CLOSURE AND POST-CLOSURE PLAN

RIVERBEND LANDFILL
MCMINNVILLE, OREGON

MARCH 2013
REVISED MARCH 2014

PREPARED FOR

RIVERBEND LANDFILL COMPANY, INC.

13469 SW HIGHWAY 18
MCMINNVILLE, OREGON 97128

PREPARED BY

VISTA CONSULTANTS, LLC
4132 SW BARBUR BOULEVARD
PORTLAND, OREGON 97239

REVISION 1 PREPARED BY

HDR ENGINEERING
601 UNION STREET, SUITE 700
SEATTLE, WA 98101

PLAN CERTIFICATION

The material and data contained in this report were prepared under the supervision and direction of the undersigned. To the best of my knowledge, the cost estimates contained herein are complete and accurate.

Roger B. North, P.E.
Vista Consultants, LLC

REGISTERED PROFESSIONAL ENGINEER
19008
OREGON
MARCH 17, 1987
ROGER BARRINGTON NORTH
EXPIRES: 12/31/14

Revision 1.0 PLAN CERTIFICATION

The material and data contained in Revision 1.0 were prepared under the supervision and direction of the undersigned. To the best of my knowledge, the cost estimates contained herein are complete and accurate.

REGISTERED PROFESSIONAL ENGINEER
61160PE
OREGON
JULY 9 2002
SHELLEY D. RICHARDS
RENEWAL DATE DECEMBER 31 2014

Shelley D. Richards, P.E.
HDR Engineering

TABLE OF CONTENTS

1 INTRODUCTION 1-1

1.1 BACKGROUND 1-1

1.2 JUSTIFICATION FOR PREPARING SUBTITLE D PLANS 1-2

1.3 FINANCIAL ASSURANCE REQUIREMENTS 1-3

1.3.1 FEDERAL REQUIREMENTS FOR CLOSURE 1-3

1.3.2 FEDERAL REQUIREMENTS FOR POST-CLOSURE CARE 1-4

1.3.3 OREGON SPECIFIC REQUIREMENTS FOR CLOSURE AND POST-CLOSURE CARE 1-4

1.3.4 2013 UPDATE 1-6

1.4 PLAN ORGANIZATION 1-7

2 CLOSURE PLAN 2-1

2.1 CLOSURE REQUIREMENTS 2-1

2.1.1 FEDERAL REQUIREMENTS 2-1

2.1.2 OREGON-SPECIFIC REQUIREMENTS 2-1

2.2 CLOSURE COMPONENTS 2-2

2.2.1 FINAL GRADING 2-3

2.2.2 FINAL COVER COMPONENTS 2-3

2.2.3 LANDFILL GAS SYSTEM COMPONENTS 2-3

2.2.4 STORMWATER MANAGEMENT SYSTEM COMPONENTS 2-4

2.3 LARGEST AREA REQUIRING CLOSURE 2-4

2.4 MAXIMUM INVENTORY OF WASTE 2-4

2.5 CLOSURE COST ESTIMATE 2-4

2.6 SCHEDULE OF CLOSURE ACTIVITIES 2-5

3 POST-CLOSURE PLAN 3-1

3.1 POST-CLOSURE PLAN REQUIREMENTS 3-1

3.1.1 FEDERAL REQUIREMENTS 3-1

3.1.2 OREGON-SPECIFIC REQUIREMENTS 3-1

3.2 POST-CLOSURE ACTIVITIES 3-2

3.2.1 OPERATIONS, MAINTENANCE AND ADMINISTRATIVE REQUIREMENTS 3-3

3.2.2 GROUNDWATER AND STORMWATER MONITORING 3-3

3.2.3 LEACHATE COLLECTION, TREATMENT, AND DISPOSAL 3-3

3.2.4 GAS COLLECTION AND CONTROL SYSTEM 3-4
3.3 POST-CLOSURE COST ESTIMATE 3-4
3.4 USE OF THE LAND DURING THE POST-CLOSURE CARE PERIOD 3-5
3.5 CONTACT INFORMATION 3-5
4 FINANCIAL ASSURANCE MECHANISM 4-1
4.1 ALLOWABLE FINANCIAL ASSURANCE MECHANISMS 4-1
4.2 SELECTED FINANCIAL ASSURANCE MECHANISMS 4-1
4.2.1 FEDERAL REQUIREMENTS: 4-1
4.2.2 OREGON SPECIFIC REQUIREMENTS 4-4
4.3 DOCUMENTATION OF FINANCIAL ASSURANCE 4-6
5 REFERENCES 5-1

APPENDIX A - WORST-CASE CLOSURE DRAWING

APPENDIX B - CLOSURE AND POST-CLOSURE COST ESTIMATES

ACRONYMS AND ABBREVIATIONS

CE	Cost estimate
CFR	Code of Federal Regulations
cm/sec	Centimeters per second
CPCP	Closure and Post-Closure Plans
CV	Current value
CY	Cubic yard(s)
DEQ	Oregon Department of Environmental Quality
GCCS	Gas collection and control system
HDR	HDR Engineering, Inc.
IPD	Implicit Price Deflator
LFG	Landfill gas
MSWLF	Municipal solid waste landfill
OAR	Oregon Administrative Rules
ORS	Oregon Revised Statutes
P.E.	Professional Engineer
RB	Required trust fund balance
RLC	Riverbend Landfill Company, Inc.
RLF	Riverbend Landfill
§	Section
SWDP	Solid Waste Disposal Permit
VISTA	Vista Consultants, LLC
WM	Waste Management, Inc.
Y	Year(s)

1 INTRODUCTION

1.1 BACKGROUND

Riverbend Landfill (RLF) is located at 13469 S.W. Highway 18, McMinnville, in Yamhill County, Oregon, and is owned and operated by the Riverbend Landfill Company, Inc. (RLC), an operating subsidiary of Waste Management, Inc. (WM). RLF is a municipal solid waste landfill (MSWLF) that is regulated by the Oregon Department of Environmental Quality (DEQ) under the Code of Federal Regulations (CFR) Chapter 40, Section 258 (Criteria for Municipal Solid Waste Landfills), Oregon Revised Statutes (ORS) 459 (Solid Waste Management), and Oregon Administrative Rules (OAR) 340-94 (Solid Waste: Municipal Solid Waste Landfills). DEQ issued RLC (the permittee) solid waste disposal permit (SWDP) number 345 for RLF on December 1, 1999. This permit has been administratively extended by DEQ in compliance with OAR 340-093 0070(6)(b)(C) since its expiry date of December 1, 2009. Addendum No. 4 to SWDP 345 was issued on December 12, 2012.

Vista Consultants, LLC (VISTA) prepared the 2013 Closure and Post-Closure Plans (CPCP) for RLF. The CPCP has been revised to reflect 2014 updates by HDR Engineering, Inc. (HDR). This CPCP has been prepared to comply with the requirements for closure and post-closure activities and associated financial assurance criteria specified in ORS 459.272 and OAR 340-94-100 through 145.

ORS 459.272 (Evidence of financial assurance for land disposal site) requires:

> *(3) The owner or operator of a land disposal site shall annually review and update the financial assurance for closure, post-closure and corrective action required under this section and cost estimates of the amount of financial assurance necessary.*

Specifically, OAR 340-94-140(6)(e) requires the permittee to update the CPCP annually, as follows:

> *(e) Annual update. The permittee shall annually review and update the financial assurance during the operating life and post-closure care period, or until the corrective action is completed, as applicable.*
>
> > *(A) The annual review shall include:*
> >
> > > *(i) An adjustment to the cost estimate(s) for inflation and, if used, in the discount rate as specified in subsection (4)(a) of this rule;*
> > >
> > > *(ii) A review of the closure, post-closure care and corrective action (if required) plans and facility conditions to assess whether any changes have occurred which would increase or decrease the estimated maximum costs of closure, post-closure care or corrective action since the previous review;*
> > >
> > > *(iii) If a trust fund or other pay-in financial mechanism is being used, an accounting of amounts deposited and expenses drawn from the fund, as well as its current balance.*

(B) The financial assurance mechanism(s) shall be increased or may be reduced to take into consideration any adjustments in cost estimates identified in the annual review;

(C) The annual update shall consist of a certification from the permittee submitted to the Department and placed in the facility operating record. The certification shall state that the financial assurance plan(s) and financial assurance mechanism(s) have been reviewed, updated and found adequate, and that the updated documents have been placed in the facility operating record. If a discount rate is used to estimate costs, the annual update shall include the certifications in subsection (6)(d) of this rule. The annual update shall be no later than:

(i) The facility's annual review date; or

(ii) For a facility operating under a closure permit, by the date specified in OAR 340-094-0100(3).

And, OAR 340-94-140(6)(d) requires:

(d) If a permittee uses a discount rate to estimate costs pursuant to subsection (4)(a) of this rule, the permittee shall prospectively for each year the discount rate is used:

(A) Certify to the Director that the landfill closure date is certain and there are no foreseeable factors that will change the estimate of site life; and

(B) Submit a certification to the Director from a Registered Professional Engineer stating the cost estimates are complete and accurate.

The SWDP requires that the annual review be performed by April 8th each year. This report provides the 2013 review and update of the CPCP and associated cost estimates.

1.2 JUSTIFICATION FOR PREPARING SUBTITLE D PLANS

OAR 340-94-110(1) and OAR 340-94-115(1) establish two different categories of closure and post-closure plans:

1. **Subtitle D ("worst-case") closure and post-closure plans.** These are based on a hypothetical worst-case scenario for closure and post-closure costs. This worst-case scenario is intended to establish a conservative basis for estimating financial assurance funding requirements, and subsequently, a Final Engineered Site Closure Plan, as required by OAR 340-094-0100(2)(a), which shall include all the elements of and replace the "worst-case" closure plan.
2. **Final engineered closure and post-closure plans.** These are linked to a closure permit, which must be obtained at least five years prior to anticipated final closure, or at a date specified in the permittee's closure permit pursuant to OAR 340-094-0100(2)(a). The final engineered plans must reflect the intended closure design and will replace the Subtitle D ("worst case") plans.

Final closure of RLF is not anticipated to take place in the next five years, based on the following:

- RLC received an expansion on May 30, 2013 for the RLF which increased the site's permitted airspace by 984,086 cy and as of April 1, 2014 the site has approximately 2 years of remaining capacity based on a future disposal rate of 510,000 tons per year;
- RLC is in the process of developing and seeking DEQ approval to increase the capacity of the landfill within the existing permitted footprint to provide approximately 2 to 3 years of additional capacity; and
- RLC is in the process of permitting a lateral expansion to the existing permitted footprint, which will provide an additional 8 to 10 years of capacity.

Therefore, since it is anticipated that more than five years of capacity remain, Subtitle D ("worst case") CPCP is appropriate at this time.

Consistent with the above, the current worst-case closure scenario is shown on Drawing 1, **Appendix A.** The drawing shows that approximately 25.2 acres of the total developed landfill area of 85.0 acres have been closed over the south, east and north sides of the landfill. The remaining developed area that would require closure under a worst-case scenario is approximately 59.8 acres.

1.3 FINANCIAL ASSURANCE REQUIREMENTS

1.3.1 FEDERAL REQUIREMENTS FOR CLOSURE

Federal closure requirements are contained in 40 CFR 258.71:

(a) The owner or operator must have a detailed written estimate, in current dollars, of the cost of hiring a third party to close the largest area of all MSWLF units ever requiring a final cover as required under §258.60 at any time during the active life in accordance with the closure plan. The owner or operator must notify the State Director that the estimate has been placed in the operating record.

(1) The cost estimate must equal the cost of closing the largest area of all MSWLF units ever requiring a final cover at any time during the active life when the extent and manner of its operation would make closure the most expensive, as indicated by its closure plan (see §258.60(c)(2) of this part).

(2) During the active life of the MSWLF unit, the owner or operator must annually adjust the post-closure cost estimate for inflation.

(3) The owner or operator must increase the closure care cost estimate and the amount of

financial assurance provided under paragraph (b) of this section if changes to the closure plan or MSWLF unit conditions increase the maximum cost of closure at any time during the remaining active life.

(4) The owner or operator may reduce the closure cost estimate and the amount of financial assurance provided under paragraph (b) of this section if the cost estimate exceeds the maximum cost of closure care remaining ot any time during the remaining active life of the MSWLF unit. The owner or operator must notify the State Director that the justification for the reduction of the closure cost estimate and the amount of financial assurance has been placed in the operating record.

1.3.2 FEDERAL REQUIREMENTS FOR POST-CLOSURE CARE

Federal financial assurance requirements for post-closure care are specified in 40 CFR 258.72, as follows:

(a) The owner or operator must have a detailed written estimate, in current dollars, of the cost of hiring a third party to conduct post-closure care for the MSWLF unit in compliance with the post-closure plan developed under §258.61 of this part. The post-closure cost estimate used to demonstrate financial assurance in paragraph (b) of this section must account for the total costs of conducting post-closure care, including annual and periodic costs as described in the post-closure plan over the entire post-closure care period. The owner or operator must notify the State Director that the estimate has been placed in the operating record.

(1) The cost estimate for post-closure care must be based on the most expensive costs of post-closure core during the post-closure care period.

(2) During the active life of the MSWLF unit and during the post-closure care period, the owner or operator must annually adjust the post-closure cost estimate for inflation.

(3) The owner or operator must increase the post-closure care cost estimate and the amount of financial assurance provided under paragraph (b) of this section if changes in the post-closure plan or MSWLF unit conditions increase the maximum costs of post-closure care.

(4) The owner or operator may reduce the post-closure cost estimate and the amount of financial assurance provided under paragraph (b) of this section if the cost estimate exceeds the maximum costs of post-closure care remaining over the post-closure care period. The owner or operator must notify the State Director that the justification for the reduction of the post-closure cost estimate and the amount of financial assurance has been placed in the operating record.

1.3.3 OREGON SPECIFIC REQUIREMENTS FOR CLOSURE AND POST-CLOSURE CARE

Oregon adopts the federal requirements described above, and has additional Financial Assurance Criteria in OAR 340-94-140:

(1) Financial Assurance Required. The owner or operator af a municipal solid waste landfill shall maintain a financial assurance plan with detailed written cost estimates of the amount of financial assurance that is necessary and shall provide evidence of financial assurance for the costs of:

(a) Closure of the municipal solid waste landfill;

(b) Post-closure maintenance of the municipal solid waste landfill; and

(c) Any corrective action required by the Department to be taken at the municipal solid waste landfill, pursuant to OAR 340-094-0080(3).

(4) Financial assurance plans. The financial assurance plan is a vehicle for determining the amount of financial assurance necessary and demonstrating that financial assurance is being provided. A financial assurance plan shall include but not be limited to the following, as applicable:

(a) Cost Estimates. A detailed written estimate of the third-party costs in current dollars according to the provisions of 40 CFR, §258.75. A landfill owner or operator meeting the criteria in 40 CFR §258.75 (a) through (c) may estimate the current dollar cost using a discount rate no greater than the Department's current reference rate. The Department shall determine the reference rate annually during the month of June. It shall be in effect for the fiscal year beginning on the first day of July immediately following the determination date and ending on June 30 of the following calendar year. (The reference rate shall be based on the current yield of composite long-term U.S. Treasury Bonds as published in the Federal Reserve's H.15 (519) Selected Interest Rates for the first full week of the month in which the reference rate is determined, less the annualized Gross Domestic Product implicit price deflator as published in the most recent U.S. Bureau of Economic Analysis Survey of Current Business). The written estimate shall be prepared by a Registered Professional Engineer and shall include costs of:

(A) Closing the municipal solid waste landfill;

(B) Providing post-closure care, including installing, operating and maintaining any environmental cantrol system required an the landfill site;

(C) Performing required corrective action activities; and

(D) Complying with any other requirement the Department may impose as a condition of issuing a closure permit, closing the site, maintaining a closed facility, or implementing corrective action.

(b) The source of the cost estimates;

(c) A detailed description of the form of the financial assurance and a copy of the financial assurance mechanism;

(d) A method and schedule for providing for or accumulating any required amount of funds which may be necessary to meet the financial assurance requirement;

(5) Amount of Financial Assurance Required. The amount of financial assurance required shall be established as follows:

(a) Closure. Detailed cost estimates for closure shall be based on the "worst-case" closure plan or the Final Engineered Site Closure Plan, as applicable. Cost estimates for the Final Engineered Site Closure Plan shall take into consideration at least the following:

(A) Amount and type of solid waste deposited in the site;

(B) Amount and type of buffer from adjacent land and from drinking water sources;

(C) Amount, type, availability and cost of required cover;

(D) Seeding, grading, erosion control and surface water diversion required;

(E) Planned future use of the disposal site property;

(F) The portion of the site property closed before final closure of the entire site; and

(G) Any other conditions imposed on the permit relating to closure of the site.

(b) Post-closure care. Detailed cost estimates for post-closure care shall be based on the "Subtitle D" post-closure plan or the Final Engineered Post-closure Plan, as applicable. Cost estimates for the Final Engineered Post-closure Plan shall also take into consideration at least the following:

(A) Type, duration of use, initial cost and maintenance cost of any active system necessary for controlling or stopping discharges; and

(B) Any other conditions imposed on the permit relating to post-closure care of the site.

(c) Corrective action. Estimated total costs of required corrective action activities for the entire corrective action period, as described in a corrective action report pursuant to requirements of OAR 340-094-0080(3) and 40 CFR, §258. 73;

(d) If a permittee is responsible for providing financial assurance for closure, post-closure care and/or corrective action activities at more than one municipal solid waste landfill, the amount of financial assurance required is equal to the sum of all cost estimates for each activity at each facility.

1.3.4 2013 UPDATE

As noted above, DEQ permits cost estimates to be computed based on the prior year costs adjusted using a quotient derived from Implicit Price Deflator (IPD) values. IPD values are published by the Department of Commerce, Bureau of Economic Analysis on a quarterly basis. The IPD values relevant to

this report are presented in **Attachment 1 of Appendix B**, and are as follows:

- IPD for January 2013 (i.e., 4th quarter 2012), the date of the prior cost estimate = 105.667;
- IPD for January 2014 (i.e., 4th quarter 2013), the date of this cost estimate = 107.121; and
- The resulting quotient = 107.121 / 105.667 = 1.0138.

Unless otherwise noted, the estimated 2014 closure and post-closure costs presented in **Sections 2.5 and 3.3** and contained in the tables in **Appendix B**, are based on adjusting the 2013 values (VISTA, 2013) by this quotient.

In 2012 and 2013, WM hauled leachate off-site for treatment and disposal. It is assumed that this will continue under closure and post-closure conditions. The volume of leachate that will be generated will decrease over time following closure and the installation of a geomembrane based cover system over the entire landfill. To develop appropriate post-closure costs for leachate management and treatment, HDR used the leachate quantities estimated by VISTA for the 2013 CPCP (**Attachment 1 of Appendix B**).

1.4 PLAN ORGANIZATION

RLF has not reached the point in its operational life requiring the final engineered closure and post-closure plans to be prepared, since it has more than five years of anticipated remaining capacity (**Section 1.2**). Furthermore the site is not subject to any form of corrective action. Therefore, the remainder of this plan presents those elements associated with the required Subtitle D ("worst case") plans.

Section 2 presents closure requirements, the Subtitle D Closure Plan, and the estimated "worst case" closure costs;

Section 3 presents post-closure requirements, the Subtitle D Post-Closure Plan, and the estimate of the "worst case" post-closure costs; and

Section 4 presents details of allowable financial assurance mechanisms to fund the worst case closure and post-closure costs, and the corresponding mechanisms selected by RLC.

2 CLOSURE PLAN

2.1 CLOSURE REQUIREMENTS

2.1.1 FEDERAL REQUIREMENTS

Federal closure requirements are contained in 40 CFR 258.60(a)-(b):

(a) Owners or operators of all MSWLF units must install a final cover system that is designed to minimize infiltration and erosion. The final cover system must be designed and constructed to:

(1) Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present, or a permeability no greater than 1 x 10^{-5}cm/sec, whichever is less, and

(2) Minimize infiltration through the closed MSWLF by the use of an infiltration layer that contains a minimum 18-inches of earthen material, and

(3) Minimize erosion of the final cover by the use of an erosion layer that contains a minimum 6-inches of earthen material that is capable of sustaining native plant growth.

(b) The Director of an approved State may approve an alternative final cover design.

2.1.2 OREGON-SPECIFIC REQUIREMENTS

Oregon adopts the above federal requirements, and has additional closure requirements in OAR 34-94-0110(2):

(2) Requirements for closure plans. A closure plan shall specify the procedures necessary to completely close the municipal solid waste landfill at the end of its intended operating life.

(a) Requirements for the "worst-case" closure plan shall include all elements specified in 40 CFR §258.60, and consist of at least the following:

(A) A description of the steps necessary to close all municipal solid waste landfill units at any point during their active life;

(B) A description of the final cover system that is designed to minimize infiltration and erosion;

(C) An estimate of the largest area of the municipal solid waste landfill unit ever requiring a final cover;

(D) An estimate of the maximum inventory of wastes ever on-site over the active life of the landfill facility; and

(E) A schedule for completing all activities necessary to satisfy the closure criteria in 40 CFR §258.60.

And in OAR 340-94-0120(2):

(2) Unless otherwise approved or required in writing by the Department, no person shall permanently close or abandon a municipal solid waste landfill, except in the following manner:

(a) All areas containing solid waste not already closed in a manner approved by the Department shall be covered with at least three feet of compacted soil of a type approved by the Department graded to a minimum two percent and maximum 30 percent slope unless the Department authorizes a lesser depth or an alternative final cover design. In applying this standard, the Department will consider the potential for adverse impact from the disposal site on public health, safety or the environment, and the ability for the permittee to generate the funds necessary to comply with this standard before the disposal site closes. A permittee may request that the Department approve a lesser depth of cover material or an alternative final cover design based on the type of waste, climate, geological setting, degree of environmental impact;

(b) Final cover material shall be applied to each portion of a municipal solid waste landfill within 60 days after said portion reaches approved maximum fill elevation, except in the event of inclement weather, in which case final cover shall be applied as soon as practicable;

(c) The finished surface of the closed areas shall consist of soils of a type or types consistent with the planned future use and approved by the Department. Unless otherwise approved by the Department, a vegetative cover of native grasses shall be promptly established over the finished surface of the closed site;

(d) All surface water must be diverted around the area of the disposal site used for waste disposal or in some other way prevented from contacting the waste material;

(e) All systems required by the Department to control or contain discharges to the environment must be completed and operational.

2.2 CLOSURE COMPONENTS

The anticipated closure design for the remainder of the landfill is based on the most recently approved and constructed closure areas. Under the "worst case" scenario the same components and concepts would be used.

Key components of the closure design are described in the subsections below and the worst-case closure area is shown on **Drawing 1** in **Appendix A**. The design satisfies the federal and state requirements presented in **Section 2.1** above; in doing so the closure design is intended to minimize the need for ongoing maintenance, minimize potential landfill gas (LFG) and leachate generation, ensure

that environmental protection systems continue to function as intended, and to prepare the site for long-term care during the post-closure period.

2.2.1 FINAL GRADING

In conformance with the final cover design, prior to constructing the final cover the landfill surface will be graded to:

- A maximum slope of 4 horizontally (H) to 1 vertically (V); and
- A minimum slope of 5 percent.

The existing access road, which has been constructed above the previously closed area, will be continued into the required closure areas to provide post closure access.

2.2.2 FINAL COVER COMPONENTS

The final cover consists of the following major components, in order from bottom to top:

- **Foundation Soil Layer:** a 12-inch thick foundation soil layer with an in-place hydraulic conductivity (permeability) equal to or less than 1 x 10^{-5} cm/sec, placed on top of the 6-inch thick layer of daily cover, for a total of 18 inches of foundation soil (the 18-inch thick intermediate soil cover layer placed by RLC during landfill operations has satisfied the requirements for this layer in closed areas and may be satisfactory for future closure areas);
- **Geomembrane Barrier:** a 60-mil thick polyethylene geomembrane with ridges on one side and studs on the other; manufactured by Agru America;
- **Geosynthetic Drainage Layer:** a geotextile placed over the studded surface of the geomembrane creates a drainage channel between the geomembrane and the geotextile;
- **Drainage Layer Piping:** collection pipes placed in or on the drainage layer to reduce seepage forces in the final cover soils and maintain cover system stability;
- **Vegetative Soil Layer:** an 18-inch thick soil layer, the top 6 inches of which is capable of supporting vegetation; and
- **Vegetation:** grasses planted on the cover.

2.2.3 LANDFILL GAS SYSTEM COMPONENTS

The LFG collection and control system (GCCS) components will consist of the following:

- Vertical (and possibly horizontal) LFG collection wells;
- Well-head assemblies to permit the conditions at each LFG collection well to be monitored (well pressure, and LFG quality and quantity) and the LFG flow rate to be controlled;

- LFG laterals connecting the LFG collection wells and well head assemblies to the main LFG headers;
- LFG headers connecting the laterals to the flare station;
- LFG flare station; and
- Condensate collection and control system.

Most components of the GCCS have been progressively designed and constructed during the operation of the landfill. The components required for a "worst case" closure include:

- LFG collection wells;
- Well-head assemblies; and
- LFG laterals.

2.2.4 STORMWATER MANAGEMENT SYSTEM COMPONENTS

Stormwater management components required for additional areas of final cover include the following:

- Ditches, lined with grass, rock or geosynthetics, located on, or around the perimeter of, the final cover, including drainage control berms associated with the ditch system;
- Concrete-block lined conveyance chutes constructed on the final cover surface; and
- Erosion control seeding.

2.3 LARGEST AREA REQUIRING CLOSURE

As presented in **Section 1.2**, the largest area requiring final cover (i.e., "worst-case" closure scenario) is the current condition, which would require approximately 59.8 acres of closure.

2.4 MAXIMUM INVENTORY OF WASTE

Disposal records (aerial surveys and historical records, updated by WM in February 2013) indicate that approximately 8,028,088 cy of waste have been disposed at RLF as of February 15, 2013, and the estimated remaining available constructed capacity airspace as of February 15, 2013 is approximately 387,790 cy (see also **Section 1.2**).

2.5 CLOSURE COST ESTIMATE

Closure components discussed above are itemized in the "worst case" closure cost estimate presented in **Appendix B**. Individual items are summarized in the following categories:

- Earthwork;

- Geosynthetics;
- Stormwater Management System;
- Temporary and Permanent Erosion Controls;
- Landfill Gas Management System;
- Water Monitoring System;
- Construction Quality Assurance, Engineering, Surveying and Other Professional Services; and
- Miscellaneous.

The following "worst case" assumptions were made, or information used, in development of the closure cost estimate:

- The largest area requiring closure is the 59.8 acres of developed landfill area that have not been closed;
- Unit costs, adjusted for inflation, from previous closure work performed at the site;
- Available third party pricing; and
- Professional engineering judgment of current costs.

The current worst-case closure cost estimate of $8,081,742 is detailed in **Appendix B.** This equates to a cost of approximately $135,146 per acre.

2.6 SCHEDULE OF CLOSURE ACTIVITIES

Pursuant to OAR 340-94-110(2)(a)(A), this section presents a general schedule of activities necessary to close the landfill at any point during its active life.

Preparatory Grading. Under a "worst case" scenario, the configuration of waste may not be compatible with closure design requirements. For example, waste slopes may not be graded flat enough or steep enough to meet closure design requirements relative to surface water drainage, cover stability, waste stability, and anticipated settlements. Therefore, time may be required for placing or regrading waste or soil to an acceptable closure configuration. It is assumed this preparatory grading would take approximately two months.

Preparation of Engineered Closure Plan. A "worst-case" closure would require the preparation of a final engineered closure plan based on the actual conditions at the time of closure. The final engineered closure plan would include design modifications, and construction plans and specifications, and would be submitted to DEQ for review and approval. It is estimated the design review and approval process would take five months.

Contractor Selection. Following DEQ approval of the final engineered closure plan, contract documents, including detailed plans and specifications, would be issued for bid to select a contractor to perform the closure construction. This process of contractor selection and contract execution is expected to take two months.

Closure Construction. Construction will begin following contractor selection and contract execution. However, construction will be weather-dependent because most construction activities can effectively only be performed between June and October. Therefore, depending on the timing of the preceding activities, there could be a discontinuity before construction can start. Construction itself is expected to take five months.

Preparation of Construction Report. After construction, a third-party professional engineer registered in the state of Oregon will prepare a report documenting that closure construction complied with the approved final engineered closure plan. It is estimated approximately six weeks will be required to prepare this report prior to submittal to DEQ for review and approval of the closure.

DEQ Inspection. Pursuant to OAR 340-94-120(4)(b), and within 30 days of receipt of the closure report requesting approval of the closure, DEQ shall inspect the facility to verify that closure has been completed consistent with the approved final engineered closure design and the provisions of OAR 340-93 and -94. If DEQ determines that closure has been properly completed, it will approve the closure in writing; closure will not be considered complete until such approval has been made. The date of the approval notice will also represent the date of commencement of the post-closure period.

3 POST-CLOSURE PLAN

3.1 POST-CLOSURE PLAN REQUIREMENTS

3.1.1 FEDERAL REQUIREMENTS

Federal post-closure plan requirements are specified in 40 CFR 258.61(a)-(c) below:

(a) Following closure of each MSWLF unit, the owner or operator must conduct postclosure care. Post-closure care must be conducted for 30 years, except as provided under paragraph (b) of this section, and consist of at least the following:

(1) Maintaining the integrity and effectiveness of any final cover, including making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, and preventing run-on and run-off from eroding or otherwise damaging the final cover;

(2) Maintaining and operating the leachate collection system in accordance with the requirements in §258.40, if applicable. The Director of an approved State may allow the owner or operator to stop managing leachate if the owner or operator demonstrates that leachate no longer poses a threat to human health and the environment;

(3) Monitoring the ground water in accordance with the requirements of subpart E of this part and maintaining the ground-water monitoring system, if applicable; and

(4) Maintaining and operating the gas monitoring system in accordance with the requirements of §258.23.

(c) The owner or operator of all MSWLF units must prepare a written post-closure plan that includes, at a minimum, the following information:

(1) A description of the monitoring and maintenance activities required in §258.61(a) for each MSWLF unit, and the frequency at which these activities will be performed;

(2) Name, address, and telephone number of the person or office to contact about the facility during the post-closure period; and

(3) A description of the planned uses of the property during the post-closure period. Post-closure use of the property shall not disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the monitoring systems unless necessary to comply with the requirements in this part 258.

3.1.2 OREGON-SPECIFIC REQUIREMENTS

Oregon adopts the federal requirements described above, and has additional post-closure requirements in OAR 340-94-115(3):

(3) Requirements for post-closure plans. Post-closure plans shall identify the postclosure activities which will be carried on to properly monitor and maintain the closed municipal solid waste landfill site:

(a) Requirements for the "Subtitle D" post-closure plan shall include all elements specified in 40 CFR §258.61, and consist of at least the following:

(A) Maintaining the integrity and effectiveness of any final cover;

(B) Maintaining and operating the leachate collection system;

(C) Monitoring the groundwater;

(D) Maintaining and operating the gas monitoring system;

(E) Monitoring and providing security for the landfill site; and

(F) Description of the planned uses of the property during the post-closure care period.

And in OAR 340-94-130(b):

(1) Post-closure requirements:

(a) Upon completion or closure of a landfill, a detailed description of the site including a plat shall be filed with the appropriate county land recording authority by the permittee. The description should include the general types and location of wastes deposited, depth of waste and other information of probable interest to future land owners;

(b) During the post-closure care period, the permittee must, at a minimum:

(A) Maintain the approved final contours and drainage system of the site;

(B) Consistent with final use, ensure that a healthy vegetative cover is established and maintained over the site;

(C) Operate and maintain each leachate and gas collection, removal and treatment system present at the site;

(D) Operate and maintain each groundwater and surface water monitoring system present at the site;

(E) Comply with all conditions of the closure permit issued by the Department.

(2) Post-closure care period. Post-closure care must continue for 30 years after the date of completion of closure of the land disposal site, unless otherwise approved or required by the Department according to OAR 340-094-100(4) and (5).

3.2 POST-CLOSURE ACTIVITIES

The following subsections describe the activities it is assumed will be performed in the post-closure

period to ensure the environmental protection systems continue to function as intended throughout the post-closure period.

3.2.1 Operations, Maintenance and Administrative Requirements

The following general operations, maintenance, and administrative requirements are anticipated:

- Final cover maintenance, including; labor, equipment, and supplies for minor regrading and reseeding and fertilizing;
- Final cover surveying to check settlement and grades;
- General facility and final cover mowing;
- Maintenance of surface water management features;
- Building security, repairs, and demolition;
- Fence and road maintenance;
- Utilities (excluding LFG and leachate equipment);
- Third-party inspections, reports and management;
- Internal administration;
- Insurance; and
- Permitting costs.

3.2.2 Groundwater and Stormwater Monitoring

The following activities associated with groundwater and stormwater monitoring are anticipated:

- Semi-annual groundwater sampling, sample analyses, quality assurance review, statistical evaluation, and reporting;
- Two stormwater sampling events per year at three sampling locations (with sample analyses for E. coli and total suspended solids, quality assurance review, and reporting) and monthly stormwater inspections and documentation;
- Monthly stormwater observations;
- Contingency for the redevelopment of groundwater monitoring wells; <u>and</u>
- Contingency for groundwater monitoring well <u>decommissioning and replacement as needed.</u>

3.2.3 Leachate Collection, Treatment, and Disposal

The leachate collection and removal system is expected to remain active for the entire 30-year post-

closure period. However, leachate production is expected to decrease dramatically during that period of time, particularly in those areas of the landfill constructed with composite liner systems (e.g., Modules 4, 5, 6, 7, and 8). The following general activities associated with the collection, treatment and disposal of leachate and the maintenance and repair of the systems are anticipated:

- Leachate sampling, sample analyses, quality assurance review, and reporting; and
- Leachate hauling for off-site treatment and disposal at publically owned treatment works (POTW).

3.2.4 GAS COLLECTION AND CONTROL SYSTEM

WM has constructed a landfill gas to energy facility at RLF. For the purposes of this plan, it has been assumed that the revenue from operating the facility would compensate for associated operational and decommissioning costs of the facility. Therefore, this facility has not been included in this plan.

The following GCCS operations, maintenance, monitoring and decommissioning items are included in the post-closure cost estimate:

- Surface emissions monitoring and reporting;
- Landfill gas migration monitoring and reporting;
- Landfill gas probe repair and contingency for replacement;
- GCCS operation, inspection, maintenance and repairs;
- Blower maintenance and repairs;
- Blower replacement contingency;
- Electrical power;
- Flare maintenance and repair;
- One-time conversion from active to passive operation;
- One-time system decommissioning;
- Annual New Source Performance Standards (NSPS) monitoring; and
- Title V Air Operating Permit compliance, reporting, and fees.

3.3 POST-CLOSURE COST ESTIMATE

The post-closure activities discussed above are itemized in the "worst case" post-closure cost estimate presented in **Appendix B**. Annual costs are estimated to be approximately $395,280. The estimated 30-year post-closure cost is $11,834,150. Based on the DEQ Worksheet for MSW Facilities, and using the MSW Reference Rate provided by the DEQ (see **Attachment 1** of **Appendix B**) the estimated 30-year

post-closure cost has been discounted to $8,561,638. Although the site is not anticipated to close within the next year, in order to remain conservative, costs have been discounted for 30 years, beginning in 2015.

3.4 USE OF THE LAND DURING THE POST-CLOSURE CARE PERIOD

Post-closure use of the property has not yet been determined. In any case, post-closure land uses will not disturb the integrity of the final cover, liner(s), or any other components of the containment system, or the function of the monitoring systems except as needed to comply with post-closure care requirements.

3.5 CONTACT INFORMATION

The name, address and telephone number of the person and office to contact during the post-closure care period is:

Paul Burns
Riverbend Landfill Company, Inc.
13469 SW Highway 18
McMinnville, Oregon 97128

Tel: (503) 472-8788

This information will be kept current using the annual CPCP review and update process.

4 FINANCIAL ASSURANCE MECHANISM

4.1 ALLOWABLE FINANCIAL ASSURANCE MECHANISMS

Federal and state regulations allow permittees to use one or more financial assurance mechanisms to demonstrate that adequate funding is available to complete closure and post-closure care. The selection of financial assurance mechanism is based upon the status of the permittee as a private company or a government agency, the value of the entity, and cost. Specific requirements are provided for each type of financial assurance mechanism.

Financial assurance mechanisms allowed by 40 CFR 258.74 include the following:

- Trust Fund;
- Surety Bond Guaranteeing Payment or Performance;
- Letter of Credit;
- Insurance;
- Corporate Financial Test;
- Local Government Financial Test;
- Corporate Guarantee;
- Local Government Guarantee; and
- State Assumption of Responsibility.

4.2 SELECTED FINANCIAL ASSURANCE MECHANISMS

RLF uses both trust funds and surety payment bonds to satisfy the financial assurance obligations for closure and post-closure care.

4.2.1 FEDERAL REQUIREMENTS:

Federal requirements applicable to **trust funds** used as financial assurance mechanisms are specified in 40 CFR 258.74(a) below:

(a) Trust Fund.

(1) An owner or operator may satisfy the requirements of this section by establishing a trust fund which conforms to the requirements of this paragraph. The trustee must be an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency. A copy of the trust agreement must be placed in the facility's operating record.

(2) Payments into the trust fund must be made annually by the owner or operator over the term of the initial permit or over the remaining life of the MSWLF unit, whichever is shorter, in the case of a trust fund for closure or post-closure care, or over one-half of the estimated length of the corrective action program in the case of corrective action for known releases. This period is referred to as the pay-in period.

(3) For a trust fund used to demonstrate financial assurance for closure and postclosure care, the first payment into the fund must be at least equal to the current cost estimate for closure or post-closure care, except as provided in paragraph (k) of this section, divided by the number of years in the pay-in period as defined in paragraph (a)(2) of this section. The amount of subsequent payments must be determined by the following formula:

Next Payment = [CE - CV]/Y

> *where CE is the current cost estimate for closure or post-closure care (updated for inflation or other changes), CV is the current value of the trust fund, and Y is the number of years remaining in the pay-in period.*

(4) For a trust fund used to demonstrate financial assurance for corrective action, the first payment into the trust fund must be at least equal to one-half of the current cost estimate for corrective action, except as provided in paragraph (k) of this section, divided by the number of years in the corrective action pay-in period as defined in paragraph (a)(2) of this section. The amount of subsequent payments must be determined by the following formula:

Next Payment = [RB - CV]/Y

> *where RB is the most recent estimate of the required trust fund balance for corrective action (i.e., the total costs that will be incurred during the second half of the corrective action period), CV is the current value of the trust fund, and Y is the number of years remaining in the pay-in period.*

(5) The initial payment into the trust fund must be made before the initial receipt of waste or before the effective date of the requirements of this section (April 9, 1997, or October 9, 1997 for MSWLF units meeting the conditions of §258.1(f)(1)), whichever is later, in the case of closure and post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of §258.58.

(6) If the owner or operator establishes a trust fund after having used one or more alternate mechanisms specified in this section, the initial payment into the trust fund must be at least the amount that the fund would contain if the trust fund were established initially and annual payments made according to the specifications of this paragraph and paragraph (a) of this section, as applicable.

(7) The owner or operator, or other person authorized to conduct closure, post-closure care, or corrective action activities may request reimbursement from the trustee for these

expenditures. Requests for reimbursement will be granted by the trustee only if sufficient funds are remaining in the trust fund to cover the remaining costs of closure, post-closure care, or corrective action, and if justification and documentation of the cost is placed in the operating record. The owner or operator must notify the State Director that the documentation of the justification for reimbursement has been placed in the operating record and that reimbursement has been received.

(8) The trust fund may be terminated by the owner or operator only if the owner or operator substitutes alternate financial assurance as specified in this section or if he is no longer required to demonstrate financial responsibility in accordance with the requirements of §§258.71(b), 258.72(b), or 258.73(b).

Federal requirements applicable to **surety bonds** used as financial assurance mechanisms are specified in 40 CFR 258.74(b) as follows:

(b) Surety Bond Guaranteeing Payment or Performance.

(1) An owner or operator may demonstrate financial assurance for closure or post-closure care by obtaining a payment or performance surety bond which conforms to the requirements of this paragraph. An owner or operator may demonstrate financial assurance for corrective action by obtaining a performance bond which conforms to the requirements of this paragraph. The bond must be effective before the initial receipt of waste or before the effective date of the requirements of this section (April 9, 1997, or October 9, 1997 for MSWLF units meeting the conditions of 258.1(f)(1)), whichever is later, in the case of closure and post-closure care, or no later than 120 days after the corrective action remedy has been selected in accordance with the requirements of 258.58. The owner or operator must notify the State Director that a copy of the bond has been placed in the operating record. The surety company issuing the bond must, at a minimum, be among those listed as acceptable sureties on Federal bonds in Circular 570 of the U.S. Department of the Treasury.

(2) The penal sum of the bond must be in an amount at least equal to the current closure, post-closure care or corrective action cost estimate, whichever is applicable, except as provided in 258.74(k).

(3) Under the terms of the bond, the surety will become liable on the bond obligation when the owner or operator fails to perform as guaranteed by the bond.

(4) The owner or operator must establish a standby trust fund. The standby trust fund must meet the requirements of 258.74(a) except the requirements for initial payment and subsequent annual payments specified in 258.74(a)(2), (3), (4) and (5).

(5) Payments made under the terms of the bond will be deposited by the surety directly into the standby trust fund. Payments from the trust fund must be approved by the trustee.

(6) Under the terms of the bond, the surety may cancel the bond by sending notice of

cancellation by certified moil to the owner and operator and to the State Director 120 days in advance of cancellation. If the surety cancels the bond, the owner or operator must obtain alternate financial assurance as specified in this section.

(7) The owner or operator may cancel the bond only if alternate financial assurance is substituted as specified in this section or if the owner or operator is no longer required to demonstrate financial responsibility in accordance with 258.71(b), 258.72(b) or 258.73(b).

4.2.2 OREGON SPECIFIC REQUIREMENTS

Oregon adopts the federal requirements, and specifies additional requirements, as found in OAR 340-94-140(6) below:

(6) How financial assurance is to be provided and updated:

(a) The permittee shall submit to the Department a copy of the first financial assurance mechanism prepared in association with a "worst-case" closure plan, a Final Engineered Site Closure Plan, a "Subtitle D" post-closure plan, a Final Engineered Post-closure Plan, and a corrective action report;

(b) The permittee shall also place a copy of the applicable financial assurance plan(s) in the facility operating record on the schedule specified in section (3) of this rule;

(c) The permittee shall certify to the Director at the time a financial assurance mechanism is submitted to the Department and when a financial assurance plan is placed in the facility operating record that the financial assurance mechanism meets all state and federal requirements. This date becomes the "annual review date" of the provision of financial assurance, unless a corporate guarantee is used, in which case the annual review date is 90 days after the end of the corporation's fiscal year;

(d) If a permittee uses a discount rate to estimate costs pursuant to subsection (4)(a) of this rule, the permittee shall prospectively for each year the discount rate is used:

(A) Certify to the Director that the landfill closure date is certain and there are no foreseeable factors that will change the estimate of site life; and

(B) Submit a certification to the Director from a Registered Professional Engineer stating the cost estimates are complete and accurate.

And, in OAR 340-94-145 (1) through (6)(c) relative to trust funds and surety payment bonds:

(1) The financial assurance mechanism shall restrict the use of the financial assurance so that the financial resources may be used only to guarantee that closure, post-closure or corrective action activities will be performed, or that the financial resources can be used only to finance closure, post-closure or corrective action activities.

(2) The financial assurance mechanism shall provide that the Department or a party approved by the Department is the beneficiary of the financial assurance.

(3) A permittee may use one financial assurance mechanism for closure, post-closure and corrective action activities, but the amount of funds assured for each activity must be specified.

(4) A permittee may demonstrate financial assurance for closure, post-closure and corrective action by establishing more than one mechanism per facility, except that mechanisms guaranteeing performance rather than payment may not be combined with other instruments.

(5) The financial assurance mechanism shall be worded as specified by the Department, unless a permittee uses an alternative financial assurance mechanism pursuant to subsection (6)(i) of this rule. The Department retains the authority to approve the wording of an alternative financial assurance mechanism.

(6) Allowable Financial Assurance Mechanisms. A permittee shall provide only the following forms of financial assurance for closure and post-closure activities:

(a) A trust fund established with an entity which has the authority to act as a trustee and whose trust operations are regulated and examined by a federal or state agency and meeting criteria in 40 CFR §258.74(a). The purpose of the trust fund is to receive and manage any funds that may be paid by the permittee and to disburse those funds only for closure, post-closure maintenance or corrective action activities which are authorized by the Department. The permittee shall notify the Department, in writing, before any expenditure of trust fund moneys is made, describing and justifying the activities for which the expenditure is to be made. If the Department does not respond to the trustee within 30 days after receiving such notification, the expenditure is deemed authorized and the trustee may make the requested reimbursements;

(b) A surety bond guaranteeing payment into a standby closure or post-closure trust fund issued by a surety company listed as acceptable in Circular 570 of the U.S. Department of the Treasury. The standby closure or post-closure trust fund must be established by the permittee. The purpose of the standby trust fund is to receive any funds that may be paid by the permittee or surety company. The penal sum of the bond must be in an amount at least equal to the current closure or post-closure care cost estimate, as applicable. The bond must guarantee that the permittee will either fund the standby trust fund in an amount equal to the penal sum of the bond before the site stops receiving waste or within 15 days after an order to begin closure is issued by the Department or by a court of competent jurisdiction; or that the permittee will provide alternate financial assurance acceptable to the Department within 90 days after receipt of a notice of cancellation of the bond from the surety. The surety shall become liable on the bond obligation if the permittee fails to perform as guaranteed by the bond. The surety may not cancel the bond until at least 120 days after the notice of cancellation has been received by both the permittee and the Department. If

the permittee has not provided alternate financial assurance acceptable to the Department within 90 days of the cancellation notice, the surety must pay the amount of the bond into the standby trust account.

4.3 DOCUMENTATION OF FINANCIAL ASSURANCE

The current financial assurance status, current trust account statements showing balances and transactions over the previous year, and bonds are provided separately to this document.

5 REFERENCES

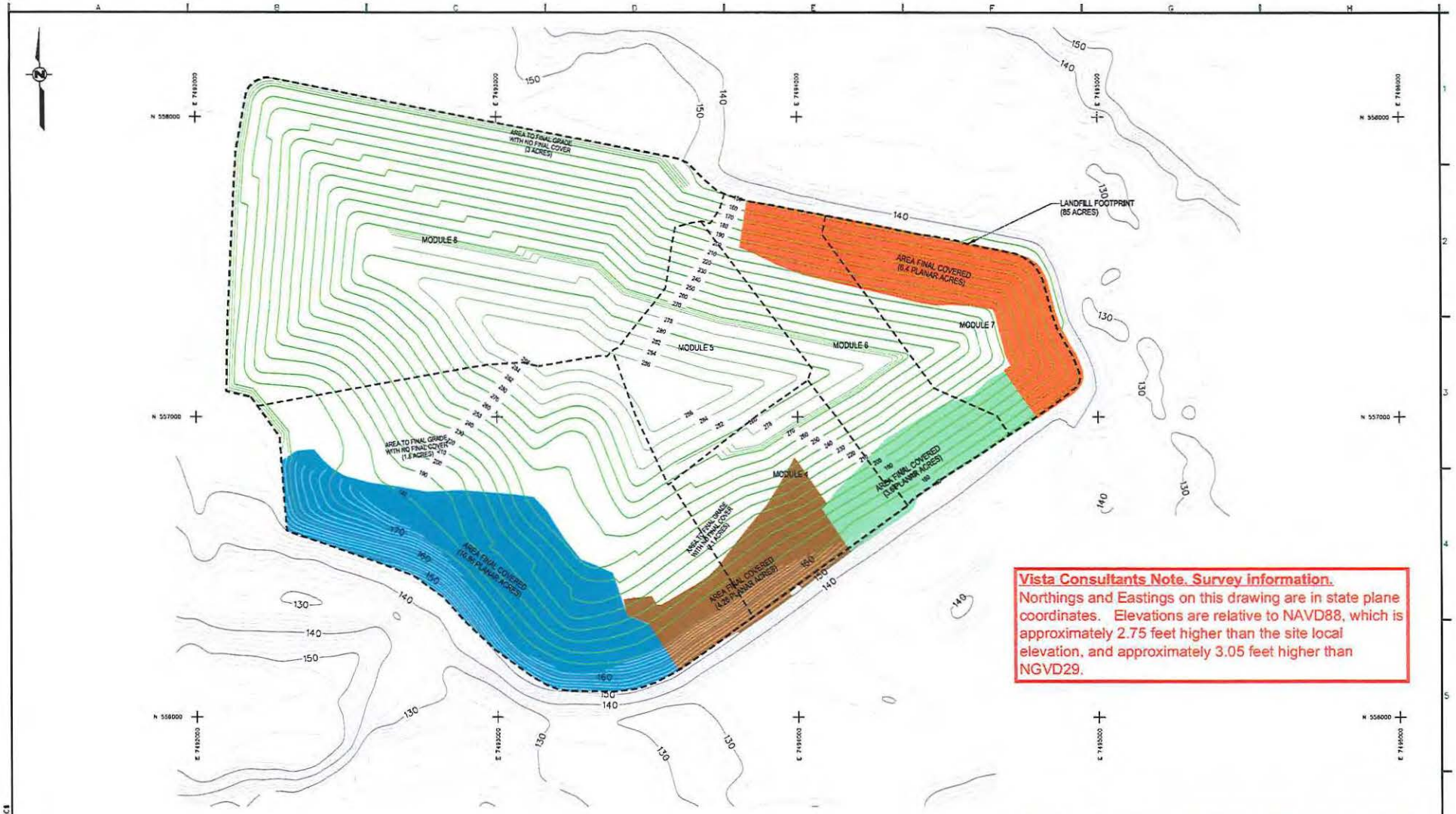
Vista Consultants. (2012). *2012 Closure and Post-Closure Plans, Riverbend Landfill, McMinnville, Oregon.*

Vista Consultants. (2013). *2013 Closure and Post-Closure Plans, Riverbend Landfill, McMinnville, Oregon.*

Waste Management. (August 2013). *Riverbend Landfill 2013 Airspace Report.*

APPENDIX A

WORST-CASE CLOSURE DRAWING



Vista Consultants Note. Survey information.
Northings and Eastings on this drawing are in state plane coordinates. Elevations are relative to NAVD88, which is approximately 2.75 feet higher than the site local elevation, and approximately 3.05 feet higher than NGVD29.

Drawing 1 for 2013 Closure and Post-Closure Plans.
Drawing origin as shown in title block below.

150 0 150 300
SCALE 1" = 300'

WASTE MANAGEMENT

THIS DOCUMENT AND THE INFORMATION CONTAINED HEREIN IS THE PROPERTY OF WASTE MANAGEMENT ("WM"). THIS DOCUMENT IS, AND CONTAINS, CONFIDENTIAL AND TRADE SECRET INFORMATION OF WM. REPRODUCTION, DISCLOSURE OR USE THEREOF IS PERMISSIBLE ONLY AS PROVIDED BY CONTRACTOR OR AS EXPRESSLY AUTHORIZED IN WRITING BY WM. THIS DOCUMENT IS LOANED FOR LIMITED PURPOSES ONLY, AND REMAINS THE PROPERTY OF WM. IT IS TO BE RETURNED UPON REQUEST AND IN ALL EVENTS UPON COMPLETION OF THE PURPOSE OF THE LOAN.

Revisions			
No.	Description	Date	By

Approved By:
Checked By:
Drawn By: R. Gibbons

Project Location:
RIVERBEND LANDFILL
McMINNVILLE, OREGON

FINAL CLOSURE GRADING PLAN
BY GEOSYNTEC (DATED 9-03)

Drawing No. OR02-1509-AIR-03
Scale: As Shown
Date: JUNE 2011
Sheet Number: 3

Or02a11_4-22-11.dgn 6/21/2011 4:51:40 PM

APPENDIX B

CLOSURE AND POST-CLOSURE COST ESTIMATES

2014 Riverbend Landfill Closure Cost Estimates

Site:	Riverbend Landfill	State:	Oregon	Waste:	MSW
Acreage:	59.80 Acres				

a	***Earthwork***	Quantity	Unit	Unit Cost ($)	Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Total
1	Bedding Soil (Foundation Soil)	19,295	Cubic Yards	$ 5.00	$ 96,475	2014	2014	0.00%	$ 96,475
2	General Backfill	99,372	Cubic Yards	$ 5.00	$ 496,860	2014	2014	0.00%	$ 496,860
6	Top Soil	49,686	Cubic Yards	$ 10.40	$ 516,734	2014	2014	0.00%	$ 516,734
7	Waste Grading	19,295	Cubic Yards	$ 8.41	$ 162,271	2014	2014	0.00%	$ 162,271
8	Other (Describe Below)								
	Subgrade Preparation	298,115	SY	$ 0.21	$ 62,604	2013	2014	1.38%	$ 63,468
	Mobilization Earthwork Contractor	1	LS	$ 75,000.00	$ 75,000	2014	2014	0.00%	$ 75,000
	CQA and Surveying	1	LS	$ 75,000.00	$ 75,000	2014	2014	0.00%	$ 75,000
			EARTHWORKS SUBTOTAL -		**$ 1,484,945**				**$ 1,485,808**

b	***Geosynthetics***	Quantity	Unit	Unit Cost ($)	Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Total
1	Geotextile	318,375	Square Yards	$ 2.61	$ 830,959	2014	2014	0.00%	$ 830,959
5	Geomembrane	318,375	Square Yards	$ 6.70	$ 2,133,113	2014	2014	0.00%	$ 2,133,113
7	Other (Describe Below)								
	Contractor Mobilization	1	LS	$ 30,000.00	$ 30,000	2014	2014	0.00%	$ 30,000
	CQA and Surveying	1	LS	$ 100,000.00	$ 100,000	2014	2014	0.00%	$ 100,000
			GEOSYNTHETICS SUBTOTAL -		**$ 3,094,071**				**$ 3,094,071**

c	***Stormwater Management System***	Quantity	Unit	Unit Cost ($)	Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Total
8	Other (Describe Below)								
	Drainage and Site Work	1	LS	$ 460,000.00	460,000	2014	2014	0.00%	$ 460,000
	Construct Remaining Storm Water Ponds	1	LS	$ 30,000.00	$ 30,000	2014	2014	0.00%	$ 30,000
			STORMWATER MANAGEMENT SYSTEM SUBTOTAL -		**$ 490,000**				**$ 490,000**

d	***Temporary and Permanent Erosion Controls***	Quantity	Unit	Unit Cost ($)	Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Total
7	Other (Describe Below)								
	Sediment and Erosion Control	59.80	Acres	$ 750.00	$ 44,850	2014	2014	0.00%	$ 44,850
	Vegetation and Seeding	76.54	Acres	$ 1,286.25	$ 98,450	2013	2014	1.38%	$ 99,808
			TEMPORARY AND PERMANENT EROSION CONTROLS SUBTOTAL -		**$ 143,300**				**$ 144,658**

e	*Landfill Gas Management System*	Quantity	Unit	Unit Cost ($)	Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Total
12	Other (Describe Below)								
	Engineering, Construction Drawings, and CQA	1	LS	$ 150,000.00	$ 150,000	2014	2014	0.00%	$ 150,000
	Remaining Well Field	59.80	Acres	$ 25,000.00	$ 1,495,000	2014	2014	0.00%	$ 1,495,000
				LANDFILL GAS MANAGEMENT SYSTEM SUBTOTAL -	**$ 1,645,000**				**$ 1,645,000**

g	*CQA, Engineering, Surveying and Other Professional Services*	Quantity	Unit	Unit Cost ($)	Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Total
3	Construction Drawing Preparation	1	LS	$ 175,000.00	$ 175,000	2014	2014	0.00%	$ 175,000
5	Construction Management	1	LS	$ 285,000.00	$ 285,000	2014	2014	0.00%	$ 285,000
7	Deed Record Update	1	LS	$ 2,500.00	$ 2,500	2014	2014	0.00%	$ 2,500
				PROFESSIONAL SERVICES SUBTOTAL -	**$ 462,500**				**$ 462,500**

h	*Miscellaneous*	Quantity	Unit	Unit Cost ($)	Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Total
1	Demobilization and Demolition	1	LS	$ 25,000.00	25,000	2014	2014	0.00%	$ 25,000
				MISCELLANEOUS SUBTOTAL -	**25,000**				**$ 25,000**

		CURRENT TOTAL -	**$ 7,347,038**
j	Contingency	10.00%	$ 734,704
		FINANCIAL ASSURANCE REQUIRED FOR CLOSURE -	**$ 8,081,742**
		Closure Cost per Acre -	$ 135,146

Site:	Riverbend Landfill	State:	Oregon	Waste:	MSW
Anticipated PCC Duration:	30 Years	Acreage:	85.00 Acres		

a	***Cover System Maintenance***	Annual Quantity	Unit	Annual Unit Cost ($)	Annual Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Annual Total
1	Mowing	87.55	Acres	$ 31.38	$ 2,747	2013	2014	1.38%	$ 2,785
4	Revegetation	2.00	Acres	$ 1,286.25	$ 2,573	2013	2014	1.38%	$ 2,608
5	Other (Describe Below)								
	Cover System Earthwork, Labor, Equipment, Surveying	1	LS	$ 2,400.00	$ 2,400	2014	2014	0.00%	$ 2,400
				COVER SYSTEM MAINTENANCE SUBTOTAL -	**$ 7,720**				**$ 7,793**

b	***Environmental Monitoring***	Annual Quantity	Unit	Annual Unit Cost ($)	Annual Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Annual Total
1	Surface Water Sampling	2	EA	$ 3,630.00	$ 7,260	2013	2014	1.38%	$ 7,360
2	Surface Water Analysis	0	EA	$ 7,260.00	$ -	2013	2014	1.38%	$ -
4	Semiannual Groundwater Sampling	24	EA	$ 468.15	$ 11,236	2013	2014	1.38%	$ 11,391
6	Semiannual Groundwater Analysis	24	EA	$ 266.30	$ 6,391	2013	2014	1.38%	$ 6,479
7	Water Quality Report Preparation	1	LS	$ 9,000.00	$ 9,000	2014	2014	0.00%	$ 9,000
8	Groundwater Well Replacement	0.0333	EA	$ 7,500.00	$ 250	2014	2014	0.00%	$ 250
10	Other (Describe Below)								
	Groundwater Analytical QA and Statistics	2	EA	$ 1,246.15	$ 2,492	2013	2014	1.38%	$ 2,527
	Well Redevelopment Accrual, Each Well Every 10 Years	1.2	EA	$ 1,170.39	$ 1,404	2013	2014	1.38%	$ 1,424
				ENVIRONMENTAL MONITORING SUBTOTAL -	**$ 38,033**				**$ 38,431**

c	***Leachate Monitoring***	Annual Quantity	Unit	Annual Unit Cost ($)	Annual Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Annual Total
1	Leachate Sampling	1	EA	$ 1,600.00	$ 1,600	2014	2014	0.00%	$ 1,600
2	Leachate Analysis	1	EA	$ 8,700.00	$ 8,700	2014	2014	0.00%	$ 8,700
3	Leachate Reporting	1	EA	$ 3,250.00	$ 3,250	2014	2014	0.00%	$ 3,250
4	Leachate Collection System Maintenance	1	LS	$ 4,000.00	$ 4,000	2014	2014	0.00%	$ 4,000
8	Leachate Treatment	3,411,759	Gal	$ 0.0525	$ 179,117	2014	2014	0.00%	$ 179,117
				LEACHATE MONITORING SUBTOTAL -	**$ 196,667**				**$ 196,667**

d	***Landfill Gas Monitoring***	Annual Quantity	Unit	Annual Unit Cost ($)	Annual Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Annual Total
5	Landfill Gas System Maintenance	1	LS	$ 24,000.00	$ 24,000	2014	2014	0.00%	$ 24,000
6	Landfill Gas System Operation	1	LS	$ 36,282.14	$ 36,282	2013	2014	1.38%	$ 36,783
7	Convert from Active to Passive	0.033	LS	$ 35,111.75	$ 1,159	2013	2014	1.38%	$ 1,175
8	Landfill Gas System Decommissioning	0.033	LS	$ 17,555.87	$ 579	2013	2014	1.38%	$ 587
12	Blower Replacement	0.067	EA	$ 19,500.00	$ 1,307	2014	2014	0.00%	$ 1,307
15	Flare Maintenance	1	LS	$ 10,000.00	$ 10,000	2014	2014	0.00%	$ 10,000
18	NSPS Monitoring	1	LS	$ 5,851.96	$ 5,852	2013	2014	1.38%	$ 5,933
19	Title V Emissions Fee	1	LS	$ 843.55	$ 844	2013	2014	1.38%	$ 855
20	Other (Describe Below)								
	Gas Migration Monitoring and Reporting	1	LS	$ 4,798.60	$ 4,799	2013	2014	1.38%	$ 4,865
	Blower Maintenance and Repair	1	LS	$ 4,800.00	$ 4,800	2014	2014	0.00%	$ 4,800
	Blower Electricity	1	LS	$ 11,703.91	$ 11,704	2013	2014	1.38%	$ 11,865
				LANDFILL GAS MONITORING SUBTOTAL -	**$ 101,325**				**$ 102,170**

e	***General Site Maintenance***	Annual Quantity	Unit	Annual Unit Cost ($)	Annual Original Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Annual Total
2	Fence and Gate Repairs	20	LF	$ 25.00	$ 500	2014	2014	0.00%	$ 500
3	Road Maintenance	1,500	SF	$ 0.70	$ 1,050	2014	2014	0.00%	$ 1,050
4	Utilities	1	LS	$ 1,500.00	$ 1,500	2014	2014	0.00%	$ 1,500
5	Building Maintenance	1	LS	$ 1,000.00	$ 1,000	2014	2014	0.00%	$ 1,000
6	Stormwater System Maintenance	1	LS	$ 3,500.00	$ 3,500	2014	2014	0.00%	$ 3,500
7	Other (Describe Below)								
				GENERAL SITE MAINTENANCE SUBTOTAL -	**$ 7,550**				**$ 7,550**

f	***Professional Services***	Annual Quantity	Unit	Annual Unit Cost ($)	Original Annual Total	Year of Orig. Cost	Current Year	Inflation Adj. (%)	Adjusted Annual Total
4	Site Inspection	1	EA	$ 6,000.00	$ 6,000	2014	2014	0.00%	$ 6,000
				PROFESSIONAL SERVICES SUBTOTAL -	**$ 6,000**				**$ 6,000**

	CURRENT ANNUAL TOTAL -		**$ 358,611**
h	Contingency	10.00%	$ 35,861
	TOTAL -		**$ 394,472**
j	Discounting	27.65312%	$ 109,084
	Annual Post-Closure Care Costs -		**$ 285,388**
	FINANCIAL ASSURANCE REQUIRED FOR POST-CLOSURE CARE -		**$ 8,561,638**
	Post-Closure Care Cost per Acre -		$ 100,725

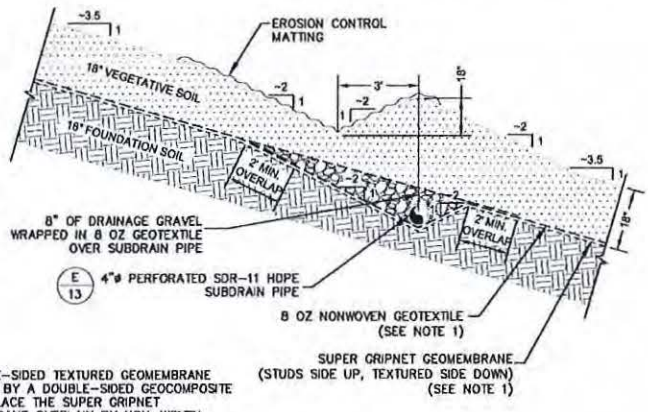
Inflation Methodology

Unless otherwise noted, the inflation adjustments for items based on prior cost estimates were made according to the instructions in the Oregon Department of Environmental Quality (DEQ) Memorandum, "Financial Assurance Updated for Calendar Year 2014: Using Inflation Factors for Annual Updates of Closure and Post-Closure Cost Estimates," date February 12, 2014 (included in Attachment 1). The inflation factor, as a percentage increase, was calculated to January 2014 (4th Quarter 2013) values by using Implicit Price Deflator (IPD) values, as shown in the following equation:

$$\left(\frac{IPD\ for\ date\ of\ current\ estimate\ (4th\ quarter\ 2013)}{IPD\ for\ date\ of\ prior\ estimate} - 1\right) * 100 = Inflation\ Adjustment$$

Final Cover Components

The final cover components are based on the description in Section 2.2.2 of the Closure and Post Closure Plan (revised March 2014) and Sheet 12 of the Permit Drawings by Geosyntec Consultants (March 2012).



NOTES:

1. A DOUBLE-SIDED TEXTURED GEOMEMBRANE OVERLAIN BY A DOUBLE-SIDED GEOCOMPOSITE MAY REPLACE THE SUPER GRIPNET GEOMEMBRANE OVERLAIN BY NON-WOVEN GEOTEXTILE.

N 4,8 FINAL COVER SYSTEM (TYP)
NOT TO SCALE

1. Closure Cost Estimate

The closure cost estimate includes costs associated with closing Riverbend Landfill under the "worst-case" scenario. This "worst-case" is occurring right now, with 59.8 acres required to be closed.

a. Earthwork

The Earthwork section includes activities associated with procurement, delivery, excavation, moving, stockpiling, placing, and compaction of soils for the closure.

1. Bedding Soil (Foundation Soil)

Bedding Soil covers the anticipated needs for the 18-inch foundation soil layer, which is required to have a hydraulic conductivity equal to or less than $1x10^{-5}$ centimeters per second. This covers any soil needed for repairing or grading during closure in order to bring the surface of the landfill into conformance with the final cover design. It is assumed that a minimum of 6 inches of foundation soil is already maintained over the waste across any areas of the landfill that have not been closed. It is also assumed that 80% of these areas will already have an 18-inch layer of intermediate soil cover that meets the requirements of the foundation layer. Therefore, the volume of bedding soil required is assumed to be approximately the amount of soil needed to add 1 foot of soil to 20% of the area to be closed.

$$20\% * (59.8\ acres) * \frac{43{,}560\ SF}{acre} * 1\ foot * \frac{1\ CY}{27\ CF} = 19{,}295\ CY$$

The unit cost is per cubic yard and based on engineering judgment.

2. General Backfill

General Backfill covers the lower 12 inches of the vegetative soil layer, which is a layer of the final cover that is 1.5 feet thick. The area is assumed to be 103% of the area to be closed, in order to account for the increased area on slopes.

$$103\% * 59.80\ acres * \frac{43{,}560\ SF}{acre} * 1\ feet * \frac{1\ CY}{27\ CF} = 99{,}372\ CY$$

The unit cost is per cubic yard and based on engineering judgment.

3. Drainage Sand – Not Used

4. Gravel – Not Used

5. Clay – Not Used

6. Top Soil

Top Soil covers the upper 6 inches of the vegetative soil layer, which is a layer of the final cover that is 1.5 feet thick, with the top 6 inches capable of supporting vegetation. The area is assumed to be 103% of the area to be closed, in order to account for the increased area on slopes.

$$103\% * 59.80\ acres * \frac{43{,}560\ SF}{acre} * 0.5\ feet * \frac{1\ CY}{27\ CF} = 49{,}686\ CY$$

The unit cost is per cubic yard and based on engineering judgment.

7. Waste Grading

Similar to the Bedding Soil (line item a1 above), Waste Grading assumes that wastes may need to be regraded in order to create stable final slopes and bring the surface

of the landfill into conformance with the final cover design. The volume is assumed to be approximately 1 foot of waste across 20% of the area to be closed.

$$20\% * (59.8\ acres) * \frac{43{,}560\ SF}{acre} * 1\ foot * \frac{1\ CY}{27\ CF} = 19{,}295\ CY$$

Waste Grading costs were based upon an average of three quotes for waste excavation provided by contractors in February 2014 for a landfill cell construction project at another Waste Management site in Oregon (Cell 6A at Hillsboro Landfill).

$$\frac{\$8.23 + \$8.00 + \$9.00}{3} = \$8.41$$

8. Other

Subgrade Preparation

This includes the cost for preparing the foundation soil for installation of the geosynthetics. The area is assumed to be 103% of the area to be closed, in order to account for the increased area on slopes.

$$59.8\ acres * \frac{4{,}840\ SY}{acre} * 103\% = 298{,}115\ SY$$

A unit cost of $0.20 per square yard was acquired from section 31 22 16.10-3300 of the 2013 RS Means (Fine Grading). Costs were adjusted by the city cost index for Portland for RS Means Site & Infrastructure (102.9%) to more accurately reflect local costs, resulting in a 2013 unit cost of $0.21 per square yard. The 2014 unit cost based on the 2013 RS Means cost, adjusted for inflation using the IPD values.

Mobilization Earthwork Contractor

The Mobilization cost for the earthwork contractor is based on engineering judgment.

Construction Quality Assurance and Surveying

The cost for construction quality assurance (CQA) activities, including surveying, for the earthwork portion of closure construction is based on engineering judgment.

b. Geosynthetics

The Geosynthetics section includes activities associated with procurement, delivery, deployment, and connection of geosynthetic materials for the closure.

1. Geotextile

The final cover system includes a geotextile placed over the studded surface of a geomembrane in order to create a drainage channel. An additional 10% was added in order to compensate for the increased area on slopes and for wastage.

$$59.8\ acres * \frac{4{,}840\ SY}{acre} * 110\% = 318{,}375\ SY$$

The $2.61 cost per square yard is based on a verbal cost estimate provided by Agru America, and includes the cost to procure, ship, and install the 8 ounce geotextile.

2. Composite Drainage Net – Not Used

3. Geonet – Not Used

4. Geosynthetic Clay Liner – Not Used

5. Geomembrane

The final cover system includes a 60-mil polyethylene geomembrane, assumed to be the 60 mil Super Gripnet Liner manufactured by Agru America, which has ridges on one side and studs on the other side. An additional 10% was added in order to compensate for the increased area on slopes and for wastage. Like the geotextile (line item b1), 318,375 square yards are estimated.

The $6.70 cost per square yard includes a cost based on a verbal cost estimate provided by Agru America, which includes the cost to procure, ship, and install the geomembrane, plus an additional cost per square yard that covers miscellaneous items such as boots, flaps, and connections.

6. Geogrid – Not Used

7. Other

Contractor Mobilization

The Mobilization cost for the geosynthetics contractor is based on engineering judgment.

CQA and Surveying

The cost for CQA activities, including surveying, for the geosynthetics portion of closure construction is based on engineering judgment.

c. Stormwater Management System

The Stormwater Management System section includes activities associated with the procurement, delivery, and installation of structures and piping necessary to promote stormwater flow as part of closure construction.

1. **Piping – Not Used**
2. **Culverts – Not Used**
3. **Toe Drain – Not Used**
4. **Inlet Structures – Not Used**
5. **Outfall Structures – Not Used**
6. **Ditches – Not Used**
7. **Berms – Not Used**
8. **Other**

Drainage and Site Work

The costs for site work related to drainage for the final closure system and its construction are combined under one line item and based on engineering judgment. This cost conservatively based on the full buildout of the landfill, which will include drainage ditches, culverts, down chutes, and energy dissipaters.

Construct Remaining Storm Water Ponds

This cost for constructing the remaining storm water pond on site is based on engineering judgment, and assumes an unlined, earthen pond approximately one-third of an acre in size.

d. Temporary and Permanent Erosion Controls

The Temporary and Permanent Erosion Controls section includes costs associated with procurement, delivery, installation, and maintenance during construction of temporary and permanent erosion controls necessary to mitigate sediment migration.

1. **Erosion Control Mat – Not Used**
2. **Silt Fencing – Not Used**
3. **Inlet Protection – Not Used**
4. **Hydroseeding – Not Used**
5. **Sodding – Not Used**
6. **Grout Filled Fabric Revetment – Not Used**
7. **Other**

Sediment and Erosion Control

The cost for temporary sediment and erosion control activities required during the earthwork portion of closure construction is per acre and based on engineering judgment.

Vegetation and Seeding

The Closure Plan assumes that vegetation will be planted or seeded across 103% of the area to be closed (61.59 acres), in order to account for the increased area on slopes. Conservatively, an additional area equal to 25% of the area to be closed is assumed to need a second round of seeding during the closure activities. Therefore, the total quantity estimated is 76.54 acres.

The unit cost of $1,250 per acre was acquired from section 32 92 19.13-0020 of the 2013 RS Means (mechanical seeding). Costs were adjusted by the city cost index for Portland for RS Means Site & Infrastructure (102.9%) to more accurately reflect local costs, resulting in a 2013 unit cost of $1,286.25/acre. The 2014 unit cost based on the 2013 RS Means cost, adjusted for inflation using the IPD values.

e. Landfill Gas Management System

The Landfill Gas Management System section includes costs associated with closure construction for procurement, delivery, and installation of piping and structures necessary for to control landfill gas and properly collect condensate.

The landfill gas collection and control system (GCCS) has primarily been constructed along with landfill expansion and waste placement, except for the landfill gas collection wells, the well-head assemblies, and the landfill gas laterals.

1. **Lateral Piping – Not Used**
2. **Header Piping – Not Used**
3. **Air Line – Not Used**
4. **Vertical Gas Wells – Not Used**
5. **Condensate Knockout – Not Used**
6. **Passive Gas Vents – Not Used**
7. **Condensate Pump Station – Not Used**
8. **LFG Migration Probe – Not Used**
9. **Blower – Not Used**
10. **Air Compressor – Not Used**
11. **Flare – Not Used**
12. **Other**

Engineering, Construction Drawings, and CQA

This line item covers costs associated with the engineering required for the remaining components of GCCS, the construction drawings, and the performance of

construction quality assurance related to constructing the GCCS. Unit cost is lump sum and based on the engineering judgment.

Remaining Well Field

This cost covers those components of the GCCS that have not been constructed during the operation of the landfill. Unit cost is per acre and based on industry knowledge.

f. Water Monitoring System

The Groundwater Monitoring System section includes construction of any wells and surface water monitoring points that will need to be constructed as part of closure. The entire groundwater monitoring system at Riverbend is assumed to be in place and operational before the closure activities commence.

1. Groundwater Well – Not Used

2. Other – Not Used

g. CQA, Engineering, Surveying, and Other Professional Services

The CQA, Engineering, Surveying, and Other Professional Services section includes work related to ensuring construction meets quality standards, design intent, and legal requirements.

1. Construction Quality Assurance – Not Used

2. Surveying – Not Used

3. Construction Drawing Preparation

This line item includes the costs associated with bringing closure plans to construction level with consideration for changed conditions. Unit cost is lump sum and based on engineering judgment and the construction costs for Earthwork, Geosynthetics, Stormwater Management, and Temporary and Permanent Erosion Controls.

4. Bid Package – Not Used

5. Construction Management

This line item includes costs associated with construction management services as may be deemed necessary. Unit cost is lump sum and based on engineering judgment.

6. Certification Report – Not Used

7. Deed Record Update

This line item includes services associated with making revisions to the property's deed to indicate that a closed landfill is on the site, as well as notes on any property use restrictions as required by law. The cost is based on engineering judgment.

8. Other – Not Used

h. Miscellaneous

The Miscellaneous section includes any additional costs not included in other sections including site-specific issues that cannot be adequately addressed in the other sections.

1. Demobilization and Demolition

This line item covers the cost of Exit Closure Demobilization, which is assumed to include the cost of removing equipment, etc., from site after closure. This is not associated with contractor costs for performing the closure activities described in other line items above. The one time cost of $25,000 is based on engineering judgment.

2. Other – Not Used

i. Overhead and Profit

The Overhead and Profit section was not used because unit costs in other sections include overhead and profit.

j. Contingency

An additional 10% is added to the costs to account for unforeseen contingencies.

k. Taxes

The Taxes section was not used because unit costs in other sections include taxes where applicable.

l. Discounting

No discounting was used for the closure cost estimate because it is assumed that closure funds should be available for immediate use.

2. Post-Closure Care Cost Estimate

The post-closure care cost estimate includes costs associated with maintaining Riverbend Landfill for 30 years.

a. Cover System Maintenance

The Cover System Maintenance section includes costs associated with erosion repairs, settlement issues, and general maintenance.

1. Mowing

Mowing quantities were based on assumptions that the entire grassed portion of the landfill will need to be mowed once per year. The area is assumed to be 103% of the area to be closed (87.55 acres), in order to account for the increased area on slopes.

Unit costs were acquired from 2013 RS Means. Mowing costs are based on information in section 32 01 90.19-4190. The unit cost of $0.70 per thousand square feet (MSF) equates to $30.49 per acre. Costs were adjusted by the city cost index for Portland for RS Means Site & Infrastructure (102.9%) to more accurately reflect local costs, resulting in a 2013 unit cost of $31.38 per acre. The 2014 unit cost based on the 2013 RS Means cost, adjusted for inflation using the IPD values.

The cost estimate assumes mowing activities will be necessary for 30 years of post-closure care.

2. Erosion Repair – Not Used

3. Replace Geosynthetics or Clay – Not Used

4. Revegetation

This item includes costs associated with maintaining or replacing dead or eroded vegetation during the post-closure care period. It is assumed that approximately 2 acres of the final cover will need seeding, planting, or fertilizing each year to maintain or re-establish of vegetation.

The unit cost of $1,250 per acre was acquired from section 32 92 19.13-0020 of the 2013 RS Means (mechanical seeding). Costs were adjusted by the city cost index for Portland for RS Means Site & Infrastructure (102.9%) to more accurately reflect local costs, resulting in a 2013 unit cost of $1,286.25/acre. The 2014 unit cost based on the 2013 RS Means cost, adjusted for inflation using the IPD values.

The cost estimate assumes revegetation activities will be necessary for 30 years of post-closure care.

5. Other

Cover System Earthwork, Labor, Equipment, Surveying

This line item covers additional site work related to maintaining the final cover, such as earthwork and surveying, and related labor and equipment costs. Unit cost is lump sum and based on engineering judgment.

b. Environmental Monitoring

The Environmental Monitoring section includes costs associated with sampling, analyzing and reporting water quality impacts from the landfill. Included in this section are costs associated with replacing wells and eventual abandonment.

1. Surface Water Sampling

The Surface Water Sampling unit cost includes costs associated with collecting samples from surface water monitoring points and with the subsequent analysis.

Unit cost is based on the Surface Water Sampling and Analysis cost estimate from January 2013, and adjusted for inflation using the IPD values. The cost was recommended by SCS Engineers for the 2013 cost estimate by Vista. The cost estimate assumes sampling and analysis activities will be necessary for 30 years of post-closure care.

2. Surface Water Analysis – Included in Surface Water Sampling Costs

3. Quarterly Groundwater Sampling – Not Used

4. Semiannual Groundwater Sampling

This item includes costs associated with sampling groundwater monitoring wells on a semiannual basis.

Unit cost is based on the groundwater sampling cost estimate from January 2013, and adjusted for inflation using the IPD values. The cost estimate assumes sampling activities will be necessary for 30 years of post-closure care.

5. Quarterly Groundwater Analysis– Not Used

6. Semiannual Groundwater Analysis

This item includes costs associated with analyzing groundwater monitoring well samples on a semiannual basis.

Unit cost is based on the groundwater analysis cost estimate from January 2013, and adjusted for inflation using the IPD values. The cost estimate assumes analysis activities will be necessary for 30 years of post-closure care.

7. Water Quality Report Preparation

This item includes costs associated with preparing and reporting on water quality.

Unit cost is based on the cost for preparing the water quality portion of the Annual Environmental Monitoring Report (AEMR), as estimated for Hillsboro Landfill by SCS Engineers in 2014. The cost estimate assumes report preparation will be necessary for 30 years of post-closure care.

8. Groundwater Well Replacement

This item includes costs associated with decommissioning damaged groundwater wells and replacing them with new wells as necessary during the post-closure care period. Costs are prorated in consideration of the 30 years of post-closure maintenance assumed, the number of wells in the system, and the replacement frequency assumed for each well. The cost estimate assumes that there will be 1 well replacement over the post-closure maintenance period, and assigns 3.33% of the replacement cost of a well to each year.

Unit cost is per well and based on engineering judgment.

9. Groundwater Well Abandonment – Not Used

10. Other

Groundwater Analytical QA and Statistics

This item covers the quality assurance (QA) review and statistical analysis of the results from sampling the groundwater monitoring wells.

Unit cost is based on the Groundwater Analytical QA and Statistics cost estimate from January 2013, and adjusted for inflation using the IPD values. The cost estimate assumes this work will be necessary for 30 years of post-closure care.

Well Redevelopment Accrual, Each Well Every 10 Years

This item includes costs associated with redeveloping groundwater wells as is necessary during the post-closure care period. Costs are prorated in consideration of the 30 years of post-closure maintenance assumed, the number of wells in the system and the redevelopment frequency assumed for each well. The cost estimate assumes that there will be 36 well redevelopments over the post-closure maintenance period, and assigns 120% of the redevelopment cost of a well to each year.

Unit cost is based on the well redevelopment cost estimate from January 2013, and adjusted for inflation using the IPD values.

c. Leachate Monitoring

The Leachate Monitoring section includes costs associated with operating and maintaining the leachate collection system, routine leachate monitoring, and eventual system decommissioning.

1. Leachate Sampling

The Leachate Sampling unit cost includes costs associated with sampling leachate. Unit cost is based on the cost for leachate sampling estimated for Hillsboro Landfill by SCS Engineers in 2014. The cost estimate assumes sampling activities will be necessary for 30 years of post-closure care.

2. Leachate Analysis

This item includes all costs associated with analyzing the sampled leachate. Unit cost is based on the cost for leachate analysis estimated for Hillsboro Landfill by SCS Engineers in 2014. The cost estimate assumes analysis activities will be necessary for 30 years of post-closure care.

3. Leachate Reporting

This item includes all costs associated with reporting the results of the leachate analysis to the appropriate regulatory agency in an annual leachate management report. Unit cost is based on the cost for leachate reporting estimated for Hillsboro Landfill by SCS Engineers in 2014. The cost estimate assumes reporting activities will be necessary for 30 years of post-closure care.

4. Leachate Collection System Maintenance

This item includes all labor and parts necessary to conduct routine maintenance on the leachate collection system. Unit cost is based on the cost for leachate collection system maintenance estimated for Hillsboro Landfill by SCS Engineers in 2014. This cost includes both routine maintenance and non-routine maintenance. The cost estimate assumes routine maintenance activities will be necessary for 30 years of post-closure care. Non-routine maintenance costs include the cost of replacing two pumps every 5 years are pro-rated over the 30 year post-closure care period.

5. Leachate Collection System Operation – Not Used

6. Leachate Collection System Decommissioning – Not Used

7. Pump Replacement – Not Used

8. Leachate Treatment

The 2013 calculations by Vista Consultants estimated that 102,352,763 gallons of leachate would be produced over the 30 year post-closure care period. Leachate is currently hauled off-site for treatment and disposal at a publicly owned treatment

works and another WM landfill. The average cost, based on current contracts, is estimated to be $52.50 per 1000 gallons. The total cost of leachate disposal for the 30 year period is pro-rated in consideration of the 30 years of post-closure maintenance. The cost estimate for each year is equivalent to the cost of disposing of approximately 3,411,759 gallons of leachate.

9. Leachate Evaporation Pond Cleanout – Not Used

10. Leachate Evaporation Pond Decommissioning – Not Used

11. Other – Not Used

d. Landfill Gas Monitoring

The Landfill Gas Monitoring section includes costs associated with routine landfill gas control system sampling, operation, maintenance, and eventual decommissioning.

1. Landfill Gas Well Sampling – Not Used

2. Landfill Gas Well Analysis – Not Used

3. Perimeter Landfill Gas Probe Sampling – Not Used

4. Perimeter Landfill Gas Probe Analysis – Not Used

5. Landfill Gas System Maintenance

This item includes labor and parts necessary to conduct routine maintenance on the landfill GCCS. Unit cost is based on the cost for landfill gas system maintenance estimated for Hillsboro Landfill by SCS Engineers in 2014. This cost includes both routine maintenance and non-routine maintenance. The cost estimate assumes routine maintenance activities will be necessary for 30 years of post-closure care. Non-routine maintenance costs are pro-rated over the 30 year post-closure care period.

6. Landfill Gas System Operation

This item includes costs associated with operating the landfill GCCS.

Unit cost is based on the System Operation and Inspection cost estimate from January 2013, and adjusted for inflation using the IPD values. The cost estimate assumes the GCCS will be operational for 30 years of post-closure care.

7. Convert from Active to Passive

This item includes costs associating converting an active gas extraction system to a passive system. This is a one-time cost pro-rated over the 30 year post-closure care period.

Unit cost is based on the One Time Conversion from Active to Passive Operation cost estimate from January 2013, and adjusted for inflation using the IPD values.

8. Landfill Gas System Decommissioning

This item includes costs associated with decommissioning the landfill gas system as a part of exiting post-closure care. This is a one-time cost pro-rated over the 30 year post-closure care period.

Unit cost is based on the One-time System Decommissioning cost estimate from January 2013, and adjusted for inflation using the IPD values.

9. Landfill Gas Probe Replacement – Not Used

10. Vertical Gas Well Replacement – Not Used

11. Vertical Gas Well Abandonment – Not Used

12. Blower Replacement

This item includes the costs associated with replacing blowers for the landfill gas collection system. Replacement costs for 2 blowers are pro-rated over the 30 year post-closure care period.

Unit cost is based on the cost for blower replacement estimated for Hillsboro Landfill by SCS Engineers in 2014.

13. Condensate Treatment – Not Used

14. Condensate Pump Replacement – Not Used

15. Flare Maintenance

This item includes labor and parts necessary to conduct routine maintenance on the flare and associated systems.

Unit cost is based on the cost for routine flare maintenance estimated for Hillsboro Landfill by SCS Engineers in 2014. The cost estimate assumes that flare maintenance activities will be necessary for 30 years of post-closure care.

16. Lateral Replacement – Not Used

17. Header Replacement – Not Used

18. NSPS Monitoring

This item includes costs necessary to conduct monitoring in compliance with NSPS grid spacing requirements.

Unit cost is based on the cost estimate from January 2013, and adjusted for inflation using the IPD values. The cost estimate assumes that NSPS monitoring will be necessary for 30 years of post-closure care.

19. Title V Emissions Fee

This item includes fees that must be paid in accordance with Title V requirements.

Unit cost is based on the cost estimate from January 2013, and adjusted for inflation using the IPD values. The cost estimate assumes that Title V emissions fees will need to be paid each year through the 30 years of post-closure care.

20. Other

Gas Migration Monitoring and Reporting

This item covers the activities associated with landfill gas migration monitoring and reporting.

Unit cost is based on the cost estimate from January 2013, and adjusted for inflation using the IPD values. The cost estimate assumes this monitoring and reporting will be necessary for 30 years of post-closure care.

Blower Maintenance and Repair

This item includes labor and parts necessary to conduct routine maintenance and repair on the blowers and associated systems.

Unit cost is based on the cost for blower maintenance and repair estimated for Hillsboro Landfill by SCS Engineers in 2014. The cost estimate assumes that blower maintenance activities will be necessary for 30 years of post-closure care.

Blower Electricity

This has traditionally been a separate line item from other utility costs, covering the electricity used for the blowers and associated systems.

Unit cost is based on the cost estimate from January 2013, and adjusted for inflation using the IPD values. The cost estimate assumes that the blowers will be operational for 30 years of post-closure care.

e. General Site Maintenance

The General Site Maintenance section includes costs associated with maintaining the site which aren't covered elsewhere in the cost estimate.

1. Security – Not Used

2. Fence and Gate Repairs

This includes all costs associated with annual repairs to the fence and/or gate. It is assumed that approximately 20 linear feet of fence will need to be replaced each year. Unit cost is per linear foot of and based on engineering judgment.

3. Road Maintenance

It is assumed that 1,500 square feet of road will need to be repaired annually. Unit costs are per square foot and based on engineering judgment.

4. Utilities

This includes utility costs associated with maintaining the site during post-closure care. This does not include utilities required to operate the landfill GCCS and leachate equipment.

Unit cost is lump sum and based on engineering judgment.

5. Building Maintenance

This includes costs associated with maintaining any on-site buildings in usable condition if necessary during the post-closure care period. The costs of demolishing on-site buildings are included and pro-rated over the 30 year post-closure care period.

Unit cost is lump sum and based on engineering judgment..

6. Stormwater System Maintenance

This includes costs associated with maintaining the stormwater system.

Unit cost is lump sum and based on engineering judgment. The cost estimate assumes that the stormwater system will be maintained for 30 years of post-closure care.

7. Other – Not Used

f. Professional Services

The Professional Services section includes work related to ensuring the site maintains regulatory compliance and periodic review by a Professional Engineer.

1. Surveying – Not Used

2. Permit Renewals – Not Used

3. Post-Closure Care Cessation Report – Not Used

4. Site Inspection

This includes costs associated with having a third party periodically inspect the site.

Unit cost is lump sum and based on engineering judgment. The cost estimate assumes that theses costs will be necessary for 30 years of post-closure care.

5. Other – Not Used

g. Overhead and Profit

The Overhead and Profit section was not used because unit costs in other sections include overhead and profit.

h. Contingency

An additional 10% is added to the costs to account for unforeseen contingencies.

i. Taxes

The Taxes section was not used because unit costs in other sections include taxes where applicable.

j. Discounting

Costs have been discounted based on the DEQ Worksheet for MSW Facilities using the MSW Reference Rate provided by the DEQ (see Attachment 1). Although the site is not anticipated to close within the next year, in order to remain conservative, costs have been discounted for 30 years, beginning in 2015. The percent to be discounted was calculated as follows (values taken from the spreadsheet):

$$1 - \frac{8{,}561{,}638}{11{,}834{,}150} = 0.2765312 \rightarrow 27.65312\%$$

APPENDIX B

ATTACHMENT 1

State of Oregon
Department of Environmental Quality — Memorandum

To: **Solid Waste Disposal Site Permittees** **Date: February 12, 2014**

From: **Jim Harris**
Financial Analyst

Subject: **Financial Assurance Update for Calendar Year 2014: Using Inflation Factors for Annual Updates of Closure and Post-Closure Cost Estimates**

This memorandum is meant to answer the question:

> *"How should permittees respond to Department requests for annual updates of "worst-case" closure & post-closure cost estimates for financial assurance at their permitted facility/ies?"*

The Department concurs with the notion that contracting out for new estimates when the scope of work has not changed at a facility is unnecessary.

COST ADJUSTMENTS

Closure and post-closure cost estimates are adjusted annually for inflation until closure is completed. Since a dollar this year is not worth as much as a dollar last year, stating that a facility will cost ten million dollars to close raises the question, "which dollar should we use to make cost estimates?"

There are two ways owners and operators may address this issue. The more obvious and more cumbersome method would be to recalculate the cost estimates completely each year.

However, to save time and expense, a simpler method may be used. The Department of Commerce, Bureau of Economic Analysis (BEA), publishes an official figure, called the Implicit Price Deflator (IPD), which summarizes what a certain group of goods and services costs during that year. An owner and operator can then use the IPD to determine how much prices "went up" (the inflation factor) and make a percentage adjustment to the previous year's closure and post-closure cost estimates.

Owners and operators must still adjust cost estimates following any changes in scope to their closure or post-closure plan that would raise the costs involved.

For example, expansion of a surface impoundment might increase the amount of contaminated soil to be removed at closure. The closure and post-closure estimates must be recalculated to reflect the additional expenses.

BEA's website provides a way to get IPD indices through Table 1.1.9. Implicit Price Deflators for Gross Domestic Product available at http://www.bea.gov.

The "Actual" section of the following table was pulled from the BEA Table 1.1.9 on 1/30/2014. The projections for 2014 and the first quarter of 2015 assume an annualized inflation rate of 1.67% (the average of the last twelve "actual" quarters). The projections in the table below should be used instead of trying to look up a current index on the BEA website, and this letter should be referenced as the source for the calculation.

Table 1.1.9.
GDP Implicit Price Deflator[1]

Type	Year	Quarter	Value	Qtr-to-Qtr Rate, Annualized
Actual	2004	I	88.130	
	2004	II	88.861	3.36%
	2004	III	89.432	2.60%
	2004	IV	90.078	2.92%
	2005	I	90.893	3.67%
	2005	II	91.525	2.81%
	2005	III	92.400	3.88%
	2005	IV	93.121	3.16%
	2006	I	93.837	3.11%
	2006	II	94.595	3.27%
	2006	III	95.249	2.79%
	2006	IV	95.583	1.41%
	2007	I	96.652	4.55%
	2007	II	97.190	2.25%
	2007	III	97.526	1.39%
	2007	IV	97.959	1.79%
	2008	I	98.507	2.26%
	2008	II	98.984	1.95%
	2008	III	99.659	2.76%
	2008	IV	99.808	0.60%
	2009	I	100.064	1.03%
	2009	II	99.897	-0.67%
	2009	III	99.874	-0.09%
	2009	IV	100.164	1.17%
	2010	I	100.513	1.40%
	2010	II	100.958	1.78%
	2010	III	101.418	1.84%
	2010	IV	101.936	2.06%
	2011	I	102.343	1.61%
	2011	II	103.002	2.60%
	2011	III	103.650	2.54%
	2011	IV	103.783	0.51%
	2012	I	104.291	1.97%
	2012	II	104.750	1.77%
	2012	III	105.292	2.09%
	2012	IV	105.667	1.43%
	2013	I	106.105	1.67%
	2013	II	106.259	0.58%
	2013	III	106.778	1.97%
	2013	IV	107.121	1.29%
Projection	2014	I	107.565	1.67%
	2014	II	108.011	1.67%
	2014	III	108.459	1.67%
	2014	IV	108.909	1.67%
	2015	I	109.361	1.67%

CALCULATION

To make an inflation adjustment **where the scope of work has not changed**, look up the GDP implicit price deflator for the current year and quarter for which you are making the calculation. Divide that by the price deflator for the year and quarter of the original estimate. Multiply that quotient by the $ amount of the original estimate. The result represents the original cost estimate inflation-adjusted to current dollars.

Finally, to document the updated cost, be sure to show the original cost estimate, along with the years and indices used in the calculation.

Example:

A closure-cost estimate completed in September of 2010 was $2,500,000. The scope of work has not changed.

The inflation-adjusted cost for May 2014 is calculated as follows:

Implicit Price Deflator for 2014-II = 108.011

Implicit Price Deflator for 2010-III = 101.418

Quotient = 108.011 ÷ 101.418 = 1.065012928

Inflation-adjusted cost estimate in current dollars =

$2,500,000 x 1.065012928 = $2,662,532.

Please let me know if your have any questions.

Jim Harris
Financial Analyst
Oregon DEQ
(503) 229-5378

[1]See http://www.bea.gov/iTable/iTable.cfm?ReqID=9&step=1
and click on SECTION 1 – DOMESTIC PRODUCT AND INCOME;
then click on Table 1.1.9. Implicit Price Deflators for Gross Domestic Product (A) (Q).
Click on the options icon to select beginning and ending quarters.

VISTA CONSULTANTS	4132 SW BARBUR BLVD PORTLAND, OR 97239

Site:	Riverbend Landfill	**Calculations by:**	Roger North, P.E.
Project:	2013 Post-Closure Cost Estimate	**Date:** 5-Mar-13	**Page:** 1 of 2

Purpose:

Estimate the present worth costs for the 30-year post-closure period associated with leachate management activities.

References:

1. Lindeburg, Michael. Civil Engineering Reference Manual . 7th ed. California: Professional Publications, 2003. 85-5, 85-7, A-123 and A-124.
2. Oregon Department of Environmental Quality, email communication from Jim Harris, June 28, 2012. 2012 Annual Reference Rate.

Assumptions:

1. In accordance with the overall closure timeline laid out, assume that closure construction would occur in 2014 (year 1), and long-term, 30-year, post-closure period lasting from 2015 to 2044.
2. Initial leachate volume of 17,240,000 gal. based on average leachate generation volumes since 2009 (following construction of Module 8D in 2008). WM reported volumes as follows: 2009 - 15,735,518 gal.; 2010 - 10,597,259 gal.; 2011 - 21,628,094 gal.; and 2012 - 21,011,921 gal.
3. Post-closure leachate generation volumes estimated by WM and VISTA on 02-21-2013, using the algorithms contained in the Waste Management 2013 Landfill Workbook for Riverbend Landfill, and following assumptions:
   - Landfill footprint as for 2013, pre-expansion for MSE berm, = 85 acres.
   - All closure to occur in 2014.
   - Precipitation fraction = 0.13; quoted value appropriate for MSW in area with >30 in. annual precitpitation.
3. Leachate management and treatment costs of $0.0525 /gal. = $52.50 / 1,000 gal., based on average WM reported off-site disposal costs in 2012, as follows:
   - Transport to and dosposal at Hillsboro Landfill - $0.035 /gal. = $35.00 / 1,000 gal.
   - Transport to and disposal at Salem POTW - $0.070 /gal. = $70.00 / 1,000 gal.

Calculations:

1. For single occurrence future costs:

   $P = (A)(1+i)^{-n}$

   Where:

   P = Present worth

   A = Single occurrence cost

   i = Municipal interest rate = 0.99%

   n = Number of years interest applied = 30 years

Site: Riverbend Landfill
Calculations by: Roger North, P.E.
Project: 2013 Post-Closure Cost Estimate
Date: 5-Mar-13

TABLE 1
ESTIMATED PRESENT WORTH LEACHATE DISPOSAL COSTS

Year	Years from 2013 (n)	(i) (%)	Estimated Leachate Generation (gal/yr)	2013 Estimated Leachate Disposal Cost ($/1,000 gal)	Estimated Annual Cost ($)	Estimated Annual Present Worth Cost ($)
2014	1	0.99%	17,240,000	$ 52.50	$ 905,100	$ 896,227
2015	2	0.99%	9,977,258	$ 52.50	$ 523,806	$ 513,587
2016	3	0.99%	8,838,522	$ 52.50	$ 464,022	$ 450,509
2017	4	0.99%	7,829,753	$ 52.50	$ 411,062	$ 395,179
2018	5	0.99%	6,936,118	$ 52.50	$ 364,146	$ 346,644
2019	6	0.99%	6,144,477	$ 52.50	$ 322,585	$ 304,070
2020	7	0.99%	5,443,188	$ 52.50	$ 285,767	$ 266,725
2021	8	0.99%	4,821,939	$ 52.50	$ 253,152	$ 233,967
2022	9	0.99%	4,271,596	$ 52.50	$ 224,259	$ 205,232
2023	10	0.99%	3,784,065	$ 52.50	$ 198,663	$ 180,026
2024	11	0.99%	3,352,177	$ 52.50	$ 175,989	$ 157,915
2025	12	0.99%	2,969,583	$ 52.50	$ 155,903	$ 138,521
2026	13	0.99%	2,630,655	$ 52.50	$ 138,109	$ 121,508
2027	14	0.99%	2,330,410	$ 52.50	$ 122,347	$ 106,585
2028	15	0.99%	2,064,433	$ 52.50	$ 108,383	$ 93,494
2029	16	0.99%	1,828,812	$ 52.50	$ 96,013	$ 82,011
2030	17	0.99%	1,620,084	$ 52.50	$ 85,054	$ 71,939
2031	18	0.99%	1,435,179	$ 52.50	$ 75,347	$ 63,104
2032	19	0.99%	1,271,377	$ 52.50	$ 66,747	$ 55,353
2033	20	0.99%	1,126,271	$ 52.50	$ 59,129	$ 48,555
2034	21	0.99%	997,726	$ 52.50	$ 52,381	$ 42,592
2035	22	0.99%	883,852	$ 52.50	$ 46,402	$ 37,361
2036	23	0.99%	782,975	$ 52.50	$ 41,106	$ 32,772
2037	24	0.99%	693,612	$ 52.50	$ 36,415	$ 28,747
2038	25	0.99%	614,448	$ 52.50	$ 32,259	$ 25,217
2039	26	0.99%	544,319	$ 52.50	$ 28,577	$ 22,119
2040	27	0.99%	482,194	$ 52.50	$ 25,315	$ 19,403
2041	28	0.99%	427,160	$ 52.50	$ 22,426	$ 17,020
2042	29	0.99%	378,406	$ 52.50	$ 19,866	$ 14,929
2043	30	0.99%	335,218	$ 52.50	$ 17,599	$ 13,096
2044	31	0.99%	296,958	$ 52.50	$ 15,590	$ 11,487
		TOTALS	102,352,763		$ 5,373,520	$ 4,995,894

This year:	2014

inputs

Rates		Basis
MSW Ref Rate	2.23%	Use reference rate for this SFY

2009/10	1.74%
2010/11	3.15%
2011/12	2.32%
2012/13	0.99%
2013/14	2.23%

		Closure Costs		Post-Closure Costs		Total	
Year #	Year	Current $	Pres Val$	Current $	Pres Val$	Current $	Pres Val$
	Totals	$8,081,742	$8,081,742	$11,834,150	$8,561,638	$19,915,892	$16,643,380
0	2014	8,081,742	8,081,742			8,081,742	8,081,742
1	2015			394,471.68	385,867	394,472	385,867
2	2016			394,471.68	377,450	394,472	377,450
3	2017			394,471.68	369,216	394,472	369,216
4	2018			394,471.68	361,162	394,472	361,162
5	2019			394,471.68	353,284	394,472	353,284
6	2020			394,471.68	345,578	394,472	345,578
7	2021			394,471.68	338,039	394,472	338,039
8	2022			394,471.68	330,666	394,472	330,666
9	2023			394,471.68	323,453	394,472	323,453
10	2024			394,471.68	316,397	394,472	316,397
11	2025			394,471.68	309,495	394,472	309,495
12	2026			394,471.68	302,744	394,472	302,744
13	2027			394,471.68	296,140	394,472	296,140
14	2028			394,471.68	289,680	394,472	289,680
15	2029			394,471.68	283,361	394,472	283,361
16	2030			394,471.68	277,180	394,472	277,180
17	2031			394,471.68	271,134	394,472	271,134
18	2032			394,471.68	265,219	394,472	265,219
19	2033			394,471.68	259,434	394,472	259,434
20	2034			394,471.68	253,775	394,472	253,775
21	2035			394,471.68	248,239	394,472	248,239
22	2036			394,471.68	242,824	394,472	242,824
23	2037			394,471.68	237,527	394,472	237,527
24	2038			394,471.68	232,346	394,472	232,346
25	2039			394,471.68	227,278	394,472	227,278
26	2040			394,471.68	222,320	394,472	222,320
27	2041			394,471.68	217,470	394,472	217,470
28	2042			394,471.68	212,727	394,472	212,727
29	2043			394,471.68	208,086	394,472	208,086
30	2044			394,471.68	203,547	394,472	203,547
31	2045						