

Attachment E

Financial Assurance Documentation

Post Closure Maintenance Cost Estimate for Cedar Hills Regional Landfill

Background

WAC 173-351 requires owners and operators of Municipal Solid Waste Landfills (MSWLF) 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 or all MSWLF units in compliance with the post-closure plan developed under WAC 173-351-500(2). The post closure period is defined to last thirty years or as long as necessary for the landfill to become functionally stable. For this cost estimate, thirty years is assumed.

The Post Closure Maintenance (PCM) estimates have been prepared for Cedar Hills Regional Landfill (CHRLF) previously. These estimates are prepared based on historical levels of effort required for tasks that will continue through the post closure period and levels of effort required for similar tasks conducted at closed landfills maintained by the King County Solid Waste Division (SWD). The last major revision was completed in 2012; annual reviews include reviewing the proposed activities and adjusting activities that have changed based on changes to operation and maintenance practices utilized by SWD.

Purpose

This document provides the basis for the PCM estimate. This includes the underlying assumptions and the documented changes from previous years. The estimate is to be reviewed annually and updated as necessary.

2014 Update

The cost items were reviewed for completeness for 2014. No additional items were identified. The cost estimates remained the same and the total annual PCM cost was inflated to 2014 dollars.

2015-2017 Updates

The cost items were reviewed for completeness annually by SWD Facility Engineering and Science Unit. No additional items were identified. The line-item detail cost estimates in Table 1 remained the same and the total annual PCM cost was inflated to current year dollars using the Seattle area CPI-U index computed by the King County Office of Economic Forecasting and Analysis.

2018 Update.

The cost items were reviewed and adjusted to reflect the addition of Area 8. Area 8 increases the volume of the landfill by 12% and the footprint by 14%. The following PCM elements were increased by 14% to reflect the addition of Area 8: Cover maintenance, leachate system maintenance, stormwater system maintenance, landfill gas system maintenance, electrical utility charges, and wastewater utility charges.

2019-20 Updates

The cost items were reviewed for completeness annually by SWD Facility Engineering and Science Section. No additional items were identified. The line-item detail cost estimates in Table 1 remained the same and the total annual PCM cost was inflated to current year dollars. No additional capacity is assumed beyond the currently permitted landfill capacity in this financial assurance analysis for PCM.

Major PCM Elements

The cost estimate includes maintenance costs for the environmental control systems at the site. The main systems are the landfill gas collection system, the leachate collection system, the North Flare Station, the leachate aeration lagoons, the cover system and the groundwater monitoring network. All tasks from previous PCM estimates were reviewed to determine that all tasks are still necessary and that all necessary tasks are included. The itemized tasks were reviewed with SWD operations leads and or supervisors.

All tasks were reviewed to determine whether current estimates of levels of effort to complete the task are still current and to determine level of effort for any new tasks.

The estimate is based on tasks being performed by SWD staff or contractors in the same manner as currently performed. To compensate for the potential that all tasks may be performed by contractors, a project management cost was added to the overall estimate. The underlying assumption is that the cost of performing the work remains constant whether performed by SWD forces or contractors, but SWD would incur increased costs for managing contracts with the contractors.

The cost items in the PCM estimate include:

- Cover Maintenance & General Site Maintenance
 - Vegetation control
 - Geomembrane repair
 - Road maintenance
 - Fence Repair
 - Litter Control
 - Grading
 - Well Boot repair
- Leachate System Maintenance
 - Aerator repair and maintenance
 - Pump repair and maintenance
 - Leachate extraction well replacement
 - Periodic line cleaning
 - Air compressor repair and maintenance
- Stormwater System Maintenance
 - Stormwater conveyance system cleaning and maintenance
 - Catch basin cleaning and maintenance
 - Pond cleaning and maintenance
- Landfill Gas System Maintenance
 - Blower repair and maintenance

- Flare repair and maintenance
- Stack emissions testing
- Routine testing and maintenance
- Environmental Monitoring
 - Groundwater and leachate samples
 - Laboratory analysis
 - Sample collection
 - Data analysis
 - Reporting
 - Data Management
- Electrical Utilities
- Permits
 - Operating Permit for Closed Landfill
 - Air Operating Permit
- Wastewater Utility Fees
- Project Management and Reporting
 - Sample collection
 - Data management
 - Reporting
 - Project Management
- Investigation and Remediation
- Project management costs for third party contractor
- Contingency

Key Assumptions for Cost Estimates

Several key assumptions were made regarding the cost estimates. These assumptions are outlined below.

- ❖ The post closure period will be thirty years in length, beginning when the closure is approved by Public Health – Seattle and King County (PHSKC).
- ❖ At the time of closure, BEW or equivalent facility will be operating to utilize the landfill gas generated at the site. The facility will have scheduled downtime for maintenance, requiring use of the flares. The source testing requirement for this minimized use of the flares will be to test all flares once every five years.
- ❖ The closure project at the final closure will leave all systems in full working condition, with no anticipated major repairs.
- ❖ Support facilities and equipment currently located at CHRLF will either be relocated or will be supported through another funding source.
- ❖ Leachate recirculation is not included in the estimate. It is expected that if leachate recirculation is implemented, this will represent a cost savings.
- ❖ Operating and maintenance costs are included in the hourly rates for equipment.
- ❖ Overhead costs for employees include all costs associated with providing resources for employees to perform their tasks, including supervision.
- ❖ Equipment required to perform tasks is included in task budgets, including pickups for supervisors and leads. Equipment costs are based on federal approved rates, as available and California State approved rates otherwise.

- ❖ As is true with SWD’s existing closed landfills, the Industrial General Stormwater Permit (IGSWP) will no longer be in effect after closure; no surface/storm water sampling will be required.
- ❖ The estimate is based on tasks being performed by SWD staff or contractors in the same manner as currently performed. To compensate for the potential that all tasks may be performed by contractors, a project management cost was added to the overall estimate. The underlying assumption is that the cost of performing the work remains constant whether performed by SWD forces or contractors, but SWD would incur increased costs for managing contracts with the contractors.
- ❖ Contingency – The contingency in this estimate includes known unknowns such as responses to changes in groundwater quality or need to address landfill gas in native soil. This contingency assumes there will be one major investigation and remediation project during the thirty-year closure period. This activity is projected from years 5 through 10. Additional contingency is included to address the management of the risk that the landfill gas and leachate systems may have a failure requiring extensive repair or replacement and is assumed at 25% of the maintenance cost of the leachate and landfill gas systems.
- ❖ Major cost items with more uncertainty include a 5-10% estimating contingency. These items are maintenance activities currently performed and therefore have reliable cost projections to perform the work, but the frequency required is less certain. Higher contingency is applied to systems that have had more variable maintenance costs.
- ❖ Unknown unknowns are not included in the contingency and are assumed to be covered by management reserves. Examples of potential unknown unknowns include remediation due to Queen City Farms, changes to regulations and natural disasters.

Assumptions specific to the tasks are included in the detail tables that provide the supporting documentation for the estimate.

Summary of Costs

The summary of costs is provided in the table below.

Table 1: Cedar Hills Regional Landfill Post Closure Maintenance Cost Estimate

Task Group	2018 Annual Amount	Basis
Cover Maintenance	\$605,000	Based on 2012 estimated hours for PCM; updated wage and benefit rates and includes a 5% contingency, and was increased by 14%
Leachate System Maintenance	\$234,000	Based on 2012 estimated hours for PCM; updated wage and benefit rates; reduced aerator repair and replacement to reflect historical; adjusted for reduced leachate production in PCM and includes 10% contingency and was increased by 14%.
Stormwater System Maintenance	\$500,000	Based on 2012 estimated hours for PCM; updated wage and benefit rates and includes a 5% contingency and was increased by 14%.

Landfill Gas System Maintenance	\$300,000	Based on 2012 estimated hours for PCM; updated wage and benefit rates; assumes BEW or alternative utilizing all LFG; flares operating intermittently requiring source testing every 5 yrs. This estimate includes a 10% contingency.
Environmental Monitoring	\$166,000	2012 analytical lab, weather station maintenance inflated
Electrical Utilities	\$328,000	Based on 2012 costs increased by 14% and inflated.
Permits	\$6,000	Based on 2012 permit costs inflated
Project Management and Reporting ¹	\$754,000	Includes project management, field staff for monitoring; database mgmt. contract mgmt.; field equipment
Project management costs for third party contractor	\$238,000	Assumes contractor can complete labor at same cost as KCSWD; KC assumes 9% cost to manage - contingency is inherent to labor tasks
Wastewater utility	\$328,000	Assume reduced to average of 100 MG per year over the 30 years and increased by 14% from prior estimate
Base Estimate	\$3,459,000	
Contingency	\$308,000	Contingency based on 25% of leachate & LFG system maintenance plus one \$5M project occurring between years 5 and 10
2018 Total	\$3,767,000	2018 dollars
2019 Total	\$3,984,000	2019 dollars
2020 Total	\$4,042,000	2020 dollars

Exclusions

This estimate does not include costs of unknown risks. The risks addressed are identifiable and have some probability of occurring based on experiences at other closed sites. The estimate does not address the potential for the PCM period to extend beyond the minimum thirty years prescribed in the WAC 173-351.

Attachments

Project Management and Reporting Costs
Landfill Reserve Fund Cash Flow

Calculation of Landfill Reserve Fund

CIP Cash Flow A789 Cashflow 4/12/18
OEFA forecast Mar 2018
Ton forecast Apr 2018

2019 (2016\$) = 17.4814 Area 9, max height 800

Closure per ton I9 (2016\$) = \$6.232
C91003 CH Post-Closure Maintenance per ton I9 (2016\$) = \$1.043
C91004

Calculation of Landfill Reserve Fund

2019 (2016\$) = 17.48
CH New Area Development per ton I9 (2016\$) = \$6.921
C91001 CH Facility Improvements per ton I9 (2016\$) = \$3.285
C91002

Total LRF Contribution Summary

Year	Status	Projected Tonnage	EOY Capacity	Tonnage	Real Interest Rate	Revenue / Transfers	Interest Earned	Expenditures	Year-end Balance	Revenue / Transfers	Interest Earned	Expenditures	Year-end Balance	Year	Revenue / Transfers	Interest Earned	Expenditures	Year-end Balance	Revenue / Transfers	Interest Earned	Expenditures	Year-end Balance	Year-end Balance	Contribution Summary
1994	history	814,384			3.0%	4,422,550	(103,676)	513,220	(2,615,707)	1,058,717	449,184		11,332,732	1994	2,598,299	457,169	283,222	11,534,186	513,071	131,548	988,751	3,318,894	23,570,104	
1995	history	822,520			3.0%	4,232,078	60,636	544,191	1,132,816	484,771	668,324		12,485,826	1995	2,390,990	740,541	830,699	13,835,018	780,564	227,132	83,237	4,243,353	31,697,013	
1996	history	809,836			3.0%	3,341,693	238,061	234,264	4,478,306	727,166	741,819		13,954,811	1996	2,091,622	841,907	933,571	15,834,977	1,070,322	296,392	34,452	5,575,616	39,843,710	
1997	history	864,397			3.0%	3,014,712	82,895	6,163,038	1,412,875	738,474	915,808		15,609,094	1997	11,715,021	1,615,420	1,632,096	27,533,323	208,510	358,797	27,567	6,115,356	50,670,647	
1998	history	875,496			3.0%	2,780,226	(149,601)	6,446,861	(2,403,361)	733,524	1,084,800	0	17,427,418	1998	2,838,832	1,520,115	7,496,872	24,395,398	473,833	367,074	1,059,187	5,897,075	45,316,529	
1999	history	925,357			3.0%	5,692,434	(108,825)	4,917,919	(1,737,670)	548,289	1,205,846	0	19,181,553	1999	1,133,937	926,778	11,713,734	14,742,379	325,256	226,057	2,845,891	3,602,496	35,788,758	
2000	history	947,174			3.0%	5,696,710	(324,949)	7,620,145	(3,986,054)	719,851	1,766,389	0	21,667,793	2000	1,903,818	1,295,365	2,051,685	15,889,876	350,454	(10,155)	4,067,363	(124,568)	33,447,047	
2001	history	936,506			3.0%	5,637,760	(91,988)	3,312,977	(1,753,259)	739,839	1,245,568	0	23,653,200	2001	2,041,581	907,435	1,600,992	17,237,900	852,220	(17,177)	1,038,342	(327,868)	38,809,974	
2002	history	939,488			3.0%	5,640,893	51,404	2,486,402	1,452,636	699,420	893,380	0	25,246,000	2002	832,703	447,676	5,867,404	12,650,876	2,426,479	76,085	24,613	2,150,084	41,499,597	
2003	history	978,836			3.0%	3,181,167	138,833	2,320,514	2,452,121	636,244	676,286	0	26,558,530	2003	6,509,525	269,166	3,759,093	15,670,474	630,955	122,498	192,901	2,710,636	47,391,763	
2004	history	1,006,163			3.0%	6,130,019	107,554	4,199,095	4,490,598	523,205	664,548	0	27,746,284	2004	3,999,677	111,826	15,113,014	5,878,768	0	49,159	707,299	2,052,497	40,168,146	
2005	history	988,855			3.0%	6,724,207	269,503	1,726,896	9,757,413	207,659	794,030	0	28,747,973	2005	1,077,851	118,398	2,788,412	4,286,604	0	52,606	200,482	1,904,622	44,696,611	
2006	history	998,207			3.0%	4,791,394	423,519	5,656,525	9,315,800	0	1,367,521	0	30,115,493	2006	618,888	184,967	1,019,096	4,071,363	339,390	96,390	218,133	2,122,268	45,624,925	
2007	history	1,010,429			3.0%	4,489,147	549,365	3,168,565	11,185,747	0	1,554,363	0	31,669,856	2007	579,848	112,798	2,468,476	2,295,533	317,981	53,596	1,396,695	1,097,150	46,248,287	
2008	history	930,617			3.0%	4,234,307	291,016	4,913,371	10,797,699	0	856,085	762,193	31,763,748	2008	1,061,917	(78,342)	6,185,877	(2,906,769)	241,960	11,659	918,189	432,581	40,087,259	
2009	history	867,481			3.0%	3,270,407	271,372	3,516,106	10,823,372	0	816,886	0	32,580,635	2009	1,397,225	(257,449)	8,501,066	(10,268,059)	216,871	(19,332)	1,401,158	(771,039)	32,364,909	
2010	history	830,932			3.0%	2,592,436	146,490	1,831,806	11,730,492	0	412,011	0	32,992,646	2010	1,213,586	(137,615)	1,827,700	(11,019,787)	224,345	(9,465)	201,785	(757,944)	32,945,406	
2011	history	812,784			-2.00%	2,316,149	81,109	4,860,709	9,267,042	0	291,003	35,407	33,248,242	2011	1,820,512	(83,215)	2,277,504	(9,510,137)	674,528	(2,050)	148,701	(234,166)	32,770,981	
2012	history	806,914			1.93%	3,969,968	138,315	3,785,264	9,590,061	0	486,547	0	33,734,789	2012	2,815,552	(97,258)	0	(6,792,551)	644,980	577	371,370	40,021	36,572,319	
2013	history	809,165			-0.70%	4,795,927	98,546	4,165,174	10,319,359	1,777,738	342,400	0	35,854,927	2013	2,631,725	(42,258)	222,039	(4,425,124)	679,699	4,302	273,484	450,539	42,199,703	
2014	history	843,321			-1.31%	5,111,363	57,249	2,593,043	12,894,929	1,867,110	168,221	0	37,890,259	2014	2,838,572	(21,270)	3,183,038	(4,790,860)	600,444	4,537	33,535	1,021,986	47,016,313	10,417,489
2015	history	869,802			-0.75%	5,821,870	78,551	6,276,818	12,518,531	3,443,063	260,996	0	41,594,317	2015	2,647,862	(85,384)	11,379,097	(13,607,479)	545,999	4,151	910,574	661,561	41,166,932	12,458,793
2016	history	922,000			-1.36%	8,603,099	188,326	1,329,322	19,980,634	2,132,496	416,066	0	44,142,879	2016	3,913,805	(214,887)	12,890,033	(22,798,593)	806,843	(27,149)	4,321,615	(2,880,360)	38,444,561	15,456,243
2017	history	931,177	20,873,863	931,177	-1.87%	6,067,642	233,111	5,594,309	20,687,079	10,239,844	619,794	0	55,002,517	2017	5,521,338	(415,344)	19,166,353	(36,858,951)	1,935,824	(32,059)	1,868,463	(2,845,058)	35,985,587	23,764,649
2018	forecast	953,421	19,920,442	953,421	-1.72%	6,212,623	(341,846)	\$7,738,015	18,819,841	3,317,221	(972,145)	0	57,347,593	2018	5,648,208	780,520	\$22,914,948	(53,345,171)	1,982,020	72,084	\$4,694,650	(5,485,604)	17,336,659	17,160,072
2019	forecast	963,089	18,957,353	963,089	-1.12%	6,002,013	(181,654)	\$11,235,171	13,405,030	1,004,780	(648,554)	0	57,703,818	2019	6,665,365	614,601	\$9,617,920	(55,683,125)	3,163,950	68,007	\$4,325,015	(6,578,662)	8,847,061	16,836,108
2020	forecast	1,007,056	17,950,297	1,007,056	-0.29%	6,276,018	(40,941)	\$4,567,291	15,072,816	1,050,650	(167,184)	0	58,587,285	2020	16,969,653	142,178	\$4,643,051	(43,214,346)	3,308,391	42,081	\$19,464,374	(22,692,564)	7,753,191	27,604,711
2021	forecast	1,030,711	16,919,586	1,030,711	0.11%	6,423,437	19,893	\$602,526	20,913,620	1,075,329	65,404	0	59,728,018	2021	7,133,364	(45,933)	\$3,752,169	(39,879,083)	3,386,102	(32,922)	\$17,524,885	(36,864,269)	3,898,285	18,018,233
2022	forecast	1,070,056	15,849,530	1,070,056	0.40%	6,668,636	87,442	\$4,781,705	22,887,993	1,116,378	241,182	0	61,085,577	2022	7,405,664	(149,887)	\$2,579,616	(35,202,922)	3,515,359	(144,121)	\$1,836,392	(35,329,424)	13,441,224	18,706,037
2023	forecast	1,088,907	14,760,623	1,088,907	0.66%	6,786,117	171,957	\$578,816	29,267,250	1,136,045	407,890	0	62,629,512	2023	7,536,128	(251,797)	\$13,249,845	(41,168,436)	3,577,288	(221,900)	\$0	(31,974,036)	18,754,289	19,035,578
2024	forecast	1,129,620	13,631,003	1,129,620	0.81%	7,039,842	247,894	\$4,702,513	31,852,472	1,178,520	514,903	0	64,322,934	2024	7,817,896	(433,591)	\$31,952,060	(65,736,192)	3,711,039	(253,140)	\$1,923,078	(30,439,215)	19,747,297	20,299,323
2025	forecast	1,161,198	12,469,805	1,161,198	0.93%	7,236,637	311,460	\$3,660,282	35,740,288	1,211,465	601,139	0	66,135,538	2025	8,036,441	(607,509)	\$7,797,475	(66,104,735)	3,814,779	(264,160)	\$0	(26,888,595)	8,882,495	21,005,081
2026	forecast	1,201,570	11,268,235	1,201,570	0.99%	7,488,237	319,532	\$14,595,799	28,952,258	1,253,585	662,783	0	68,051,906	2026	8,315,849	(614,977)	\$0	(58,403,864)	3,947,410	(247,343)	\$0	(23,188,528)	15,411,772	21,525,081
2027	forecast	1,231,316	10,036,919	1,231,316	1.02%	7,673,616	318,535	\$2,967,981	33,976,427	1,284,618	698,976	0	70,035,500	2027	8,521,715	(550,914)	\$0	(50,433,063)	4,045,132	(215,367)	\$0	(19,358,764)	34,220,100	21,525,081
2028	forecast	1,273,235	8,763,684	1,273,235	1.02%	7,934,857	352,414	\$6,618,363	35,645,334	1,328,352	702,983	0	72,033,647	2028	8,811,829	(468,334)	\$0	(42,089,568)	4,182,845	(175,698)	\$0	(15,351,617)	47,047,796	21,525,081
2029	forecast	1,295,246	7,468,438	1,295,246	1.02%	8,072,032	381,317	\$4,412,242	39,686,441	1,351,316	707,371	0	74,002,334	2029	8,964,165	(383,320)	\$129,157	(33,637,879)	4,255,156	(134,557)	\$0	(11,231,018)	65,719,877	251,617,206
2030	forecast	1,317,638	6,150,800	1,317,638	1.02%	8,211,578	411,922	\$6,618,363	41,691,577	1,374,677	728,437	0	76,005,448	2030	9,119,134	(296,972)	\$215,261	(25,030,979)	4,328,717	(92,255)	\$0	(6,994,556)	82,671,490	251,617,206
2031	forecast	1,340,417	4,810,383	1,340,417	1.02%	8,353,536	444,271	\$4,412,242	46,077,142	1,398,442	749,958	0	78,153,847	2031	9,276,782	(207,936)	\$86,104	(16,048,238)	4,403,550	(55,394)	\$1,302,589	(3,948,988)	101,233,762	251,617,206
2032	forecast	1,363,589	3,446,794	1,363,589	1.02%	8,497,949	478,405	\$6,618,363	48,435,132	1,422,618	771,941	0	79,348,406	2032	9,437,155	(115,281)	\$0	(6,726,365)	4,479,677	(37,272)	\$3,907,766	(3,414,349)	115,642,825	251,617,206
2033	forecast	1,387,162	2,059,631	1,387,162	1.02%	8,644,858	514,370	\$4,412,242	53,182,118	1,447,211	794,396	0	80,592,013	2033	9,600,301	(19,600)	\$0	(2,854,336)	4,557,120	(44,692)	\$6,512,944	(5,4		