special waste application submitted by the customer:

a. Sewage sludge

b. Sandblast grits (include non-hazardous test results)
c. Baghouse dusts
d. Inorganic filter cake
e. Empty containers
f. Treated medical waste

Customers proposing to dispose special wastes at Layon Landfill will be required to submit a Generator's Waste Profile Sheet in advance of delivering the material to the site, and all special waste shipments must be accompanied by a Non-hazardous Waste Manifest form. When a special waste load arrives at the scalehouse, the scale attendant will direct the driver to the landfill office for inspection of the load and accompanying documentation. Once approved by the office, the load will be directed to the working face for disposal. Undocumented special waste loads will be rejected.

Appendix B contains copies of the Generator's Waste Profile Sheet and Non-hazardous Waste Manifest forms.

5.4 **Unacceptable Waste Exclusion Program**

5.4.1 Categories of Unacceptable Waste

Layon Landfill will operate an active program to prevent the disposal of the following categories of waste at the site:

a. Materials of a toxic nature, such as insecticides or poisons
b. Radioactive materials
c. Materials designated as hazardous under 40 CFR Part 261
d. PCB wastes as defined in 40 CFR Part 761
e. Untreated infectious wastes
f. Bulk or non-containerized liquids
g. Bulk green waste
h. Other wastes banned by GEPA regulations
i. Asbestos
j. Debris contaminated with water separation, car and equipment wash liquid
k. Grease trap waste
l. Debris contaminated with underground storage tank and other sludge
m. Resins and chemical debris
n. Petroleum-contaminated soils and other non-hazardous contaminated soils
o. Debris contaminated with diesel fuel
p. Debris contaminated with used oils
q. Debris contaminated with gasoline, jet fuel, or kerosene
r. Paint waste from removal, construction and demolition
s. Treated poles and lumber
t. Off-specification and outdated products

5.4.2 Screening and Excluding Procedures

Procedures to exclude these materials from the site include the following:

Customer notification - By means of published information and the sign at the landfill entry, customers are informed that the site does not accept hazardous or liquid wastes.

Scalehouse monitoring and inspection - Scalehouse attendants will question each incoming customer as to the source and contents of the load. If any suspicious wastes or unusual loads are observed, the gate attendant will reject such wastes or direct the load to the landfill office where supervisors will determine the acceptability of the waste. If hazardous or unacceptable wastes are found or observed in a vehicle during visual monitoring conducted at the landfill gate, landfill personnel will reject the entire load. If possible, educational information on the proper disposal of rejected wastes will be provided to the customer.

Random inspections - A minimum of one random load check will be performed daily. Personnel performing load checks will wear the appropriate personal protective equipment, including steel-toed boots, steel mid-soles, protective suit, gloves, hardhat, and safety glasses. The load check spotter will randomly choose the truck that will receive a load check. The truck will be directed to an area within the active landfill cell that is off to the side of the main working area. After the load has been dumped, the load will be cordoned off using traffic cones. At least one lane on either side of the selected load will be kept clear of any traffic. A second spotter will be present to ensure that no traffic is allowed in the area.

The load check spotter will begin to fill out the random load check form (Waste Screening Check List, contained in Appendix B), asking the appropriate questions of the driver. The load check spotter will then walk around the load looking for any unacceptable waste. After the initial walk around, the spotter will signal for a bulldozer to spread out the load. After the load is spread and the dozer is out of the area, the spotter will use a rake or other appropriate tool to inspect the load for prohibited wastes.

Select load inspections – The select load inspection program is similar in all respects to the random load check, except that selection is not random. The select load inspection program is used for suspicious loads or for customers who have a history of attempting to deliver inappropriate material to the site.

Landfill working face inspections - Equipment operators and spotters at the landfill working face will visually observe the refuse for prohibited wastes as it is being dumped and compacted. Should wastes that contain suspicious-looking materials be observed, trained personnel will be summoned to determine the acceptability of the waste. If the waste is determined to be unacceptable, the waste handling and agency notification procedures described below will be followed.

5.4.3 Management of Unacceptable Wastes

If hazardous or unacceptable wastes are discovered during a random load check or through visual observation during unloading, site personnel will reject such wastes and require the prohibited wastes to be reloaded onto the transporting vehicle. Rejections will be noted on the waste screening form. The transporter is responsible for returning the rejected waste to the generator for disposal. Appropriate health and safety measures will be taken in handling unacceptable wastes, depending on the particular type of waste involved.

If hazardous or prohibited wastes are detected at the working face, and the transporter is unknown, site personnel will attempt to identify the generator or transporter. If these parties can be identified, they will be responsible for removing the unacceptable waste from the landfill for proper disposal. If the generator or transporter cannot be identified, the following steps will be taken:

1. If the hazardous or unacceptable waste is a general household hazardous waste (i.e., paint, solvents, motor oil, insecticides, pesticides, and automobile batteries), trained site personnel will remove these wastes from the face and transport them to a properly licensed facility authorized to accept or dispose of the material.

2. If the characteristics of the waste is unknown, or the waste is perceived to be a safety hazard, the following steps will be taken:

    - Notify the site supervisor of the situation.
    - Secure the immediate and surrounding areas of the waste to establish a safe zone. Other vehicles will be directed to dump in another location.
    - Material being held prior to transport will be coned off and covered with a waterproof covering (plastic film, rain cap material, etc.) until the transporter collects it.
    - The General Manager or Operations Manager will contact a licensed emergency response contractor to respond and manage the removal and disposal of the waste.
    - Notify all required agencies of the incident.

5.4.4 Agency Notification

In the event a hazardous waste or PCB waste discharge is discovered during a random load check or at the working face, a verbal notification will be provided to GEPA within 8 hours, if possible, and no later than 24 hours or the next working day after the occurrence. The Incident and Non-Compliance reports will be prepared as prescribed in Sections 10.1 and 10.2 respectively.

The landfill facility must obtain a Guam EPA Hazardous Waste Generator No. for the occasional handling of hazardous waste.

Twenty-Four Hour Reporting

1. The Permittee shall report to the Administrator any noncompliance which may endanger human health or the environment. Any such information shall be reported orally within twenty-four (24) hours or less from the time the Permittee becomes aware of the circumstances. The oral report shall include the following:
   i. Date, time, and type of incident;
   ii. Name and quantity of materials involved;
   iii. The extent of injuries, in any
   iv. Information concerning release of any hazardous waste, constituents of concerns (COC), or potential constituents of concerns (PCOC) that may endanger public drinking water supplies.
   v. Any information of a release or discharge of hazardous waste, constituents of concerns (COC), or potential constituents of concerns (PCOC) or of a fire or explosion from the solid waste management facility which could threaten the environment or human health outside the facility.

Other Noncompliance

The Permittee shall report all other instances of noncompliance not otherwise required to be reported above at the time monitoring reports are submitted. The reports shall contain the information listed in Permit Condition I.A.19.

5.4.5 Training

Site personnel responsible for load checking or inspections will receive training in the identification of hazardous wastes, worker safety, and procedures to be followed should hazardous wastes be found. This training is included in the landfill's annual employee training program

5.4.6 Records

Records generated relative to this waste exclusion program will be filed in the Landfill's Operating Record and kept for a minimum of three years. Records will be available for inspection by regulatory agencies. Records include:

- Records of special waste approvals, approvals with conditions, and disapprovals
- Load checking data sheets
- Employee training records
- Agency notifications
- Records of unacceptable wastes found at the facility where the generator is unknown, and their disposition

5.5 Traffic Control

Customers entering the site from the main access road will travel approximately 500 feet before reaching the scalehouse, a distance sufficient to queue a minimum of 15 waste delivery vehicles. Signs will direct customers from the front gate to the scalehouse, and from the scalehouse to designated areas for unloading. Signs also are posted to inform customers of on-site speed limits (20 miles per hour). Spotters are posted at key locations as needed to direct traffic to the MSW disposal area, and to direct customers to specific locations for unloading at the active disposal face.

All access roads used by customers are maintained as all-weather roads by surfacing with rock, asphalt or concrete rubble. Roads are graded and watered as needed.

5.6 Waste Unloading and Compaction

5.6.1 General

After being processed at the scalehouse, commercial and industrial haulers will follow designated routes, as delineated by signs, barriers, and cones, and as directed by traffic spotters, to the working face. At the working face, landfill spotters will direct the waste haulers to unload at a specific area. Landfill personnel responsible for traffic control and directing customers in waste unloading areas will be equipped with two-way radios to facilitate coordinated and safe control of traffic.

Landfill personnel will observe the unloading operations to ensure safe operations and monitor the waste for unacceptable materials. They also prevent customers from attempting to salvage materials from waste deposited at the active face. Salvaging is prohibited at the landfill. Random loadchecks will be performed at the active face, as described above.

Waste is unloaded at the working face and spread by compactors and dozers in layers a maximum of 2 feet thick. Compaction of the waste is typically achieved by compactors traversing each layer three to four times while spreading the refuse. Successive layers are compacted to form lifts 12 to 20 feet thick across the working face. Daily cover soil is placed between successive lifts. Trucks deliver daily cover to the refuse disposal area where it is applied by dozers as the lift progresses horizontally.

Whenever possible, the tipping area should be at the lower level of an advancing lift so that the tipping area is within 50 feet of the face. This will limit the length dozers have to push waste, maximizing productivity and decreasing potential for litter. Dozers will push the waste up to the level of the compactor operating to the extent possible on a horizontal ledge of waste where its compactive effort will be most effective.

The number of dozers, compactors and equipment operators to be assigned to the working face will be determined by the Operations Manager based on the average daily

tonnage expected, and on the normal patterns of waste deliveries throughout the day. The key factor in determining how many dozers and compactors are to be operated is the number of customer trucks that are dumping at the same time (the number of unloading lanes or stations in use at one time). The Operations Manager will establish and implement a daily work schedule to ensure that throughout the day the following combination of equipment will be in operation:

If the number of lanes in operation is expected to be:	The equipment being operated will be:
1 or 2 lanes	One bulldozer or compactor
3 or 4 lanes	One bulldozer and one compactor
5 or 6 lanes	Two bulldozers and one compactor

5.6.2 Fill Operations in New Cells

This section addresses two specific aspects of initial waste operations in newly constructed cells: first waste lift placement to prevent damage to the liner system; and operations on rain cap material.

First Waste Lift Placement

The initial lift of refuse in a new cell must be placed with special care to avoid damaging the liner system which is covered with three feet of protective soil. The following general procedures should be adhered to:

- If landfill equipment or waste delivery vehicles are allowed to operate on the protective cover soil, strict attention must be paid to limiting speeds and turns to avoid creating ruts or otherwise damaging the soil cover. Under no circumstances should compactors be allowed on the protective cover.
- In inclement weather, no vehicles should be allowed to operate on the protective cover soil. The native soils that will be used as protective cover will not support vehicle traffic when they become extremely wet, and attempts to operate vehicles on the protective soil surface may result in damage to the liner system. Under these circumstances, vehicles delivering waste must travel across the first lift of waste and dump at the edge of the lift, with waste being spread across the protective soil by bulldozers. A new cell opening during the rainy season may have its entire first lift placed by "floating" it across the cell with both delivery vehicles and landfill equipment operating only on the surface of the waste fill.
- The first lift should be spread across the protective soil in a thick layer, with the bulldozer operating on a minimum of two feet of refuse. Minimal compaction should be attempted, using dozers only.

placed by "floating" it across the cell with both delivery vehicles and landfill equipment operating only on the surface of the waste fill.

- The first lift should be spread across the protective soil in a thick layer, with the bulldozer operating on a minimum of two feet of refuse. Minimal compaction should be attempted, using dozers only.

Operations with a Rain Cap

As a means of minimizing leachate generation during the pre-operational and early stages of operations in a newly constructed cell, new cells will be covered with a sacrificial 12-mil thick rain cap geomembrane. The following guidelines, as illustrated in Figure 12, are to be followed when placing the first lift of refuse in a new cell:

- Waste filling operations will begin the edge or corner of the cell with the highest elevation, and proceed toward the sump or lowest elevation area of the cell.
- On a daily basis, the portion of the rain cap that is to be covered with refuse will be removed, or destroyed by traversing with a bulldozer, prior to placement of refuse. Refuse shall not be placed above an intact area of rain cap, in order to prevent leachate from ponding on the rain cap and potentially migrating to surface water collecting above the rain cap in the lower elevations of the cell.

5.6.3 Special Waste Procedures

Specialized procedures will be used to manage the categories of special waste described in this section, refer to Appendix B for further details.

Dead Animals and Offal

Dead animals and offal (hides, intestines and other waste from slaughtered animals) is not subject to special waste acceptance procedures, but will be identified by the transporter at the scalehouse. Loads known to contain dead animals or offal, and such wastes discovered incidental to other loads after dumping at the active face, will be placed in an area where they can be covered with additional solid waste immediately after being placed. Wherever possible, this will be accomplished by excavating a pit in the solid waste at the working face, placing the animal waste in it, and filling back in with MSW. Any areas that have received animal waste will be covered with daily cover soil at the end of the working day.

Medical Waste

The special waste screening program (Section 5.3) and unacceptable waste exclusion program (Section 5.4) are intended to ensure that no untreated infectious wastes are disposed at Layon Landfill. Only medical wastes that have been rendered non-infectious by incineration or sterilization (by autoclaving) are accepted for disposal. In the event that any "red bag" wastes suspected of being non-treated medical wastes are discovered

Treated medical waste may be handled and covered in the same manner as other municipal solid waste. Typically, however, it is disposed in a trench excavated in waste at the active face, and buried immediately with additional waste to prevent exposure of equipment or personnel to the treated medical waste.

5.6.4 Inclement Weather Operations

In advance of the rainy season, a wet weather pad area and road will be selected each year based on filling plan progress and the approximate waste volume expected during the rainy season. The area will be covered with concrete and asphalt demolition base material, allowing it to be used when rainy weather will not permit vehicle access to the normal working refuse face or when mud would be a nuisance to roads off-site.

5.7 Storage and Disposition of Non-Disposable Waste

Layon Landfill will not accept for disposal by commercial waste haulers the following categories of waste.

- Bulk green waste
- Tires
- White goods (major appliances)

Tires and white goods may occasionally be encountered in mixed loads after they have been dumped at the working face. In these cases, site personnel will remove the materials to designated locations in the unacceptable materials temporary storage area (See Figure 1) for temporary storage. The following guidelines will be implemented for such materials.

Tires shall be stacked in a designated part of the storage area and stored until they are picked up and transported to an approved tire recycler. A maximum of 50 tires may be stored at any time, and all tires shall be removed from the site at intervals of not more than 6 months.

White goods shall also be transferred to the designated unacceptable temporary storage area (See Figure 1) until approved recyclers come to the site to remove them. Appliances are handled and stored in a manner to prevent spills or release of oil, lubricants or CFCs.

Bulk green waste will not be accepted for disposal at Layon Landfill.

The landfill operator will maintain records of off-site shipments of recyclables.

5.8 Interim and Final Cover Plans

5.8.1 Daily and Intermediate Cover

Onsite native, low-permeability soil, used for daily and interim cover, shall be broken up to avoid clumps exceeding cover material gradation requirements by traversing with a bulldozer.

Daily Cover

A minimum of 6 inches of soil is required as daily cover over the working face of the landfill. Layon Landfill will use on-site soil stockpiled during construction of cells, or excavated for future cell construction, for cover soil.

The amount of soil needed to achieve an effective thickness of 6 inches of daily cover will vary depending on several factors, including:

- Compaction of the waste. Well compacted waste will have fewer and smaller voids to be filled with soil.

- Soil characteristics. Sand tends to filter deep into the waste, whereas more silty or clayey soils tend to bridge the voids in the waste surface.

Regardless of the type of soil or degree of compaction, some soil will be lost into voids on the uneven waste surface. Therefore, a volume equivalent to more than 6 inches of soil will need to be placed to achieve an effective thickness of 6 inches of cover above the upper surface of the refuse.

Most landfills operate with a total soil usage defined by a waste: soil ratio in the range of 3:1 to 6:1. A 3:1 waste: soil ratio occurs when one cubic yard of soil is used for each 3 cubic yards of compacted refuse, and is equivalent to $1/4^{th}$ (25%) of the total airspace being filled with soil and 75% being filled with refuse. A 6:1 waste: soil ratio is equivalent to $1/7^{th}$ (14.3%) of the volume being filled with soil.

The following strategies are recommended as a means of minimizing soil use:

- Maximize compaction before application of cover material. In addition to constant attention to compactive effort by dozers and compactors, application of dust control water at the active face will help achieve a compact face with minimum voids for soil to filter into.

- If compost or mulch is approved as an alternative daily cover (ADC), it should be used to the maximum extent possible. Spreading and compacting a layer of mulch before applying soil cover will reduce the amount of soil required to cover the refuse. Advancing temporary refuse slopes may be covered overnight with

mulch ADC and no soil cover, provided additional refuse is placed against it on the following day.

- Supervisors should periodically check the thickness of daily cover soil. This can be done using a shovel, and would be appropriately done at random in the early morning to check the previous day's cover. If more than six inches of soil is found, operating staff should be shown the condition, and encouraged to use no more soil than is necessary.

- Always attempt to recover and reuse intermediate and daily cover when placing a new lift across the top deck of the landfill. A dozer can be used to strip off the previous day's daily cover soil from temporary slopes where refuse will be placed. The stripped daily cover soil can be stockpiled adjacent to the working face. Because the stripped daily cover soil will be contaminated with refuse, this material is not suitable as a replacement for clean daily cover soil. The stripped daily cover soil will be used as a leveling layer prior to clean daily cover soil placement.

- Prior to placing the stripped daily cover soil, the day's working face should be prepared to receive the stripped daily cover soil. The landfill compactor leaves large divots on the surface of the refuse. These divots will absorb a significant quantity of daily cover soil. To reduce the size and quantity of these divots, run a bulldozer over the entire surface, as the cleats on the bulldozer will smooth the surface of the refuse. After the bulldozer has smoothed the entire surface of the refuse, then the bulldozer is to spread stripped daily cover soil over the surface of the refuse. Once the stripped daily cover soil is reinstalled, the clean daily cover soil can be placed.

- Daily and intermediate cover will be broken up prior to the placement of the next lift of waste.

Newly placed daily or intermediate cover soil should be track-walked by a bulldozer after placement. Checks to determine that the minimum 6 or 12 inches of soil are in place should be made after the cover is track-walked.

Layon Landfill may use contaminated soils as daily cover, but only if they have been demonstrated to contain contaminant levels meeting the EPA Region 9 Regional Screening Levels (RSL) for industrial soils.

Layon Landfill may apply to GEPA for use of geosynthetic blankets (tarps) as alternative daily cover. If approved, the tarps will generally be applied to advancing slopes of the active fill area, with soil used on the top surface of the lift, and may not be left in place longer than 24 hours.

Intermediate Cover

Filled areas that will not receive additional waste fill for 60 days or more should receive at least 12 inches of soil cover. The soil will be hauled from stockpiles and deposited in the area to receive intermediate soil. The dozer operator will spread the soil in a 6-inch-thick layer (for a final thickness over refuse greater than 12 inches), or more, as needed to adequately cover any protruding waste.

When areas that have received intermediate cover are scheduled for additional waste filling, site personnel will use bulldozers to scrape off as much of the cover soil as possible before the additional waste is placed. The soil should be pushed into a temporary stockpile adjacent to the working face, for reuse as daily cover at the end of the day. Care should be taken when stripping off the intermediate cover not to mix any significant volume of trash with the soil.

5.8.2 Final Cover

Final cover will be placed on filled areas that have reached approved final grades, in accordance with the site's approved Closure and Post-Closure Plan.

6. MAINTENANCE AND CONTROL

This section sets forth the policies and procedures to maintain the site and control dust, fire, stormwater, erosion, litter, odor, vectors and explosive gas.

6.1 Access Roads

All access roads used by Layon Landfill customers must be maintained as all-weather roads by surfacing with asphalt paving, rock, gravel, or concrete/asphalt rubble. They are graded as needed to maintain safe operating conditions, and are watered during dry periods to control dust. Roadside drainage ditches or culverts are cleaned or otherwise maintained at least annually to prevent road washouts due to inadequate drainage control.

Two-way access roads have a minimum width of thirty (30) feet, and one-way roads are to be at least 15 feet wide. Roads are to be constructed with a maximum grade of 8 percent except for short distances where less steep grades cannot be achieved.

Temporary roads used only by Layon Landfill personnel and vehicles may be constructed as other than all-weather roads, provided they are not needed for maintenance of drainage facilities or emergency access.

6.2 Air Criteria

Layon Landfill operates in full compliance with state and federal requirements for air pollution control. Activities conducted in relation to air programs include:

- Asbestos waste management in conformance with federal requirements for hazardous air pollutants (NESHAPS)
- Prohibition of open burning and implementation of programs to detect, prevent and suppress fires in solid waste loads (see Section 6.8).
- Monitoring for emissions of landfill gas (See Section 6.11).
- Control of dust and odors (See Sections 6.3 and 6.5).

6.3 Mud and Dust

Layon Landfill personnel will be responsible for preventing the emission of excessive dust from the facility. The site's water truck will be used as needed to spray water on access roads and other areas generating wind-blown dust. The volume of water and frequency of spraying is increased as needed during particularly dry and windy conditions.

During wet weather, Layon Landfill will implement measures to minimize the tracking of mud onto public roads. Wet weather tipping areas will be constructed using rock or asphalt and concrete rubble, to minimize the exposure of customer vehicles to excessively muddy conditions. As vehicles exit the landfill, they will be given an

opportunity to wash down wheels and tires in a wheel washing area on the exit road. Alternatively, all vehicles may be required to drive across a steel rumble strip, which removes a significant portion of tracked mud from the tires, before the trucks exit the site.

Layon Landfill personnel will monitor the condition of the main access road and Dandan Road between Route 4 and the site, and clean any mud or debris that is tracked onto the road from the landfill.

6.4 Litter

Layon Landfill will use permanent litter fences, portable screens, and routine site cleanup operations to prevent wind-blown litter from leaving the landfill premises and creating nuisance conditions in the area. Typical litter control program elements are described below.

- Portable skid-mounted litter screens, typically 8 feet high, will be located in downwind locations near the active MSW disposal area as the first line of defense against litter. The screens are relocated frequently as the active area moves across the site.

- Temporary litter fences, consisting of reusable fence posts and poultry wire, may be installed near the working face in places where they will not hinder traffic control.

- Litter should be removed from portable and temporary litter fences daily or as needed to prevent excessive buildup that could cause them to blow over or allow litter to escape in the event wind directions change.

- The use of geosynthetic tarps, if approved as alternative daily cover, will be suspended during periods of high winds (typically, above 30 miles per hour), and the working face covered with six inches of soil in order to minimize the potential for wind-blown litter.

- Routine site cleanup and litter collection are the final elements of the litter control program. Layon Landfill personnel will remove litter from portable screens and permanent fences on a daily basis, and pick up litter anywhere on the site at any time. Litter patrols should be assigned to check and collect litter along the site access road and along site perimeter fences, and to collect any litter seen to migrate beyond the site perimeter.

Litter cleanup crews will be organized as needed to remove litter from the site and the buffer zones. If necessary, equipment operators may be assigned to litter crews, and personnel will work overtime as needed to collect litter.

Information will be included in the site's daily operating log to document unusual litter problems or control activities, including instances when temporary personnel are used to collect or control litter on or off-site.

6.5 Odor

The odor control program at Layon Landfill consists of the following elements:

- Identification and special handling of odorous wastes;
- Effective application of daily and intermediate cover; and
- Management of landfill gas if warranted.

In the event unacceptable odors are present when these program elements are being effectively implemented, the site operator will engage appropriately qualified outside assistance to study the problem and recommend additional measures after consultation with Guam EPA.

6.5.1 Management of Odorous Wastes

Wastes capable of creating off-site odor problems must be given special handling to minimize potential odor problems. Odorous wastes include:

- Sewage sludge and grits
- Dead animals and offal
- Grease trap pumping waste
- Bulk shipments of off-specification foods and food wastes

These wastes are among those generally handled under the site's special waste program as described in Section 5.3. Upon receipt at the scalehouse, they will be designated as odorous loads and directed to a designated part of the active disposal area located a minimum of 50 feet from outside perimeter or temporary slopes. Disposal will then occur as follows:

- A bulldozer will excavate a trench or pit in previously place solid waste known to contain no odorous special wastes. The pit will be large enough to contain approximately twice the volume of the anticipated odorous load.
- The odorous load will be discharged into the pit.
- The bulldozer will immediately cover the odorous material with the solid waste excavated to create the pit, and compact it firmly.
- Daily cover soil will be placed and compacted above the solid waste.

Daily scalehouse records will reflect the receipt of odorous loads designated for special handling.

6.5.2 Cover Soil Maintenance

The most effective means of preventing odors from general solid waste activities is by application of daily and intermediate cover soil to MSW. As described in Section 5.8, a minimum of six inches of soil material is placed daily on all waste fills, and compacted by track walking with a bulldozer. Intermediate cover, consisting of an additional six inches, further controls odors on a long-term basis. Regular inspection and maintenance of cover to eliminate cracks and fissures in cover soil is also an important element of odor control from solid waste after it is buried. Inspections should be made on a quarterly basis or at any time when persistent or pervasive odors are present. Once a landfill gas collection and control system (GCCS) is installed at the site, the inspection of cover soil can be integrated with the required surface emissions monitoring that will accompany the operation of the GCCS.

6.5.3 Landfill Gas Control

Odorous conditions at landfills are often associated with uncontrolled landfill gas. Section 3.6 describes the landfill gas facilities planned for installation during the life of the site. Detailed operational procedures will be added to this Operations Plan when the gas collection and flaring system is installed, as currently projected in the fourth or fifth year of site operations.

6.6 **Leachate Management Plan**

Layon Landfill will manage leachate by collection through the leachate collection and removal system (LCRS), and pumping it offsite to the Inarajan wastewater treatment plant (WWTP), using a new pipeline to be constructed during the initial landfill development project. This section describes procedures for operating and maintaining the leachate management system of the landfill which is within the confines of the landfill complex. Since the treatment will occur off-site it is not within the scope of the Solid Waste Facility Permit. The Applicant and GWA are currently finalizing the report in this matter and the Applicant has indicated that it is committed to performing whatever level of treatment is required by GWA. The report indicates the WWTP can accommodate the leachate flow for disposal and some improvements to the plant will be made, before it accepts leachate, to improve effluent quality.

Leachate management within the landfill complex includes temporary storage in the sump area and an above ground holding tank until it is pumped offsite. Transport to the Inarajan WWTP can be accomplished by trucking, only as a temporary alternative, until the sewer line is in place. The following sections describe in detail the management of leachate at the landfill.

6.6.1 Leachate Quantity

Based on computer modeling using the USEPA-sanctioned HELP Model the facility is expected to produce a maximum of approximately 39,300 gallons per day of leachate during the operational life of the landfill. The peak leachate volume from Phase 1 during the first 5 years of operation is estimated to be approximately 13,500 gallons per day, with average values substantially less.

Of the total leachate produced, based on the computer modeling an average of approximately 8 percent is expected to pass through the primary geomembrane liner and be collected in the secondary LCRS. This is a normally expected event, due to the absence of a second layer of liner material below the primary liner, which is placed directly above the secondary LCRS geocomposite. All leachate collected in the secondary LCRS will be commingled with liquid from the primary LCRS and piped to the Inarajan Treatment Plant.

The system as designed is capable of maintaining hydraulic head of less than 12 inches above the liner system under all conditions. Three feet of protective soil will be placed above the geocomposite on the floor, and two feet of protective soil will be placed above the geotextile on the sideslopes.

Leachate management requires a significant effort, as described in the following sections.

6.6.2 Leachate Pumping and Storage Facilities

As described in Section 3.4, each leachate collection sump will be equipped with a pumping system to maintain leachate levels in the liner system below 12 inches, based on the leachate generation volumes summarized above. The system will transfer liquid from the primary and secondary LCRS sumps to storage tanks located within the lined area adjacent to the sump, and to transfer leachate from the storage tanks to the leachate pipeline leading to the Inarajan wastewater treatment plant. Automatic control systems are installed at each sump to control pump operations and prevent overfilling the storage tanks. Visual and audible alarms are installed to alert site personnel to upset conditions including excessive liquid levels in the sump or in the storage tanks. Storage tanks are equipped with quick-connect fittings for transfer to tanker trucks, and fittings for future connection to an on-site piping system.

Electric-powered submersible pumps will be placed in the primary LCRS sump riser and the sideslope riser in the secondary LCRS sump. The pumps and control system will be based on equipment supplied by EPG Companies, Inc., Maple Grove, Minnesota. EPG specializes in supplying leachate pumping and control equipment for the landfill industry.

The following sections provide information on pump selection, the leachate storage tank and the pump control system.

Primary LCRS Pump

The design capacity for the pump in the primary is 20 gallons per minute (gpm). It delivers leachate from an elevation 298 (bottom of primary sump) to a storage tank located on the soil plug above the sump at approximate elevation 310. Assuming a maximum tank height of 8 feet, the total dynamic head to overcome is therefore approximately 20 feet, plus pipe friction head losses.

The pump is sized to avoid short cycling times. EPG recommends a minimum of 100 starts in a 24-hour period. Two factors must be considered: the minimum time to pump leachate from the sump between the starting liquid level and low flow control settings of the pump; and the time required to fill the storage tank.

The pump recommended for the primary leachate sump riser is:

EPG Model 8-2	
Motor horsepower	0.75 horsepower (1 or 3 phase)
Minimum liquid level for starting	21 inches
Capacity	40 gpm @ 35 ft head
	20 gpm @ 45 ft. head

Book 2 Design Narrative, Appendix G, contains the pump information.

The range of operation for each pump cycle (assuming pump capacity greater than leachate inflow to the sump) is approximately 10 inches. The Cell 1 primary sump contains approximately 458 cubic yards of gross volume between elevation 299 (one foot above the bottom) and elevation 300. Based on this increment, and on a gravel porosity of 0.35, the volume that would be pumped in a cycle with 10-inch drawdown would be approximately 27,000 gallons. At a nominal pumping rate of 20 gpm, once the pump turns on it would run continuously for a minimum of 22 hours before shutting off, with the actual duration depending on the rate of leachate inflow to the sump. At 40 gpm the pump would run for a minimum of about 11-hours. Thus there is no significant chance of short-cycling the pump based on sump-draining time.

The pump will be discharged to the storage tank through a 1½ -inch chemical-resistant hose. Head loss through a 50-foot length of hose would be approximately 7 feet at 40 gpm, producing a total dynamic head of approximately 27 feet. Information on the specified hose is included in Book 2 Design Narrative, Appendix G.

Secondary LCRS Sump Pump

The expected maximum flow into the secondary LCRS sump is 1.2 gpm, indicating that a minimum design flow rate would be 2.5 gpm with a factor of safety of 2.0. The elevation head for this pump is approximately 22 feet.

The recommended pump for the secondary LCRS, packaged in the EPG horizontal "Sump Drainer" configuration, is:

EPG Model 2-3	
Motor horsepower	0.5 horsepower (1 or 3 phase)
Capacity	14 gpm @ 25 ft head
	10 gpm @ 50 ft. head

The secondary sump has a total depth of 18 inches. Pressure controls on the pump can be set to operate between this depth and the minimum drawdown of the pump, which is expected to be 8 to 10 inches. The secondary sump total volume between elevation 297 (six inches above the bottom) and elevation 298 (the top) is calculated at 343 cubic yards. Assuming a working range of 8 inches, the volume pumped in each cycle would be approximately 16,000 gallons. For this volume, a pump working at a rate of 10 gpm would take a minimum of 27 hours to complete one cycle.

The secondary LCRS pump would use the same type of 1½ inch chemical resistant hose as the primary sump pump, and would have negligible dynamic head loss.

Storage Tank

Two level control switches will be installed in the storage tank located next to the Cell 1 sump riser pipes. One will override the pressure switches on the sump pumps, to prevent overfilling the tank. The other will control the transfer pump delivering leachate to the force main system and the Inarajan Treatment Plant. Although the pumping rates of the sump and transfer pumps will be set to generally match each other, variations will occur. The system should be designed such that neither pump is placed in an unstable or excessive start-stop condition. This issue is addressed by providing sufficient capacity and setting flow controls for both pumps to always provide capacity in the tank for the sump pump to operate. For example, assume a 5,000 gallon tank is provided and the transfer pump is set to begin pumping when the tank is 50% full and shut off when it is empty. If for some reason the sump pump fails, the transfer pump would take 125 minutes to empty the tank at a rate of 20 gpm, or 62 minutes at a rate of 40 gpm—not an issue for cycle times. Conversely, the sump pump would be allowed to begin operating only if the tank is at 50% of capacity and shut off if it is full.

6.6.3 Leachate Pumping System Controls

The leachate sump pumps will be controlled using a custom-designed package system provided by EPG Companies or another qualified supplier of leachate management systems. System components will include the following components:

- Submersible level sensors
- EPG "PumpMaster" controllers
- Tank gauging system with level controllers

Major system functions and logic include:

- Allow sump pumps to begin operating when tank has minimum empty capacity, e.g. 50 percent;
- Stop sump pump operation when tank is full; and
- When allowed by tank controls, start and stop sump pumps at specified depths of liquid in each sump.

6.6.4 Maintenance Procedures

It is important that the system be properly maintained in working order at all times, with special emphasis during the rainy season.

Operation and maintenance of the leachate system includes the following elements:

Daily Requirements:

- Measure and record the volume of liquid in leachate storage tanks.
- Record readings of pump operating hour meters and liquid levels in sumps.
- Inspect leachate storage tanks and piping for any leakage. Clean up any spills or leakage, and call immediately for repairs of any leakage or damage.
- Inspect landfill sideslopes for signs of leachate seeps; if seeps are noted implement procedures in Section 6.6.7
- Plan and mobilize to implement system equipment repairs or replacement within 24-hours of discovery of equipment problems.

Weekly Requirements

- Visual inspection of:
- Leachate risers and pumps to ensure the pumping system is operating properly
- Measure depth of leachate in leachate collection sumps
- Leachate levels in storage tanks

Monthly Requirements

- Record leachate pumped quantities as measured by in-line flow meters between sumps and storage tanks, or by other methods.
- Exercise the sump pumps to verify operation
- Check high level alarms in sumps and tanks by activating them manually
- Record volumes of leachate transferred to the leachate pipeline

6.6.5 Spare Leachate System Components

An inventory of spare components for the leachate management system shall be maintained at all time, to include at a minimum the following:

- One or more of each type of pump installed in the system, including sump pumps and transfer pumps;
- One of more of each type of level or flow sensor used in the system; and
- Other items that are found to require frequent repair or replacement, or which are recommended to be kept as spares by the equipment manufacturer

Each item removed from the spare components inventory and installed in the operating system shall be replaced within 30 days.

6.6.6 Leachate Operations Personnel Training

The site General Manager will designate at least two individuals to be responsible for operation and maintenance of the leachate management system. These individuals shall receive specialized training consisting of a minimum of two days instruction by the manufacturer of the leachate pumps and control systems. Training topics shall include pump operation, maintenance and replacement; controls logic, setup and troubleshooting; and other topics to be determined by the training organization.

6.6.7Response to Leachate Seeps

In the event a seep or release of leachate is observed on a landfill sideslope, it shall be immediately mitigated by placement and compaction of additional soil on the affected area. If necessary, leachate-contaminated or wet soil will be removed and disposed at the active disposal face before clean soil is applied and compacted. The affected area shall be monitored daily after correction until it is determined no further seepage is occurring.

Guam EPA shall be notified of a leachate seep and its correction by filing an Incident Report as provided in Section 10.1.

6.7 Landfill Gas Management and Monitoring

Methane gas is produced by the anaerobic decomposition of organic components of solid waste. Layon Landfill will implement a Gas Monitoring Plan to ensure that methane gas does not cause safety or environmental problems. Specifically, the program must demonstrate compliance with the requirements of GEPA Regulations §23306 that concentrations of methane do not exceed 25% of the lower explosive limit in facility structures, or 100% of the lower explosive limits at the property boundary. The lower explosive limit for methane is 5% by volume (50,000 ppm)

Methane monitors will be installed in the landfill office building and in the maintenance building to measure explosive gas levels continuously and provide an alarm if levels reach 10,000 ppm (20% of the lower explosive limit). This program ensures that explosive gas levels in buildings are below the 25% limits set forth in GEPA Regulations §23306.

Appendix C contains the Landfill Gas Monitoring Plan for Layon Landfill. Monitoring will be conducted on a quarterly basis to ensure compliance with GEPA Regulations §23306, which specifies that the concentration of methane gas at the property boundary shall not exceed the lower explosive limit. Initially, monitoring will be conducted in three permanent gas probes installed at 1,000 foot intervals around the perimeter of the site, as shown in Figure 11. Additional probes will be installed as additional disposal cells are constructed. A quarterly summary of gas monitoring results will be placed in the operating record.

The only gas management facilities to be installed during initial landfill construction will be horizontal collectors consisting of perforated pipes placed within a gravel bed in the protective soil layer on the floor of cells. Refer to Drawing L1.9 for the horizontal collectors planned for Cell 1 and Cell 2. Horizontal collectors provide a means of collecting gas generated in the early stages of filling each new cell. They also help minimize the migration of gas into the leachate collection and removal system (LCRS) below the protective soil

Horizontal collectors are 4-inch perforated HDPE pipes placed above the protective cover soil before waste is placed in the cell. Pipes are placed 150 feet apart across the cell floor, and perforations are spaced to provide uniform vacuum and collection rates across the length of the collector. Each collector has a solid pipe section running up the side slope of the cell, and has a valve and sample port at the location where it ties into the gas header pipe.

Piping systems to collect and deliver gas from the Phase 1 horizontal collectors will be constructed at the time the flare system is installed. This is projected to occur in the fourth year of site operations, or approximately 2013 based on the landfill gas generation estimates. Appendix C with the Design Narrative contains a detailed conceptual schedule for installation of the flare and energy generation facilities.

Detailed operating procedures for the active gas collection and flare system will be added to this Operating Plan when the system is activated by installation of the flare, currently scheduled for 2013.

6.8 Fire

Personnel at the scalehouse and unloading areas will be trained and directed to notice any smoldering or burning material in incoming waste, and prevent it from contacting other combustible material or being buried in the disposal area before all combustion is extinguished. Fire extinguishers will be provided in all buildings and vehicles at the site for use in extinguishing small fires, and equipment or water is used to put out larger fires in incoming waste loads.

In the event of a structure fire or large fire in uncovered waste, the local Fire Department will be summoned to assist in putting out the fire.

6.9 Stormwater

6.9.1 General

Stormwater is managed by controlled grading on the surface of the landfill and by maintaining an engineered system of drainage ditches, channels, pipes and infiltration ditches. Drainage is managed to:

- prevent run-on of surface water to the active disposal face or uncovered refuse;
- minimize erosion in all areas of the site;
- maintain roads and other ancillary facilities in useable condition under all weather conditions; and
- prevent excessive runoff or sedimentation impacts to neighboring properties.

The landfill top deck in the vicinity of active disposal areas is graded at a slope of at least 3% away from the active area. Earth berms are constructed upgradient of the active area if needed to prevent run-on from contacting the leachate, and divert drainage around any exposed waste. Similarly, berms are constructed downgradient of exposed waste to prevent the runoff of any precipitation that has contacted waste. Such water is retained within the waste, for collection and management as leachate.

The operator will periodically evaluate the condition of the landfill surface for signs of erosion. Eroded areas will be repaired by replacing soil, and protecting against further erosion by placement of rock, planting vegetation, or other measures. In addition, silt fencing, check dams and other measures to reduce sediment transport will be installed downgradient of areas subject to erosion. The annual surface water management plan will address erosion and sediment control measures to be implemented each year.

The stormwater control system will be inspected and maintained as needed after each significant storm event. Sediment is removed from ditches as required, and from sedimentation basins annually, prior to the onset of the rainy season.

6.9.2 Erosion Control

Erosion is controlled primarily by the stormwater management system, which incorporates diversion berms, sandbag checkdams and similar measures to control and reduce the velocity of runoff. Side slopes will be inspected periodically, and eroded areas repaired. Silt fences will be installed on slopes subject to erosion on bare slopes.

6.9.3 Prevention of Pollutant Discharges

The surface water management system prevents any discharge of pollutants to waters of the United States or violation of water quality regulations by:

- Preventing runoff of surface water that has contacted waste;

- Controlling erosion to prevent loss of cover or washout of refuse slopes; and
- Retaining surface water on site and allowing it to infiltrate to groundwater without discharge to surface waters.

Layon Landfill will prepare and implement a Spill Prevention Control and Countermeasure (SPCC) Plan to prevent releases of petroleum products used on the site from being discharged to surface or ground water.

6.9.4 Annual Surface Water Management Plan

The stormwater collection system, including all ditches, channels and sedimentation basins, will be inspected annually during the months of February or March, and an annual surface water management plan will be prepared. The annual surface water management plan will include the following:

- Documentation of the inspection, together with a description of recommended maintenance, repairs and modifications to be made based on the observed conditions.

- Updated drawings of the landfill based on current topography, showing current conditions and planned changes to the stormwater management system.

The annual stormwater plan will be completed by April 1, and all modifications recommended in it will be implemented by June 1 of each year.

In addition to physical changes in the site's stormwater management system, the annual plan will contain the following ongoing management practices.

Runoff Controls at the Active Disposal Working Face

Among the most critical responsibilities of site operations for storm water control is to prevent run-on and run-off of surface water from the active working face. All precipitation incident on exposed refuse must be contained within the immediate area and be allowed to infiltrate into the refuse for subsequent management as leachate. This is accomplished primarily by construction and maintenance of temporary earthen berms around the active area during periods of rain. Berms upgradient of the active working face prevent run-on from contacting refuse, and divert it to soil-covered areas. Downgradient berms retain any runoff from the working face until it is absorbed into the refuse and cover soil.

Installation and maintenance of diversion and retention berms are responsibilities of landfill operations supervisors. Planning and installation must occur prior to the first seasonal rains or at any time when rain is forecast. Berms must be maintained, relocated or reconstructed on a daily or weekly basis as the location of the active disposal working face changes.

Preventive and Scheduled Maintenance

Preventive maintenance of landfill operating equipment is important not only to ensure equipment availability for operations, but also to minimize the potential for leaks or spills of fuel or other fluids that could contribute to pollution of stormwater.

Stormwater management facilities must be maintained consistently to ensure their proper functioning. At a minimum the following measures should be implemented:

- Asphalt paved and concrete channels and all storm drain pipes and culverts will be inspected annually, and any significant accumulations of sediment will be removed prior to the onset of the winter rainy season;
- Grass and other vegetation growing in storm water basins will be cut and removed annually or as necessary during the dry season to maintain it at a height of 12 inches or less at the onset of the winter rainy season; and
- At not less than 5 year intervals, all sediment and vegetation will be removed from storm water basins in order to maintain their storage capacity at design levels.

Good Housekeeping

Landfill operations staff must keep the site clear of litter, and control dust and mud. Measures for these controls are specified elsewhere in this Operating Plan and are implemented on a daily basis, including:

- Placement and maintenance of litter screens to minimize the amount of litter leaving the active disposal area;
- Daily litter pickup throughout the site by site employees and contract laborers;
- Control of dust from unpaved areas by spraying water from the site water truck;
- Periodic sweeping or cleaning of paved roads and parking areas; and
- Installation and operation of a truck wheel wash facility to minimize tracking of mud from the landfill area onto paved roads.

Sediment and Erosion Control

The following measures will be implemented to minimize soil erosion and sediment transport in surface water being managed at the site:

- Soil and vegetative cover in active and closed areas will be inspected annually, with any eroded or bare areas being repaired and replanted;
- Landfill exterior sideslopes that are substantially at final grade will be covered with temporary rain cap geomembrane or green waste mulch, and/or planted with grass to prevent erosion to the extent possible, and eroded areas will be repaired as needed prior to the onset of the rainy season each year;

- Unpaved access roads on the surface of the landfill will be surfaced with rock, asphalt rubble or other materials, to the extent possible consistent with the availability of suitable materials; and
- Sandbag check dams, diversion berms, silt fencing and similar devices will be installed and maintained during the rainy season to minimize erosion and sediment transport in unpaved areas of the site.

Preparation of a Wet Weather Deck

A wet-weather tipping area should be prepared in advance of the rainy season. The pad should preferably be located in an area sheltered from prevailing winds. It should be sufficiently large to provide access, turning and backing movements for the expected peak number of waste delivery trucks, and be situated where waste tipped from the pad will be pushed no farther than 100 feet during the time the pad is in use.

The wet weather deck should be used only on days when weather conditions make the use of normal access roads and tipping areas unsafe or inefficient. The pad will be relocated as necessary throughout the season to maintain reasonable push distances for the refuse.

The wet weather deck should be constructed using a 6 to 12 inch thickness of crushed rock, or concrete or asphalt rubble. The operator should make arrangements during the year to receive and stockpile these materials for use in wet weather deck construction.

Enhanced Maintenance and Monitoring During Periods of Rain

Landfill operations should carefully monitor the condition of access roads and vehicle maneuvering areas on the top deck during periods when rainfall occurs or is expected. At any time when rainfall is sufficiently heavy to create excessively muddy conditions in normally used areas of the landfill, disposal operations will be diverted to the wet weather tipping pad. Extraordinary maintenance of roads will be conducted as needed to ensure safe operating conditions during rainy periods.

In addition to adjusting disposal operations, landfill staff must also increase the level of monitoring and maintenance of leachate and stormwater management systems during rainstorms. Special attention must be given to the following:

- If rain occurs while a new disposal area is still partially covered by a rain cap, stormwater collecting above the rain cap at the lowest elevation of the cell should be pumped daily or continuously to prevent excessive head on the material which could increase leakage through it to leachate collection system.
- Other elements of the stormwater management system should be inspected at least daily during periods of rain, and maintained to ensure they are functioning as intended.

6.10 Vectors

Site personnel will be trained to observe and identify the first signs of vectors, including rodents, insects and birds. The daily cover operation for MSW disposal areas normally prevent vectors from actively using the site.

A weekly inspection will be made of the disposal area perimeter fence to identify signs of animals such as dogs or pigs attempting to enter the facility, and appropriate measures taken to prevent their entry.

Should vectors become a problem, cover programs will be enhanced and a local exterminating firm will be hired to provide control services on an as needed basis. If use of the site by birds is excessive and is determined to present a health hazard, nuisance or ecological threat, a bird abatement program will be established and implemented. Most bird abatement programs are based on use of noise-making guns or other sound devices to frighten birds away. Less common measures include installation of monofilament grids above active areas or use of birds of prey or model aircraft to deter bird use of the site.

6.11 Safety Procedures

The operator will provide training and strict enforcement of a comprehensive program to ensure the safety of customers and employees. Access routes are clearly marked, and an on-site speed limit of 20 miles per hour is enforced. Customers are directed by spotters to specific locations for unloading, with traffic managed to avoid accidents.

Hard hats and fluorescent vests/reflective striped uniforms are required for all employees in operating areas when they are not in the confines of equipment, buildings, or vehicles. Landfill employees are required to wear safety glasses when near the active landfill face or near situations where a risk of eye injury exists. Such situations include the following: repair or cleaning of equipment; operation of equipment used to cut brush, grass, or weeds; grinding, crushing, or compacting operations; and when near vehicles unloading waste suspected to shatter or fragment. Gloves are required when employees are litter picking or when dermal hazards exist. Fluorescent vests/reflective striped uniforms are required to be worn by all operations personnel and scalehouse personnel when directing traffic or performing other duties outside the scalehouse.

Before a temporary employee is deployed to a work assignment, a landfill supervisor will verify that the temporary employee is equipped with the required safety equipment.

Procedures to be followed in the event of a serious accident, injury or other emergency are set forth in the site's emergency response procedures, with which all employees are familiarized in training sessions.

7.0 EMERGENCY PROCEDURES

Layon Landfill will establish and maintain a detailed Emergency Management Plan that provides detailed procedures to be followed by site personnel in the event of an emergency. Specific procedures are established for different types of emergencies, including medical emergencies, fires on and off the site, spills, bomb threats, natural disasters, and general emergencies. The emergency plan outlines chains of command and communication, preparatory activities, response procedures, personnel evacuation procedures, and recovery activities.

7.1 Fire

Procedures outlined below will be followed for potential emergencies involving fire, including waste fires on the landfill surface, brush fires in the buffer zone, and structure fires.

Landfill Surface Fire. The following actions will be taken if a fire occurs in a refuse fill area prior to application of interim cover or near the surface.

- Burning refuse will be excavated and separated from the fill area and covered immediately with on-site soil
- If necessary, water will be applied to the burning refuse using the on-site water truck
- The local Fire Department will be summoned if site personnel and equipment can not extinguish the fire

Layon Landfill will maintains a water truck with capacity of 4000 gallons, a bulldozer, and a front-end loader that are available 24-hours per day for use in fire fighting.

Buffer Zone Fire. In the unlikely event of a fire occurring in the buffer zone area around the site, the following actions would be taken to prevent the fire from reaching refuse fill areas by utilizing on-site assets.

- Maintain existing fire breaks between waste fill areas and surrounding vegetation.
- Excavate additional fire breaks between the landfill and the oncoming fire. Excavated soils will be bermed on the fire side of the fire break for additional protection.
- Water down areas between the fire break and the disposal area using the on-site water trucks.
- Call 911 emergency services.

Structure Fire. The following actions will be taken if a fire occurs in a site structure.

- Evacuate building.
- Call 911 emergency services.
- Prevent fire from spreading to surrounding areas by using on-site equipment to construct fire breaks, and by using the water truck to wet down adjacent areas.
- Avoid entering a burning structure for any reason.

7.2 Severe Storms

The following measures will be taken to protect against excessive erosion, flooding and wind damage before and during severe storms.

Prior to a forecast storm, site personnel will inspect all drainage structures on the site and verify they are in working order. Excessive silt in ditches and basins will be removed; and the condition of pipes and discharge structures from basins will be verified. Diversion berms will be constructed around the current disposal area as needed to prevent run-on from upgradient areas from entering the waste fill, and to prevent runoff from the waste fill to downgradient areas of the site. Interim cover will be placed over exposed waste at the end of the working day prior to the forecast beginning of a severe storm.

At the discretion of landfill management, the site may be closed for business during storm periods. In this event, the working face will be closed and covered with interim cover, graded to discharge runoff to the site surface water drainage system. Temporary diversion berms will be constructed as necessary to prevent run-on to any areas of exposed waste.

Facility personnel will periodically inspect site drainage systems during any prolonged storm involving extensive rain, and correct or repair as needed any conditions with potential to cause damage to on-site or off-site facilities.

7.3 Earthquake

In the event of a significant earthquake, defined here as one that produces any sign of damage in on-site structures, including but not limited to overturned furniture, wall cracks, or structural shifts, the following procedures will be implemented:

- Immediately cease or limit landfilling operations.
- Promptly conduct a visual survey of the site to identify any slope failures, fires, landfill gas system failures, or other conditions that could threaten worker or public safety.
- Follow the procedures set forth in Section 7.1 if any fires occur.
- Follow the procedures set forth in Section 7.5 if any injuries occur.
- During the month following the event, sample and test subdrain liquids for leachate constituents on a weekly basis to detect any release due to possible

earthquake damage to the liner system. If the event occurs during the dry season when no subdrain liquid is being discharged, this testing shall be done during the first month after subdrain discharge next resumes.

In the event telephone systems are inoperable, notification of the appropriate agencies/businesses will be accomplished in the most expedient manner available (cellular phones, person to person, overnight mail, etc.). In the event power is lost, landfill personnel will notify the appropriate local utility companies.

7.4 Hazardous Material Spills

Layon Landfill has a low potential for spills of hazardous materials, but incidents are possible in the event vehicle accidents or malfunctions that could cause spills of coolant, fuel or lubricants. The facility will maintain a Spill Prevention, Containment and Countermeasure (SPCC) Plan, as required by 40 CFR Part 112, to prevent and manage spills. Actions to be taken in the event of a spill are described below.

The first step in responding to an oil or substance release incident is to keep the material separated from water to minimize migration and the resulting potential increase in human and environmental exposure. Every effort should be made to prevent spills and emphasize substance containment at the source rather than resort to separation of the material from expanded portions of the environment or downstream waters.

Discovery of a Release

The person discovering a release of material from a container, tank, or operating equipment should initiate the following actions immediately.

- Extinguish any sources of ignition. Until the material is identified as nonflammable and noncombustible, all potential sources of ignition in the area should be removed. Vehicles should be turned off. If the ignition source is stationary, attempt to move spilled material away from the ignition source. Avoid sparks and movement creating static electricity.

- Attempt to stop the release at its source. **Assure that no danger to human health exists first.** Simple procedures (turning valves, plugging leaks, etc.) may be attempted by the discoverer if there is no health or safety hazard and there is a reasonable certainty of the origin of the leak. No site personnel shall come into contact with unknown or hazardous substances illegally brought into the facility.

- Initiate spill notification and reporting procedures. Report the incident immediately to a supervisor. If there is an immediate threat to human life (e.g. a fire in progress or fumes overcoming workers), an immediate alarm should be sounded to evacuate the building, and the fire department should be called. Request the assistance of the fire department's hazardous materials response team if an uncontrollable spill has occurred and/or if the spill has migrated beyond the site boundaries.

Containment of a Release

- Attempt to stop the release at the source. If the source of the release has not been found; if special protective equipment is necessary to approach the release area; or if assistance is required to stop the release, the fire department should be called to halt the discharge at its source. Facility personnel should be available to guide the fire department's efforts.

- Contain the material released into the environment. Following proper safety procedures, the spill should be contained by absorbent materials and dikes using shovels and brooms. Consult applicable material safety data sheets for material compatibility, safety, and environmental precautions.

- Obtain outside contractors to clean up the spill, if necessary.

Spill Cleanup

- Recover or clean up the material spilled - As much material as possible should be recovered and reused where appropriate. Material that cannot be reused must be declared waste. Liquids absorbed by solid materials shall be shoveled into open top, 55-gallon drums; or if the size of the spill warrants, into a roll-off container(s). When drums are filled after a cleanup, the drum lids shall be secured and the drums shall be appropriately labeled (or re-labeled) identifying the substance(s), the date of the spill/cleanup, and the facility name and location. Combining non-compatible materials can cause potentially dangerous chemical and/or physical reactions or may severely limit disposal options. Compatibility information can be found on material safety data sheets.

- Cleanup of the spill area - Surfaces that are contaminated by the release shall be cleaned by the use of an appropriate substance or water. Cleanup water must be minimized, contained and properly disposed. Occasionally, porous materials (such as wood, soil, or oil-dry) may be contaminated; such materials will require special handling for disposal.

- Decontaminate tools and equipment used in cleanup - Even if dedicated to cleanup efforts, tools and equipment that have been used must be decontaminated before replacing them in the spill control kit.

- Arrange for proper disposal of any waste materials. - The waste material from the cleanup must be characterized, transported and disposed according to State and Federal Regulations.

7.5 Injury Accidents

Should an accident occur, site management personnel are to be notified immediately. First aid kits are maintained in site offices and vehicles for use as needed. If the nature of an injury requires additional treatment, the local emergency response provider is to be notified by dialing 911. The person making the call should inform the operator of the nature and location of the emergency, what first aid measures have been initiated, and the need for any special equipment, i.e. hazardous materials response, confined space rescue, or vehicle extrication.

Persons with major injuries should never be moved without professional assistance. Major injuries would include second or third degree burns; unconsciousness; severe bleeding; obviously broken limbs; and any head, back, or neck injury.

Additional details on procedures for preventing and responding to accidents are contained in the Employee Safety Plan.

Records of all site accidents and first aid treatments will be maintained at the Layon Landfill office. Accident reports will be filed with insurance companies and state agencies as required.

After the situation has stabilized, site management will arrange for investigation of the cause of the accident. A complete investigation report should be completed within seven days of the incident. The report should include a review of the actions leading up to the incident, factors that contributed to or mitigated the severity of the incident, and provide recommendations to prevent reoccurrence.

8.0 INSPECTIONS

This section summarizes the facility inspections described in previous sections of the Operating Plan, organized by requirements for daily, weekly, monthly and quarterly or annual inspections.

8.1 Daily Inspection Activities

Daily inspection activities will include, at a minimum:

- Equipment: Inspect and maintain major landfill operating equipment according to manufacturer's preventive maintenance recommendations.
- Incoming waste loads: Perform a minimum of one random load check and select load checks of any loads suspected of containing unacceptable wastes.
- Access roads: Inspect daily during periods of rain or muddy conditions to ensure safe operating conditions and avoid mud trackout to public roads.
- Litter: Inspect areas in vicinity of and downwind of working face for presence of litter escaping the litter fences.
- Leachate system – conduct the following:
  - Measure and record the volume of liquid in leachate storage tanks.
  - Record readings of pump operating hour meters and liquid levels in sumps.
  - Inspect leachate storage tanks and piping for any leakage. Clean up any spills or leakage, and call immediately for repairs of any leakage or damage.
  - Inspect landfill sideslopes for signs of leachate seeps; if seeps are noted implement procedures in Section 6.6.7

8.2 Weekly Inspection Requirements

Weekly requirements include, at a minimum:

- Perimeter fences: Inspect fences for signs of burrowing or other animals attempting to enter the site; and inspect for litter that has escaped the disposal cell area.
- Surface water management system: During wet season check ponds and drainage channels for sediment buildup and proper functioning; maintain as needed.
- Leachate system – conduct the following:

- Inspect leachate risers and pumps to ensure the pumping system is operating properly.
- Measure and record depth of leachate in leachate collection sumps.
- Measure and record leachate levels in storage tanks.

8.3 Monthly Inspection Requirements

Perform the following for the leachate management system:

- Record leachate pumped quantities as measured by in-line flow meters between sumps and storage tanks, or by other methods.
- Exercise the sump pumps to verify operation.
- Check high level alarms in sumps and tanks by activating them manually.
- Record volumes of leachate transferred to the leachate pipeline.

8.4 Quarterly and Annual Inspection Requirements

- Perform quarterly inspection of all daily and intermediate cover for erosion, fissures and signs of landfill gas or leachate breakouts.
- Perform annual inspection of surface water management system prior to onset of rainy season; maintain as needed according to annual surface water management plan.

9.0 RECORD KEEPING

Layon Landfill will maintain an operating record in a designated area of the landfill office, including the categories of records and documents listed below.

9.1 Daily Operating (Scalehouse) Records

Each load of refuse delivered to the site is documented in terms of the customer identity, type of waste, source of waste, and weight. Records of each load are maintained on a daily basis and are accumulated for monthly and annual reports. Scalehouse records, including waste manifest forms, are archived and maintained on site for a minimum of three years.

9.2 Daily Log

Any unusual occurrence at the site is documented in a daily log record maintained at the site. Operations personnel are trained to report and document incidents of unacceptable waste being identified in incoming loads, accidents, severe weather conditions, fires or other unusual events. Daily logs are maintained on site for a minimum of three years.

9.3 Records Related to Hazardous Waste Exclusion

Layon Landfill will maintain records of the date, content and names of employees attending annual training events related to the hazardous waste exclusion program. Any reports or other detail related to waste load inspections or incidents of unacceptable waste discovered at the landfill, in addition to information in the daily log, are placed in the hazardous waste exclusion files of the operating record.

9.4 Groundwater Monitoring Data

Groundwater monitoring will be conducted in accordance with the approved Groundwater and Leachate Monitoring Plan. The Monitoring Plan is part of the operating record of the site. In addition, the operator will place in the operating record and maintain for a minimum of three years all results of groundwater monitoring.

9.5 Climatic Data

Layon Landfill will collect and maintain a data base of climatic data useful for evaluating and managing leachate and stormwater at the site. Data will be obtained on a daily basis and will include information on rainfall, temperature, solar radiation, evaporation, wind speed, wind direction and humidity.

9.6 Closure and Post-closure Plans and Data

The operating record includes copies of the current closure plan and post-closure plan, plus records related to any actual closure or partial closure activity. Such records include

engineering plans, construction inspection reports and certifications related to closure activities. Additionally, records pertaining to financial assurance for closure and post-closure will be maintained, including cost estimates and documentation of financial assurance mechanisms.

9.7 Location Restrictions Demonstration

Layon Landfill will maintain a copy of its solid waste permit application documents containing analyses of the site location in relation to regulatory siting criteria, including airport safety, floodplains, wetlands, fault areas, seismic impact zone, unstable areas, tidal wave zone and local zoning ordinance consistency.

9.8 Access Control Documentation

Daily sign-in sheets for public visitors and other records documenting how Layon Landfill controls access to the site and prevents unauthorized dumping will be maintained.

9.9 Liquids Restrictions Documentation

Layon Landfill does not accept liquid wastes for disposal. Records will be maintained of liquid waste loads rejected during the special waste screening process or in load checks. This information may be incorporated in records of the hazardous waste exclusion program.

9.10 Training Records

Copies of employee training program agendas and attendance sheets will be maintained. Applicable training programs include those related to hazardous waste exclusion, safety, environmental compliance, emergency procedures and other elements of facility operation.

9.11 Vector Control Records

Periodic (daily, weekly or monthly) inspection reports will be maintained that include observations of insects, rodents, birds or other potential disease vectors at the site. In addition, records will be maintained of special inspections or abatement activities by pest control contractors providing services to the facility.

9.12 Litter Control Records

A daily record will be kept of litter control activities, and maintained in the operating record. The log will contain information on the wind conditions each day, the number of litter control personnel on site, and the volume of litter collected.

9.13 Emergency Condition Reports

Any emergency incident or condition at Layon Landfill is required to be documented in an incident report that will be maintained in the operating record. Emergency conditions that would be documented in the record would include fires, hazardous material spills, injury accidents, natural disasters such as floods or violent storms, and any other event that threatened the safety or security of personnel and facilities.

9.14 Inspection Reports

Copies of all forms and reports of daily, weekly, monthly, quarterly and annual inspections performed in accordance with Section 8 and other parts of this Operating Plan will be maintained with the permanent site records.

9.15 Complaint Records

Copies of any complaints received from the public regarding landfill operations shall be maintained with the permanent site records, together with copies of associated investigation reports and correspondence related to resolution of each complaint.

10.0 REPORTING

This section describes the reports that Layon Landfill is obligated to submit to the Guam EPA, including special reports and regularly scheduled reports.

10.1 Incident Reports

Layon Landfill must submit to GEPA a written Incident Report of any event that could endanger human health or the environment. As stated in Section 5.4.4, a verbal notification of such occurrence must be provided to GEPA within 8 hours, if possible, and no later than 24 hours or the next working day after the occurrence. The written Incident Report must be filed within 5 days of the occurrence.

The following incidents must be reported:

- Any fire or explosion
- Any hazardous material release or spill in excess of 26 gallons

A written notice shall also be provided within five (5) calendar days of the time the Permittee becomes aware of the circumstances. The written notice shall contain the following:

Each Incident Report must contain the following information, at a minimum:

- Date, time, type of incident,
- Name and quantity of material(s) involved,
- The extent of injuries, if any,
- An assessment of actual or potential hazards to human health or the environment outside the facility, where applicable; and
- Estimated quantity and disposition of recovered and unrecovered material that resulted from the incident.
- A description of the noncompliance and its cause;
- The period(s) of noncompliance (including exact dates and times);
- Whether the noncompliance has been corrected; and if not;
- The anticipated time it is expected to continue; and
- Steps taken or planned to reduce, eliminate, and prevent recurrence of the noncompliance.

Incident Reports may be faxed to GEPA, provided hard copy is subsequently mailed.

10.2 Non-Compliance Report

Layon Landfill must submit to GEPA a written Non-Compliance Report of any occasion on which the landfill is unable to comply with any condition or limitation of the sites solid waste permit. Verbal notification of such occasions must be given to GEPA within

24 hours of the occurrence, and the written Incident Report must be filed within 7 days of the occurrence.

The written Incident Report must contain the following information:

- A description of the non-compliance and its cause;
- The period (s) of non-compliance including, including exact dates and times;
- Whether the non-compliance has been corrected, and if not; the anticipated time the non-compliance will continue.
- Steps taken or being taken to reduce, eliminate and prevent recurrence of the non-compliance.

10.3 Annual Operating Report

The annual operating report is due by the date specified in the solid waste facility permit, and will contain the following information:

a) Types of solid waste received (MSW, green waste, industrial/commercial, tires, wood, metals, metal containers of 20-gallons or larger capacity, asbestos, other special wastes).
b) Quantities and tonnage of solid wastes received, by type.
c) Quantities of semi-solid and liquid waste received (if any) and how it was handled or disposed.
d) Quantities of leachate generated and how it was handled or disposed.
e) Quantities of filled airspace for the present year, past filled airspace and remaining airspace and life.
f) An annual topographic survey showing the vertical and horizontal dimensions of the landfilled area.
g) An annual sequencing plan, including a drawing, identifying areas planned for filling in the coming year and areas to be used for wet weather operations. The square footage or acreage of cells and wet weather operating areas will be computed and shown on the plan. Final fill areas, intermediate fill areas and future unused fill areas will be identified for the projected year.
h) Solid waste tonnage accepted from small haulers and private individuals.
i) Data on waste excluded (volumes, character, load count, other)
j) Record of location (waste management unit, cell, etc.) where special waste is located.
k) Estimated recyclable tonnage and types accepted.
l) Cover material quantity usage.
m) Other items as may be directed by the Administrator.

10.4 Annual Surface Water Management Plan

An annual surface water management plan will be prepared and submitted to GEPA annually by the time specified in the permit and will contain, at a minimum:

a) Report of an annual inspection of surface water management features and facilities, together with a description of required maintenance and changes.

b) Updated drawings showing current topography and surface water drainage paths and conveyances, and modifications planned during the next year.

c) Engineering calculations documenting the capability of the surface water management system to manage a 25-year, 24-hour storm.

d) Any Storm Water Pollution Prevention (SWPP) plan or Spill Prevention and Countermeasure (SPCC) plan prepared pursuant to federal requirements under the Clean Water Act

10.5 Environmental Monitoring Reports

Reports of groundwater, leachate, surface water and gas migration monitoring data will be submitted to GEPA within 90 days after completion of monitoring events. Reports of these monitoring activities are kept on file at the landfill and made available to regulatory agencies for inspection or submittal upon request.

Monitoring Reports shall be submitted on schedule in accordance with the Rules and Regulations for the Guam Environmental Protection Agency (GEPA) Solid Waste Disposal.

Monitoring reports must contain the following information, at a minimum:

- Dates, exact location and time of sampling or measurement;
- Names of persons responsible for sampling or measurement;
- Dates analyses were performed;
- Persons responsible for analysis; and
- Results of analyses.

GEPA will be notified in writing within seven days if any of the monitoring systems indicate non-compliance with the performance standards specified in Title 22 of GEPA regulations.

TABLES

TABLE 1
PROJECTED WASTE DISPOSAL VOLUMES

Year	Tons per Year[3]	Cumulative Tons	Cubic Yards per Year[4]	Cumulative Cubic Yards
2010	75,697	75,697	126,161	126,161
2011	154,530	230,227	257,550	383,711
2012	157,726	387,953	262,877	646,588
2013	160,982	548,935	268,303	914,891
2014	164,299	713,234	273,832	1,188,723
2015	167,680	880,914	279,467	1,468,189
2016	171,072	1,051,986	285,120	1,753,309
2017	174,530	1,226,516	290,883	2,044,193
2018	178,054	1,404,570	296,757	2,340,949
2019	181,646	1,586,216	302,743	2,643,693
2020	185,307	1,771,523	308,845	2,952,538
2021	189,396	1,960,919	315,660	3,268,198
2022	194,186	2,155,105	323,643	3,591,841
2023	198,779	2,353,884	331,298	3,923,139
2024	203,477	2,557,361	339,128	4,262,268
2025	208,284	2,765,645	347,140	4,609,408
2026	212,725	2,978,370	354,542	4,963,949
2027	217,259	3,195,629	362,098	5,326,048
2028	221,887	3,417,516	369,812	5,695,859
2029	226,610	3,644,126	377,683	6,073,543
2030	231,431	3,875,557	385,718	6,459,261
2031	236,915	4,112,472	394,858	6,854,119
2032	242,525	4,354,997	404,208	7,258,328
2033	248,267	4,603,264	413,778	7,672,106
2034	254,142	4,857,406	423,570	8,095,676
2035	260,153	5,117,559	433,588	8,529,264
2036	266,305	5,383,864	443,842	8,973,106
2037	272,600	5,656,464	454,333	9,427,439
2038	279,033	5,935,497	465,056	9,892,495
2039	285,619	6,221,115	476,031	10,368,526
2040	292,359	6,513,475	487,265	10,855,791
2041	299,259	6,812,733	498,765	11,354,556
2042	306,321	7,119,055	510,536	11,865,091
2043	313,551	7,432,605	522,584	12,387,675
2044	320,950	7,753,556	534,917	12,922,593
2045	328,525	8,082,080	547,541	13,470,134
2046	336,278	8,418,358	560,463	14,030,597
2047	344,214	8,762,572	573,690	14,604,287
2048	352,338	9,114,910	587,230	15,191,517
2049	360,654	9,475,564	601,089	15,792,607
2050	9,712	9,485,276	16,187	15,808,794

[3] Annual disposal tonnage for 2007-2037 as presented in Table 1b, Final Site Selection Report. Estimated volumes for 2038-2055 based on projected annual growth rate of 2.36% per year.

[4] Cubic yards computed assuming in-place density (airspace utilization factor) of 1,200 pounds of waste per cubic yard of airspace consumed.

TABLE 2
STAGED DEVELOPMENT PLAN SUMMARY DATA
Volume Data in Cubic Yards

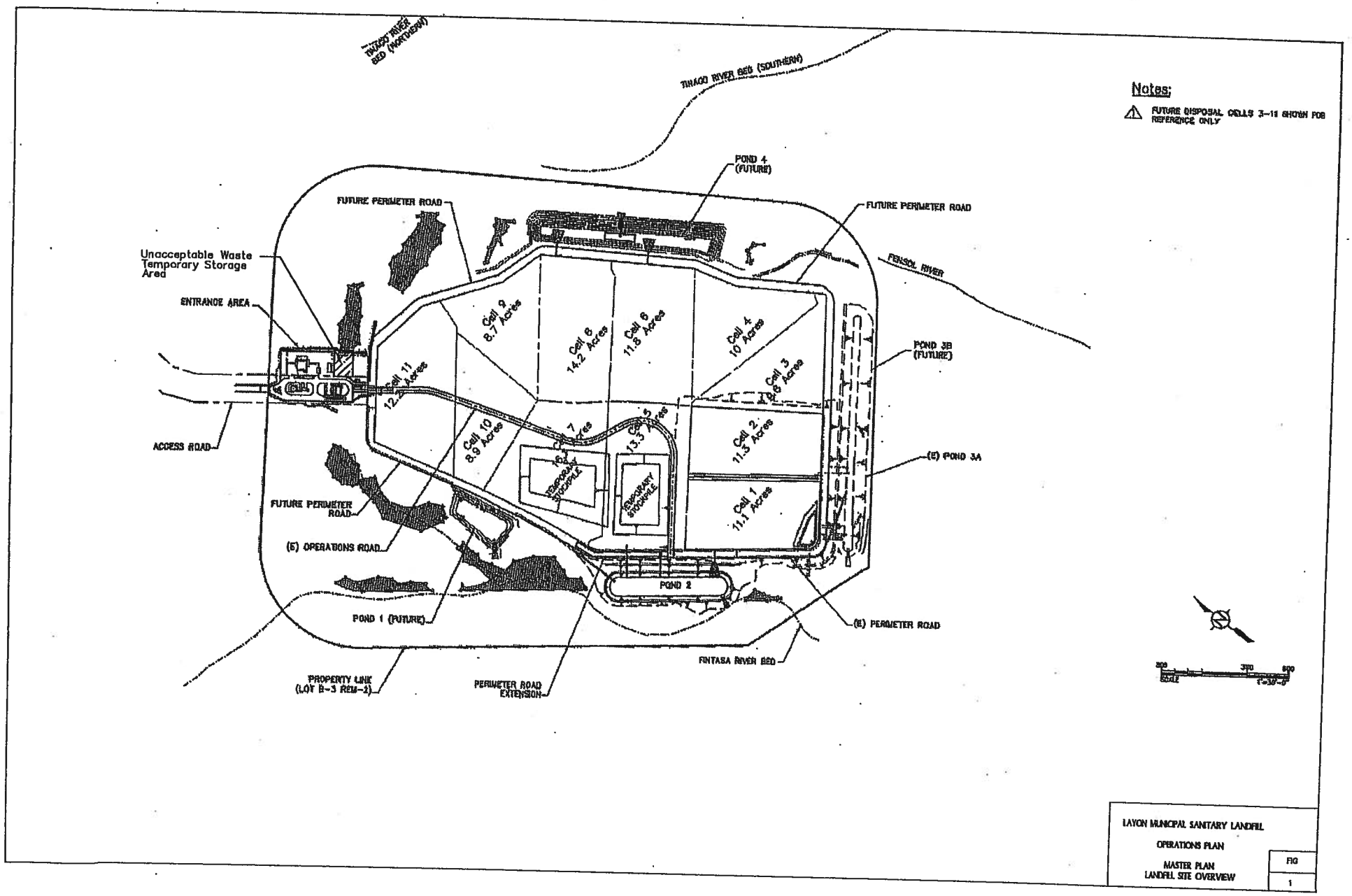
Cell	Approximate Year	Construction Executed	New Lined Acres	New Net Airspace (cubic yards)	Cumulative New Net Airspace (cubic yards)	New Net Excavation (cubic yards)	Stockpiled Soil (cubic yards)
1	1	Facilities, Cell 1& 2, Ponds 2 & 3A	11.1	360,109	360,109	281,613	228,056
2	1	Cell 2	11.3	1,047,064	1,407,172	278,518	379,725
3	6	Cell 3, Pond 3B	9.8	895,872	2,303,045	(114,167)	8,761
4	9	Cell 4	10.0	1,047,021	3,350,066	(138,505)	(357,249)
5	13	Cell 5	13.3	1,262,585	4,612,650	369,320	(261,886)
6	17	Cell 6, Pond 4A	11.8	2,046,076	6,658,726	468,643	(103,021)
7	23	Cell 7, Pond 1, Final Closure Cells 1-4	16.1	1,823,881	8,482,608	873,064	10,645
8	27	Cell 8, Pond 4B	14.2	2,913,775	11,396,383	1,056,266	633,409
9	34	Cell 9, Final Closure Cells 5 & 6	8.7	884,502	12,280,885	424,440	270,665
10	36	Cell 10	8.9	1,651,676	13,932,561	427,321	478,248
11	39	Cell 11	12.2	1,876,233	15,808,794	331,316	420,150
Closure	42	Final Closure	-	-	-	-	(342,701)
Totals			127.4		15,808,794	4,257,828	-

Total Lined Area Developed 127.4 acres

Total Disposal Capacity Developed and Filled 15,808,794 cubic yards

Notes: (1) New airspace is computed net of final cover and volume used by leachate collection gravel and protective cover soil

FIGURES

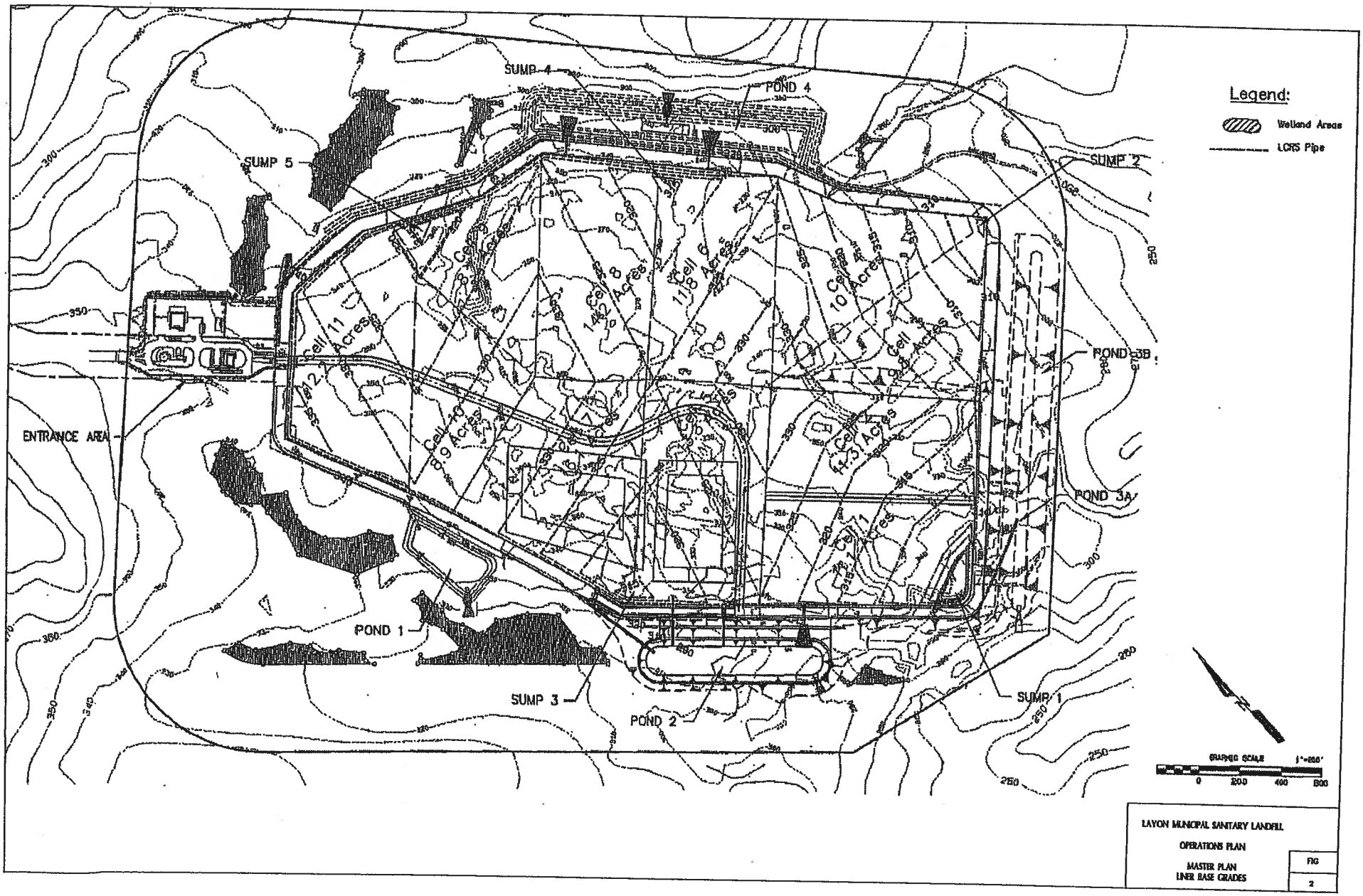


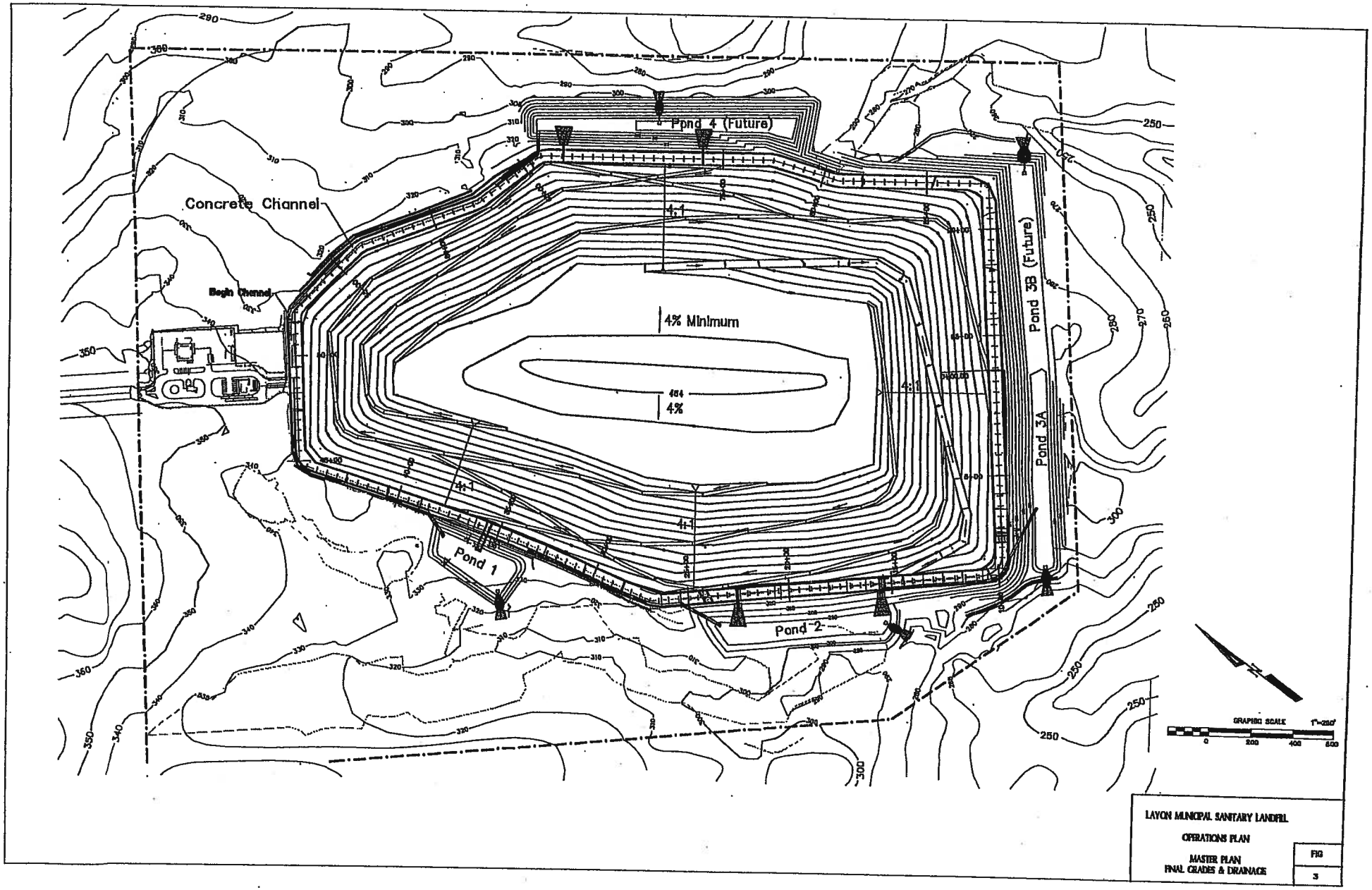
LAYON MUNICIPAL SANITARY LANDFILL

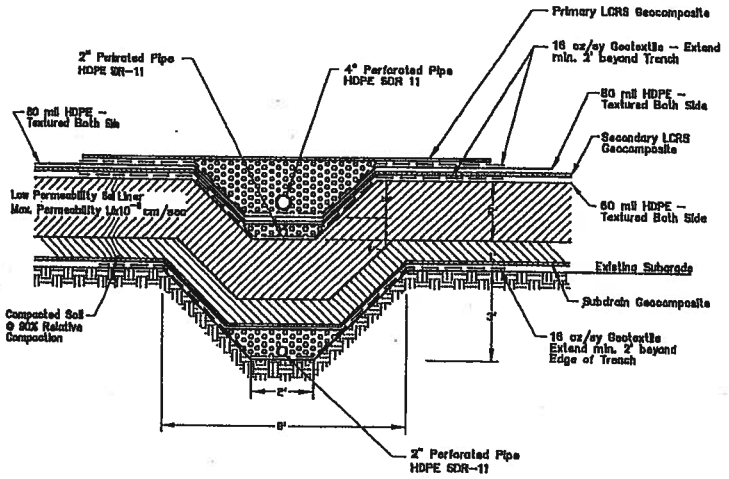
OPERATIONS PLAN

MASTER PLAN
LANDFILL SITE OVERVIEW

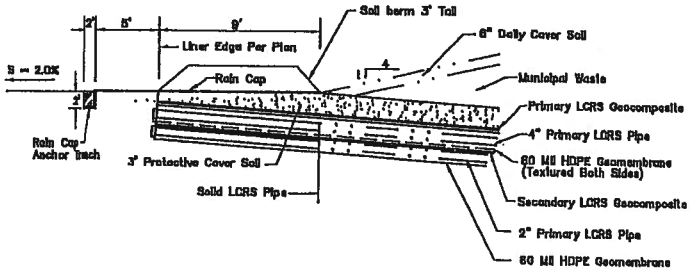
FIG
1


SUMP 4
POND 4
SUMP 5
SUMP 2
POND 3B
ENTRANCE AREA
POND 3A
POND 1
SUMP 3
POND 2
SUMP 1
Cell 11
11.2 Acres
Cell 9
8.9 Acres
Cell 8
14.5 Acres
Cell 6
11.8 Acres
Cell 10
10 Acres
Cell 7
Cell 5
14.3 Acres
Cell 4
Legend:
Wetland Areas
LCRS Pipe
GRAPHIC SCALE
0
200
400
800
LAYON MUNICIPAL SANITARY LANDFILL
OPERATIONS PLAN
MASTER PLAN
LINER BASE GRADES
FIG
2

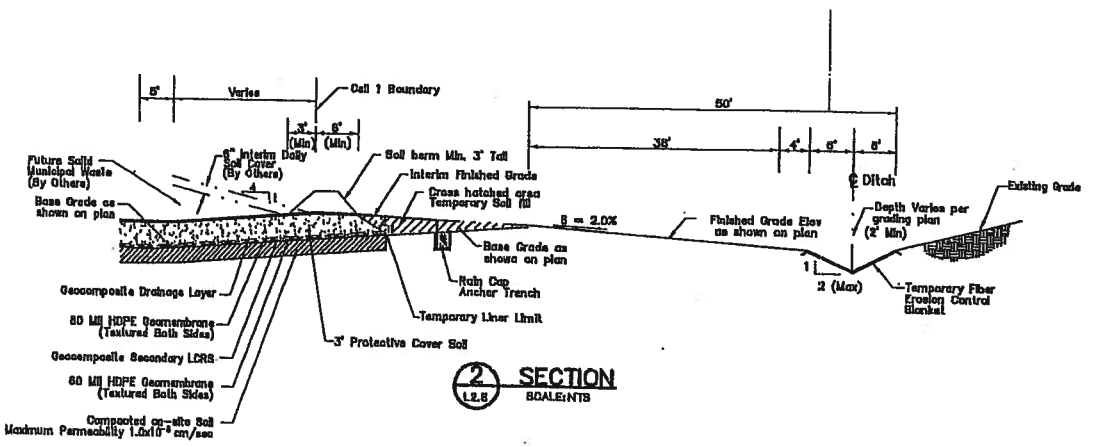

Pond 4 (Future)
Concrete Channel
Begin Channel
4% Minimum
484
4%
Pond 3B (Future)
Pond 3A
Pond 1
Pond 2
4:1
GRAPHIC SCALE 1"=250'
0
200
400
600
LAYON MUNICIPAL SANITARY LANDFILL
OPERATIONS PLAN
MASTER PLAN
FINAL GRADES & DRAINAGE
FIG
3



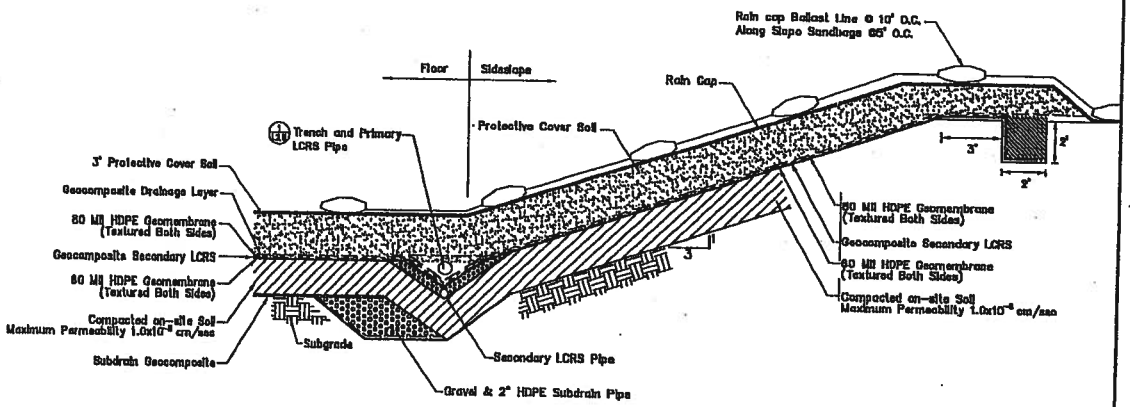
1 L2.6 **LEACHATE COLLECTION TRENCH SECTION**
SCALE: NTS



3 L7.1 **SECTION – TEMPORARY LINER TERMINATION**
SCALE: NTS



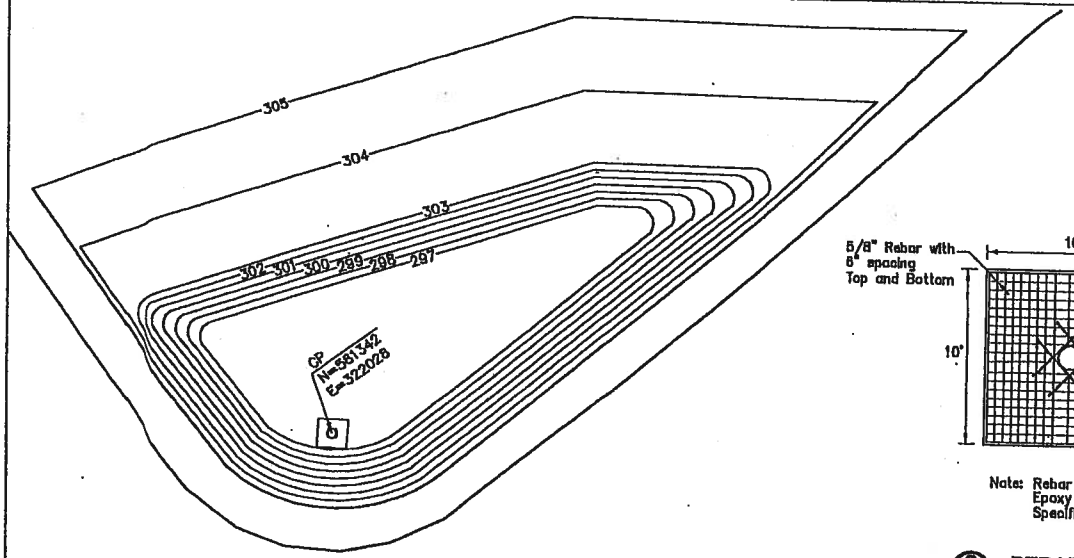
2 L2.6 **SECTION**
SCALE: NTS



4 L2.8 **FLOOR AND SIDESLOPE LINER SYSTEM SECTION**
SCALE: NTS

LAYON MUNICIPAL SANITARY LANDFILL
OPERATIONS PLAN
LINER DETAILS

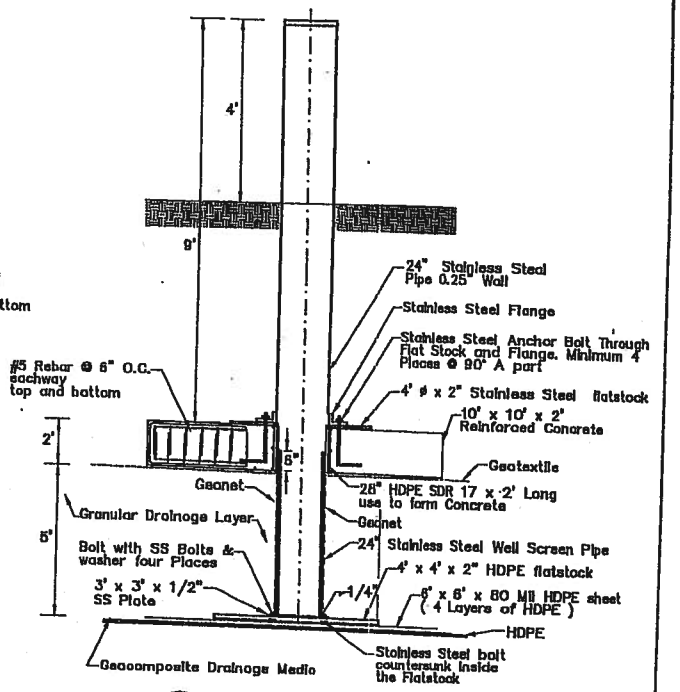
RG
4



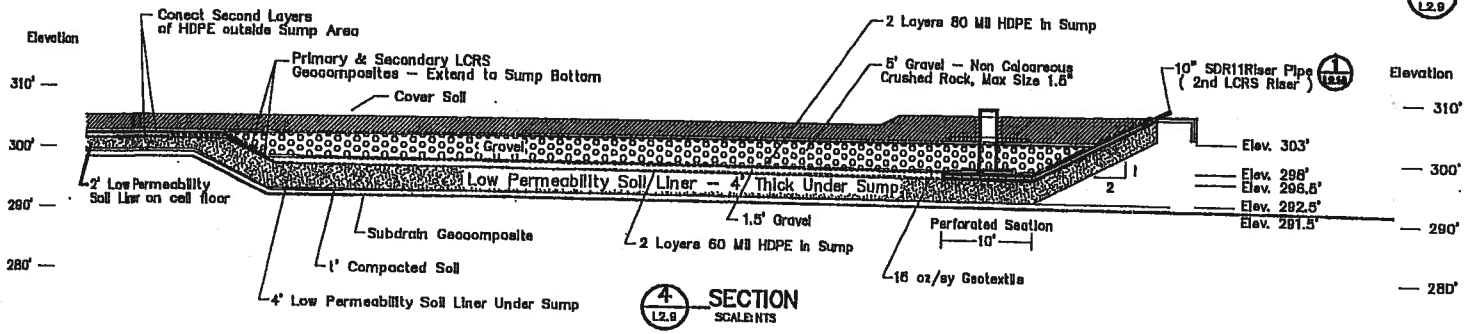
1 L2.9 SUMP SCALE: NTS

Note: Rebar Shall be Epoxy Coated per Specifications

2 L2.9 REBAR DETAIL SCALE: NTS



3 L2.9 LCRS RISER DETAIL SCALE: NTS



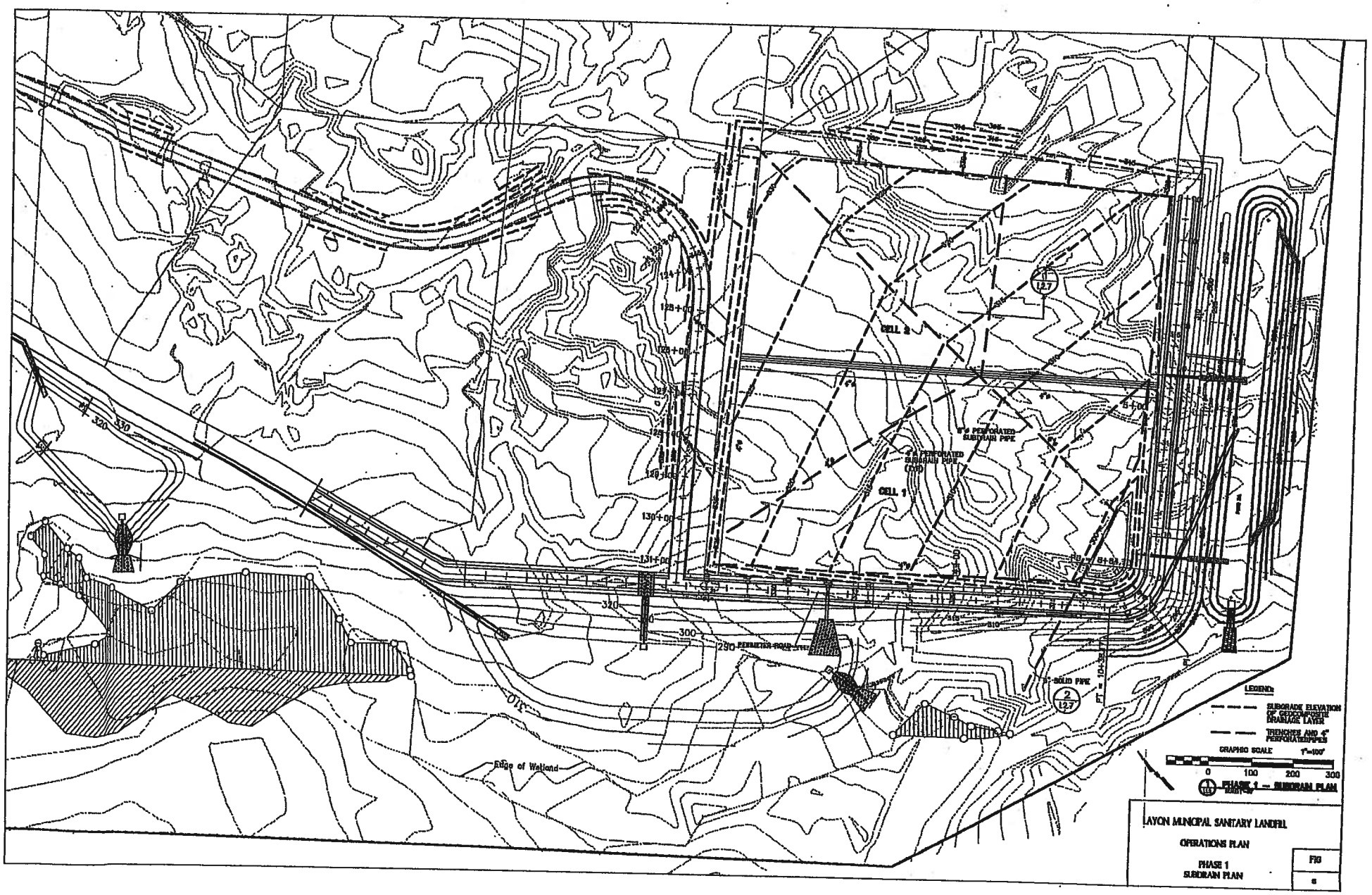
4 L2.9 SECTION SCALE: NTS

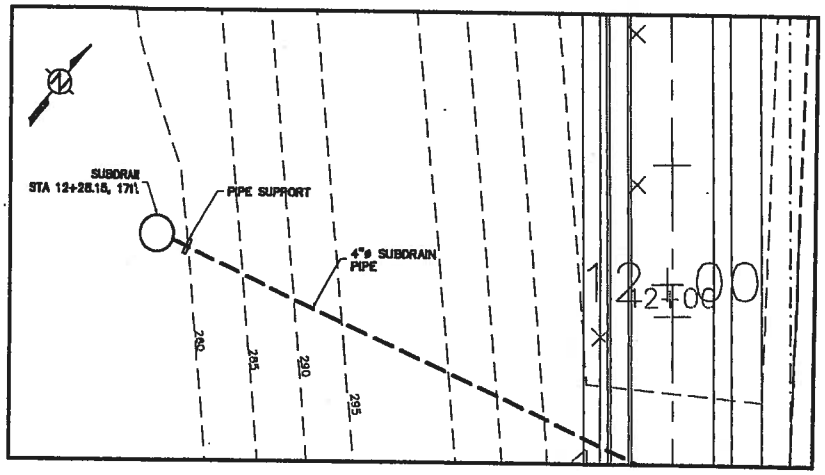
LAYON MUNICIPAL SANITARY LANDFILL

OPERATIONS PLAN

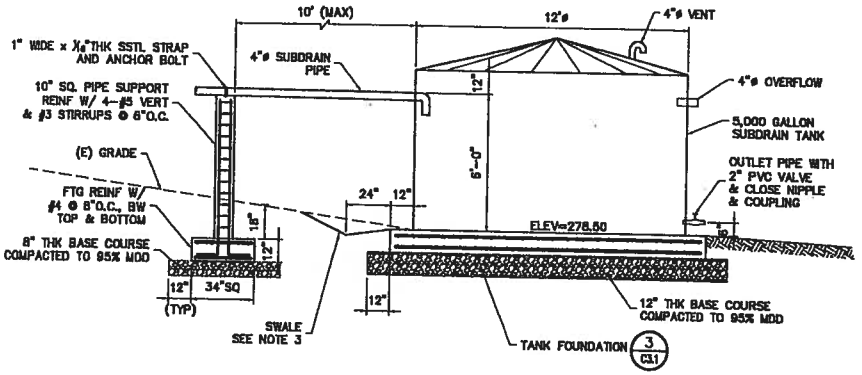
LEACHATE COLLECTION SUMP AND RISER

FIG 5


CELL 2
CELL 1
6"ø PERFORATED SUBDRAIN PIPE
4"ø PERFORATED SUBDRAIN PIPE (TYP)
PERIMETER ROAD SYS.
Edge of Wetland
LEGEND:
SUBGRADE ELEVATION OF GEOCOMPOSITE DRAINAGE LAYER
TRENCHES AND 4" PERFORATED PIPES
GRAPHIC SCALE 1"=100'
0 100 200 300
PHASE 1 — SUBDRAIN PLAN
LAYON MUNICIPAL SANITARY LANDFILL
OPERATIONS PLAN
PHASE 1
SUBDRAIN PLAN
FIG
6

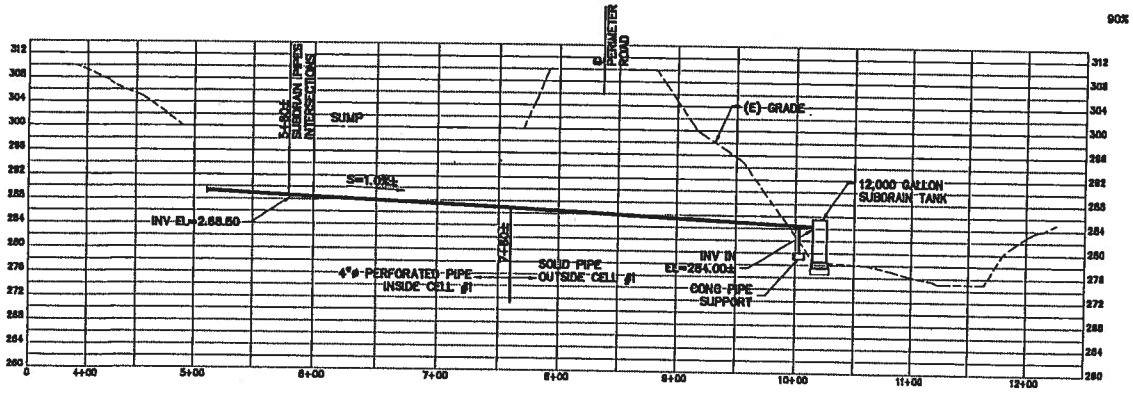


1 SUBDRAIN TANK PLAN
SCALE: 1"=20'

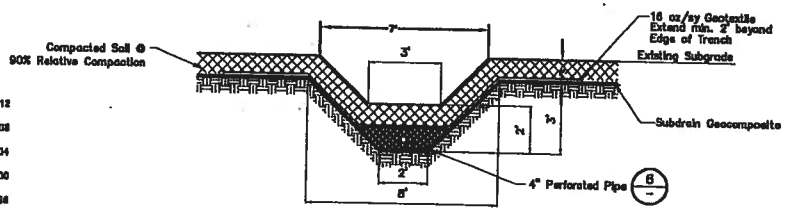


2 PIPE SUPPORT
SCALE: NTS

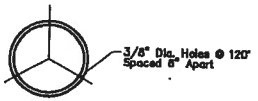
4 SUBDRAIN CATCHMENT TANK
SCALE: NTS



3 SUBDRAIN PROFILE
SCALE HOR 1"=50', VER 1"=10'



5 SUBDRAIN BELOW LCRS TRENCH

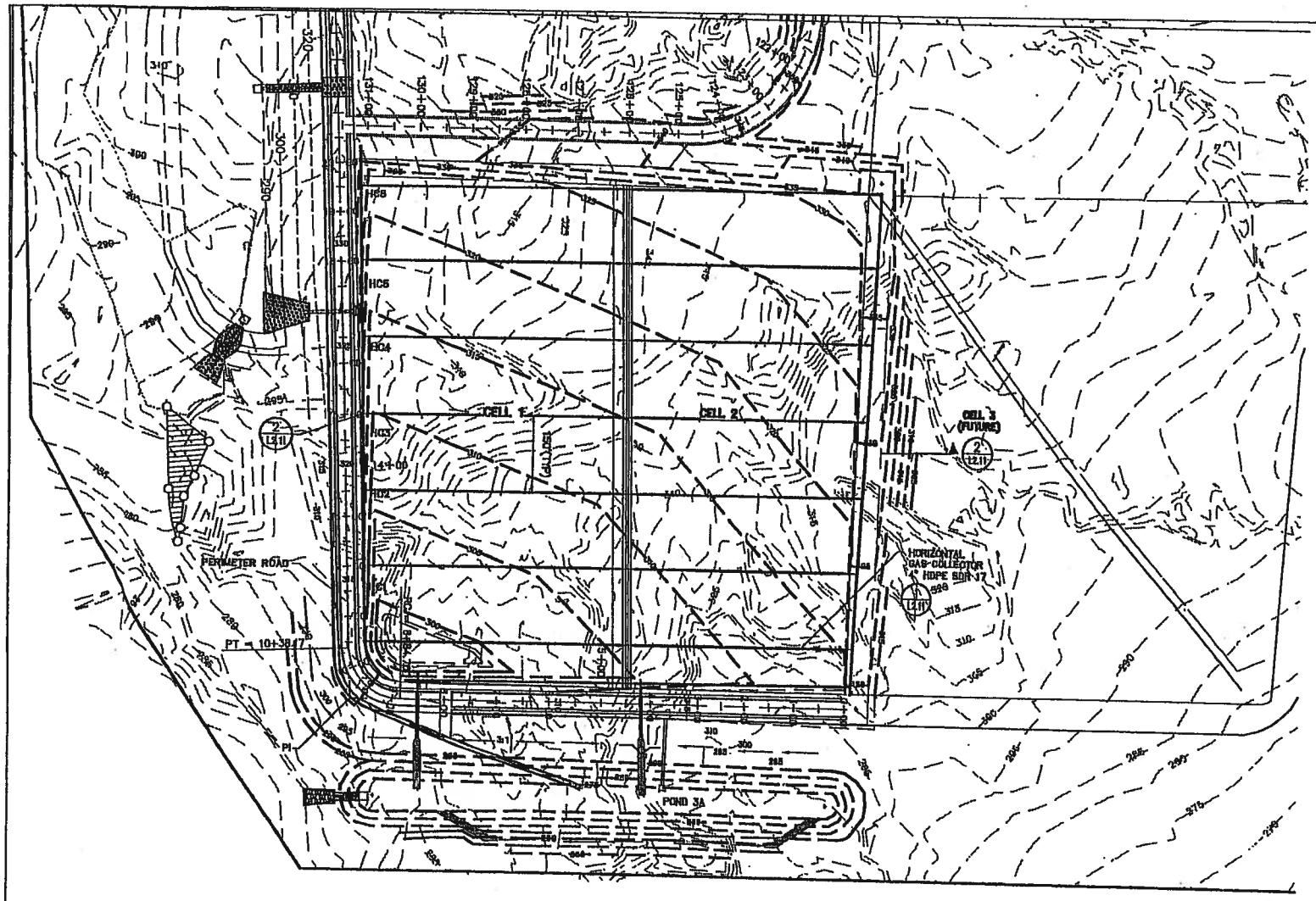


6 PIPE PERFORATION DETAIL

LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

SUBDRAIN DETAILS

FIG. 7



LEGEND:

LINER GRADES

100 50 0 100 200 300

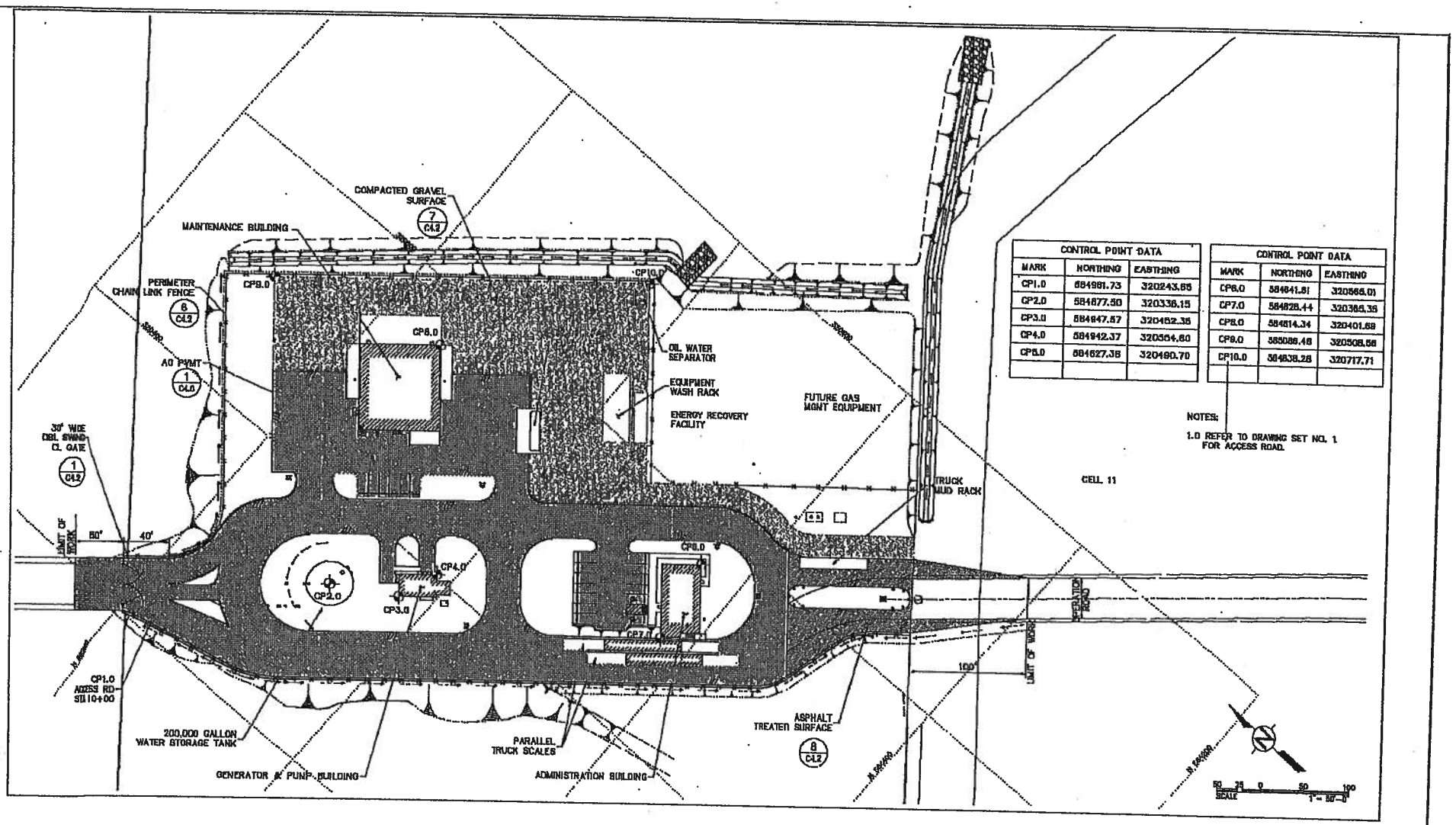
SCALE 1"=100'-0"

LAYON MUNICIPAL SANITARY LANDFILL

OPERATIONS PLAN

CEL 1&2
HORIZONTAL GAS COLLECTORS

FIG
8



CONTROL POINT DATA		
MARK	NORTHING	EASTHING
CP1.0	584981.73	320243.65
CP2.0	584877.50	320336.15
CP3.0	584947.57	320452.35
CP4.0	584942.37	320504.60
CP5.0	584627.38	320490.70

CONTROL POINT DATA		
MARK	NORTHING	EASTHING
CP6.0	584641.51	320566.01
CP7.0	584828.44	320385.35
CP8.0	584814.34	320401.68
CP9.0	585086.48	320508.58
CP10.0	584838.28	320717.71

NOTES:

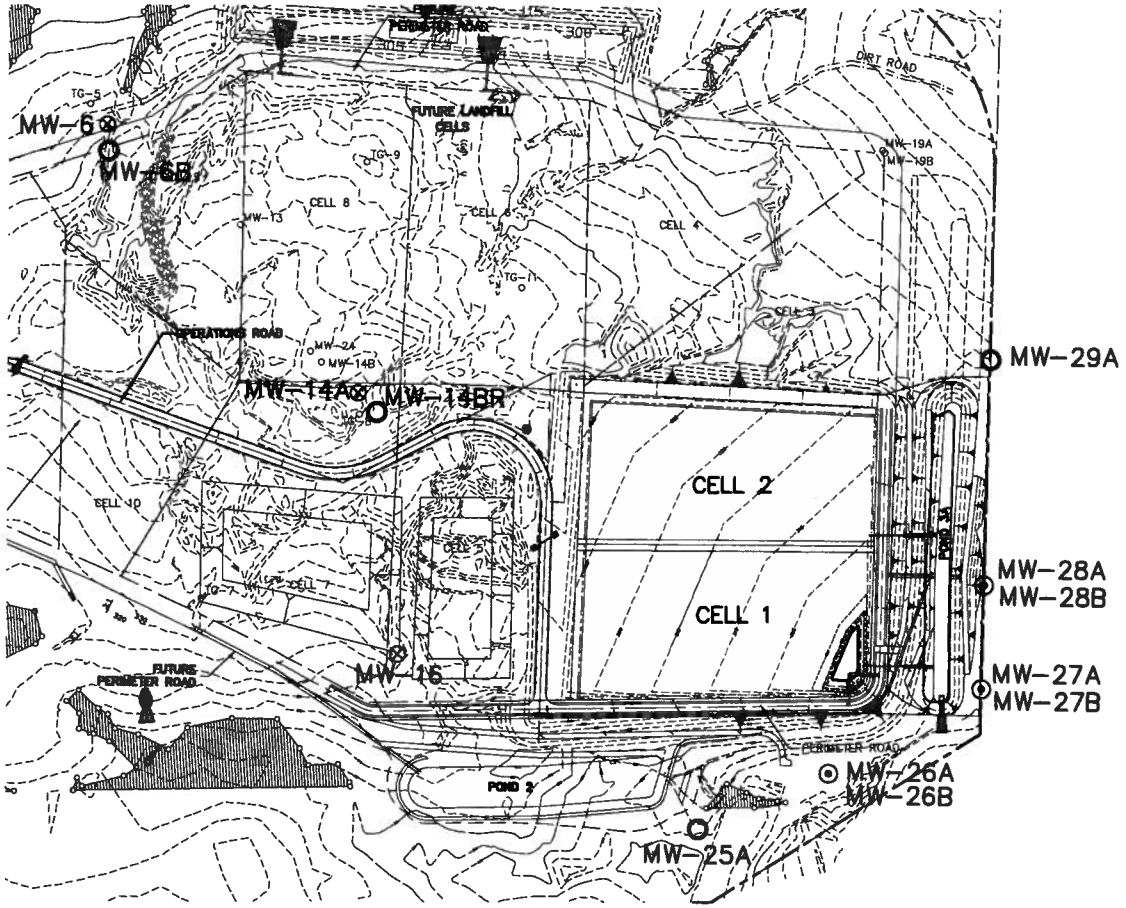
1.0 REFER TO DRAWING SET NO. 1 FOR ACCESS ROAD.

LAYON MUNICIPAL SANITARY LANDFILL

OPERATIONS PLAN

SITE GEOMETRY PLAN

FIG 9



LEGEND

- ⊕ EXISTING SHALLOW AND PROPOSED DEEP GROUND-WATER MONITORING WELL PAIR
- ○ PROPOSED SHALLOW GROUNDWATER MONITORING WELL
- ⊙ PROPOSED SHALLOW (A) AND DEEP (B) GROUNDWATER MONITORING WELL PAIR

1 GROUNDWATER MONITORING WELLS

SCALE: 1"=200'

100 50 0 200 400
SCALE 1"=200'-0"

REFERENCES	REVISION							
TITLE	No.	BY	DATE	DESCRIPTION	DESIGN: MD	DATE: 11/09/09	TERRITORY: GUAM	PROJECT NAME: LAYON MUNICIPAL SANITARY LANDFILL SITE SPECIFIC MONITORING PLAN
					CHECKED: TG	SCALE: AS SHOWN		GROUNDWATER MONITORING WELLS
					RECOMMENDED: MD	DRAWN: RJ		FIGURE: 10
					APPROVED: TG			SHEET: – of –

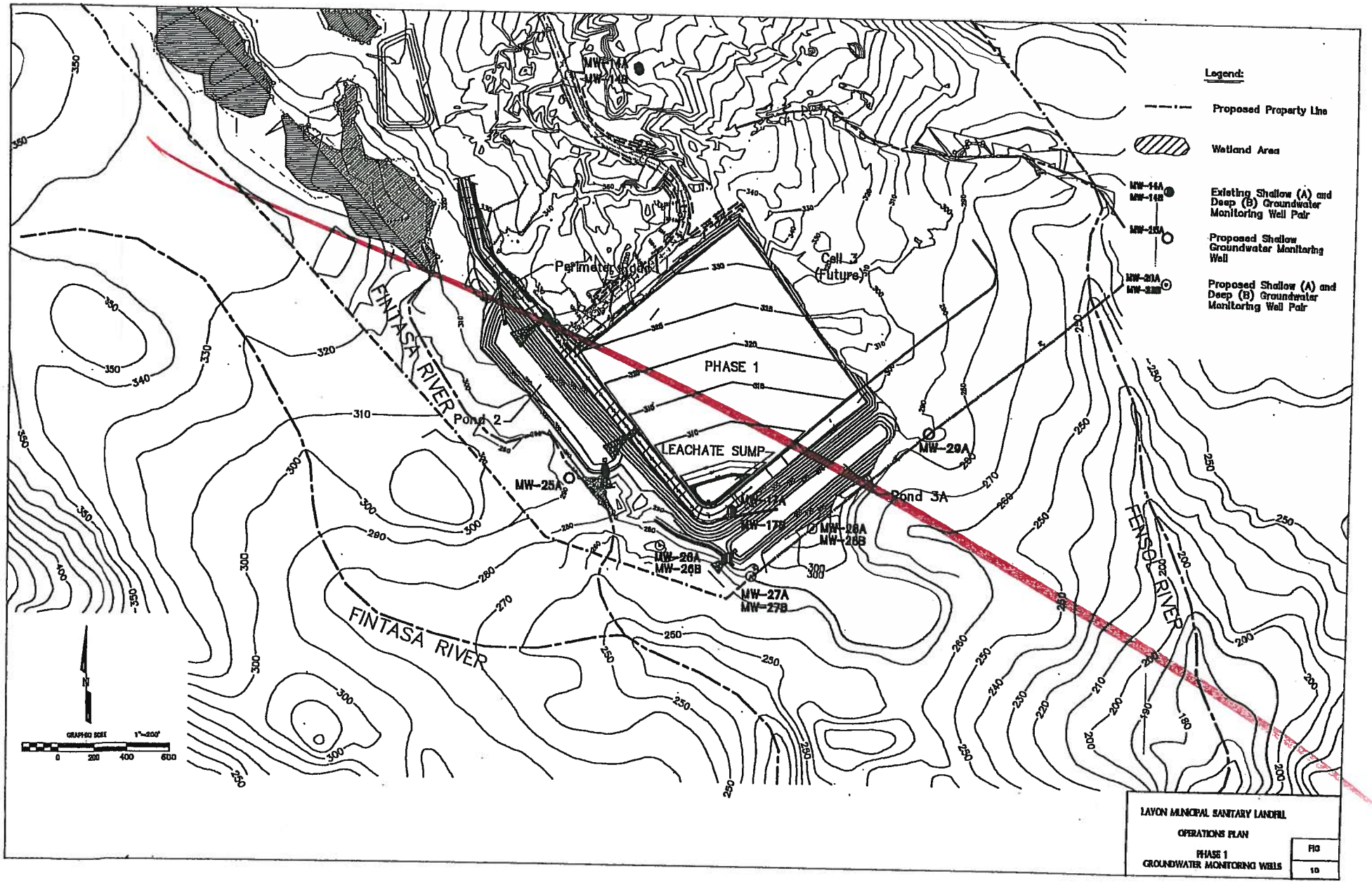
GUAM

THIS WORK WAS PREPARED BY ME OR DONE UNDER MY DIRECT SUPERVISION

PROJECT NO. –

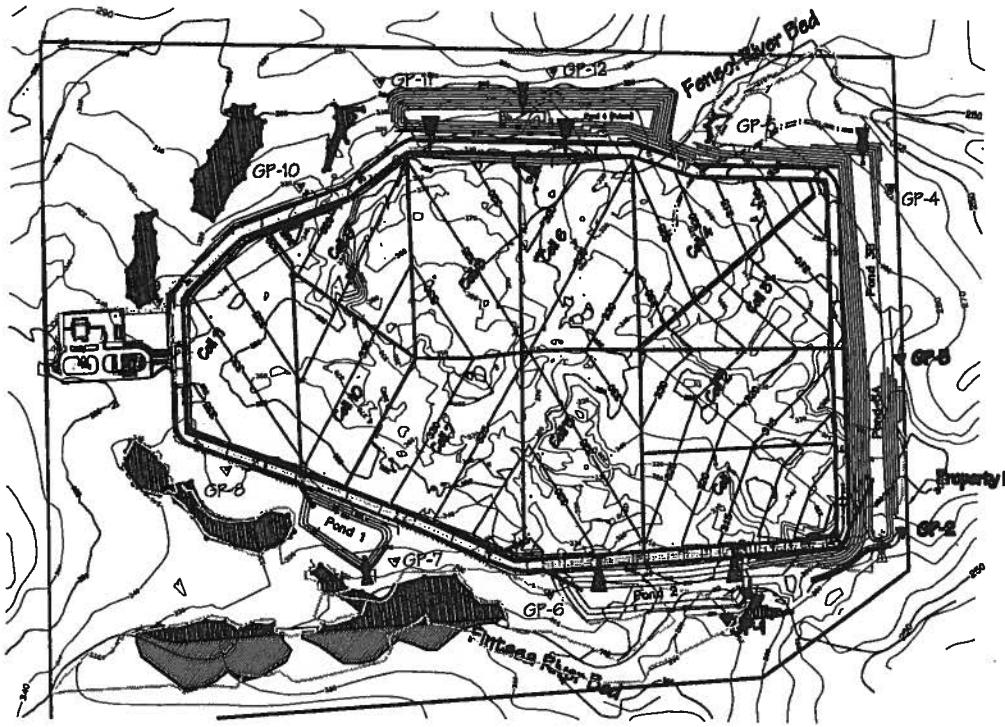
CAD FILE:

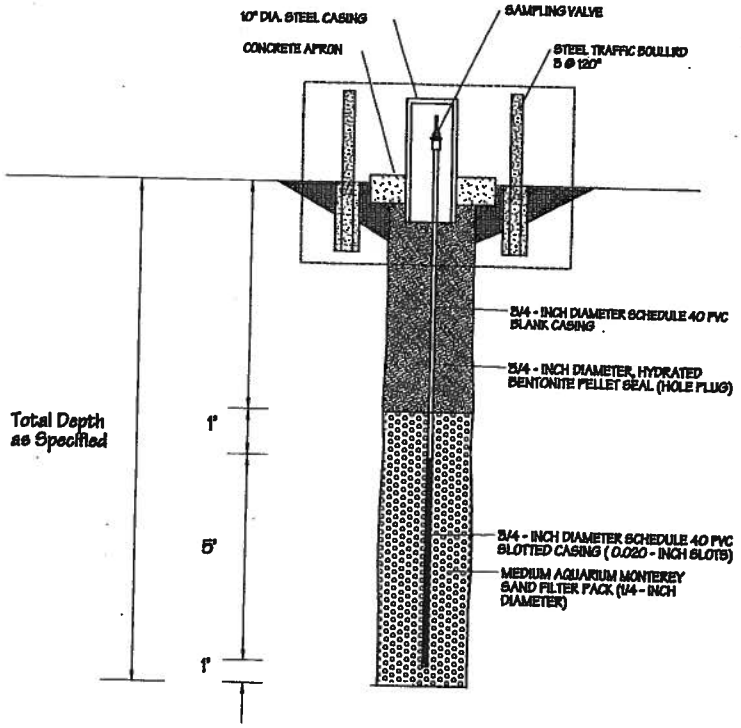
C:\Projects\project 2009\LANDFILL OPTN RD & MASS GDG\FOR TOR\LSRD-C0.1.dwg, 7/9/2009 10:07:26 AM


Legend:
Proposed Property Line
Wetland Area
MW-14A
MW-14B
Existing Shallow (A) and Deep (B) Groundwater Monitoring Well Pair
MW-25A
Proposed Shallow Groundwater Monitoring Well
MW-21A
MW-21B
Proposed Shallow (A) and Deep (B) Groundwater Monitoring Well Pair
Perimeter Berm
Cell 3 (Future)
PHASE 1
FINTASA RIVER
Pond 2
LEACHATE SUMP
MW-25A
MW-29A
Pond 3A
MW-17A
MW-17B
MW-28A
MW-28B
MW-26A
MW-26B
MW-27A
MW-27B
FINTASA RIVER
FENSOLO RIVER
N
GRAPHIC SCALE 1"=200'
0 200 400 600
LAYON MUNICIPAL SANITARY LANDFILL
OPERATIONS PLAN
PHASE 1
GROUNDWATER MONITORING WELLS
FIG
10

Gas Probe Construction Schedule

Probe	Location - Field Adjust as Necessary		Total Depth (ft.)	Screened Interval (ft. below Surface)	Status
	Northing	Easting			
GP-1	581460	321545	10	4-9	In Contract
GP-2	581004	322252	10	4-9	
GP-3	581549	322955	10	4-9	
GP-4	582108	325584	10	4-9	Future
GP-5	582965	325275	10	4-9	
GP-6	582260	320888	10	4-9	
GP-7	582985	320539	15	9-14	
GP-8	583928	320397	10	4-9	
GP-9	584721	320659	15	9-14	
GP-10	584502	321745	10	4-9	
GP-11	584504	322399	10	4-9	
GP-12	583847	322966	10	4-9	





Typical Landfill Gas Probe

Legend

GP-1 ▼ Gas Monitoring Probe (Phase I)

▽ Gas Monitoring Probe (Future)

LAYON MUNICIPAL SANITARY LANDFILL

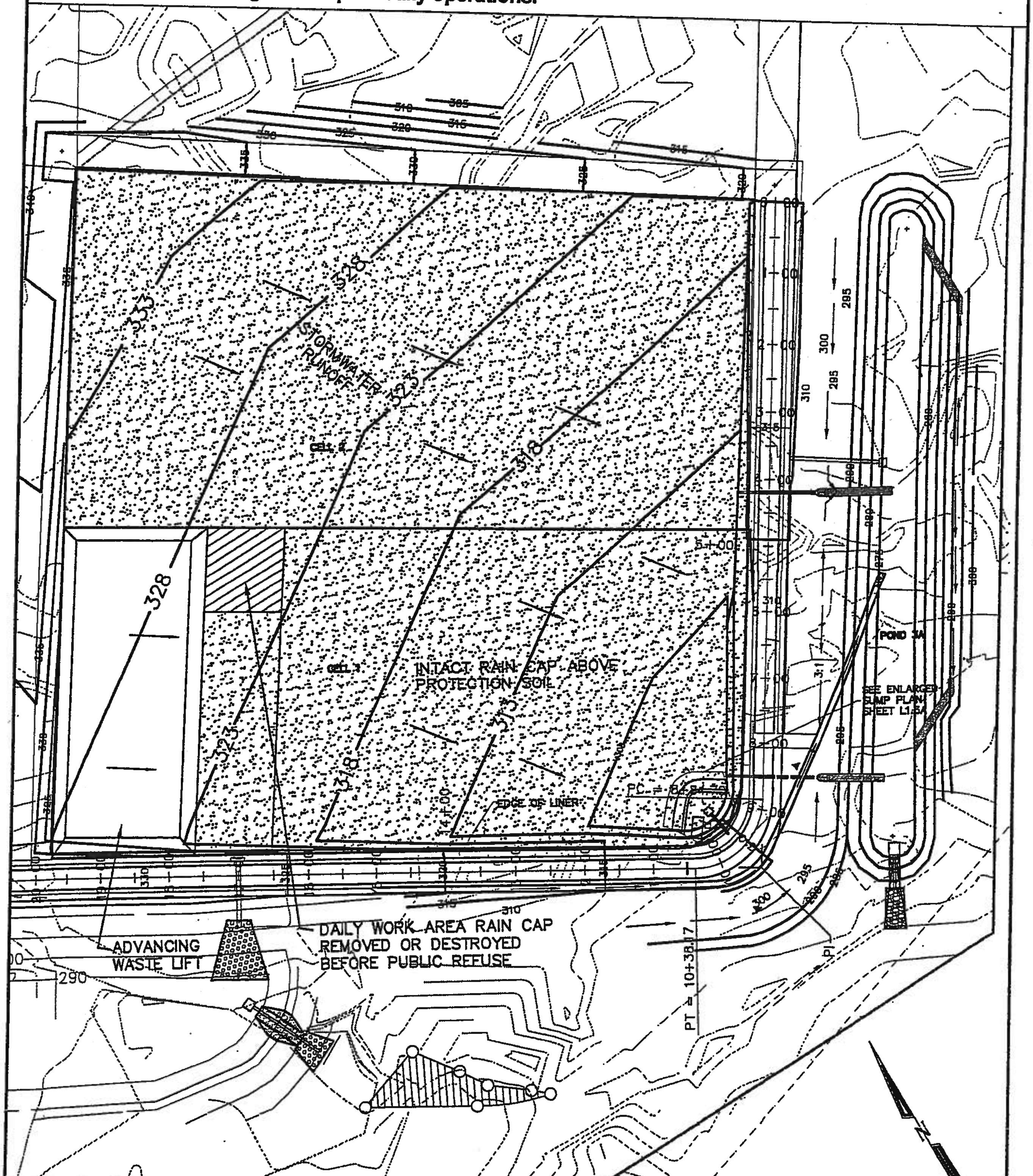
OPERATIONS PLAN

MASTER PLAN
LANDFILL GAS MONITORING FACILITIES

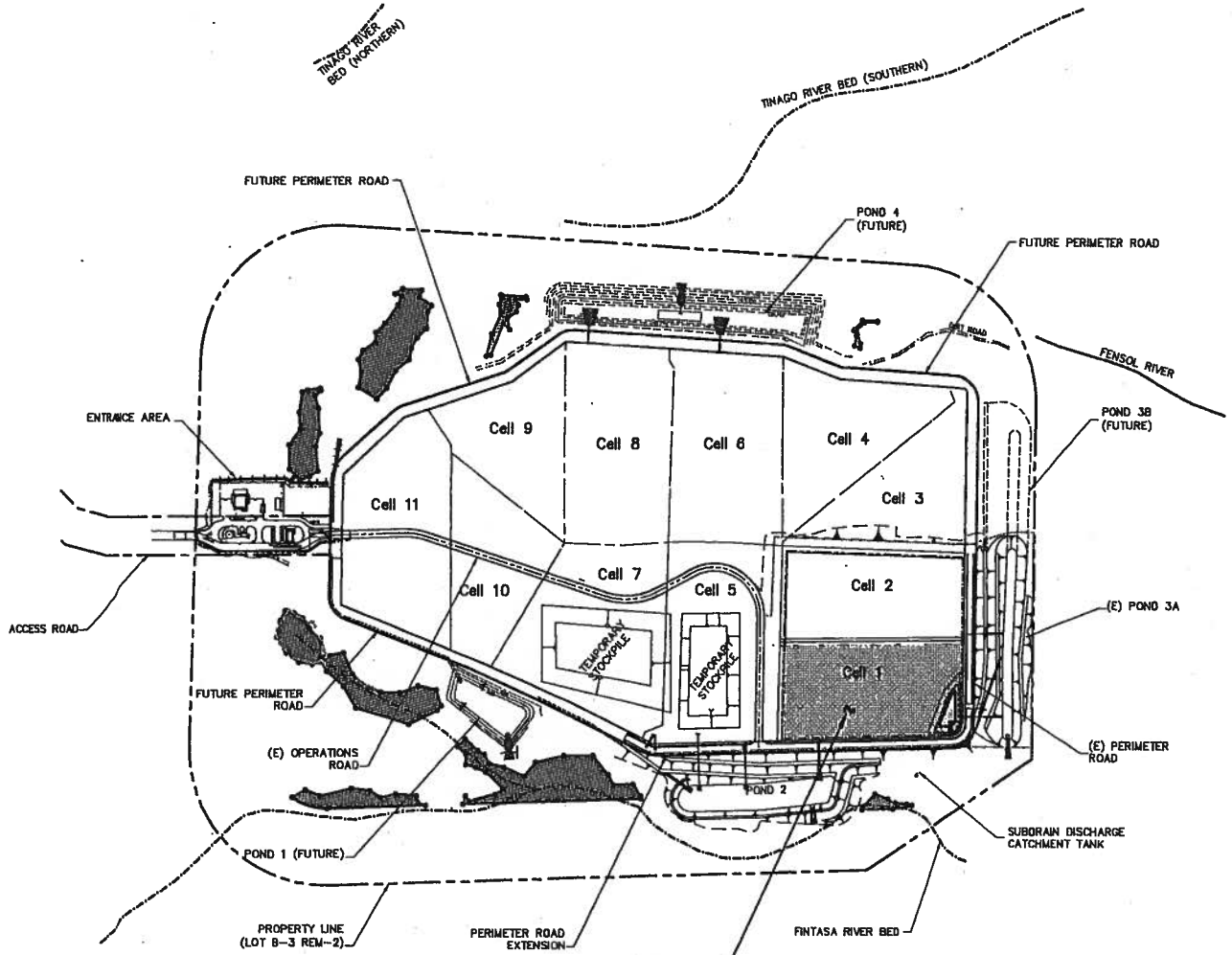
FIG
11

Note:

1) Begin disposal operations in highest elevation of each cell and work toward sump area.
2) Remove Rainflap or destroy by running over with bulldozer before placing waste.
3) Remove only enough rainflap for daily operations.

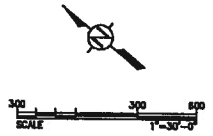


GRAPHIC SCALE 1"=200'	LAYON MUNICIPAL SANITARY LANDFILL	1" = 200'
0 200 400 600	Operations Plan	Figure 12
	Initial Waste Lift with Rain Cap	3/30/09



CELL 1
YEAR 2010
(CUMULATIVE VOLUME=126,161 Cu.Yds)

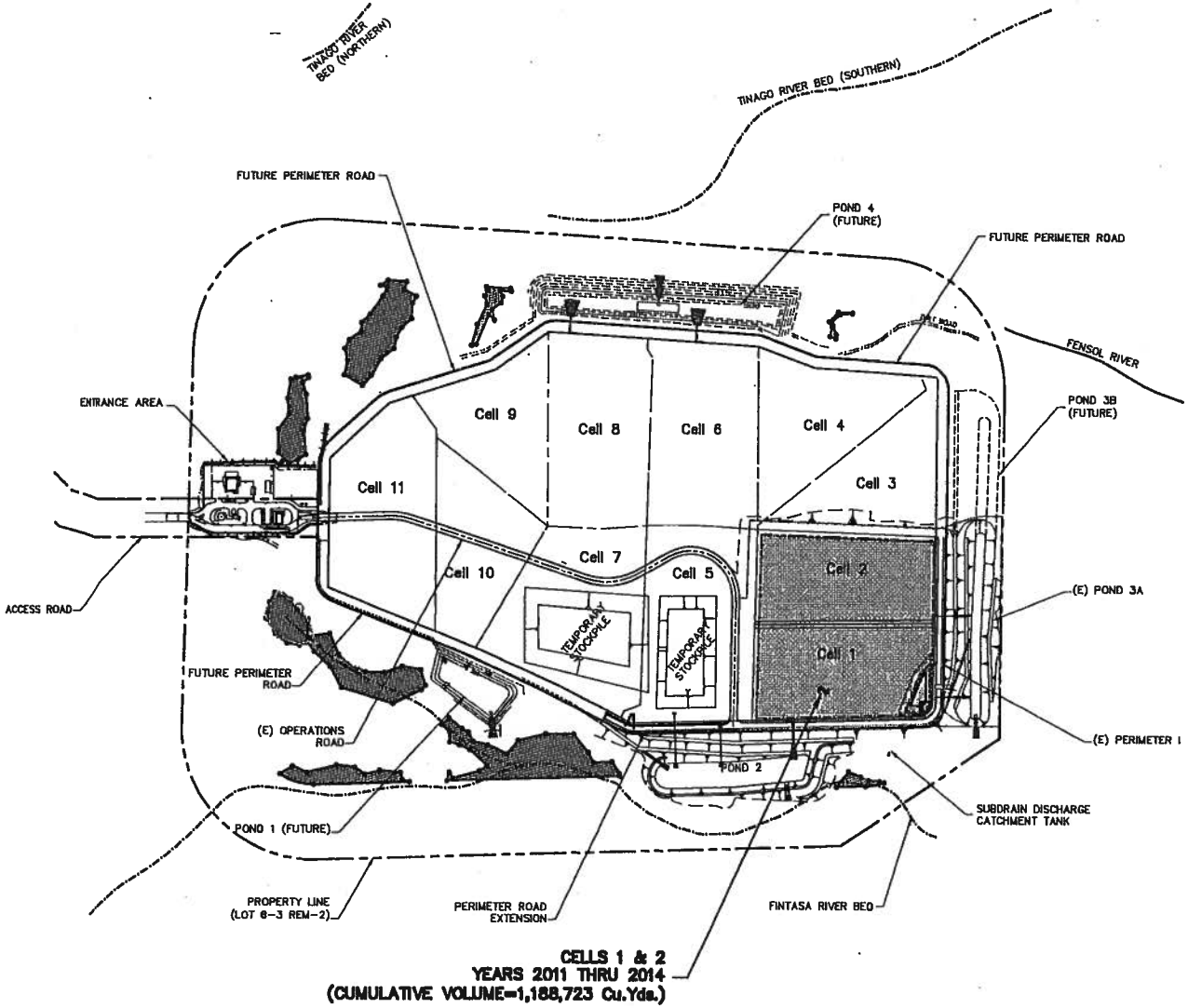
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	237,499	126,161	126,161	CELL 1	
2011	184,530	257,550	383,711	CELLS 1 & 2	
2012	167,726	262,877	646,588	CELLS 1 & 2	
2013	160,982	268,303	914,891	CELLS 1 & 2	
2014	164,299	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1-3	
2016	171,072	285,120	1,753,309	CELLS 1-3	
2017	174,530	290,883	2,044,193	CELLS 1-3	
2018	178,054	296,757	2,340,949	CELLS 1-4	
2019	181,646	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,398	315,660	3,268,198	CELLS 1-4	
2022	194,186	323,643	3,591,841	CELLS 1-5	
2023	198,778	331,298	3,923,139	CELLS 1-5	
2024	203,477	339,128	4,262,268	CELLS 1-5	
2025	208,284	347,140	4,609,408	CELLS 1-5	
2026	212,725	354,542	4,963,949	CELLS 1-5	
2027	217,259	362,098	5,326,048	CELLS 1-5	
2028	221,887	369,812	5,695,859	CELLS 1-5	
2029	226,610	377,683	6,073,543	CELLS 4-6	
2030	231,431	385,718	6,459,261	CELLS 4-6	
2031	236,815	394,858	6,854,119	CELLS 4-6	
2032	242,525	404,208	7,258,328	CELLS 4-8	
2033	248,267	413,778	7,672,106	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	279,033	465,056	9,892,495	CELLS 5-7	
2039	285,619	476,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,259	498,765	11,354,556	CELLS 6 & 8	
2042	306,321	510,536	11,865,091	CELLS 7-9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7-9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,278	560,463	14,030,597	CELLS 7-11	
2047	344,214	573,690	14,604,287	CELLS 7-11	
2048	352,338	587,230	15,191,517	CELLS 7-11	
2049	360,654	601,089	15,792,607	CELLS 7-11	
2050	9,712	16,187	15,808,794	CELLS 7-11	FINAL CLOSURE (CELLS 7-11)



LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

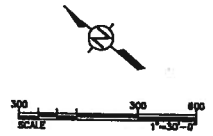
CELLS FILLING SEQUENCE

FIG. 13.1



CELLS 1 & 2
YEARS 2011 THRU 2014
(CUMULATIVE VOLUME=1,188,723 Cu.Yds.)

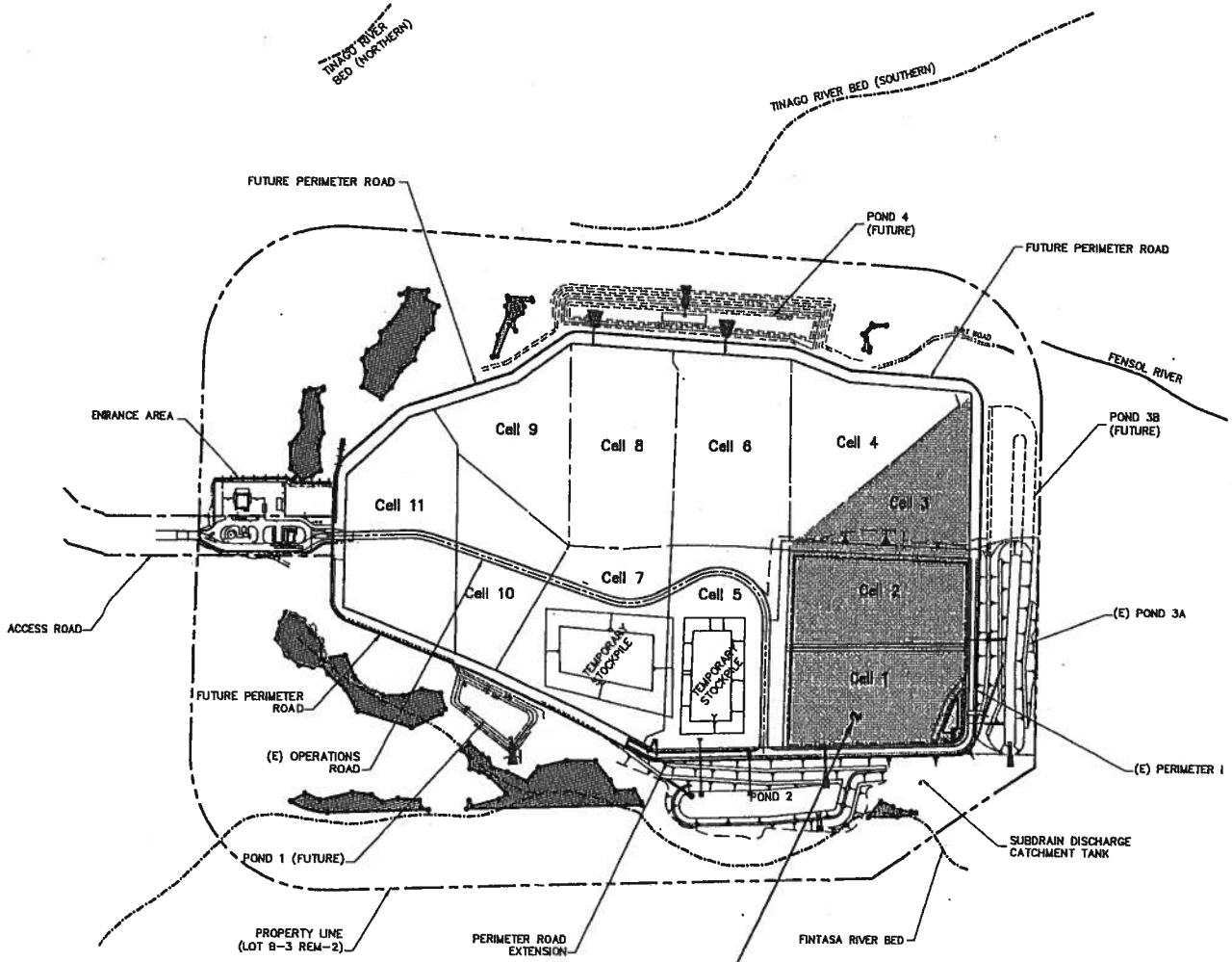
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	126,161	126,161	CELL 1	
2011	84,540	140,900	267,061	CELL 1	
2012	87,774	146,290	413,351	CELL 1	
2013	90,951	151,585	564,936	CELL 1 & 2	
2014	94,293	157,137	722,073	CELL 1 & 2	
2015	167,680	279,467	1,466,189	CELLS 1-3	
2016	171,072	285,120	1,753,309	CELLS 1-3	
2017	174,530	290,883	2,044,193	CELLS 1-3	
2018	178,054	296,787	2,340,849	CELLS 1-4	
2019	181,646	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,386	315,650	3,268,188	CELLS 1-4	
2022	194,186	323,643	3,591,841	CELLS 1-5	
2023	198,779	331,298	3,923,139	CELLS 1-5	
2024	203,477	339,128	4,262,268	CELLS 1-5	
2025	208,284	347,140	4,609,408	CELLS 1-5	
2026	212,725	354,542	4,963,949	CELLS 1-5	
2027	217,259	362,098	5,326,048	CELLS 1-5	
2028	221,887	369,812	5,695,859	CELLS 1-5	
2029	226,610	377,683	6,073,543	CELLS 4-6	
2030	231,431	385,718	6,459,261	CELLS 4-6	
2031	236,915	394,858	6,854,118	CELLS 4-6	
2032	242,525	404,208	7,258,328	CELLS 4-6	
2033	248,267	413,778	7,672,106	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	278,033	465,056	9,892,495	CELLS 5-7	
2039	285,619	476,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,258	498,765	11,354,556	CELLS 6 & 8	
2042	306,321	510,536	11,865,091	CELLS 7-9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7-9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,278	560,463	14,030,597	CELLS 7-11	
2047	344,214	573,690	14,604,287	CELLS 7-11	
2048	352,338	587,230	15,191,517	CELLS 7-11	
2049	360,654	601,089	15,792,607	CELLS 7-11	
2050	9,712	16,187	15,808,794	CELLS 7-11	FINAL CLOSURE (CELLS 7-11)



LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

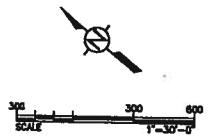
CELLS FILLING SEQUENCE

FIG. 13.2



CELLS 1 – 3
YEARS 2015 THRU 2017
(CUMULATIVE VOLUME=2,044,193 Cu.Yds.)

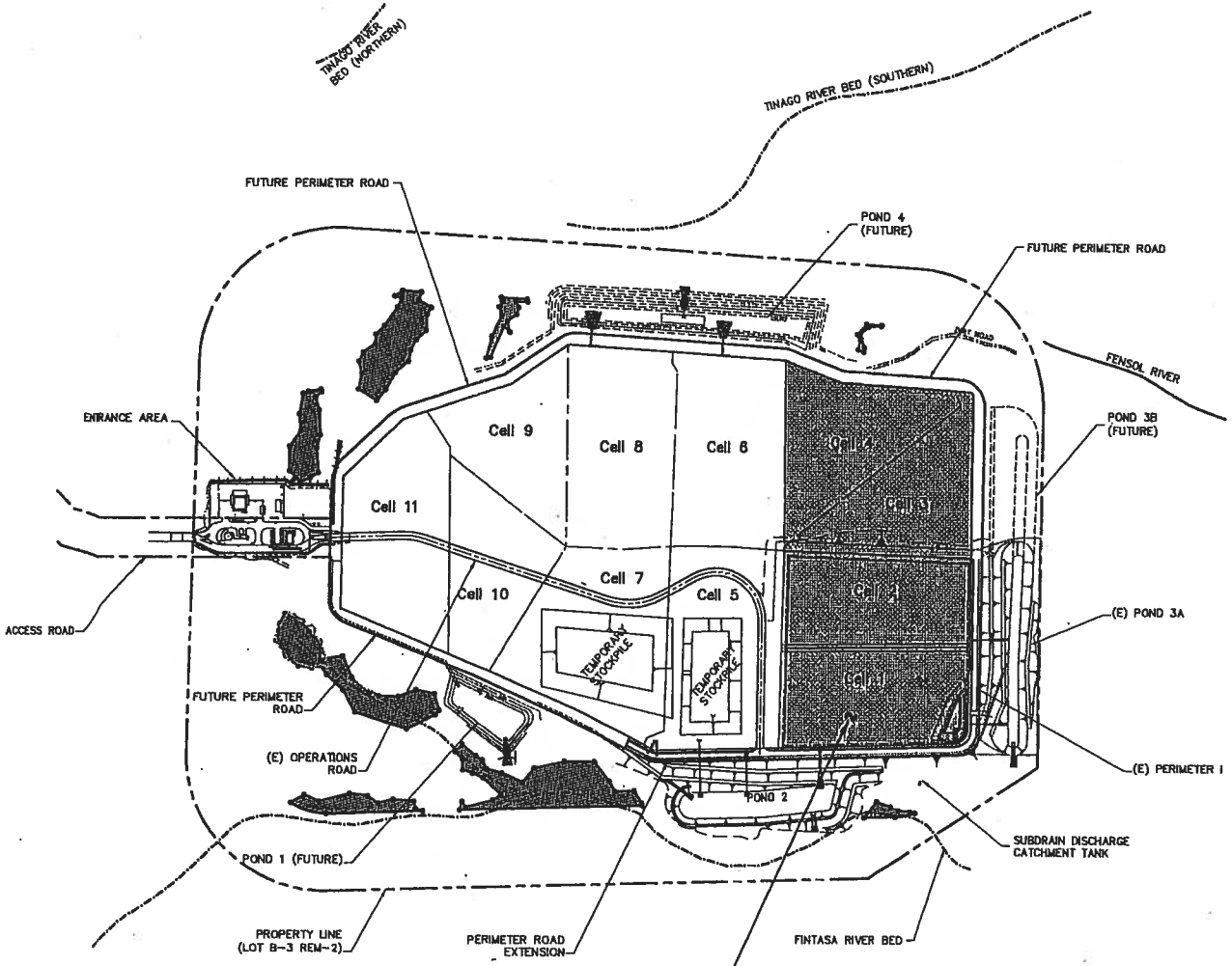
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	126,161	126,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	160,982	268,303	914,891	CELLS 1 & 2	
2014	164,298	273,832	1,188,723	CELLS 1 & 2	
2015	167,676	279,460	1,468,183	CELLS 1-3	
2016	171,072	285,120	1,753,303	CELLS 1-3	
2017	174,430	290,883	2,044,193	CELLS 1-3	
2018	178,054	296,757	2,340,949	CELLS 1-4	
2019	181,846	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,398	316,660	3,268,198	CELLS 1-4	
2022	194,186	323,643	3,591,841	CELLS 1-5	
2023	198,779	331,298	3,923,139	CELLS 1-5	
2024	203,477	339,128	4,262,268	CELLS 1-5	
2025	208,284	347,140	4,609,408	CELLS 1-5	
2026	212,725	354,542	4,963,949	CELLS 1-5	
2027	217,259	362,098	5,326,048	CELLS 1-5	
2028	221,887	369,812	5,695,859	CELLS 1-5	
2029	226,610	377,683	6,073,543	CELLS 4-6	
2030	231,431	385,718	6,459,261	CELLS 4-6	
2031	236,915	394,858	6,854,119	CELLS 4-6	
2032	242,525	404,208	7,258,328	CELLS 4-6	
2033	248,267	413,778	7,672,106	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	279,033	465,056	9,892,495	CELLS 5-7	
2039	285,619	476,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,259	498,765	11,354,556	CELLS 6 & 8	
2042	306,321	510,536	11,865,091	CELLS 7-9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7-9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,278	560,463	14,030,597	CELLS 7-11	
2047	344,214	573,690	14,604,287	CELLS 7-11	
2048	352,338	587,230	15,191,517	CELLS 7-11	
2049	360,654	601,089	15,792,607	CELLS 7-11	
2050	9,712	16,187	15,808,794	CELLS 7-11	FINAL CLOSURE (CELLS 7-11)



LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

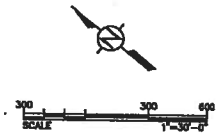
CELLS FILLING SEQUENCE

FIG. 13.3



CELLS 1 – 4
YEARS 2018 THRU 2021
(CUMULATIVE VOLUME=3,268,198 Cu.Yds.)

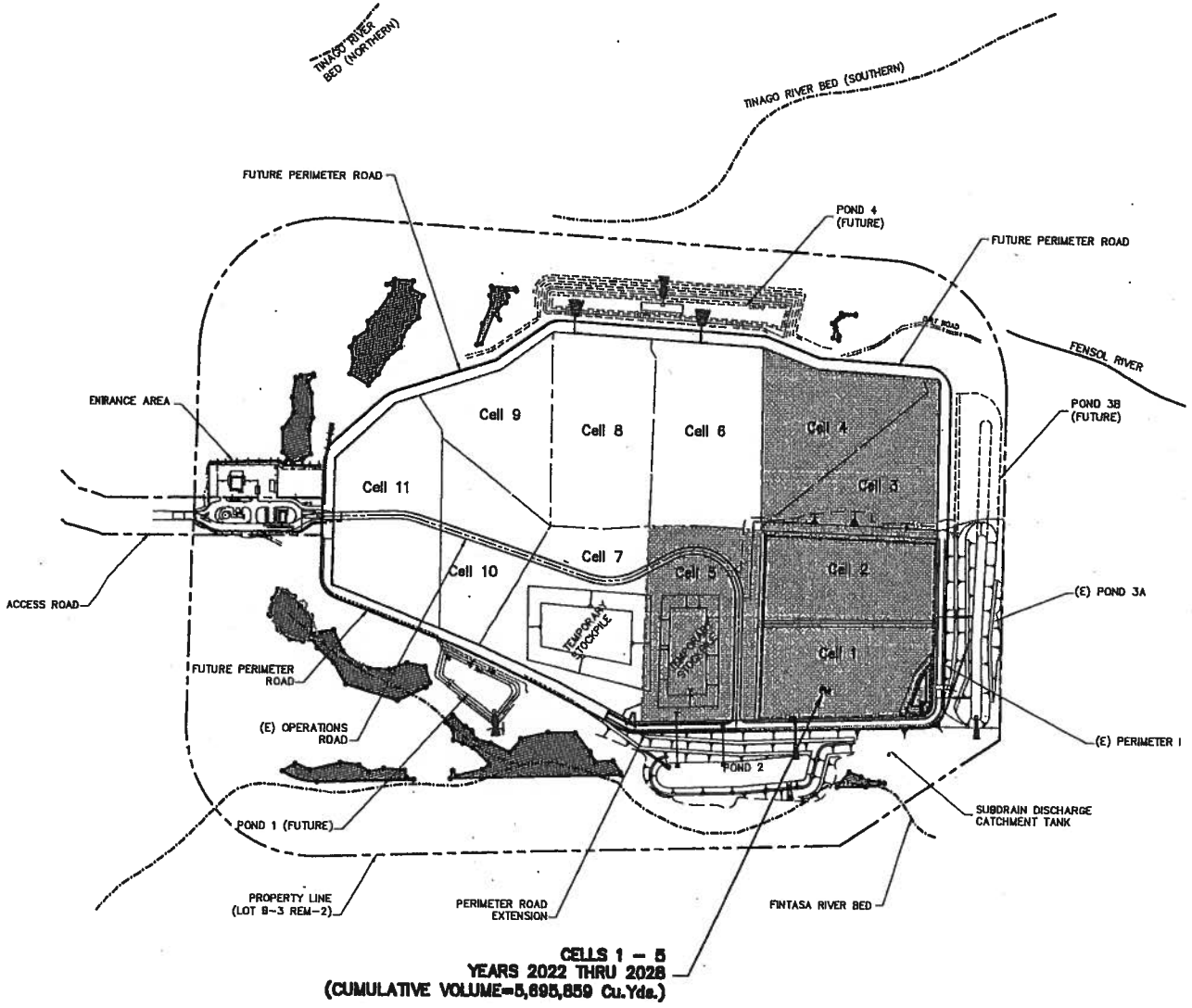
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	126,161	126,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	160,982	268,303	914,891	CELLS 1 & 2	
2014	164,299	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1–3	
2016	171,072	285,120	1,753,309	CELLS 1–3	
2017	174,530	290,883	2,044,193	CELLS 1–3	
2018	178,054	296,757	2,340,949	CELLS 1–3	
2019	181,645	302,743	2,643,693	CELLS 1–3	
2020	185,307	308,845	2,952,538	CELLS 1–3	
2021	189,040	315,060	3,267,598	CELLS 1–3	
2022	194,166	323,843	3,591,441	CELLS 1–5	
2023	198,779	331,298	3,923,139	CELLS 1–5	
2024	203,477	339,128	4,262,266	CELLS 1–5	
2025	208,264	347,140	4,609,408	CELLS 1–5	
2026	212,726	354,542	4,963,949	CELLS 1–5	
2027	217,258	362,098	5,326,048	CELLS 1–5	
2028	221,857	369,812	5,695,859	CELLS 1–5	
2029	226,610	377,683	6,073,543	CELLS 4–6	
2030	231,431	385,718	6,459,261	CELLS 4–6	
2031	236,918	394,858	6,854,119	CELLS 4–6	
2032	242,525	404,208	7,258,328	CELLS 4–6	
2033	248,267	413,776	7,672,106	CELLS 5–7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5–7	
2035	260,153	433,588	8,529,264	CELLS 5–7	
2036	266,305	443,842	8,973,106	CELLS 5–7	
2037	272,600	454,333	9,427,439	CELLS 5–7	
2038	279,033	465,056	9,892,495	CELLS 5–7	
2039	285,619	476,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,259	498,765	11,354,556	CELLS 6 & 8	
2042	306,321	510,536	11,865,091	CELLS 7–9	CELLS 5 & 8
2043	313,551	522,584	12,387,675	CELLS 7–9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,278	560,463	14,030,597	CELLS 7–11	
2047	344,214	573,690	14,604,287	CELLS 7–11	
2048	352,338	587,230	15,191,517	CELLS 7–11	
2049	360,654	601,089	15,792,607	CELLS 7–11	
2050	9,712	16,187	15,808,794	CELLS 7–11	FINAL CLOSURE (CELLS 7–11)



LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

CELLS FILLING SEQUENCE

FIG. 13.4



CELLS 1 – 5
YEARS 2022 THRU 2028
(CUMULATIVE VOLUME=5,695,859 Cu.Yds.)

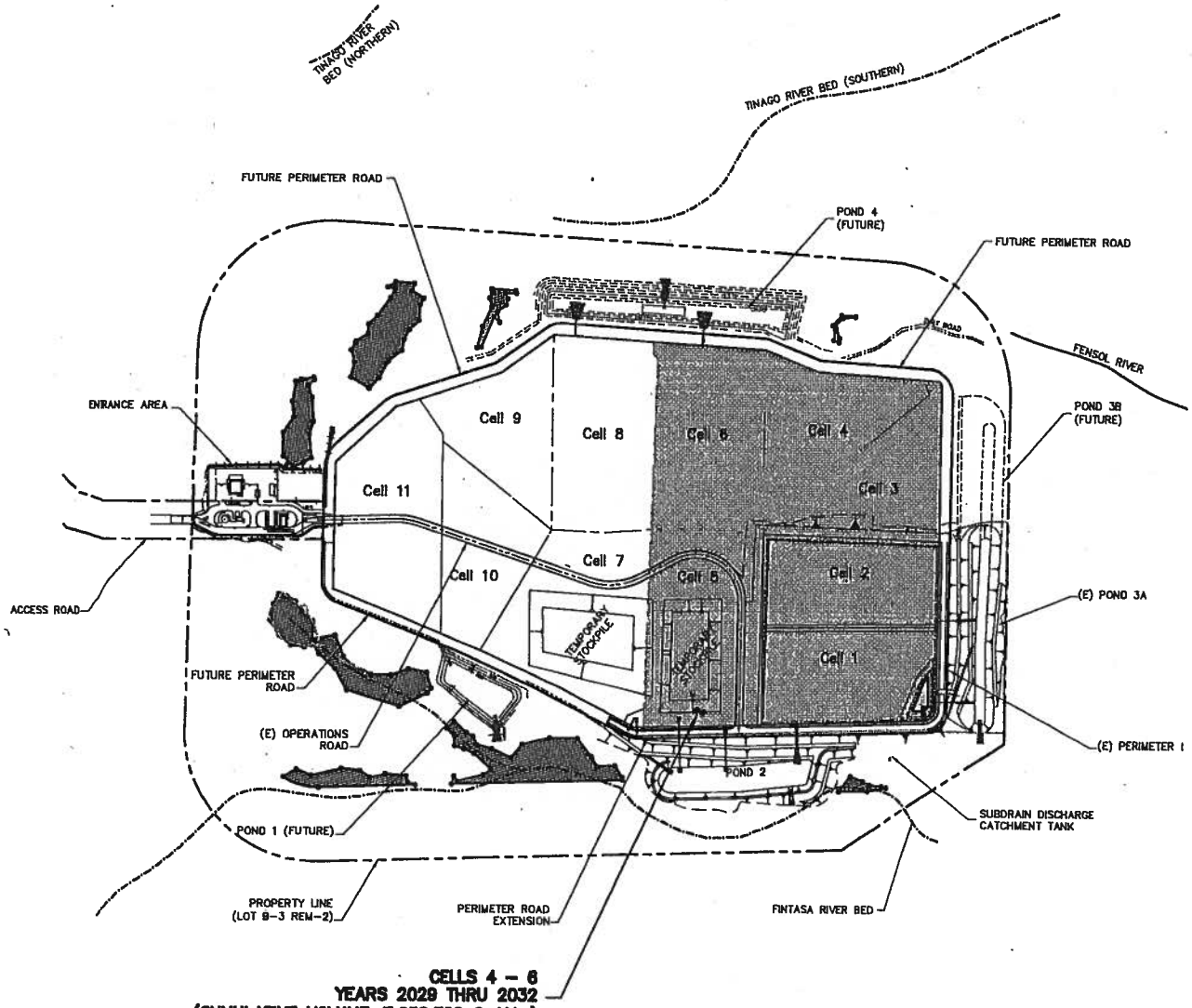
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	126,161	126,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	160,982	268,303	914,891	CELLS 1 & 2	
2014	164,299	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1-3	
2016	171,072	285,120	1,753,309	CELLS 1-3	
2017	174,530	290,883	2,044,193	CELLS 1-3	
2018	178,054	296,757	2,340,949	CELLS 1-4	
2019	181,646	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,396	315,660	3,268,198	CELLS 1-4	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
2029	226,610	377,683	8,073,545	CELLS 4-8	
2030	231,431	385,718	8,459,281	CELLS 4-8	
2031	236,915	394,858	8,854,119	CELLS 4-8	
2032	242,525	404,208	7,258,328	CELLS 4-8	
2033	248,267	413,779	7,672,108	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,678	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	279,033	465,056	9,892,495	CELLS 5-7	
2039	285,619	476,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,259	498,765	11,354,556	CELLS 6 & 8	
2042	306,321	510,536	11,865,091	CELLS 7-9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7-9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,278	560,463	14,030,597	CELLS 7-11	
2047	344,214	573,690	14,604,287	CELLS 7-11	
2048	352,338	587,230	15,191,517	CELLS 7-11	
2049	360,654	601,089	15,792,607	CELLS 7-11	
2050	9,712	16,167	15,808,794	CELLS 7-11	FINAL CLOSURE (CELLS 7-11)

SCALE 1"=30'-0"

LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

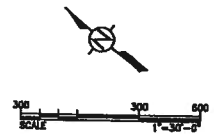
CELLS FILLING SEQUENCE

FIG. 13.5



CELLS 4 – 6
YEARS 2029 THRU 2032
(CUMULATIVE VOLUME=7,258,328 Cu.Yds.)

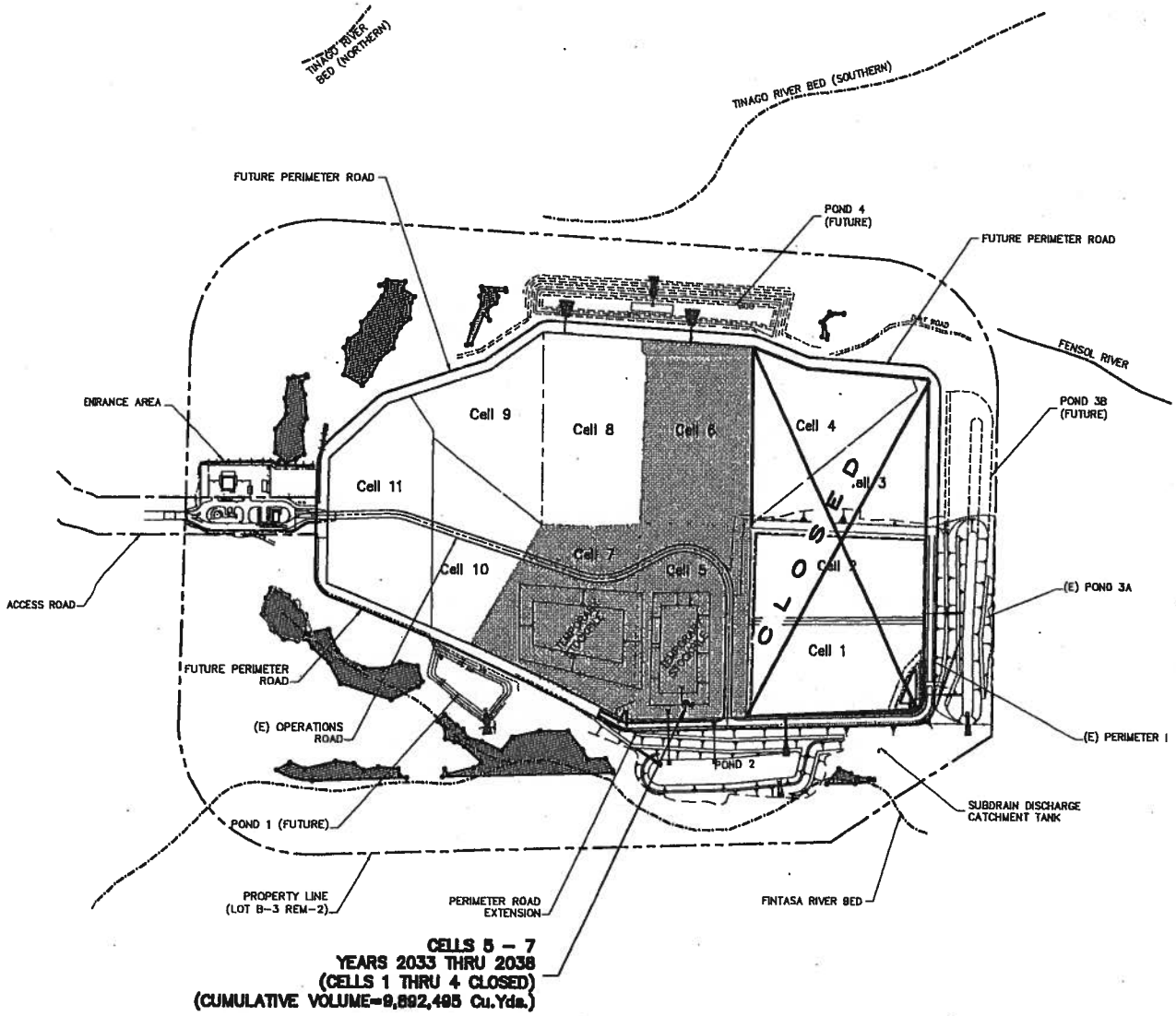
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	126,161	126,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	160,982	268,303	914,891	CELLS 1 & 2	
2014	164,298	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1-3	
2016	171,072	285,120	1,753,309	CELLS 1-3	
2017	174,530	290,883	2,044,193	CELLS 1-3	
2018	178,054	296,757	2,340,949	CELLS 1-4	
2019	181,646	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,398	315,660	3,268,198	CELLS 1-4	
2022	194,186	323,843	3,591,841	CELLS 1-5	
2023	198,779	331,298	3,923,139	CELLS 1-5	
2024	203,477	339,128	4,262,268	CELLS 1-5	
2025	208,284	347,140	4,609,408	CELLS 1-5	
2026	212,725	354,542	4,963,949	CELLS 1-5	
2027	217,259	362,098	5,326,048	CELLS 1-5	
2028	221,887	369,812	5,695,859	CELLS 1-5	
2029	226,610	377,683	6,073,543	CELLS 1-5	
2030	231,431	385,718	6,459,261	CELLS 1-5	
2031	236,352	393,920	6,853,181	CELLS 1-5	
2032	241,375	402,292	7,255,473	CELLS 1-5	
2033	246,287	413,778	7,672,106	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	279,033	465,056	9,892,495	CELLS 5-7	
2039	285,619	476,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,259	498,765	11,354,556	CELLS 6 & 8	
2042	306,321	510,536	11,865,091	CELLS 7-9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7-9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,278	560,463	14,030,597	CELLS 7-11	
2047	344,214	573,690	14,604,287	CELLS 7-11	
2048	352,338	587,230	15,191,517	CELLS 7-11	
2049	360,654	601,089	15,792,607	CELLS 7-11	
2050	9,712	16,187	15,808,794	CELLS 7-11	FINAL CLOSURE (CELLS 7-11)



LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

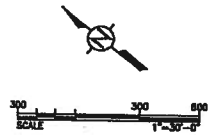
CELLS FILLING SEQUENCE

FIG. 13.6



CELLS 5 – 7
YEARS 2033 THRU 2038
(CELLS 1 THRU 4 CLOSED)
(CUMULATIVE VOLUME=9,892,495 Cu.Yds.)

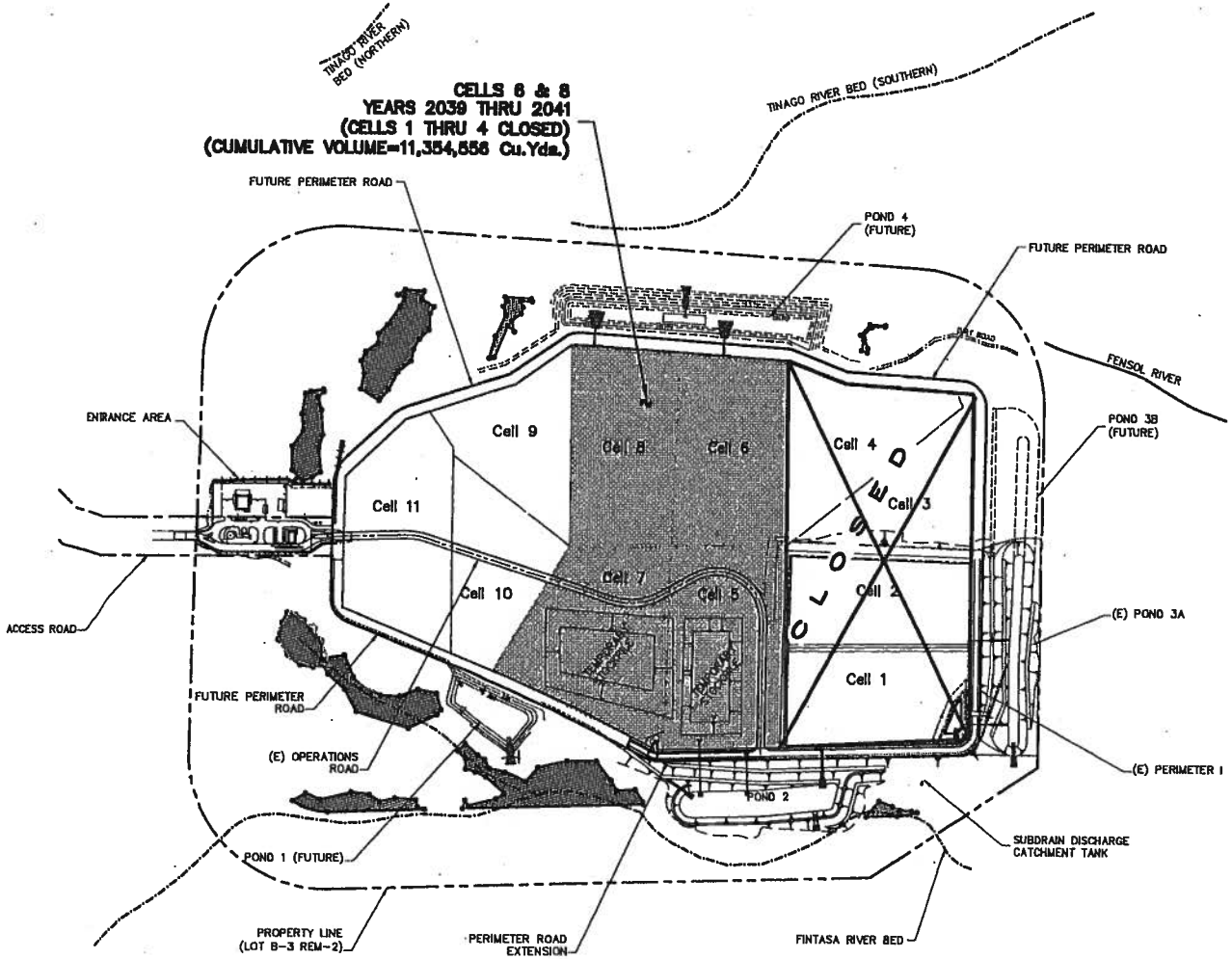
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	126,161	126,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	160,952	268,303	914,891	CELLS 1 & 2	
2014	164,299	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1–3	
2016	171,072	285,120	1,753,309	CELLS 1–3	
2017	174,530	290,883	2,044,193	CELLS 1–3	
2018	178,054	296,757	2,340,949	CELLS 1–4	
2019	181,646	302,743	2,643,693	CELLS 1–4	
2020	185,307	308,845	2,952,538	CELLS 1–4	
2021	189,398	315,660	3,268,198	CELLS 1–4	
2022	194,188	323,643	3,591,841	CELLS 1–5	
2023	198,778	331,298	3,923,138	CELLS 1–5	
2024	203,477	339,128	4,262,266	CELLS 1–5	
2025	208,284	347,140	4,609,406	CELLS 1–5	
2026	212,725	354,542	4,963,949	CELLS 1–5	
2027	217,259	362,098	5,326,048	CELLS 1–5	
2028	221,887	369,812	5,695,859	CELLS 1–5	
2029	226,610	377,683	6,073,543	CELLS 4–6	
2030	231,431	385,718	6,459,261	CELLS 4–6	
2031	236,915	394,858	6,854,119	CELLS 4–6	
2032	242,525	404,208	7,258,328	CELLS 4–6	
2033	248,267	413,778	7,672,106	CELLS 5–7	CELLS 1, 2, 3 & 4
2034	254,143	423,572	8,095,678	CELLS 5–7	
2035	260,155	433,591	8,529,269	CELLS 5–7	
2036	266,306	443,843	8,973,112	CELLS 5–7	
2037	272,600	454,334	9,427,446	CELLS 5–7	
2038	279,039	465,064	9,892,510	CELLS 5–7	
2039	285,619	476,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,259	498,765	11,354,556	CELLS 6 & 8	
2042	306,321	510,536	11,865,091	CELLS 7–9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7–9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,278	560,463	14,030,597	CELLS 7–11	
2047	344,214	573,690	14,604,287	CELLS 7–11	
2048	352,338	587,230	15,191,517	CELLS 7–11	
2049	360,654	601,089	15,792,607	CELLS 7–11	
2050	9,712	16,187	15,808,794	CELLS 7–11	FINAL CLOSURE (CELLS 7–11)



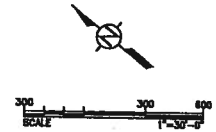
LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

CELLS FILLING SEQUENCE

FIG. 13.7



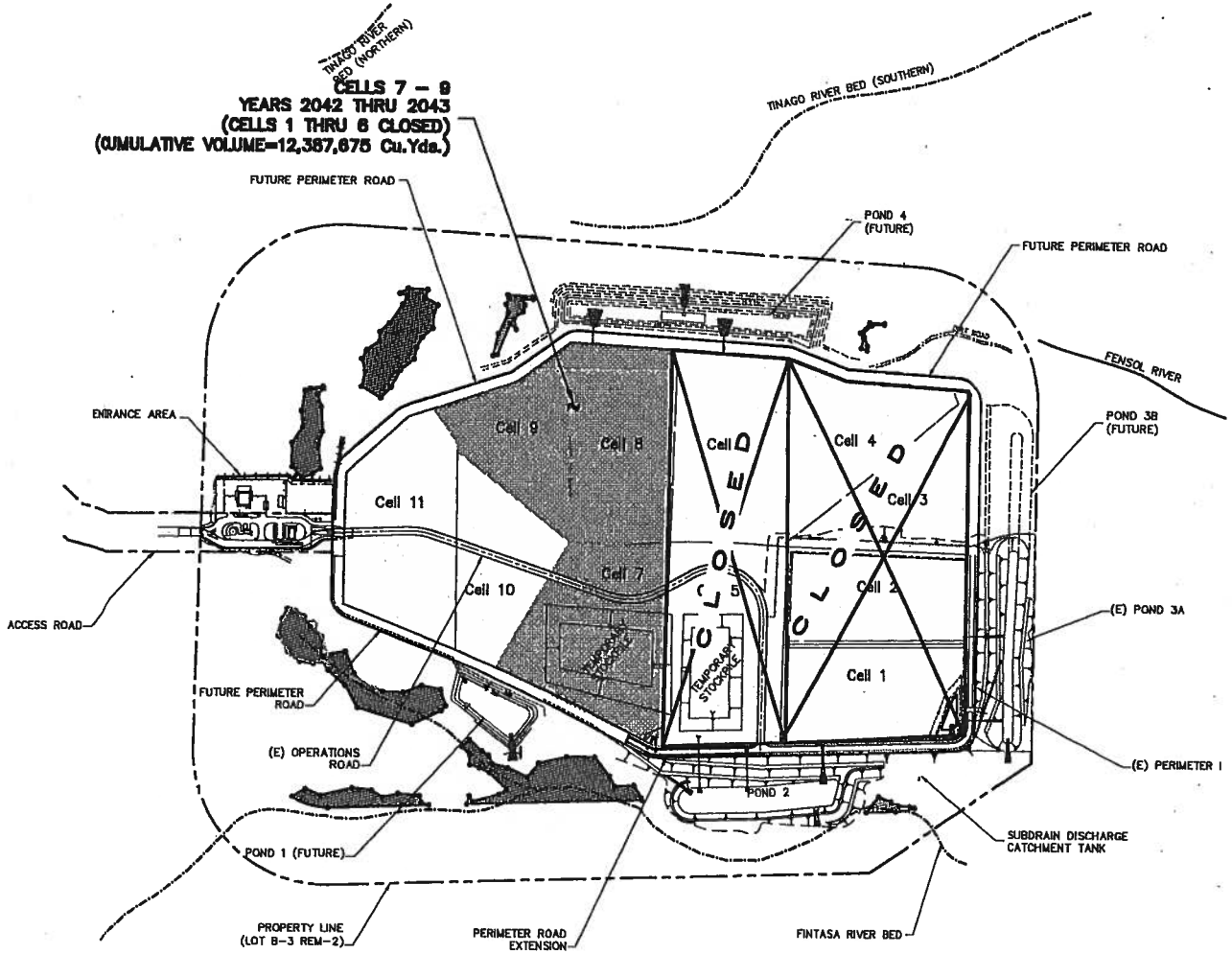
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	126,161	126,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	160,982	268,303	914,891	CELLS 1 & 2	
2014	164,298	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1-3	
2016	171,072	285,120	1,753,309	CELLS 1-3	
2017	174,530	290,883	2,044,193	CELLS 1-3	
2015	178,054	296,757	2,340,949	CELLS 1-4	
2019	181,646	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,398	315,660	3,268,198	CELLS 1-4	
2022	194,186	323,643	3,591,841	CELLS 1-5	
2023	198,779	331,298	3,923,139	CELLS 1-5	
2024	203,477	339,128	4,262,268	CELLS 1-5	
2025	208,284	347,140	4,609,408	CELLS 1-5	
2026	212,723	354,542	4,963,949	CELLS 1-5	
2027	217,259	362,098	5,326,048	CELLS 1-5	
2028	221,887	369,812	5,695,859	CELLS 1-5	
2029	226,610	377,683	6,073,543	CELLS 4-6	
2030	231,431	385,718	6,459,261	CELLS 4-6	
2031	236,615	394,858	6,854,119	CELLS 4-6	
2032	242,525	404,208	7,258,328	CELLS 4-6	
2033	248,267	413,778	7,672,106	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	278,933	465,056	9,892,495	CELLS 5-7	
2039	285,310	475,517	10,368,012	CELLS 6-8	
2040	292,231	487,051	10,855,063	CELLS 6-8	
2041	299,231	498,718	11,353,781	CELLS 6-8	
2042	306,321	510,536	11,865,091	CELLS 7-9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7-9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,276	560,483	14,030,597	CELLS 7-11	
2047	344,214	573,690	14,604,287	CELLS 7-11	
2048	352,338	587,230	15,191,517	CELLS 7-11	
2049	360,654	601,089	15,792,607	CELLS 7-11	
2050	9,712	16,187	15,808,794	CELLS 7-11	FINAL CLOSURE (CELLS 7-11)



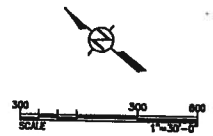
LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

CELLS FILLING SEQUENCE

FIG. 13.8



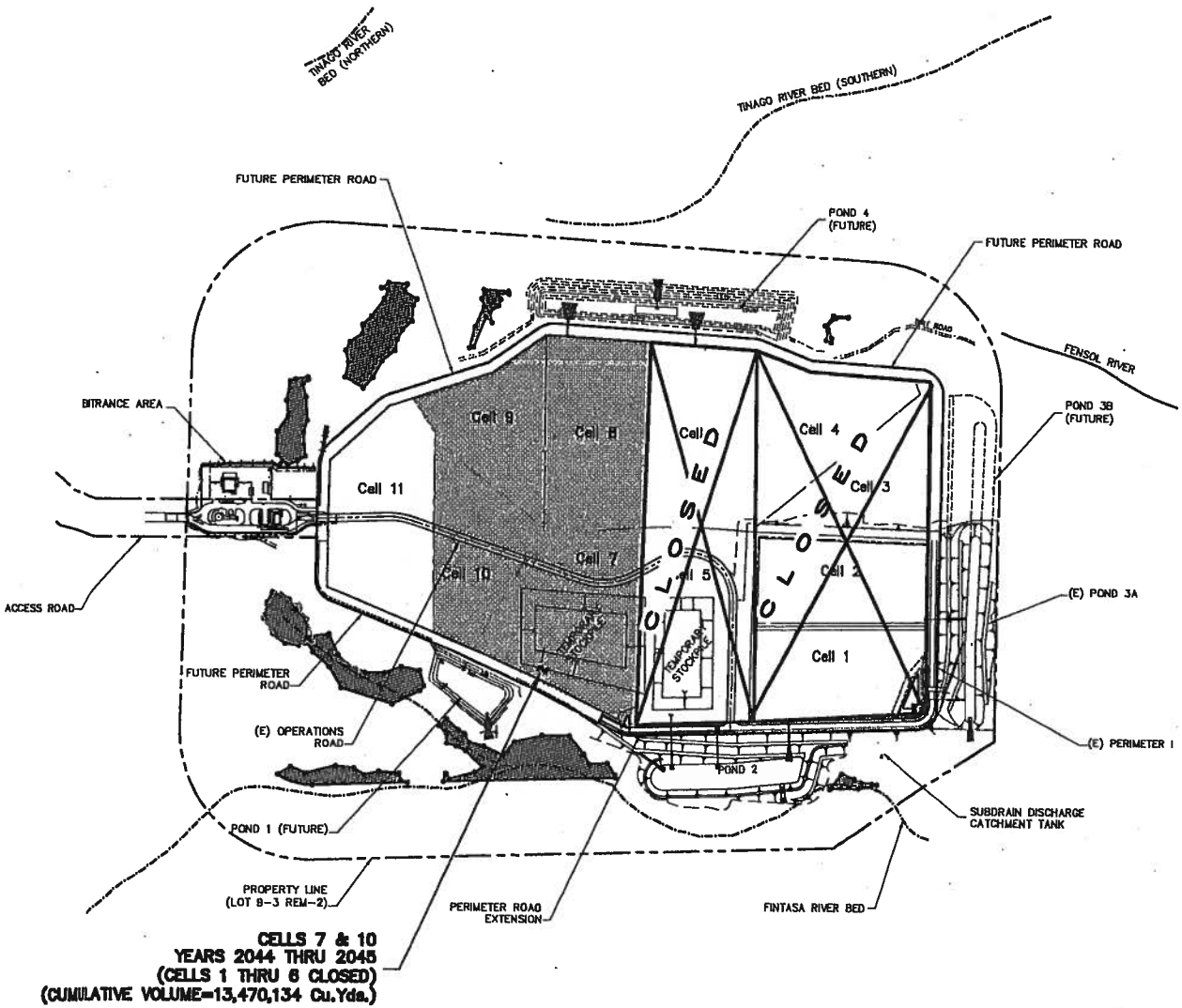
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	126,161	126,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	160,982	268,303	914,891	CELLS 1 & 2	
2014	164,298	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1-3	
2016	171,072	285,120	1,753,309	CELLS 1-3	
2017	174,530	290,883	2,044,193	CELLS 1-3	
2018	178,054	296,757	2,340,949	CELLS 1-4	
2019	181,646	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,398	315,660	3,268,198	CELLS 1-4	
2022	194,186	323,643	3,591,841	CELLS 1-5	
2023	198,778	331,298	3,923,139	CELLS 1-5	
2024	203,477	339,128	4,262,268	CELLS 1-5	
2025	208,284	347,140	4,609,408	CELLS 1-5	
2026	212,725	354,542	4,963,949	CELLS 1-5	
2027	217,259	362,098	5,326,046	CELLS 1-5	
2028	221,887	369,812	5,695,859	CELLS 1-5	
2029	226,610	377,683	6,073,543	CELLS 4-5	
2030	231,431	385,718	6,459,261	CELLS 4-6	
2031	236,915	394,858	6,854,119	CELLS 4-6	
2032	242,525	404,208	7,258,328	CELLS 4-6	
2033	248,267	413,778	7,672,106	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	278,033	465,056	9,892,495	CELLS 5-7	
2039	285,619	476,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,259	498,765	11,354,556	CELLS 6 & 8	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2043	313,661	522,801	12,387,675	CELLS 7 & 10	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,278	560,463	14,030,597	CELLS 7-11	
2047	344,214	573,690	14,604,287	CELLS 7-11	
2048	352,338	587,230	15,191,517	CELLS 7-11	
2049	360,654	601,089	15,792,607	CELLS 7-11	
2050	9,712	16,187	15,808,794	CELLS 7-11	FINAL CLOSURE (CELLS 7-11)



LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

CELLS FILLING SEQUENCE

FIG. 13.9



CELLS 7 & 10
YEARS 2044 THRU 2045
(CELLS 1 THRU 6 CLOSED)
(CUMULATIVE VOLUME=13,470,134 Cu.Yds.)

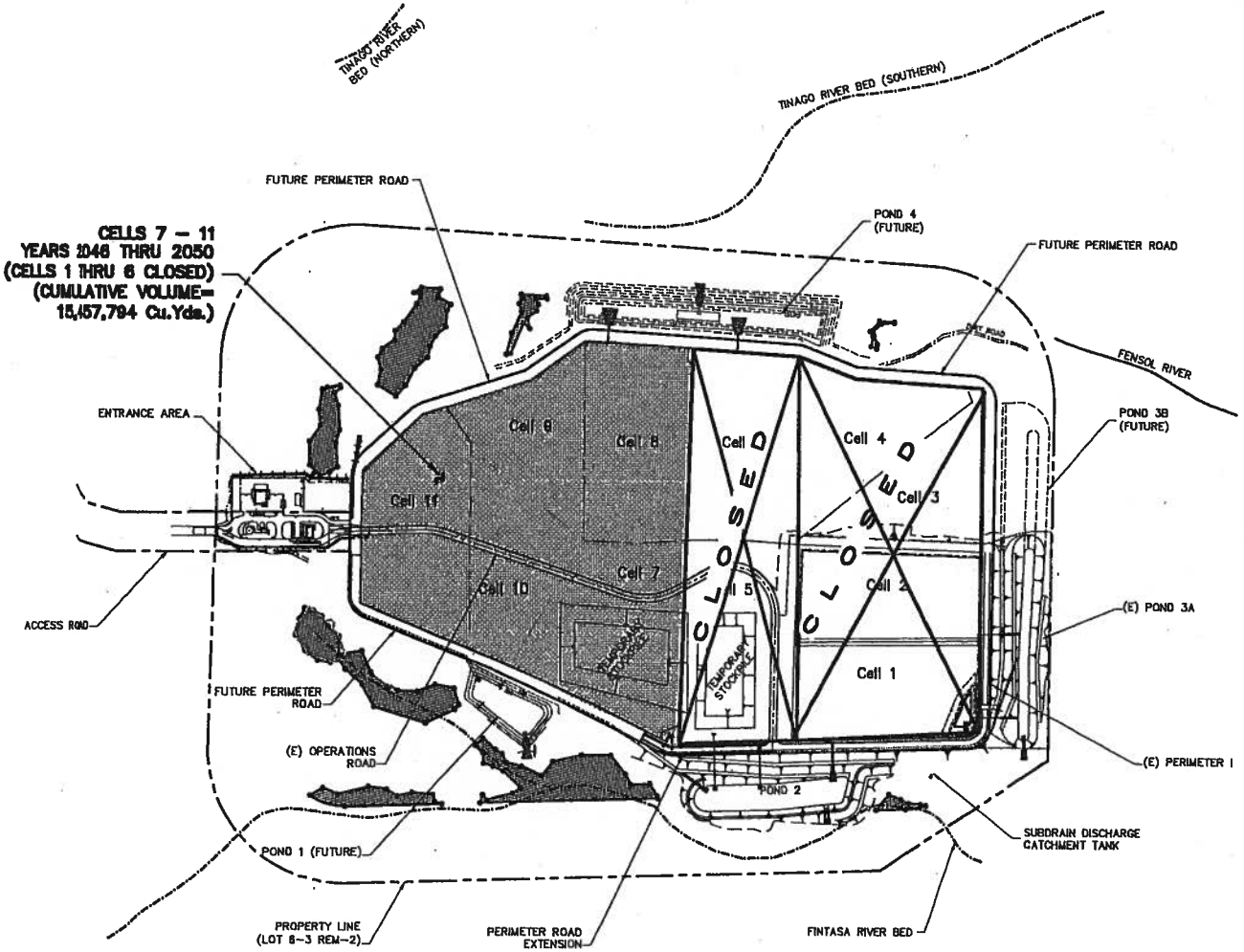
YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,897	126,161	126,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	160,962	268,303	914,891	CELLS 1 & 2	
2014	164,299	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1-3	
2016	171,072	285,120	1,753,309	CELLS 1-3	
2017	174,530	290,883	2,044,193	CELLS 1-3	
2018	178,054	296,757	2,340,949	CELLS 1-4	
2019	181,648	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,396	315,660	3,268,198	CELLS 1-4	
2022	194,186	323,643	3,591,841	CELLS 1-5	
2023	198,779	331,298	3,923,139	CELLS 1-5	
2024	203,477	339,128	4,262,268	CELLS 1-5	
2025	208,284	347,140	4,609,408	CELLS 1-5	
2026	212,725	354,542	4,963,949	CELLS 1-5	
2027	217,259	362,098	5,326,048	CELLS 1-5	
2028	221,887	369,812	5,695,859	CELLS 1-5	
2029	226,610	377,683	6,073,543	CELLS 4-6	
2030	231,431	385,719	6,459,261	CELLS 4-6	
2031	236,915	394,858	6,854,119	CELLS 4-6	
2032	242,525	404,208	7,258,328	CELLS 4-6	
2033	248,267	413,778	7,672,106	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	279,033	465,056	9,892,495	CELLS 5-7	
2039	285,619	476,031	10,368,526	CELLS 5 & 6	
2040	292,359	487,265	10,855,791	CELLS 5 & 6	
2041	299,259	498,765	11,354,556	CELLS 5 & 6	
2042	306,321	510,536	11,865,091	CELLS 7-9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7-9	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
2048	336,276	560,463	14,030,597	CELLS 7-11	
2047	344,214	573,690	14,604,287	CELLS 7-11	
2048	352,338	587,230	15,191,517	CELLS 7-11	
2049	360,654	601,089	15,792,607	CELLS 7-11	
2050	9,712	16,187	15,808,794	CELLS 7-11	FINAL CLOSURE (CELLS 7-11)

SCALE 1"=30'-0"

LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

CELLS FILLING SEQUENCE

FIG. 13.10

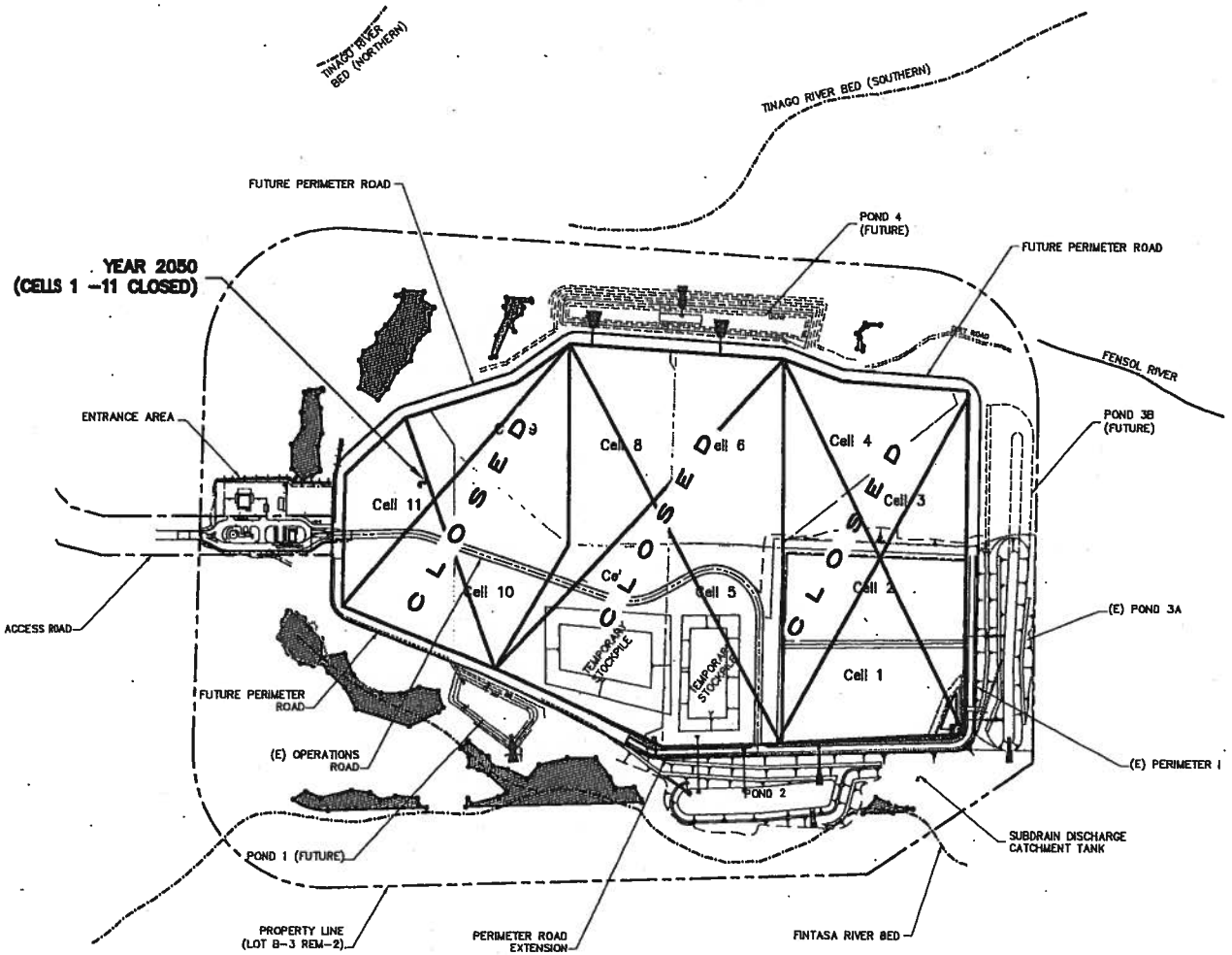


YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	126,161	126,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	180,982	268,303	914,891	CELLS 1 & 2	
2014	164,299	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1-3	
2016	171,072	285,120	1,753,309	CELLS 1-3	
2017	174,530	290,883	2,044,193	CELLS 1-3	
2018	178,054	296,757	2,340,949	CELLS 1-4	
2019	181,646	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,396	315,660	3,268,198	CELLS 1-4	
2022	194,186	323,643	3,591,841	CELLS 1-5	
2023	198,779	331,298	3,923,139	CELLS 1-5	
2024	203,477	339,128	4,262,268	CELLS 1-5	
2025	208,284	347,140	4,609,406	CELLS 1-5	
2026	212,725	354,542	4,963,948	CELLS 1-5	
2027	217,259	362,098	5,326,046	CELLS 1-5	
2028	221,887	369,812	5,695,859	CELLS 1-5	
2029	226,810	377,683	6,073,543	CELLS 4-6	
2030	231,431	385,718	6,459,261	CELLS 4-6	
2031	236,916	394,858	6,854,119	CELLS 4-6	
2032	242,525	404,208	7,258,328	CELLS 4-6	
2033	248,267	413,778	7,672,106	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	279,033	465,056	9,892,495	CELLS 5-7	
2039	285,619	479,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,259	498,765	11,354,556	CELLS 6 & 8	
2042	306,321	510,536	11,865,091	CELLS 7-9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7-9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

CELLS FILLING SEQUENCE

FIG. 13.11



YEAR	TONS PER YEAR	CUBIC YARD PER YEAR	CUMULATIVE CUBIC YARDS	FILLING IN CELLS	CLOSURE CELL
2010	75,697	128,161	128,161	CELL 1	
2011	154,530	257,550	383,711	CELLS 1 & 2	
2012	157,726	262,877	646,588	CELLS 1 & 2	
2013	160,982	268,303	914,891	CELLS 1 & 2	
2014	164,299	273,832	1,188,723	CELLS 1 & 2	
2015	167,680	279,467	1,468,189	CELLS 1-3	
2016	171,072	285,120	1,753,309	CELLS 1-3	
2017	174,530	290,883	2,044,193	CELLS 1-3	
2018	178,054	296,757	2,340,949	CELLS 1-4	
2019	181,646	302,743	2,643,693	CELLS 1-4	
2020	185,307	308,845	2,952,538	CELLS 1-4	
2021	189,398	315,680	3,268,168	CELLS 1-4	
2022	194,166	323,643	3,591,841	CELLS 1-5	
2023	198,779	331,298	3,923,139	CELLS 1-5	
2024	203,477	339,128	4,262,266	CELLS 1-5	
2025	208,284	347,140	4,609,406	CELLS 1-5	
2026	212,725	354,542	4,963,948	CELLS 1-5	
2027	217,259	362,098	5,326,046	CELLS 1-5	
2028	221,887	369,812	5,695,859	CELLS 1-5	
2029	226,610	377,683	6,073,543	CELLS 4-6	
2030	231,431	385,718	6,459,261	CELLS 4-6	
2031	236,915	394,858	6,854,119	CELLS 4-6	
2032	242,525	404,208	7,258,328	CELLS 4-6	
2033	248,267	413,778	7,672,106	CELLS 5-7	CELLS 1,2,3 & 4
2034	254,142	423,570	8,095,676	CELLS 5-7	
2035	260,153	433,588	8,529,264	CELLS 5-7	
2036	266,305	443,842	8,973,106	CELLS 5-7	
2037	272,600	454,333	9,427,439	CELLS 5-7	
2038	279,033	465,056	9,892,495	CELLS 5-7	
2039	285,619	476,031	10,368,526	CELLS 6 & 8	
2040	292,359	487,265	10,855,791	CELLS 6 & 8	
2041	299,259	498,765	11,354,556	CELLS 6 & 8	
2042	306,321	510,536	11,865,091	CELLS 7-9	CELLS 5 & 6
2043	313,551	522,584	12,387,675	CELLS 7-9	
2044	320,950	534,917	12,922,593	CELLS 7 & 10	
2045	328,525	547,541	13,470,134	CELLS 7 & 10	
2046	336,278	560,463	14,030,597	CELLS 7-11	
2047	344,214	573,690	14,604,287	CELLS 7-11	
2048	352,338	587,230	15,191,517	CELLS 7-11	
2049	360,654	601,089	15,792,607	CELLS 7-11	
2050	9,712	16,187	15,808,794	CELLS 7-11	FINAL CLOSURE (CELLS 7-11)

LAYON MUNICIPAL SANITARY LANDFILL
OPERATION PLAN

CELLS FILLING SEQUENCE

FIG. 13.12

APPENDIX A

PERSONNEL POSITION DESCRIPTIONS

APPENDIX A
PERSONNEL POSITION DESCRIPTIONS

Site Manager

The Site Manager is responsible for the overall coordinated operation the landfill. The Site Manager must ensure that both on-site disposal practices and personnel performance are directed toward meeting the regulatory requirements of planning, design, operations and maintenance documents. Typical duties of the Site Manager include supervising landfill personnel, adjusting staff to meet disposal conditions, coordinating contract work, inspecting work for its quality and compliance to design, scheduling and procuring equipment and suppliers, maintaining records and reports, implementing employee and safety training, and managing the operations budget. The Site Manager has primary responsibility for ensuring that all employees are well trained in health and safety procedures, and that all health and safety procedures are implemented.

Prior experience should include managing people, financial planning, budgeting, report writing, executing plans, and interpreting specifications and contracts. In addition, the Site Manager should have complete knowledge in the workings of all systems and procedures involved with the operation of a RCRA Subtitle D landfill and be a certified manager of landfill operations.

Heavy Equipment Operator

Heavy equipment operators will be responsible for operating the equipment used in constructing the landfill and its related facilities, placing refuse, and installing and compacting cover material. Typical duties will include land clearing, excavating, hauling, spreading and compacting soil and refuse, trenching, placing pipelines, backfilling, and maintaining roads and ditches.

Heavy equipment operators must be aware of the site-specific waste disposal plan. In order to successfully fulfill the plan, the operators should have experience in landfill construction practices, such as requirements for waste placement, daily cover, and compaction. The heavy equipment operators should be trained and have experience in operating bulldozers, backhoes, graders, compactors, dump trucks, and other heavy equipment which are used on the site. Beyond experience, the operator should have knowledge in inspecting and servicing equipment, knowledge of site and equipment safety precautions, the ability to recognize potential malfunctions of the equipment prior to breakdown, traffic laws; and fire extinguishing procedures are also required.

Light Equipment Operator

The light equipment operator is responsible for operating smaller equipment, such as trucks, loaders, and backhoes. The light equipment operator may operate medium and heavy equipment on a trainee basis. Knowledge in equipment inspection and routine repairs, site safety, and traffic laws is a requirement. Primary responsibilities of the light equipment operator will include landfill maintenance and aiding the heavy equipment operators in landfill construction and waste placement duties.

Laborer/Spotter

A laborer is employed to perform unskilled manual work such as directing traffic, maintaining the facility, collecting wind-blown debris, assisting with construction work, and unloading materials, supplies, and equipment. A laborer may also be trained to operate light equipment. Aside from being able to perform manual labor, the laborer should be able to follow instructions and understand basic health and safety information.

The spotter is responsible for directing the proper placement of authorized refuse. The spotter must have a thorough understanding of the waste placement strategy with respect to the overall landfill design, daily cover, compaction, and hazardous waste exclusion. Routine duties will include inspecting refuse for unauthorized waste and coordinating actions of the various operators. The spotter should have experience in identifying hazardous waste.

A spotter is used at the landfill's working face and at the public drop-off area. At the drop-off area, the spotter directs the public to the appropriate area for placement of recyclables, green waste and refuse. The spotter observes public disposal activities and monitors for household hazardous wastes and special wastes. The drop-off spotter is responsible for keeping the public convenience areas neat and free of debris.

Scalehouse Attendant

The scale-house attendant is responsible for ensuring that incoming waste to the landfill is measured and documented. Typical duties will include queuing vehicles as necessary, operating the scale, recording weights and volumes, collecting fees, maintaining records, inspecting the loads, providing instruction to customers on where to dispose of their loads, and maintaining the scale house. The scale house attendant should have experience in operating standard office equipment and computers, operating the scale, maintaining records, and communicating with employers and customers.

APPENDIX B

SPECIAL WASTE AND HAZARDOUS WASTE EXCLUSION PROGRAM

SPECIAL WASTE ACCEPTANCE & HAZARDOUS WASTE EXCLUSION PROGRAM

Layon Municipal Solid Waste Landfill

May 22, 2009

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LAYON MUNICIPAL SOLID WASTE LANDFILL
SPECIAL WASTE ACCEPTANCE AND
HAZARDOUS WASTE EXCLUSION PROGRAM

1.0 INTRODUCTION

Layon Landfill (LLF) accepts only non-hazardous municipal solid waste for disposal. This plan:

- Defines acceptable and unacceptable wastes for the facility,
- Establishes procedures for preventing, detecting, and managing wastes that are not suitable for disposal at the landfill; and
- Establishes procedures for reviewing and approving and managing special wastes that customers wish to dispose at the landfill.

2.0 WASTE ACCEPTANCE POLICY

This section describes the site's waste acceptance policy in terms of acceptable wastes, special wastes, unacceptable wastes and recyclables. The lists of acceptable wastes, unacceptable wastes, and recyclables are subject to change as economic conditions and regulatory requirements warrant.

2.1 Acceptable Wastes

The following wastes are accepted for disposal at the landfill, subject to random checks for hazardous or other unacceptable waste components:

- Municipal solid waste

2.2 Special Wastes

The following types of waste are acceptable, subject to approval under special waste acceptance procedures set forth in Section 3.4 of this Program description.

a. Sewage sludge
b. Sandblast grits (include non-hazardous test results)
c. Baghouse dusts
d. Inorganic filter cake
e. Empty containers
f. Treated medical waste
g. Empty containers

2.3 Recyclables

Layon Landfill does not actively accept any recyclable materials. White goods (major appliances) incidental to other loads of municipal solid waste will be segregated and temporarily stored before being transported to a appropriate recycling facility. Similarly, any tires found in mixed waste loads will be removed and temporarily stored prior to being removed from the site.

2.4 Unacceptable Wastes

Wastes listed below as "unacceptable" under this program are not knowingly accepted for management or disposal by the facility. A prevention, detection, and management program is in place to minimize the possibility of having unacceptable wastes delivered to the facility, to detect and reject unacceptable wastes that have been delivered to the facility, and to properly manage any unacceptable wastes that may escape prevention and detection efforts. If unacceptable waste is discovered in the MSW stream, efforts are made to remove that waste as soon as possible. Early detection increases the likelihood of identifying the waste generator.

The following wastes are unacceptable at Layon Landfill:

a. Materials of a toxic nature, such as insecticides or poisons
b. Radioactive materials
c. Materials designated as hazardous under 40 CFR Part 261
d. PCB wastes as defined in 40 CFR Part 761
e. Untreated infectious wastes
f. Bulk or non-containerized liquids
g. Bulk green waste
h. Other wastes banned by GEPA regulations
i. Asbestos
j. Debris contaminated with water separation, car and equipment wash liquid
k. Grease trap waste
l. Debris contaminated with underground storage tank and other sludge
m. Resins and chemical debris
n. Petroleum-contaminated soils and other non-hazardous contaminated soils
o. Debris contaminated with diesel fuel
p. Debris contaminated with used oils
q. Debris contaminated with gasoline, jet fuel, or kerosene
r. Paint waste from removal, construction and demolition
s. Treated poles and lumber
t. Off-specification and outdated products

3. PREVENTION

The most effective way to eliminate unacceptable waste from the MSW stream is to prevent its initial entry. LLF has implemented the following methods to prevent unacceptable waste from entering the facility:

1. Signs, Customer Education, Community Involvement
2. Random and Select Load Inspection Program
3. Visual Monitoring
4. Special Waste Program

3.1 Signs, Customer Education, & Community Involvement

LLF makes its waste acceptance policies readily available to customers. Acceptable and unacceptable wastes are routinely communicated to the community, and referrals are provided to customers who have materials that LLF does not accept. Methods include communicating through the local haulers, using recorded telephone messages, radio advertisements, maintaining brochures and referrals with important information, and posting signs at the facility. LLF also regularly communicates with the local and state agencies which advise generators about waste recycling and disposal issues so that issues can be addressed as they arise, participates in the local solid waste advisory committee, and works directly with customers and key business sectors to resolve waste-related issues.

3.2 Random and Select Load Inspection Program

All waste loads delivered to LLF are subject to the random and select load inspection program. Signs are posted stating that hazardous wastes and regulated PCB-containing wastes are prohibited.

A minimum of one random load check will be performed daily. Personnel performing load checks will wear the appropriate personal protective equipment, including steel-toed boots, steel mid-soles, protective suit, gloves, hardhat, and safety glasses. The load check spotter will randomly choose the truck that will receive a load check. The truck will be directed to an area within the active landfill cell that is off to the side of the main working area. After the load has been dumped, the load will be cordoned off using traffic cones. At least one lane on either side of the selected load will be kept clear of any traffic. A second spotter will be present to ensure that no traffic is allowed in the area.

The load check spotter will begin to fill out the random load check form (Waste Screening Check List, contained in Appendix B), asking the appropriate questions of the driver. The load check spotter will then walk around the load looking for any unacceptable waste. After the initial walk around, the spotter will signal for a bulldozer to spread out the load. After the load is spread and the dozer is out of the area, the spotter will use a rake or other appropriate tool to inspect the load for prohibited wastes.

The select load inspection program is similar in all respects, except that selection is not random. The select load inspection program is used for suspicious loads or for customers who have a history of attempting to deliver inappropriate material to the site.
All affected employees are trained in which materials are acceptable and unacceptable and the identification of suspect hazardous wastes and PCB-containing materials. Training records are maintained on file.

3.3 Visual Monitoring

Scalehouse attendants will question each incoming customer as to the source and contents of the load. If any suspicious wastes or unusual loads are observed, the gate attendant will reject such wastes or direct the load to the landfill office where supervisors will determine the acceptability of the waste. If hazardous or unacceptable wastes are found or observed in a vehicle during visual monitoring conducted at the landfill gate, landfill personnel will reject the entire load. If possible, educational information on the proper disposal of rejected wastes will be provided to the customer.

Equipment operators and spotters at the landfill working face will visually observe the refuse for prohibited wastes as it is being dumped and compacted. Should wastes that contain suspicious-looking materials be observed, trained personnel will be summoned to determine the acceptability of the waste. If the waste is determined to be unacceptable, the waste handling and agency notification procedures described below will be followed

3.4 Special Waste Program

Waste defined as *special wastes* are subject to pre-screening prior to delivery to the landfill. Commercial customers who have the type of wastes that are subject to waste designation or analysis to determine whether they are regulated (and therefore prohibited) are asked to fill out a Customer Waste Profile, and to attach any supporting documentation such as analytical data and Material Safety Data Sheets (MSDS). An example form is shown in Attachment 2. The generator is required to certify as to the truth, completeness, and accuracy of the information provided. This information is then reviewed by a company employee or contractor experienced and knowledgeable in waste designation procedures per local, state, and federal hazardous waste and PCB regulations and the site-specific waste acceptance policy, who approves, approves with conditions, or disapproves the waste stream.

All special wastes accepted at the facility must be pre-approved, with an un-expired Customer Waste Profile on file. The waste being delivered must be the same as that described on the Profile. Customers are required by contract to identify any material changes in the waste stream or the process generating the waste that might affect the status of the approval.

3.4.1 Site-Specific Issues

This section highlights some issues and requirements specific to LLF. Normally special waste is handled in the same manner as MSW and no special handling is required. However the special waste streams listed below have site specific management methods:

Dead Animals and Offal

Dead animals and offal (hides, intestines and other waste from slaughtered animals) is not subject to special waste acceptance procedures, but will be identified by the transporter at the scalehouse. Loads known to contain dead animals or offal, and such wastes discovered incidental to other loads after dumping at the active face, will be placed in an area where they can be covered with additional solid waste immediately after being placed. Wherever possible, this will be accomplished by excavating a pit in the solid waste at the working face, placing the animal waste in it, and filling back in with MSW. Any areas that have received animal waste will be covered with daily cover soil at the end of the working day.

Medical Waste

The special waste screening program (Section 5.3) and unacceptable waste exclusion program (Section 5.4) are intended to ensure that no untreated infectious wastes are disposed at Layon Landfill. Only medical wastes that have been rendered non-infectious by incineration or sterilization (by autoclaving) are accepted for disposal. In the event that any "red bag" wastes suspected of being non-treated medical wastes are discovered at the working face or in a random load check, the material will be removed to a safe location, using care to avoid personnel exposure to the waste or to needles that may be inside bagged waste. The procedures specified for hazardous waste management in Section 5.4.3 will then be implemented.

Treated medical waste may be handled and covered in the same manner as other municipal solid waste. Typically, however, it is disposed in a trench excavated in waste at the active face, and buried immediately with additional waste to prevent exposure of equipment or personnel to the treated medical waste.

Food wastes

Non-regulated ship waste and other loads consisting largely of food, often tend to be wet and /or odorous. In order to avoid issues due to free liquids and odors, such material must be stabilized by the generator using absorbent materials, and de-odorized if necessary by bagging the material or treating with odor control products prior to delivery to LLF.

Bulk Green Waste

Bulk green waste will not be accepted for disposal at Layon Landfill.

Dry friable wastes (baghouse dust, sandblast grit etc.)

Dry or easily blown waste streams may be unloaded into a pre-dug trench in the waste to minimize wind-blown dust.

3.4.2 Required Minimum Analyses

The analyses or information required on each individual waste stream will vary. However, analytical parameters or other information, such as MSDS Sheets or Generator Knowledge sufficient to perform a hazardous waste designation will be required.

Typical analyses may include:

- Metals
- Organics
- Corrosivity (pH)
- Flashpoint
- Reactivity
- TCLP (toxicity characteristics leaching procedure)

In some cases additional analyses such as chloride concentration, Total Petroleum Hydrocarbons, etc. may also be required. Required testing parameters and informational data will be at the discretion of the Special Waste Coordinator.

3.4.3 Use of Process Knowledge

The use of process/generator knowledge may be utilized to modify or reduce the required spectrum of analytical testing for a given waste stream. Use of process/generator knowledge to reduce analytical testing is solely at the discretion of the Special Waste Coordinator.

3.4.4 Verification

Upon arrival at the facility, each delivery of special waste is checked for conformity with the approved Profile. Each load of recyclables or MSW is screened for the presence of unacceptable waste via visual inspection and/or questioning the driver about the load. Loads that do not conform to the approved Profile may be rejected. Unacceptable wastes are rejected.

It is not LLF's intention to sample loads of waste entering the site. LLF reserves the right to sample any load in order to verify that the load conforms to the information provided by the generator. At a minimum visual inspection and random load checks will be used to ensure the acceptability of special wastes and other wastes.

4. DETECTION & MANAGEMENT

Despite the best efforts by the facility to prevent unacceptable wastes from entering the facility, and to reject unacceptable wastes that are detected, a situation may occur in which suspected unacceptable wastes are found, and the generator cannot be identified.

If unacceptable wastes are detected, the first response is to return the material to the Generator. If the Generator cannot be identified, the Site Manager will be notified immediately. The Site Manager may elect to move the material to an isolated location for proper designation and management. The Site Manager will work with experienced personnel to determine appropriate agency notification procedures, proper storage conditions, waste designation procedures, and final management alternatives for the material. If regulated hazardous wastes or PCB wastes are found at the facility, The Guam EPA will be notified within 24 hours of confirmation using the notification procedures specified in Section 9.1 of the Operations Plan.

4.1 Managing Unacceptable Wastes

There are two possible scenarios for the management of unacceptable waste.

Scenario 1 - Generator Known:

If the generator or hauler can be identified, they will be directed to safely load and remove the unacceptable material so it can be managed properly. Efforts will be made to educate the generator about waste acceptance policies. Generators will be directed to appropriate state or local agencies or vendors, for assistance in finding appropriate handling or disposal of their wastes.

Scenario 2 - Generator Unknown:

In spite of prevention and detection programs, a situation may occur in which unacceptable waste is discovered and the generator cannot be identified. In this case, the waste will be identified, if possible, and the risks associated with handling and storage will be taken into account. If the material is known or suspected to be hazardous, the following procedures will be followed.

4.1.1 Handling

Unacceptable wastes will be handled in a manner appropriate to the risks of handling and/or storing the material. This will be determined on a case-by-case basis in consultation with experienced personnel and/or agencies. A licensed hazardous waste service provider will be contracted to handle wastes which require use of HAZMAT techniques.

4.1.2 Storage

The designated unacceptable waste storage area is an area near the site entrance (See Operations Plan, Figure 1) where suspected hazardous waste can be isolated and protected from the environment. In addition, the storage area meets the following criteria.

a) The storage area can be properly secured when an authorized attendant is not present.

b) The storage area can be partitioned so that incompatible wastes can be placed in separate areas for storage.

Hazardous wastes must be removed from the temporary storage area at no less than 180-day intervals. No more than 100 kg (2200 pounds) of hazardous materials may be accumulated at any time.

4.1.3 Disposal

The unacceptable waste will be designated to determine whether it is a hazardous or non-hazardous waste.

Hazardous wastes and PCB-containing wastes will be handled according to applicable regulations. Non-hazardous wastes will be managed as municipal solid waste where possible.

5. RECORD KEEPING

The following records are maintained in relation to the Special Waste Acceptance & Hazardous Waste Exclusion program:

a. Records of employee training in the prevention, detection, and management of acceptable and unacceptable wastes, including hazardous waste and PCBs.
b. Records documenting results of the random and select load check program.
c. Records of special waste approvals, approvals with conditions, and disapprovals.
d. Records of unacceptable wastes found at the facility where the generator is unknown, and their disposition.

ATTACHMENT 1
RANDOM & SELECT LOAD CHECK FORM

LAYON LANDFILL
LOAD CHECKING DATA SHEET

1. DATE: _____ WEEK NO. _____ SHEET NO._____

2. TIME: _____

3. HAULING FIRM OR VEHICLE OWNER: _____
_____

4. DRIVER'S NAME: _____

5. TELEPHONE NO. HAULER/OWNER: _____

6. VEHICLE LICENSE PLATE & TRUCK NO. _____

7. SOURCE OF WASTE: _____

8. TYPE OF VEHICLE: _____
CAPACITY OF VEHICLE (cubic yards): _____

9. NOTES (what wastes were found)
_____
_____
_____

10. WAS HAZARDOUS WASTE FOUND? YES ( ) NO ( )

IF YES GIVE DETAILS: _____
_____
_____

Hazardous Waste was _____ returned to generator _____ sent to storage.

11. FREE LIQUID WAS FOUND: YES ( ) NO ( )

IF YES, OBSERVATIONS AS FOLLOWS:

a. pH _____ b. Odor _____ c. Color _____
d. Suspected source of liquid & comments: _____
_____

Signature of member of load check team _____

Signature of truck/vehicle driver _____

ATTACHMENT 2
CUSTOMER WASTE PROFILE FORM

LAYON MUNICIPAL SANITARY LANDFILL

CUSTOMER WASTE PROFILE FORM

I. Customer Information

Generator:
Address:

Phone #:
Contact:
EPA ID#:

Broker:
Address

Phone #
Contact

II. Material Description and Process of Generation

A. Material Name or Description of Waste:

Quantity per Shipment:
Frequency of Shipment: (weekly, quarterly, etc.)

DOT Hazard Class:_____
Estimated Annual Volume:

Describe the Process Generating the Waste:

Does this waste meet any of the following criteria?

RCRA Hazardous Waste	☐ Yes	☐ No	Explosive Waste	☐ Yes	☐ No
State Hazardous Waste	☐ Yes	☐ No	Sulfide Containing Waste	☐ Yes	☐ No
TSCA Regulated Waste	☐ Yes	☐ No	Cyanide Containing Waste	☐ Yes	☐ No
Radioactive Waste	☐ Yes	☑ No	Total PCB's greater than 50 ppm	☐ Yes	☐ No
Infectious Waste	☐ Yes	☐ No	Compressed Gas or Aerosol	☐ Yes	☐ No
Antineoplastic Waste	☐ Yes	☐ No	Contains Polymerizable Products	☐ Yes	☐ No
Asbestos Containing	☐ Yes	☐ No	Contains Dioxins or Furans	☐ Yes	☐ No
Shock Sensitive Waste	☐ Yes	☐ No	Benzene Containing	☐ Yes	☐ No
Pyrophoric	☐ Yes	☐ No			

Identify any applicable Federal or State waste codes:

B. Origin of the waste

☐ Raw Material ☐ Intermediate Product
☐ Finished Product ☐ Production or Process Waste ☐ Other (Contraband, etc.)

C. Describe the reason for disposal

☐ Off Spec
☐ Expired
☐ Contaminated — Describe contaminant and provide MSDS
☐ Other — Provide description of other

D. Physical form as the waste would be received for disposal

☐ Solid	☐ Single Layer	☐ Cream	
☐ Semi-Solid	☐ Multi-Layer	☐ Granular	
☐ Liquid	☐ Wax	☐ Color	(Describe)
☐ Powder	☐ Paste	☐ Odor	(Describe)

sample of the material or waste available? ☐ Yes ☐ No

Date sampled
Sampled by:

CUSTOMER WASTE PROFILE FORM

Source of sample

Generator agent supervising sampling:

III Packaging and Shipping

A. Material Shipping Packaging(Identify all that apply)

Quantity per Shipment: 0 Frequency: 0

- ☐ Roll-off Container
- ☐ Fiber Drum (Not allowed in CT)
- ☐ Steel Drums (Not allowed in CT)
- ☐ Plastic Drums (Not allowed in CT)
- ☐ Shrink Wrapped or Banded
- ☐ Baled
- ☐ Cardboard Boxes
- ☐ Cubic Yard/Gaylord Boxes
- ☐ Palletized
- ☐ Other _____ (Describe)

Volume Per Container

Weight Per Container(lbs)?

Are the containers lined? ☐ Yes ☐ No

B. Delivery Vehicle

- ☐ ~~Walking Floor or Live Bottom Trailer~~
- ☐ ~~Box Trailer~~
- ☐ ~~Flat Bed Truck/Trailer~~
- ☐ ~~Roll Off~~

C. Delivery Vehicle Offloading Method

- ☐ ~~Fork Truck~~
- ☐ ~~Dump Unload/Self Unloading~~
- ☐ ~~Manual/Hand Offload~~
- ☐ ~~Pallet Jack~~
- ☐ ~~Other(Outline below)~~

D: Describe any assistance the delivery vehicle driver may need from the receiving facility during the unloading process:

E: Describe any special handling needed during the offloading or storage and inspection process:

IV. Chemical Characteristics

Please attach any available MSDS's for this material

A. Chemical Composition by Weight or Percent

	%
	%
	%
	%
	%
	%
	%
	%

Total must equal 100% or more

B. Analytical Information (Attach Analytical Results)

Please refer to Attachment I for the comprehensive analytical list.

TCLP Metals(mg/l)		% by weight
	Arsenic	Aluminum Oxide
	Barium	Titanium Dioxide
	Cadmium	Manganese
	Chromium	Silicates
	Lead	
	Mercury	
	Selenium	
	Silver	

IV. Chemical Characteristics (continued)

C. Physical Properties

	pH (Range or NA)
	Boiling Point(°F)
	Melting Point(°F)
	Ignition Point(°F)
	Density(lb/ft³)
	Flashpoint(°F)
	% Moisture
	Heating Value (Btu's/lb)
	Viscosity (cp)
	% Solids
	% Ash

D. Inorganics(%)

	Chlorine
	Bromine
	Iodine
	Fluoride
	Sulfur
	Cyanide
	Nitrogen
	Total PCB's(ppm)

E. How was the information presented in this section derived?

- ☐ Analytical data
- ☐ Generator knowledge
- ☐ Reference material information
- ☐ Based on information describing the process that generates the waste
- ☐ Based on the materials used in the process that generates the waste
- ☐ Other (Describe)

☐ Yes ☐ No Is analytical data for this waste attached to this profile?

CUSTOMER WASTE PROFILE FORM

F. ☐ Yes ☐ No Is the waste described by this profile sheet a Listed Hazardous Waste as defined by 40 CFR 261?

G. ☐ Yes ☐ No Is the waste described by this profile sheet a Characteristic Hazardous Waste as defined by 40 CFR 261?

V. Health and Safety Issues

A. Identify the following if applicable

☐ Yes ☐ No Does this waste require any special PPE while handling during disposal?

☐ Yes ☐ No Does this waste possess any special handling or storage requirements?

☐ Yes ☐ No Does this waste contain any crystalline silica?

☐ Yes ☐ No Will the waste contain any free standing liquids when delivered?

☐ Yes ☐ No Does this waste have a strong odor?

Describe:

If yes to any of the above, please outline below:

B. Has the waste been tested for any of the following: (Circle all that apply): Ignitability, Radioactivity, Corrosivity, Reactivity, Toxicity, PCB's

C. Have any available MSDS's for this material been attached to this profile sheet? ☐ Yes ☐ No

If no, please explain why:

VI. Current Disposal Method

☐ Solid Waste Landfill ☐ Non-Hazardous Waste Treatment Facility ☐ Non-Hazardous Waste-to-Energy Facility

☐ Hazardous Waste Landfill ☐ Hazardous Waste Treatment Facility ☐ Hazardous Waste Incinerator

Name and location of current disposal facility:

Other Handling and Disposal Requirements

☐ Witness Burn

☐ Certificate of Destruction

For a Witness Burn please outline witness requirements,e.g. customer supplied security agents, customer employees, etc.

VIII. Generator Certification

I certify as generator of the waste and supplier of the information presented on this Waste Profile Sheet that to the best of my knowledge the information is true and accurate.

I certify as the generator of the waste that the waste is non-hazardous as outlined by the Resource Conservation and Recovery Act, and any other applicable federal, state, or local law as amended.

I certify as the generator of the waste that the waste does not contain any materials regulated by the Toxic Substances Control Act and that the waste does not contain PCB's in any quantity over 49 ppm. NOTE: Limited to less than 2 ppm for disposal in PA.

I certify as the generator of the waste that if the process of generation of the waste outlined on this Waste Profile Sheet changes in a way that affects the regulatory status of the waste I will notify the disposal facility that the Waste Profile Sheet needs to be amended or disposal must cease.

I certify as the generator of the waste that the waste does not pose any significant health or safety threat to the disposal facility personnel or the general public.

Signature: Title:

ne(Printed) Date:

CUSTOMER WASTE PROFILE FORM

SPECIFIC GENERATORS CERTIFICATION

NOTE: If the waste being profiled is for disposal in Layon Landfill the generator must also sign this certification

I hereby certify, under penalty of law, that the results submitted with this profile for all sampling and testing were performed in accordance with the "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods", EPA Publication SW-846, as amended or approved other test methods. In addition, the wastes that are outlined in this profile are not hazardous.

I have personally examined and am familiar with the information submitted in this document and all attachments thereto and I certify that based on reasonable investigation, including my inquiry of the individuals responsible for obtaining the information, the submitted information is true, accurate and complete to the best of my knowledge and belief. I understand that a false statement in the submitted information may be punishable as a criminal offense.

Signature: Title:

Name(Printed) Date:

Layon Landfill Waste Acceptance Sign off Form

Quantity per Shipment: 0 Frequency: 0 Approval Number:

THIS WASTE IS ACCEPTABLE	THIS WASTE IS NOT ACCEPTABLE
Operations Manager	Operations Manager
::	Date:
Operations Manager	Operations Manager
Date:	Date:

COMMENTS:

CUSTOMER WASTE PROFILE FORM

Attachment 1

TESTING PARAMETERS FOR ACCEPTANCE OF SPECIAL WASTE.

Note: The following parameters are the minimum analytical requirements for special waste disposal at Layon Landfill

Waste Types	Parameters	Test Methods
Commodity Waste(Discarded consumer products, except food and health and beauty aids)	TCLP Metals (CT Only)	MSDS[2] SW-846
Pharmaceuticals	Not specific	MSDS[2]
Pharmaceuticals w/unknown composition	TCLP Metals, Volatile Organics	MSDS[2] SW-846
Paint, Oil Based Paint Wastes	TCLP metals, Volatile Organics	SW-846[3]
Plastic	Not specific	MSDS, formulation sheets or process flow diagrams
Rubber Waste	Not specific	MSDS, formulation sheets or process flow diagrams
Oily wastes/oil contaminated debris	TCLP (all parameters)	SW-846[3]
	Ignitability	SW-846[3]
	Corrosivity	SW-846[3]
	Reactivity	SW-846[3]
	Liquid paint filter test (as necessary)	SW-846[3]
	PCBs	SW-846[3]
Industrial Waste	TCLP (all parameters)	SW-846[3]
	Ignitability	SW-846[3]
	Corrosivity	SW-846[3]
	Reactivity	SW-846[3]
	Liquid paint filter test (as necessary)	SW-846[3]
	PCBs	SW-846[3]
Painting Waste	TCLP metals,	SW-846[3]
	TCLP volatile organics	SW-846[3]
Wood Waste, Wood Contaminated Wastes from	TCLP (all parameters)	SW-846[3]
Industrial Processes	Ignitability	SW-846[3]
	Corrosivity	SW-846[3]
	Reactivity	SW-846[3]
	Liquid paint filter test (as necessary)	SW-846[3]
	PCBs	SW-846[3]
Contraband Waste	Not specific	Not applicable
Contraband Waste	TCLP Metals	SW-846[3]
Processed screenings from sewage treatment facilities	Not specific	MSDS, formulation sheets or process flow diagrams
Oil based printing wastes	TCLP metals, Volatile Organics	SW-846[3]
Other printing with unknown compounds	TCLP metals, Volatile Organics	SW-846[3]

[2] Material Safety Data Sheet. Additional analytical may be requested depending on the waste stream and/or the process of waste generation.

[3] Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods, EPA publication SW-846. Exceptions to providing analytical under this category include water based paints.

ATTACHMENT 3
NOTICE OF APPLICATION / APPROVAL FOR DISPOSAL OF CONTAMINATED MATERIALS

LAYON MUNICIPAL SOLID WASTE LANDFILL

NOTICE OF APPLICATION / APPROVAL FOR DISPOSAL OF CONTAMINATED MATERIALS

Section A: This Section to be completed by Waste Generator

NAME OF ORGANIZATION: _____

ADDRESS OF ORGANIZATION: _____

TEL. NUMBER : _____ **FAX NUMBER:** _____

ORIGIN OF WASTE: _____

ADDRESS: _____

TYPE OF WASTE: Please check waste type and complete details on the attached sheet

- ☐ LOW CHROME FILTER CAKE
- ☐ PAINT SLUDGE
- ☐ INERT SLUDGE, Please specify overleaf
- ☐ CHEMICALLY CONTAMINATED GLASSWARES OR CONSUMABLE, Please specify chemicals overleaf
- ☐ CHEMICALLY CONTAMINATED ABSORBENT MATERIALS, Please specify chemical overleaf
- ☐ MICROBIOLOGICAL WASTE - NON-PATHOGENIC MATERIALS
- ☐ CONTAMINATED SOIL, Please specify contaminant overleaf and attach test results
- ☐ OTHER WATSE, Please specify overleaf

DISPOSAL FEES: _____

I hereby declare that the above waste is accurately described and is in a proper condition for transport

Signature _____

Name _____ Title _____ Date _____

Section B: This Section to be completed by Layon Landfill Authorized Personnel

NAME OF GENERATOR _____

Inert Waste ☐ Solid Waste ☐ Industrial Waste ☐

I hereby approve ☐ / disapproved ☐ the above waste to be disposed of in the appropriate site at Layon Municipal Solid Waste Landfill

Signature _____

Name: _____ Title: _____ Date: _____

DESCRIPTION OF WASTE	QUANTITY	UNIT (Weight)	UNIT (Volume)
		Ton (s)	Cu. Yd (s)

APPENDIX C

LANDFILL GAS MONITORING PLAN

LANDFILL GAS MONITORING PLAN

LAYON MUNICIPAL SANITARY LANDFILL
INARAJAN, GUAM

Prepared for

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LANDFILL GAS MONITORING PLAN
LAYON MUNICIPAL SANITARY LANDFILL
INARAJAN, GUAM

1. INTRODUCTION

Federal and Guam regulations require monitoring of solid waste landfills for potential migration of landfill gas, to prevent potential impacts to the environment or health and safety. This document describes the facilities, equipment and schedule for monitoring activities in conformance to regulatory requirements.

2. REGULATORY REQUIREMENTS

Section 23306, Explosive Gases Control, of Guam EPA regulations sets forth the requirements for management and monitoring of landfill gas (LFG) in municipal solid waste landfills. The major provisions include the following:

- Section 23306(a) establishes performance criteria for control of LFG:

  (1) the concentration of methane gas in facility structures shall not exceed 25% of the lower explosive limit; and

  (2) the concentration of methane gas as the facility property boundary shall not exceed the lower explosive limit.

  The lower explosive limit for methane gas is five percent (5%) by volume; hence the maximum allowable concentrations are 1.25 % in structures and 5.0% at the property boundary.

- Section 23306(b) requires that monitoring be performed not less than quarterly, and more frequently if warranted based on consideration of soil conditions, hydrogeology, hydraulic conditions and the location of facility structures and property boundaries.

- Section 23330(c) establishes procedures for responses to measurements of methane concentrations in excess of the limits specified in 23306(a).

3. GAS MONITORING NETWORK

3.1 Perimeter Gas Probes

Monitoring for landfill gas migration from the landfill will be conducted in shallow gas monitoring probes located around the perimeter of the disposal area. Initially three (3) probes will be installed around the outside perimeter of Cells 1 and 2.

Additional probes will be installed as additional cells expand the waste footprint. Ultimately, twelve probes will be installed, spaced approximately 1,000 feet apart around the waste perimeter. Figure 1 shows the location of the perimeter gas probes, as well as typical construction details.

Additional probes will be installed at the same time new cells are constructed. The minimum schedule for installation, which may be accelerated at the operator's option, will be as follows:

New Cells Constructed	New Gas Probes Installed
Cells 1 & 2	GP-1, GP-2, GP-3
Cell 3	GP-4, GP-5
Cell 4	None
Cell 5	GP-6
Cell 6	GP-12
Cell 7	GP-7
Cell 8	GP-11
Cell 9	GP-10
Cell 10	GP-8
Cell 11	GP-9

Gas probes are constructed to detect and measure methane gas concentrations in the soil at a depth corresponding to the lowest elevation of refuse near the probe. Due to the shallow depth of excavation for the landfill base, the deepest waste is typically no more than 10 to 15 feet below the ground elevation at the probe locations. Accordingly, all probes are planned to be 10 or 15 feet deep, with a single screened monitoring interval of either 4 to 9 feet below surface, or 9 to 14 feet below surface as indicated in Figure 1.

3.2 Structure Monitoring

The primary occupied structures on the landfill will be the administration building and maintenance building. Monitoring for the presence of methane in the buildings will be done manually during the initial years of landfill operations. Due to the extreme distance (over ½ mile) from these structures to the initial waste areas (Cells 1, 2 3 and 4), it is not necessary to install continuous gas monitoring instruments in these buildings during initial operations. Continuous explosive gas monitoring will be implemented as part of the installation of a gas collection and control system (GCCS), which will occur not less than five years after the beginning of disposal operations. The GCCS will include collecting and piping all landfill gas to the gas management facility located in the entrance area, making it prudent to begin monitoring for methane concentrations in the buildings at that time.

4. PERIMETER PROBE MONITORING

4.1 Frequency of Monitoring

Perimeter gas probes will be monitored on a quarterly basis. More frequent monitoring is required (See Section 6.2) following detection of an exceedance of the maximum allowable concentration (5 percent by volume, the lower explosive limit of methane).

4.2 Monitoring Instruments

Perimeter gas probes will be monitored with a portable instrument using a flame ionization detector (FID) meeting the following requirements:

a. The portable analyzer shall meet the following specifications:

- The instrument shall be designed to measure total organic compounds (TOC) concentrations, expressed as methane.
- Instrument response time shall be 15 seconds or less.
- Instrument precision shall be 3% or better.
- Instrument minimum detectable limit shall be 5 ppmv or lower.
- Instrument shall have a flame-out indicator, audible and visual.
- Instrument shall operate at an ambient temperature of 0 - 50° C.
- The instrument shall be equipped with an electrically driven pump to ensure that a sample is provided to the detector at a constant flow rate. The nominal sample flow rate, as measured at the sample probe tip, shall be 0.10 to 3.0 l/min (0.004 to 0.1 ft_3/min) when the probe is fitted with a glass wool plug or filter that may be used to prevent plugging of the instrument.
- The instrument shall be equipped with a probe or probe extension for sampling not to exceed 6.4 mm (1/4 in) in outside diameter, with a single end opening for admission of sample.
- The instrument shall be intrinsically safe for operation in explosive atmospheres as defined by the National Electrical Code by the National Fire Prevention Association or other applicable regulatory code for operation in any explosive atmospheres that may be encountered in its use. The instrument shall, at a minimum, be intrinsically safe for Class 1, Division 1 conditions, and/or Class 2, Division 1 conditions, as appropriate, as defined by the example code. The instrument shall not be operated with any safety device, such as an exhaust flame arrestor, removed.

b. Calibration gas shall be methane, diluted to a nominal concentration of 10,000 ppmv (parts per million by volume) in air for subsurface refuse

boundary probe monitoring. Zero gas, if required, shall contain less than 10 ppmv methane.

4.3 Monitoring Procedures

4.3.1 Instrument Calibration

The FID instrument must be calibrated each day prior to taking measurements of gas probes. Follow the detailed procedures recommended by the instrument manufacturer, provided they are generally consistent with the following: After the appropriate warmup period and zero internal calibration procedure, introduce the calibration gas into the instrument sample probe. Adjust the instrument meter readout to correspond to the calibration gas value.

4.3.2 Measurement Procedure

Before taking measurements, evacuate the probe (the probes must be sealed during evacuation) until the TOC concentration remains constant for at least 30 seconds.

Record the constant concentration of TOC.

5. STRUCTURE MONITORING

Prior to the installation of fixed continuous monitoring instruments, structures will be monitored on a quarterly basis during the corresponding perimeter gas probe monitoring event. The FID instrument will be used to test the air at several locations in each building. The sample should be drawn from an elevation 5 to 6 feet above floor level at locations least affected by air movement due to doors, windows or ventilation fans. Record a 30-second average concentration at each location tested.

Continuous monitoring instruments will be installed in the administration and maintenance buildings at the time the gas collection and control system is installed at the landfill. Each instrument will include a digital readout of TOC concentration in terms of percent by volume or percent of LEL (lower explosive limit), and an audible and visual alarm for concentrations in excess of 25 percent of LEL (1.25% ppmv).

6. REPORTING AND RECORDKEEPING

6.1 Routine Reporting

Quarterly gas monitoring results for perimeter gas probes and structures will be recorded on data forms and submitted to GEPA with other quarterly reporting data according to the site's Operations Plan and permits. All monitoring data will be maintained in the site's permanent record.

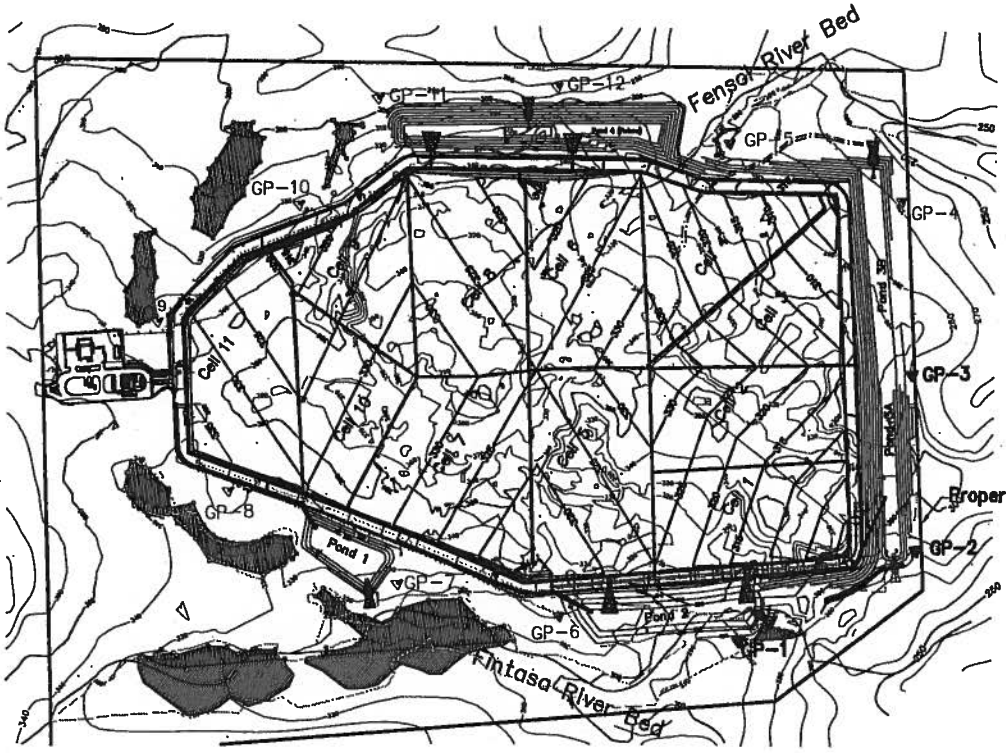
6.2 Non-Compliance Events

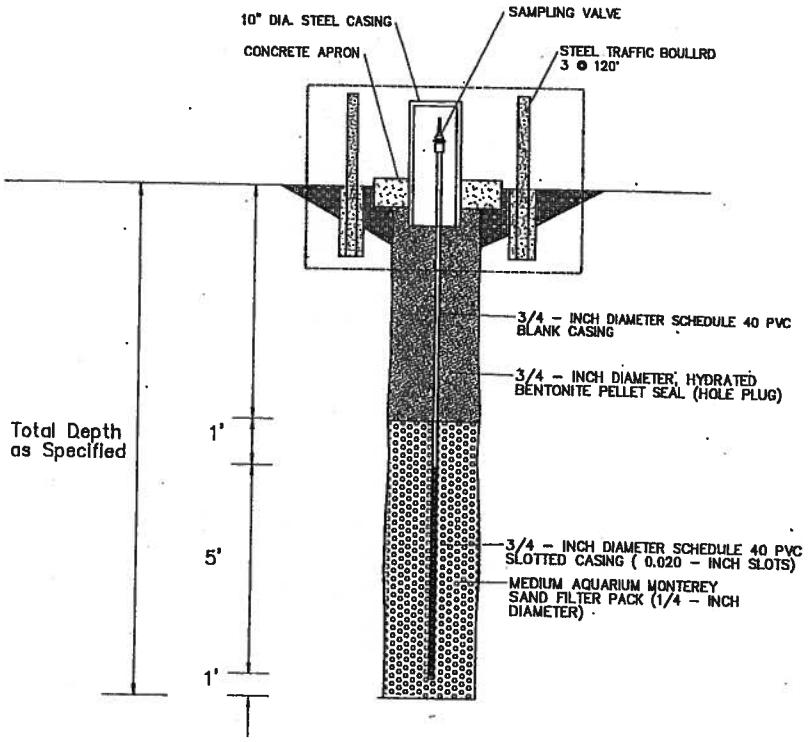
In the event any perimeter gas probe is determined to have a methane concentration in excess of 5 percent, or if a concentration in excess of 1.25 percent methane is identified in any building, the following procedures shall be followed:

- Immediately take any steps necessary to ensure protection of human health and safety. This is particularly critical in event of excessive methane concentrations in structures.
- Notice of a non-compliance event shall be given to GEPA as required by the site's Operations Plan or solid waste facility permit.
- Within 7 days, place in the site's operating record a report of the measured concentrations and steps taken to protect human health and safety.
- Within 60 days, implement a remediation plan to reduce methane concentrations to permissible levels. The plan shall describe the nature and extent of the problem responsible for the excessive concentrations, and describe the proposed remedy. The plan shall be submitted to GEPA and placed in the site's operating record. Monitoring of affected structures shall be not less than daily, and of perimeter gas probes not less than weekly, during the period of preparation and implementation of the remediation plan. Routine monitoring frequency may be resumed after methane levels have been shown to be consistently within permissible limits.

Gas Probe Construction Schedule

Probe	Location – Field Adjust as Necessary		Total Depth (ft.)	Screened Interval (ft. below Surface)	Status
	Northing	Easting			
GP–1	581460	321345	10	4–9	In Contract
GP–2	581004	322252	10	4–9	
GP–3	581549	322935	10	4–9	
GP–4	582108	323584	10	4–9	Future
GP–5	582983	323275	10	4–9	
GP–6	582260	320888	10	4–9	
GP–7	582985	320539	15	9–14	
GP–8	583928	320397	10	4–9	
GP–9	584721	320859	15	9–14	
GP–10	584502	321745	10	4–9	
GP–11	584504	322399	10	4–9	
GP–12	583847	322966	10	4–9	





Typical Landfill Gas Probe

Legend:

GP–1 ▼ Gas Monitoring Probe (Phase I)

▽ Gas Monitoring Probe (Future)

LAYON MUNICIPAL SANITARY LANDFILL

OPERATIONS PLAN

LANDFILL GAS MONITORING FACILITES

FIG 1

CLOSURE AND POST-CLOSURE PLAN

LAYON MUNICIPAL SOLID WASTE LANDFILL

CLOSURE AND POST-CLOSURE PLAN

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LAYON MUNICIPAL SOLID WASTE LANDFILL
CLOSURE AND POST-CLOSURE PLAN

1. INTRODUCTION

This Closure and Post-Closure Plan has been prepared for the Layon Municipal Solid Waste Landfill (Layon Municipal Landfill, LML) in accordance with requirements of Guam EPA Rules and Regulations for Solid Waste Disposal in Guam Administrative Rules, Title 22, Section 23601(c). It describes the activities that will be taken to close, inspect and maintain the site at the end of its active life, in conformance with Guam and federal requirements including the following:

- Estimate the largest area of the site ever requiring closure at one time during the life of the site.
- Estimate the maximum inventory of wastes ever on site.
- Identify activities necessary to close the site.
- Describe the final cover design.
- Provide a schedule for conducting closure activities.
- Describe post-closure care and maintenance activities including a scheduled frequency for them.
- Provide contact information for the person or office responsible for post-closure care.
- Provide an estimate of the costs for a third party to close and provide post-closure care for the facility.
- Describe the funding mechanism to be used to meet the financial assurance requirements for closure and post-closure costs.

Sections 2, 3 and 4 of this Plan document provide background information on the LML site, landfill design and environmental monitoring systems. Section 5 describes the facilities, activities and schedule for closure. Section 6 provides the required information on post-closure. Section 7 contains the cost estimates and financial assurance information.

2. FACILITY DESCRIPTION

2.1 Site Description

The Layon Municipal Solid Waste Landfill is located near the village of Inarajan, near the former NASA tracking station. Layon is located in the higher badland areas on the west side of the Dandan parcel, southwest of the former NASA tracking station. Figure 1 presents the overall site development plan.

The LML property covers approximately 317 acres, with 127.4 acres designated for waste disposal. Ground elevations range from 270 feet to 400 feet above mean sea level (MSL). Prevailing elevations prior to site development generally slope from approximately 350 feet at the north boundary to approximately 270 feet MSL at the south boundary. The most prominent topographic feature is a steeply eroded hill area in the central east side of the site, rising to approximately 400 feet MSL.

Disposal cells will be constructed by excavating to elevations ranging generally from 300 to 330 feet MSL. Figure 2 shows the proposed final grade contours of the site at closure, with a maximum elevation of approximately 470 feet MSL.

2.2 Liners and Leachate Collection System

The liner system selected for the facility in consultation with USEPA and Guam EPA provides two liners and leachate collection systems, and exceeds Guam and federal design requirements for environmental protection. Figure 3 presents details showing the enhanced composite liner systems on the cell floor, side slopes and leachate collection sump areas, as described below.

2.2.1 Floor Liner System

The floor liner and LCRS system consists of the following layers, listed from bottom to top:

- Prepared subgrade below the subdrain system
- Geocomposite subdrain drainage layer
- 12 inches compacted native soil
- 24 inches low-permeability soil (maximum 1.0×10^{-6} cm/sec)
- 60-mil HDPE geomembrane
- Geocomposite secondary LCRS drainage layer
- 80-mil HDPE geomembrane
- Geocomposite primary LCRS drainage layer
- 3 ft. protective soil layer
- 12-mil scrim-reinforced polyethylene rain cap

2.2.2 Slope Liner

The slope liner system consists of the following layers, listed from bottom to top:

- Prepared subgrade
- 24 inches low-permeability soil (maximum 1.0 x 10^{-6} cm/sec)
- 60-mil HDPE geomembrane
- Geocomposite secondary LCRS drainage layer
- 80-mil HDPE geomembrane
- Geocomposite primary LCRS drainage layer
- 3 ft. protective soil layer
- 12-mil scrim-reinforced polyethylene rain cap

2.2.3 Leachate Collection Sumps

The five leachate collection sumps indicated on Figure 2 are composed of the following layers, from bottom to top:

- Prepared subgrade below the subdrain system
- 48 inches low-permeability soil (maximum 1.0 x 10^{-6} cm/sec)
- Two layers of 60-mil HDPE geomembrane
- 16-ounce per square yard non-woven geotextile
- 18 inches of 1½ inch minus gravel (secondary LCRS sump)
- Two layers of 80-mil HDPE geomembrane
- 16-ounce per square yard non-woven geotextile
- Five (five) feet of 1½ inch minus gravel (primary LCRS sump)
- 16-ounce per square yard non-woven geotextile
- Protective soil or soil plug to elevation of adjacent perimeter road in immediate vicinity of the LCRS riser pipes.

Leachate removed from leachate collection sumps at the landfill will be pumped into a new pipeline that will transfer it to the Inarajan wastewater treatment facility.

2.3 Subdrains

Subdrains will be installed below the liner system to manage shallow groundwater and maintain a minimum of 6 feet of separation between the groundwater surface and refuse. Figures 4 and 5 show the proposed subdrain system for Cells 1 and 2.

Due to the low hydraulic conductivity of on-site soils (on the order of 0.0005 cm/sec), the subdrain system has been designed using a continuous geocomposite drainage blanket across the entire cell floor. Water collected in the geocomposite will drain toward gravel-filled trenches with perforated HDPE pipes locate below the LCRS trenches and sumps.

Subdrain construction will proceed in the following steps:

- The cell floor will be excavated to grades one foot below the design bottom of the low-permeability soil liner (three feet below the liner grades shown on the drawings).
- Perimeter and interceptor trenches will be excavated.
- Geotextile lining will be placed in the trenches, followed by the perforated HDPE subdrain pipe.
- Geocomposite will be deployed across the cell floor, terminating inside the interception trenches.
- Trenches will be backfilled with gravel, and a layer of geotextile placed over them.
- A one-foot layer of native soil will be placed over the geocomposite and trenches.
- The 2-feet thick low-permeability soil liner will then be constructed.

This system will ensure a separation between groundwater and overlying units as follows:

- One foot from the bottom of the soil liner;
- Three feet from the geomembrane; and
- Six feet from refuse

Subdrain pipes installed in the trenches will be of perforated HDPE. The pipes will be 4-inch nominal diameter, SDR-11. The perforations will end after pipes pass under the lowest point of the cell (typically, under the sumps), and continue to a temporary, 5,000-gal storage tank. The storage tank will provide the ability to sample and test the subdrain liquid for potential leachate contamination and allow controlled release of the subdrain liquid.

2.4 Leachate Management

2.4.1 Leachate Management Facilities

Submersible pumps will be placed at the bottom of the primary and secondary sump riser pipes to remove leachate from the sump and transfer it to an above-ground, 12,000-gal holding tank located on the adjacent operational pad created by the soil berm. An automatic control system will be installed to operate the submersible pumps to maintain acceptable liquid levels in the sump, and to prevent overfilling of the leachate tanks. Leachate will be transferred from the tank to the Inarajan Wastewater Treatment Plant (WWTP) Facility by a new pipeline, with combined gravity and pumped sections, to be constructed as part of the landfill project. Refer to Book 2, Appendix G, subsections 5.3 - 5.5 for the storage, pumping system and control concepts. The construction contractor will be required to complete the final design with the selected equipment manufacturer and provide details with shop drawings.

Regarding LCRS sump storage capacity and system redundancy, the LCRS facilities have significant storage capacity in the sump areas. Using the numbers from the LCRS Addendum 1 Memorandum, the primary LCRS sump has storage capacity approximately equal to approximately 15-days assuming peak leachate flow rates. The above-ground, 12,000-gal holding tank was sized equal to approximately 1-day of peak leachate flow, this volume is sufficient since there is the large storage capacity available in the sump.

Pump Station No. 1, beginning the new pipeline from the sump to the Inarajan WWTP, has a duplex pump system with the 2-pumps alternating operations and providing backup in the event one pump is temporarily down.

A separate study is ongoing concurrently to evaluate the leachate quality and the Inarajan WWTP capacity to handle additional flow. The Draft Report is expected to be submitted on June 22, 2009. It is planned that the study findings will identify the need for any or all of the following.

Leachate pretreatment at the Landfill Site
WWTP expansion requirements for added flow
WWTP treatment system improvement requirements

Interim plans for leachate management include temporary storage in the sump area and above ground holding tank. Transport to the Inarajan WWTP can be accomplished by trucking as an alternative. It is expected that pretreatment and plant improvements, if needed, can be accomplished by the landfill opening date, such that the WWTP can accommodate the leachate flow for disposal utilizing either the pipe system or trucking.

2.4.2 Leachate Collection Sump and Riser

As shown on Figure 2, five (5) sumps will be constructed to serve the eleven cells. The sump bottoms will be depressed below the surrounding elevation of the cell, and each sump will be sized to hold a liquid volume equal to or greater than the estimated peak daily leachate generation, and a minimum of one week's average leachate generation from the tributary area of the sump. The initial sump to be constructed to serve Cells 1 and 2 has been designed based on analysis using the HELP (Hydraulic Evaluation of Landfill Performance) computer model using Guam weather data and assumptions approximating those under which the leachate generation would be maximized. Subsequent sumps will be designed using leachate generation data from actual operations at the site.
An enhanced liner system will be installed below the sump to compensate for the potential of the sump to contain more than 12 inches of leachate. The thickness of the low-permeability soil liner will be increased from two feet to four feet, and one additional layer of 60-mil HDPE geomembrane will be installed. The secondary LCRS collection area is covered with18 inches of non-calcareous gravel. The secondary LCRS sump is equipped with a 10-inch HDPE sideslope riser pipe.

Above the gravel in the secondary sump are a layer of geotextile, two layers of 80-mil HDPE geomembrane and a layer of 16-ounce per square yard geotextile. Five feet of a non-calcareous granular drainage media is placed above the geotextile to form the collection area for the primary LCRS. A vertical leachate collection riser pipe will be installed in the primary LCRS sump area, supported by a reinforced concrete foundation placed above the gravel bed. A berm of compacted soil is placed above the sump gravel next to the riser pipe to fully encase the pipe to the elevation of the adjacent liner anchor trench, creating an operational pad between the riser and the liner edge. All leachate

handling activities will be performed in this area, which is located above the composite liner system. Figure 6 illustrates the sump and riser pipe design as applied to the sump serving Cells 1 and 2.

2.4.3 Leachate Management

The peak time for leachate generation is when rainy periods coincide with the first stage of operations in a newly constructed cell, before a significant thickness of waste and daily cover soil is placed across the cell floor. To minimize leachate generation during these times, each new cell will be covered with a sacrificial geomembrane rain cap. Waste disposal operations will begin in the up-slope areas of each new cell, with the rain cover in the active area removed or destroyed in place by landfill equipment before waste is placed over it. Soil berms will be maintained in the active area to prevent runoff that has contacted waste from running onto the remaining intact rain cap. Stormwater runoff on the rain cap will be collected at the low point of the cell and pumped to the stormwater system.

Once the entire cell floor is covered with an initial lift of refuse, subsequent rainfall will create far less leachate than if significant areas are covered only with protective soil, allowing percolating rainfall to enter the LCRS sump.

2.5 Landfill Gas Management

Landfill gas will be managed by installation of horizontal collectors and vertical wells within the refuse, developing a main loop header system, and delivering gas to a central blower and flare station located in the entrance area. Subject to demonstration of economic feasibility, an energy recovery facility is likely to be added in the future.

The TGE team used the USEPA Landfill Gas Emissions Model (LandGEM), Version 3.02, to estimate the LFG generation potential for the Layon Landfill. LandGEM is based on a first-order decomposition rate equation for quantifying emissions from the decomposition of landfilled waste in municipal solid waste (MSW) landfills. The software provides a relatively simple approach to estimating landfill gas emissions. Model inputs are based on USEPA recommendations for wet landfills. The waste intake was assumed to be as presented in Table 2-1.

The computer modeling results indicate that significant landfill gas generation will begin as early as the second year of operations, and increase sharply thereafter. The model projects a peak generation rate of approximately 4,100 cfm of LFG, of which approximately 50% is expected to be methane, at the end of the site's active life. The volume would then decline quickly during the post-closure years.

LFG will be managed by a collection system expected to collect approximately 75 percent of the gas generated. The collection system will consist of horizontal collectors, placed on the floor of the disposal cells before placement of waste begins, and vertical extraction wells. Gas will be drawn under vacuum from these wells and collectors into a

piping network delivering the LFG to a blower system that transfers it to a flare and (eventually) energy recovery facility. Based on projected flows, the primary elements of the piping system will be a 12-inch HDPE gas header loop around the perimeter of the landfill, connected to an 18-inch main that terminates at the blower

The TGE team recommends use of a single flare with a capacity of 4,100 scfm of landfill gas to manage gas by combustion. The flare is able to operate efficiently at 10 percent of its rated maximum capacity, so that its installation can be scheduled relatively early in the life of the site. The initial installation would include two 1,350-scfm blowers capable of handling 2/3 of the total capacity of the flare, with a third blower to be added when the gas generation volume exceeds 50% of the flare capacity.

A preliminary analysis of the energy recovery potential of the site indicates that up to 6.4 MW of electricity could eventually be generated using a series of internal combustion engine-generators designed specifically for landfill gas. The conceptual energy recovery plan includes four engines installed at 5 to 7 year intervals as the gas collection volume increases, with each engine rated at 1.6 MW.

A potential implementation schedule for the flare and energy recovery system includes the following key dates for the first 25 years of operation:

- 2010 Landfill begins operation
- 2013 Install flare and first two blowers
- 2015 Install first 1.6 MW engine-generator
- 2023 Install second 1.6 MW engine-generator
- 2034 Install third blower and third 1.6 MW engine-generator

Obviously, the timing and configuration of an energy recovery system will depend on the actual rate of LFG generation, which will be determined on an ongoing basis during the site's operating life.

2.6 Perimeter Roads and Drainage Facilities

Two major roads will be developed in the landfill footprint area. During the initial mass grading construction project planned for 2009, a temporary landfill operations road will be constructed generally through the center of the site to provide access from the entrance facility to the Phase 1 disposal area. This road will have two 12-ft. wide travel lanes with 4 ft. shoulders, surfaced with asphalt treated base, and will serve as the primary landfill haul road for at least 10 years, until construction of Cell 5. At that time it will likely be continued for landfill access to disposal areas until completion of the perimeter road system.

A 60-feet wide perimeter road corridor will be constructed in stages as the landfill develops to from the south toward the entrance area. This facility will serve the following uses:

- Liner anchor trench
- Access road surfaced with asphalt-treated base material
- Primary drainage conveyance for landfill runoff (rip-rap lined swales and concrete trapezoidal channels)
- Electric power, leachate, landfill gas and condensate pipe headers placement

Grading for the road is designed as needed to carry stormwater runoff from the landfill footprint to the appropriately located sedimentation basin. The road is designed with the same structural details as the main access road into the site, as described in the following section.

2.7 Surface Water Management

2.7.1 Design Basis

The stormwater conveyance systems will be designed to maintain peak discharges from the landfill site at flow volumes estimated for existing (pre-development) conditions. The flow rate used for this analysis is a 25-year/24-hour storm event that generates 20-inches of rainfall in a 24-hour period (ref: Table 3.3, Guam Stormwater Management Criteria 7/30/04).

2.7.2 Detention / Sedimentation Ponds Design

Final Site Development

As the site develops a total of four sedimentation basins will be constructed adjacent to the perimeter road around the base of the landfill. The discharge from these basins consists of the following:

- Pond 1, Pond 2 and Pond 3A (the westerly half of Pond 3) drain into the Fintasa River watershed
- Ponds 3B will flow into the Fensol River watershed
- Pond 4 will have two discharges, one each to the Tinago and Fensol River watersheds

The tributary areas and peak flows into each pond are estimated as follows:

Pond	Tributary Acres	Peak Flow (cfs)
Pond 1	26	273
Pond 2	46	404
Pond 3A	33	400
Pond 3B	22	184
Pond 4	64	578

Initial construction of Phase 1 of the landfill will include Pond 2 and Pond 3A, which will receive runoff from the constructed landfill area of Cells 1 and 2. Pond 3B will be

constructed when Cells 3 and 4 are developed. Ponds 1 and 4 will be developed in the future as landfill cell construction and the permanent perimeter road system are extended northward.

2.7.3 Stormwater Conveyances Design

Final landfill grades will be constructed at a 4:1 slope from the top deck to the perimeter road. The design will be refined to include benches at approximately 50 foot elevation intervals. These features will allow for intermediate collection of runoff to be directed to paved down drain swales that will be designed to reduce flow velocity and ultimately discharge into the roadside ditch. One or more paved and curbed roads will be constructed to the top deck, and will double as access routes and major conveyances for stormwater. These roads and other major downdrains will discharge to culverts leading directly to stormwater ponds.

The perimeter road will have rip-rap lined drainage swales on the inside and outside edges to channel runoff toward the ponds. Cross-drains or swales will be provided to discharge the swales to the ponds. Where warranted, concrete trapezoidal channels will be installed at the outside edge of the perimeter road. Detailed design of drainage structures for future phases will be done as landfill development continues after Phase 1 is placed in operation.

2.8 Ancillary Facilities

Figure 7 shows the general arrangement of the entrance area where major site facilities will be located. A general discussion of these facilities is presented in the following sections.

2.8.1 Scalehouse / Administration Building

The entrance area will be equipped with two scales in order to serve a full range of customers including commercial refuse collection vehicles, transfer trucks and public self-haulers, if required.

It is anticipated that most vehicles using the site will be repeat customers, and that vehicle tare weights will be established during an initial visit and then kept on file for use in subsequent weighing and billing. Accordingly, a dedicated outbound scale is not needed, and any vehicles needing outbound weighing will circle around the scalehouse for re-weighing on the inbound scales. The entrance area circulation system is designed to accommodate this practice.

The entrance area layout features an integrated scalehouse and administration building. The scale attendant will be stationed adjacent to a window constructed adjacent to the scales at an appropriate height to allow transactions to occur without the truck driver leaving the vehicle. The attendant will be able to perform other administrative functions in addition to scale operation during periods when no truck is at the scales.

In addition to scales and associated computer equipment for records and billing, the scalehouse area of the building will contain the following:

- Closed-circuit television cameras, monitors and recording equipment for surveillance of scalehouse operations. One camera will be mounted to view the vehicle from the front, and another will be mounted on the building or adjacent light pole to view the waste load from the top. The video images are recorded and retained for a minimum 30-day period for use in audits of scalehouse performance or investigations of unauthorized waste delivered to the landfill.

- Radiation monitoring equipment. A detector unit is mounted in the wall of the building or on an external pole, at an elevation and location suitable to detect any significant radioactive source in the incoming waste load. A meter and alarm system alert the scale attendant, who then implements inspection procedures that will be specified in the site's operations manual.

2.8.2 Maintenance Facilities

An area of approximately 4 acres is set aside at the entrance area for maintenance functions. Within this area the following facilities will be provided:

- Maintenance shop containing a minimum of two roofed bays for maintenance and repairs of landfill operating equipment, plus parts storage areas, lubricant storage and dispensing equipment, maintenance manager office and a locker area for mechanics.

- Locker room, restrooms and a meeting / break area for landfill operating personnel including a private office for the landfill operations manager or lead supervisor. These areas would typically be combined with similar functions for maintenance personnel in the maintenance shop building.

- Fueling area, including a storage tank and dispenser for diesel fuel.

- Equipment wash pad with an appropriate wastewater handling system including sediment removal and oil separation.

2.8.3 Water Storage and Emergency Electric Power Generation

A reliable water supply will be needed for potable water needs, sanitary facilities, dust control, construction and fire protection on the site. To accommodate this requirement a water storage tank with 200,000 gallons capacity is to be provided. A nearby pumphouse will supply necessary pressure and flow for fire protection and service requirements to the distribution system.

An emergency power source is being provided to ensure continued and safe operation of the site during power outages. A diesel generator set will be provided at the location of the pumphouse, with necessary controls, switchgear and fuel storage.

2.8.4 Gas Management Facilities

An area of approximately one acre is reserved for installation of equipment for treatment of landfill gas and gas condensate. The landfill gas management facility will include blowers, condensate separation, and a thermal flare for incineration of gas and condensate. Initial elements of this facility are expected to be installed in the fifth year of site operations, with additional capacity added from time to time. The landfill gas master plan also projects establishing a future energy recovery facility in the area.

2.8.5 Entrance Area Roads

The two-way main access road enters the site at a main gate in a chain link fence at the front property line, then splits into separate inbound and outbound roadways. Refuse delivery vehicles proceed directly to the scales, with sufficient length between the gate and the scales to queue as many as 15 large trucks. Visitors or employees make a left turn leading to the parking areas for the administration building or the maintenance building.

From the scales, refuse delivery trucks proceed directly to the main landfill access road from which they access the perimeter road as it is developed, or temporary roads leading to the landfill working face. After discharging their load they return to the perimeter road or landfill access road, thence to the paved exit road between the administration building and maintenance area.

A connecting loop from the outbound road back to the inbound road leading to the scales is provided near the main gate for refuse vehicles needing an outbound tare weight. After the second weighing, the trucks can proceed back to the exit road to leave the site.

Access to maintenance areas and the leachate and gas management area is provided from the landfill access or perimeter roads. The maintenance area will be surfaced with a combination of asphalt paving and gravel travel routes and parking areas for all-weather use by both tracked and wheeled vehicles and equipment, and will be surrounded by a chain link fence.

2.8.6 Site Fencing and Signage

The perimeter of the site will be enclosed by a 6-foot high chain link fence. Additional internal chain link fencing will secure the entrance area.. These fences will deter and prevent unauthorized entry to the site during times with the site is closed. Signs will be placed on perimeter fence at appropriate intervals identifying the site as a restricted entry area.

A sign installed at the gate to the entrance facility will be maintained in good condition and appearance. The sign will identify the site by name, indicate the operating days and hours, waste materials not accepted, disposal rates and the name, address and telephone

number of the site operator. It will state that all people entering the facility must check in at the office.

Appropriate directional and safety information will be provided on signs throughout the site. Road signage will indicate direction of traffic flow, warn of heavy equipment crossings and designate speed limits.

2.9 Method of Operation

Disposal operations use the area fill method of disposal, whereby waste is discharged to a limited area each day, and covered prior to the following day's operation. MSW is compacted using landfill compactors and bulldozers prior to covering. Daily and intermediate soil will generally be fine-grained on-site soil, with some potential use of green waste mulch or other alternative daily covers if available and approved by GEPA in the future.

2.10 Characteristics, Quantity and Source of Waste

Layon Landfill proposes to be permitted to accept for disposal non-hazardous municipal solid waste (MSW), including construction and demolition (C&D) waste. MSW will be received from residential, commercial and industrial sources.

Layon Landfill also proposes to be permitted to receive for disposal certain non-hazardous wastes managed under special operating procedures. These special wastes include wastewater treatment sludge, treated medical waste, asbestos materials, petroleum contaminated soils, and industrial process wastes.

The site is projected to begin operations in mid-2010 with waste volumes at an annual rate of approximately 152,000 tons per year, which is equivalent to approximately 485 tons per day on a 6 day/week basis. Total capacity of the site is estimated at 9,485,276 tons of waste based on the data presented in Table 2-1.

It is anticipated that minor amounts of non-disposable unacceptable wastes will be delivered to the site in mixed waste loads. Such wastes, including tires and white goods (major appliances), will be temporarily stored and removed from the site.

2.11 Proposed Ultimate Use of Land

Upon completion of its useful life as a landfill, the LML site used for waste disposal will be returned to its original use as vegetated open space. The landfill administrative area may be retained in support of waste-related activities, including management of LML post-closure activities. Detailed information on post-closure conditions and activities is contained in Section 6.

TABLE 2-1
PROJECTED WASTE DISPOSAL VOLUMES

Year	Tons per Year[1]	Cumulative Tons	Cubic Yards per Year[2]	Cumulative Cubic Yards
2010	75,697	75,697	126,161	126,161
2011	154,530	230,227	257,550	383,711
2012	157,726	387,953	262,877	646,588
2013	160,982	548,935	268,303	914,891
2014	164,299	713,234	273,832	1,188,723
2015	167,680	880,914	279,467	1,468,189
2016	171,072	1,051,986	285,120	1,753,309
2017	174,530	1,226,516	290,883	2,044,193
2018	178,054	1,404,570	296,757	2,340,949
2019	181,646	1,586,216	302,743	2,643,693
2020	185,307	1,771,523	308,845	2,952,538
2021	189,396	1,960,919	315,660	3,268,198
2022	194,186	2,155,105	323,643	3,591,841
2023	198,779	2,353,884	331,298	3,923,139
2024	203,477	2,557,361	339,128	4,262,268
2025	208,284	2,765,645	347,140	4,609,408
2026	212,725	2,978,370	354,542	4,963,949
2027	217,259	3,195,629	362,098	5,326,048
2028	221,887	3,417,516	369,812	5,695,859
2029	226,610	3,644,126	377,683	6,073,543
2030	231,431	3,875,557	385,718	6,459,261
2031	236,915	4,112,472	394,858	6,854,119
2032	242,525	4,354,997	404,208	7,258,328
2033	248,267	4,603,264	413,778	7,672,106
2034	254,142	4,857,406	423,570	8,095,676
2035	260,153	5,117,559	433,588	8,529,264
2036	266,305	5,383,864	443,842	8,973,106
2037	272,600	5,656,464	454,333	9,427,439
2038	279,033	5,935,497	465,056	9,892,495
2039	285,619	6,221,115	476,031	10,368,526
2040	292,359	6,513,475	487,265	10,855,791
2041	299,259	6,812,733	498,765	11,354,556
2042	306,321	7,119,055	510,536	11,865,091
2043	313,551	7,432,605	522,584	12,387,675
2044	320,950	7,753,556	534,917	12,922,593
2045	328,525	8,082,080	547,541	13,470,134
2046	336,278	8,418,358	560,463	14,030,597
2047	344,214	8,762,572	573,690	14,604,287
2048	352,338	9,114,910	587,230	15,191,517
2049	360,654	9,475,564	601,089	15,792,607
2050	9,712	9,485,276	16,187	15,808,794

[1] Annual disposal tonnage for 2007-2037 as presented in Table 1b, Final Site Selection Report. Estimated volumes for 2038-2055 based on projected annual growth rate of 2.36% per year.

[2] Cubic yards computed assuming in-place density (airspace utilization factor) of 1,200 pounds of waste per cubic yard of airspace consumed.

3. PHYSICAL SETTING

3.1 Climate

Rainfall totals in the vicinity of the proposed landfill site average between 90 and 105 inches per year. Guam has distinct wet and dry seasons. Approximately 70 percent of the rainfall is recorded during the wet season (July through December) with the remainder during the dry season (January through June).

The design storm for purposes of surface water management requirements GEPA regulations §23309, consisting of the 24-hour, 25-year return event, is 20 inches of rain.

3.2 Floodplains

The site is not within a floodplain area as delineated by the Federal Emergency Management Agency, National Flood Insurance Program, or Flood Insurance Rate Maps.

3.3 Seismic Environment

No known fault zones have been identified on or near the LML site. The United States Geological Survey (USGS) characterizes the seismic hazard of Guam by a peak horizontal acceleration between 0.16 g and 0.24 g (1.0 g = the acceleration due to gravity) during an earthquake event with a probability of exceedance of 10 percent in 50 years (or an equivalent average return period of 475 years). This level of seismicity would classify Guam in Seismic Hazard Zone 3 as specified in the 1988 Uniform Building Code, in which the highest hazard rating of 4 represents a peak acceleration greater than 0.3g for the 475-year return event.

Federal and Guam landfill regulations (22GAR 23205(b)) establish the design seismic event for municipal solid waste landfills as one with a 10 percent chance of occurring in 250 years. This event is statistically similar to one with a 2% chance of occurring in 50 years, which is equivalent to an average return period of 2,475 years. The estimated peak horizontal acceleration in rock at the LML site has been estimated at 0.6 g for this design event, due to a Magnitude 8.1 earthquake in the offshore Mariana Subduction Zone.

3.4 Topography and Surface Features

The site ranges from gentle sloping and hilly savannah to steeply incised erosional features with no vegetation. The savannah is covered with thick, tall grasses and shows evidence of former farming in the gently sloping areas. There exist small patches of isolated forest trees and associated vegetation along the western mid-section of the site with wetlands in the northwestern and northeastern areas. Large areas of the central and southern parts of the site consist, however, primarily of deeply weathered exposures of basaltic lava flows with little to no vegetation present.

Ground elevations on the proposed landfill property range from 270 feet to 400 feet above mean sea level (MSL). Prevailing elevations generally slope from approximately 350 feet at the north boundary to approximately 270 feet MSL at the south boundary. The most prominent topographic feature is a steeply eroded hill area in the central east side of the site, rising to approximately 400 feet MSL.

3.5 Wetlands and Streams

Site investigations identified eight (8) wetland areas surrounding the site, as shown on Figure 1. The site is also proximate to three identified intermittent riverbeds. A portion of the Fintasa River lies within the westerly site boundary; the Tinago River originates and runs just outside the easterly boundary; and the Fensol River is shown on maps to originate in the southeast corner of the landfill property. All three of these designated streams are intermittent in the vicinity of the site, containing flow only during the rainy season.

The sedimentation basins that collect runoff from the landfill footprint area will discharge at locations that maintain, to the extent possible, existing flow volumes in the wetlands and streambeds. Rock-lined flow dissipation pads will be installed at the outlet of pipes and spillways to reduced velocity and spread the flow to prevent erosion or channelization in wetland areas and existing streambeds.

3.6 Geology and Soils

The geology at the site is comprised of the Umatac Formation (Tracey, et al., 1964). Of the four members within this formation, only the Bolanos pyroclastic member is present at the site. The Bolanos member consists of thick-bedded to massive water-laden tuff breccia, thin-bedded tuffaceous sandstone, and lenses of volcanic conglomerate. In the Dandan area, bedded tuffaceous sandstone and lenses of volcanic conglomerate are common.

The lava flows of the Dandan member are especially prominent at the site. Major lava boulder fields are thought to be residuals of the weathered flows and occupy a significant portion of the highest elevations at the site. The existing boulders range in diameter from less than one foot to more than 20 feet and show that the flows covered most of the area from the crest of the nearby mountains to the limestone that fringes the coast.
The site is generally underlain by a weathered soil of volcanic origin, consisting of a reddish brown to mottled reddish purple to yellow orange green brown black clayey silt. Near-surface soils generally range from soft to very stiff in the upper approximately 30 feet of depth below existing ground surface. Limited areas of the site contain substantially harder soils between approximate elevation 345 to 300 feet MSL. Unweathered hard volcanic rock generally underlies the site at depths below elevations 300 to 270 feet MSL.

Soils are generally characterized by relatively high in-situ moisture content, or about 40 to 80 percent, and low dry unit weights, or about 50 to 80 pcf. Fines contents range from

approximately 50 to nearly 100 percent. Liquid Limit (LL) values range from approximately 60 to 90 while Plastic Limit (PL) values were range from approximately 22 to 50. In most cases the soils are fine-grained soils classified as elastic silt (MH).

3.7 Hydrogeologic Conditions

Groundwater elevations below the site are generally shallow, ranging from elevations 330 to 290 based on the findings of the hydrogeologic investigations by the TG Engineers team. Groundwater elevations generally decrease from north to south across the site. The northerly half of the site also appears to overlie a groundwater mound, with elevations decreasing from the center of the site toward the east, west and south. Detailed information on hydrogeology of the site is contained in the Final Integrated Hydrogeologic Assessment of hydrogeologic investigations by AMEC Geomatrix, Inc.[3]

Groundwater samples collected during the Geomatrix field program during 2007 provide a preliminary indication of groundwater quality below the site. The study concluded that shallow groundwater conditions beneath the planned landfill footprint can generally be described as reducing, as evidenced by negative ORP (oxygen reduction/redox potential0 and low dissolved oxygen values, and the elevated concentrations of iron and manganese. Shallow groundwater at several wells (MW-12, MW-13, MW-14A, MW-15, MW-16, and MW-20) has iron and manganese concentrations that exceed the U.S. EPA and/or the World Health Organization secondary drinking water criteria for these elements. The iron concentration at MW-22 also exceeds these criteria, and manganese exceeds the criteria at MW-19A.

Groundwater samples collected at shallow/deep monitoring wells MW-17A/MW-17B exceed the U.S. EPA and WHO primary drinking water criteria for arsenic with concentrations of 0.012 mg/L and 0.024 mg/L, respectively. The concentrations of boron, barium, and nickel, measured at well MW-16, also exceed the WHO criteria set for these elements. However, the concentrations are very close to the standards and the iron concentration at MW-16 was very high (310 mg/L), which could potentially have biased the analytical results. No VOCs, organochlorine pesticides, chlorinated herbicides, mercury, or cyanide were detected in any of the wells.

Several new groundwater monitoring wells will be established, and additional sampling and analysis of background levels of groundwater quality will be conducted prior to operation of the landfill, in conformance with the Site-Specific Groundwater Monitoring Plan.[4]

[3] AMEC Geomatrix, Inc. Final Integrated Hydrogeologic Assessment, Layon Municipal Sanitary Landfill Site, Inarajan, Guam. November 26, 2008.

[4] TGE Engineers, PC. Site-Specific Groundwater Monitoring Plan, Layon Municipal Sanitary Landfill, Inarajan, Guam. November 26, 2008 (Draft)

4. ENVIRONMENTAL MONITORING SYSTEMS

4.1 Groundwater and Leachate Monitoring

4.1.1 Applicable Monitoring Requirements

Groundwater monitoring requirements for LML are set forth in Section 23502 of Title 22, Guam Administrative Rules (22 GAR 23502). A system complying with these requirements is being developed and will be operated as described in the facility's approved site-specific groundwater monitoring plan (GWMP). Key elements of the groundwater monitoring program are summarized below.

4.1.2 Groundwater Monitoring System

The recommended groundwater detection monitoring system for Phase 1 is shown on Figure 8 and described in the Site Specific Groundwater Monitoring Plan. As recommended therein, a groundwater monitoring well network consisting of 13-wells will be installed for the initial phase of development of the landfill. Additional wells will be added to the system as the landfill footprint expands. At full buildout the monitoring network would consist of twelve wells. The initial wells will be installed in 2009 and sampled on a quarterly basis prior to beginning site operations in order to establish the statistical database for the detection monitoring program. In addition, subdrain water discharge points will be monitored at the same frequency as groundwater wells as part of the program.

4.1.3 Groundwater Sampling and Analysis Procedures

LML's groundwater sampling and analysis procedures are described in detail in the site's GWMP. Sampling will be performed initially on a quarterly basis, and subsequently on a semi-annual basis after a suitable background data base has been compiled.

The GWMP sets forth detailed procedures for the collection of samples, sample preservation, chain of custody, quality assurance/quality control measures, laboratory analysis and recordkeeping, and reporting. It also describes the statistical methods used for evaluation of groundwater monitoring data. The statistical methodology, designed in accordance with applicable Guam and federal requirements, uses an intra-well comparison approach with verification resampling. Statistical analysis is performed using the statistical computer modeling program DUMPSTAT™.

4.1.4 Leachate Monitoring

Data obtained from sampling and testing leachate has two principle uses in post-closure monitoring:

- It is an indicator of progressive decomposition and stabilization of the waste mass; and
- It provides ongoing data for use in interpreting any groundwater monitoring data that indicates a potential release from the landfill.

Leachate samples will be collected during the semi-annual groundwater monitoring events. Samples will be collected from each primary LCRS sump in the first semi-annual event, and from the secondary sump in the second semi-annual event. Samples will be analyzed for the same suite of constituents as groundwater samples, and results will be included in the annual groundwater monitoring reports.

4.1.5 Detection Monitoring Program

The groundwater monitoring program described above meets all criteria for a detection monitoring program as described in 22 GAR 23505.

4.2 Landfill Gas Monitoring and Control

Methane gas will be produced by the anaerobic decomposition of organic components of solid waste. LML will implement a gas monitoring plan to ensure that methane gas does not cause safety or environmental problems. Specifically, the program must demonstrate with the requirements of 22 GAR 23306 that concentrations of methane do not exceed 25% of the lower explosive limit in facility structures, or 100% of the lower explosive limits at the property boundary. The lower explosive limit for methane is 5% by volume (50,000 ppm)

Monitoring will be conducted on a quarterly basis by sampling a network of two-level gas probes constructed around the perimeter of the site, measuring methane concentrations at depths of 5 to 10 feet, and at 20 feet or the elevation of nearest waste, whichever is greater. Figure 9 shows the proposed locations of the gas monitoring probes.

A summary of gas monitoring results is placed in the operating record.

A landfill gas collection system will be installed incrementally as the site develops. Horizontal collectors will be installed at the bottom of each cell as it is constructed, and vertical gas wells will be added as the elevation of waste reaches 50 feet or more in an area. An active gas collection system consisting of main transmission pipes, blowers, flares and potentially an energy recovery system will be added as gas generation rates reach recoverable quantities.

5. CLOSURE PLAN

5.1 Estimated Closure Date

The total airspace capacity of the landfill as represented by the final grades of Figure 2 is approximately 15.8 million cubic yards, exceeding project requirements of a minimum of 14 million cubic yards. Disposal capacity was estimated by computing the volume contained between the final grades and liner grades using earthwork design software, and then calculating the waste disposal capacity taking into account the volume that will be occupied by final cover soil, leachate collection gravel and protective cover soil above the liner. The results are as follows:

Gross airspace	17,247,565cubic yards
Less final cover	(822,155)
Less protective soil 127.4 acres @ 3 ft	(616,616)
Net airspace (refuse and cover soil)	15,808,794 cubic yards

Based on planning projections prescribed by the Guam Department of Public Works, the site is projected to open in 2010 with an annual disposal volume of approximately 142,000 tons per year, which will increase at an annual rate of approximately two percent. With an assumed airspace utilization factor of 0.6 tons of waste per cubic yard of net airspace used, the estimated site life is forty years, projecting a 2050 final closure date for LML. This projected life will vary according to actual waste disposal rates, which depend on future population growth and waste diversion programs, and on actual airspace utilization factors achieved by landfill operations.

It is expected that several partial final closure phases will be implemented prior to final closure of the site. The conceptual partial closure phases are described in Section 5.4 below.

5.2 Final Cover

Final cover for LML will be designed and constructed in conformance with the requirements of 22GAR 23601(a), which contains the following prescriptive elements:

a) an infiltration layer consisting of a minimum of 18 inches of earthen material and having a permeability no greater than that of any bottom liner system or natural soils below the liner; and

b) an erosion layer above the infiltration layer, containing a minimum of six inches of soil capable of sustaining native plant growth

An alternative to the prescriptive design may be approved if it can be shown to achieve infiltration and erosion control equivalent to the prescriptive design.

The proposed final cover for LML is an alternative design consisting of the following elements, as shown on Figure 10:

- A foundation layer of 6 to 12 inches of soil (including previously placed daily or intermediate cover);

- On top deck areas with a slope of less than 10 percent:

    - 12 inches additional foundation layer of on-site soil;
    - A geomembrane of low-density or other polyethylene material, to be specified in a final closure plan and design at the time of the first phased closure project;
    - 24 inches vegetative soil layer of on-site soils.

- On side slope areas:

    - 12 inches additional foundation layer of on-site soil;
    - A geomembrane of low-density or other polyethylene material, with thickness and specific compound to be specified in a final closure plan and design at the time of the first phased closure project;
    - A geocomposite drainage layer; and
    - 24 inches vegetative soil layer of on-site soils.

The final cover will be constructed using certified quality assurance procedures performed under the supervision of a qualified registered engineer. Final grades will be established and maintained to support effective surface water management and erosion control.

5.3 Leachate and Gas Management Facilities

5.3.1 Leachate Management Facilities

Leachate management sumps, pumps, tanks and transfer facilities (See Section 2.4 above) will be in place and operational in areas of partial or final closure, and no modifications of them are anticipated as part of closure construction.

5.3.2 Landfill Gas Management Facilities

It is anticipated that a landfill gas (LFG) collection and treatment system will be constructed and placed in operation at LML prior to closure, as described in Section 2.5 above. Some elements of the LFG system will require modification during construction of the final cover system in order to facilitate effective operation and maintenance during the post-closure period. The final design plans may include the following kinds of gas system modifications:

- Raising vertical gas wells and header pipes above the final cover;
- Installing horizontal collectors in the upper waste layers; and
- Relocating or reconstructing condensate collection sumps to facilitate condensate management during the post-closure period.

5.4 Largest Area Requiring Closure

The permitted waste footprint of LML will be closed in three stages as significant areas reach permitted final grades. The three stages are described as follows:

- Stage I Closure will occur after Cells 1-6 have been developed and filled to interim final grades, and Cell 7 has been constructed and placed in service. At that time, Cells 1, 2, 3 and 4 will have reached final grades and will be closed, removing 42.2 acres from the open landfill area.

- Stage II Closure will occur after Cells 1-8 have been developed and filled to interim grades, and Cell 9 has been constructed and placed in service. At that time, Cells 5 and 6 will be at final grades and will be closed, removing an additional 28.3 acres from the open landfill area.

- Stage III Closure will occur after the remaining cells have been filled to final grades. The final closure stage will include Cells 7-11 and will cover 57.9 acres.

The largest open areas before and after each closure stage are as follows:

Stage	Before Closure		After Closure		
	Cells Open	Acres	Cells Closed	Cells Open	Acres Open
I	1-7	85.1	1-4	5-7	42.9
II	5-9	64.8	1-6	7-9	36.5
III	7-11	57.9	1-11	None	0

Based on this analysis, the largest area to potentially required closure at any time would be that occurring before Stage I Closure is implemented, 85.1 acres.

5.5 Maximum Waste Inventory

On a daily basis, the largest amount of waste not buried in the landfill is the maximum daily tonnage received at the site, which is projected to reach approximately 1,200 tons of municipal solid waste in the last years of site operation.

The total volume capacity of MSW and daily/intermediate cover soil at LML is approximately 15.8 million cubic yards. Based on an airspace utilization factor of 1,200 pounds of waste per cubic yard of airspace, the estimated tonnage of MSW in place at closure will be approximately 9.5 million tons.

5.6 Closure Activities

Closure of LML will be implemented by the following sequence of activities:

- Final design and construction procurement. Prior to receipt of final waste, detailed plans and specifications will be prepared. Plans will include grading, final cover, storm water management system, roads, modifications of the landfill gas sytem, demolition or removal of structures, any necessary revisions to site security or related systems, and modifications to environmental controls or monitoring systems. The plans and specifications will be used to secure one or more construction contracts to implement the closure.

- Obtain regulatory approval. Notice must be given to GEPA of intent to implement closure construction. The submittal will include a revision of this Closure Plan to document the partial or complete final closure, together with detailed plans, specifications and construction quality assurance plan.

- Closure cap construction. Construction of the final closure cap over the landfill surface will involve placing and grading soil and rock products, installation or modification of landfill gas and leachate management systems, and revisions to the surface water management system. Construction activities will be carried out by one or more contractors, under the supervision of qualified construction quality assurance personnel to ensure conformance to project plans and specifications.

- Removal of structures. Structures not required for support of post-closure maintenance activities will be demolished or removed from the site during the closure construction period. The entrance area structures may be kept in use to support other business activities of the site owner, as well as to provide a base of operations for the post-closure program at LML.

- Closure documentation. Following completion of partial or complete closure construction activities, a final construction quality assurance report will be prepared, certifying that closure has been completed in accordance with the Closure Plan and applicable plans and specifications. The site owner will submit the report to the Guam Environmental Protection Agency in accordance with 22 GAR 23601(h). In addition, the owner of the property will record on the deed to the landfill property a notation that the site has been used as a landfill facility and that its use is restricted, as required under 22 GAR 23601(i).

5.7 Closure Schedule

The closure activities described above will be implemented according to the following conceptual schedule, which will be refined as final closure plans are developed and in accordance with permit or regulatory requirements at the time of closure.

- One year prior to receipt of final waste (or achievement of final grades in areas subject to partial final closure) - Begin preparation of detailed plans and specifications;

- Six months prior to receipt of final waste – Notify GEPA of intent to implement closure activities; submit final closure plan, drawings, specifications and CQA plan;

- One month after receipt of final waste or GEPA approval, whichever is later – Begin procurement of closure construction services and materials;

- Twelve months following beginning construction – Complete all closure construction activities including removal of structures, if applicable;

- Three months following completion of construction – Complete documentation and notification requirements;

6. POST-CLOSURE PLAN

6.1 Post-Closure Responsibility

The owner of the facility has ultimate responsibility for post-closure care of LML. Owner's representatives responsible for implementation of this plan are (to be completed after Owner and operator are known and contractual relationships relative to closure/post-closure are defined):

Title	Name	Address	Telephone / E-mail
Site Supervisor	TBD	TBD	TBD
Engineer	TBD	TBD	TBD
Other (TBD)	TBD	TBD	TBD

The names, addresses and telephone numbers of individuals responsible for LML post-closure activities will be maintained in the site's operating records and updated in this Post-Closure Maintenance Plan whenever it changes after the post-closure period begins. Landfill employees not listed in the plan will be trained and directed to note any issues or problems affecting the integrity of site features during the post-closure period, and notify responsible individuals.

6.2 Post-Closure Period

The minimum period for which post-closure maintenance activities are required is 30 years from the date a partial final closure phase or complete final closure is certified as complete. This period may be extended by GEPA if the landfill continues to present a potential threat to health or the environment after 30 years.

6.3 Post Closure Uses

It is anticipated the site will remain as restricted open space with no public access permitted during the post-closure period. The existing entrance area may be maintained as a business center for the site owner. Any other private activity permitted on the site would be closely controlled and restricted to prevent any interference with or damage to critical facilities such as the landfill gas or leachate management systems, monitoring systems, closure cap and surface water management facilities.

6.4 Records and Reporting During Post-Closure Period

Results and records of all inspections, monitoring and maintenance activities will be maintained in the Owner's records for a minimum of five years. It is anticipated that GEPA will specify requirements for recording and reporting results of inspections, monitoring and maintenance activities during the post-closure period. These

requirements will be incorporated into this Plan and implemented throughout the post-closure period.

6.5 Monitoring and Maintenance Activities

This section describes the specific activities to be conducted during the post-closure period in conformance with 22 GAR 23602, including:

- Inspection and maintenance of the final cover
- Operation and maintenance of leachate collection and removal systems
- Operation and maintenance of the LFG management system
- Inspection and maintenance of surface water management systems
- Inspection and maintenance of security systems
- Ground water monitoring
- Landfill gas monitoring and
- Settlement monitoring including maintenance of settlement monuments

6.5.1 Final Cover Maintenance

The following scheduled activities will be conducted throughout the post-closure period to ensure the integrity of final cover systems.

- Semi-annual inspection and maintenance. Inspections during March/April and September/October will identify any areas of eroded cover or other damage, and repairs will be made by adding soil or rock, grading or other activities as required. All storm water conveyances and structures will be inspected, cleaned of sediment and repaired as needed. Areas with failing vegetation will be reworked and reseeded as needed. Repairs will be made using materials and methods consistent with those used during initial closure construction, and will be performed under construction quality assurance protocols comparable to those in effect during initial construction. Any alternative methods of repair will be submitted to and approved by GEPA prior to implementation.

- As-needed inspections and repairs. Unscheduled inspections will be made following any unusual events with potential to cause excessive erosion or damage to the final cover systems. Such events would include extreme rainstorms, typhoons or earthquakes. Any damage discovered during the inspection will be repaired on a timely basis. Repairs will be made using materials and methods consistent with those used during initial closure construction, and will be performed under construction quality assurance protocols comparable to those in effect during initial construction. Any alternative methods of repair will be submitted to and approved by GEPA prior to implementation.

- Settlement surveys. Immediately after completion of final closure construction and at minimum five-year intervals thereafter, the site topography will be surveyed and mapped. The maps will be reviewed to identify any areas where differential settlement may create flat spots that could cause surface water to pond or otherwise collect on the surface. Any areas so identified will be repaired at the next semi-annual inspection and maintenance event.

  Areas where partial final closures have been implemented should be surveyed annually along with the active landfill as part of the ongoing airspace and soil management program. Maintenance of partial final closed areas to maintain acceptable drainage should be made during the next semi-annual inspection and maintenance event following the survey.

6.5.2 Leachate Collection and Removal System

Sumps in the leachate collection and removal system (LCRS) will be monitored and pumped on a regularly scheduled basis, at a frequency depending on the rate of leachate production at the site during the post-closure period. Leachate will be removed as needed to prevent a depth of leachate above the liner in excess of 30 centimeters (12 inches).

Operation and maintenance of the leachate system during the post-closure period s expected to include the following elements:

Daily Requirements:

Weekly Requirements

- Visual inspection of leachate risers and pumps
- Measure and record depth of leachate in leachate collection sumps
- Measure and record the volume of liquid in leachate storage tanks.
- Inspect leachate storage tanks and piping for any leakage. Clean up any spills or leakage, and call immediately for repairs of any leakage or damage.

Monthly Requirements

- Record leachate pumped quantities as measured by in-line flow meters between sumps and storage tanks, or by other methods.
- Exercise the sump pumps to verify operation
- Check high level alarms in sumps and tanks by activating them manually
- Record volumes of leachate transferred to the leachate pipeline

Unscheduled inspections will be conducted following major unusual events such as a typhoon or other major storm, or a large earthquake.

In the event of a leachate pump failure, the site will maintain at all times a spare backup pump.

Leachate will be transferred to the Inarajan wastewater treatment facility using the pipeline to be constructed as part of initial landfill development. The volume of leachate being managed is expected to decrease significantly after construction of the closure cap. It will continue to decrease during the post-closure period as organic matter in the MSW degrades and is converted to carbon dioxide and methane.

6.5.3 Landfill Gas Management System

Depending on the type of final control device (flare, energy recovery system, etc.) installed at LML, the landfill gas system will require frequent operational and maintenance attention. The following activities are typically required:

Daily to weekly frequency:

- Monitor the performance of the flare or other final control device; maintain or repair as needed.

Weekly to monthly frequency:

- Visual inspection of aboveground pipe and fittings to detect and repair any significant leaks or damage.
- Check liquid levels in condensate sumps, pump and dispose of condensate by combining with leachate being pumped to the Inarajan treatment plan, or by thermal destruction in the flare.

Quarterly frequency:

- Check wellfield and adjust vacuum and flows in wells and header pipes as needed to maintain optimum gas quality in each well (approximately 50% methane, with minimal oxygen content).

Semi-annual or annual frequency:

- Scheduled major preventive maintenance of flare or other final control device, according to manufacturer's recommendations.

Unscheduled inspections will be conducted following major unusual events such as a typhoon or other major storm, or a large earthquake.

Condensate management will be an ongoing operation throughout the post-closure period. Condensate will be pumped or drained by gravity to a storage tank, and be disposed of by one or a combination of two alternative methods. It may be piped to the

Inarajan wastewater treatment facility along with leachate. Alternatively, condensate may be thermally destructed by injecting it into the flare at a controlled rate. Detailed procedures for condensate management during the post-closure period will be developed after installation of the LFG system and determination of actual gas and condensate production volumes.

6.5.4 Ground Water and Gas Monitoring

Current programs for monitoring of groundwater and landfill gas migration, as described in Section 4 above, will be continued throughout the post-closure period. Landfill gas and groundwater will both be monitored on a semi-annual basis. Surface emissions monitoring for landfill gas will be conducted as required by future air pollution permits associated with the gas collection and control system.

7. FINANCIAL ASSURANCE

7.1 Applicable Requirements

This section responds to the requirements of 22 GAR 23602 and 23601 requiring the landfill operator to provide financial assurance for the cost of hiring a third party to close and provide post-closure care for the site at any time in its operational life.

7.2 Closure Cost Estimate

The estimated total cost for closure of the entire landfill footprint (127.4 acres), including a 20% contingency factor, is $ $24,000,405. The cost estimate, evaluated in 2009 dollars, is summarized in Table 7-1.

Appendix A contains the detailed assumptions and computations. Appendix A breaks down closure costs into two cost categories: (1) fixed costs; and (2) per-acre variable costs. The fixed and variable cost data are used to estimate the incremental costs of closing areas smaller than the entire 127.4-acre footprint. The estimated costs are in 2009 dollars, and will be adjusted annually for inflation as provided in 22 GAR 23702(a)(2).

7.3 Post-Closure Care Cost Estimate

The estimated total cost for post-closure care and maintenance of the 127.4-acre landfill is $464,433 per year, as shown in Table 7-1. The total for 30 years of post-closure care is $13,932,996. Post-closure care costs are assumed to be independent of the area of the site closed. Appendix A contains the detailed assumptions and computations. The estimated costs are in 2009 dollars, and will be adjusted annually for inflation as provided in 22 GAR 23703(a)(2).

7.4 Incremental Financial Assurance Mechanism

Funding for closure and post-closure care activities at LML will be provided by the facility operator using one of the mechanisms provided in 22 GAR 23705. The amount of financial assurance to be provided will be based on the area of landfill constructed, and will increase from time to time as discussed below.

The total estimated cost of closure and 30 years of post closure care for 127.4 acres of landfill is $37,933,401 in 2009 dollars. However, the landfill will be developed, filled and closed in stages, so that 127.4 acres will never be open and subject to potential closure at any time. Figure 2 shows the general arrangement of the 11 disposal cells into which the 127.4 acre waste footprint is divided. The appropriate level of financial assurance at any one time should be based on the estimated closure and post-closure costs of the area constructed to date. Table 7-2 contains the estimated costs, based on the analysis in Appendix A, for the landfill as each cell is added. The data in Table 7-2

would be adjusted after each incremental closure stage to account for the acreage already closed.

Prior to opening of the landfill, LML will provide financial assurance in the amount of $18,202,718, the estimated closure and post-closure cost for Cells 1 and 2 in 2009 dollars, escalated to 2010 dollars. Thereafter, the financial assurance amount will be revised as each subsequent disposal cell (Cell 3 through Cell 11) is added to the waste footprint, based on Table 7-2 as adjusted for inflation. The revision will be made within 6 months of placement of waste in any part of a new cell, and will be based on the area of the entire cell as shown in Figure 2, regardless of whether all or only part of the cell has been constructed.

7.5 Phased Closure Considerations

As indicated in Section 5.4, the site will most likely be closed in three phases, with the first phase consisting of closing Cells 1-4 after Cell 7 is placed in service. The required financial assurance amount after completion of the first closure phase would be computed based on the following elements:

- Closure cost for Cells 5-7; and
- 30 years post-closure care for Cells 1-7

In subsequent years, the amount would be decreased by the amount of one-year's variable post-closure for Cells 1-4, and increased by the annual inflation factor prevalent at that time. At the subsequent time when Cell 8 is constructed, the amount would be increased by the closure and 30-year post-closure costs for Cell 8.

The second phase of closure would result in a similar adjustment in the financial assurance amount.

TABLE 7-1
LAYON MUNICIPAL LANDFILL
CLOSURE / POST-CLOSURE COSTS

SUMMARY
TOTAL SITE AREA - 127.4 ACRES

Closure

Final Cover Including Revegetation	$	17,990,918
Landfill Gas Monitoring & Control	$	250,000
Groundwater Monitoring Installation	$	-
Drainage Installation	$	200,000
Security Installation	$	-
Removal of Structures	$	50,000
Engineering and Construction Quality Assurance	$	2,736,138
Subtotal Closure	$	21,227,055
Subtotal x 20% Contingency Costs	$	4,245,411
Total Closure Cost	**$**	**25,472,466**

Post-Closure Monitoring and Maintenance - Annual Cost

Final Cover Maintenance	$	120,219
Leachate Management	$	68,600
Gas Management	$	173,815
Monitoring	$	85,800
Drainage	$	10,000
Security	$	1,000
Inspection	$	5,000
Subtotal - Annual Monitoring and Maintenance	$	464,433
Subtotal x 30 years	**$**	**13,932,996**
Total Closure and 30 Years Post-Closure Cost	**$**	**39,405,462**

TABLE 7-2
LAYON MUNICIPAL LANDFILL
INCREMENTAL FINANCIAL ASSURANCE AMOUNTS

Cells Constructed	Cumulative Lined Area (acres)	Variable Cost (2009 dollars)	Total Cost (2009 dollars)
1	11.10	$ 2,167,067	$ 16,700,063
1 - 2	22.40	$ 4,373,181	$ 18,906,176
1 - 3	32.20	$ 6,286,448	$ 20,819,443
1 - 4	42.20	$ 8,238,760	$ 22,771,756
1 - 5	55.50	$ 10,835,337	$ 25,368,332
1 - 6	67.30	$ 13,139,066	$ 27,672,061
1 - 7	83.40	$ 16,282,290	$ 30,815,285
1 - 8	97.60	$ 19,054,574	$ 33,587,569
1 - 9	106.30	$ 20,753,086	$ 35,286,082
1 - 10	115.20	$ 22,490,645	$ 37,023,640
1 - 11	127.40	$ 24,872,466	$ 39,405,462

Cost Basis

Variable Closure Costs	per acre	$ 195,231
Fixed Closure Costs		
Closure		$ 600,000
Post-closure (30 years)		$ 13,932,996
Total Fixed Costs		$ 14,652,996

FIGURES

1. Site Map and Existing Topography
2. Final Grade Contours
3. Liner Details
4. Typical Subdrain Plan
5. Subdrain Details
6. Sump and LCRS Riser Details
7. Entrance Area Plan
8. Groundwater Monitoring Plan
9. Landfill Gas Monitoring Plan
10. Final Cover Details

APPENDIX A

Cost Estimates