

## **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.

### 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 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**

<b>Task Group</b>	<b>Annual Costs</b>	<b>Contingency</b>	<b>Annual Amount</b>	<b>Basis</b>
Cover Maintenance	\$443,042	5%	\$461,833	Based on current estimated hours for PCM; updated wage and benefit rates
Leachate System Maintenance	\$168,046	10%	\$178,844	Based on current estimated hours for PCM; updated wage and benefit rates; reduced aerator repair and replacement to reflect historical; adjusted for reduced leachate production in PCM
Stormwater System Maintenance	\$356,431	5%	\$382,209	Based on current estimated hours for PCM; updated wage and benefit rates
Landfill Gas System Maintenance	\$206,050	10%	\$226,655	Based on current 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
Environmental Monitoring	\$143,150	10%	\$144,000	analytical lab, weather station maintenance
Electrical Utilities	\$250,000		\$250,000	Based on current costs
Permits	\$5,000		\$5,000	Based on current permit costs
Project Management and Reporting <sup>1</sup>	\$655,893		\$655,893	Includes project management, field staff for monitoring; database mgmt. contract mgmt.; field equipment

<sup>1</sup> See attached schedule "Project Management and Reporting Costs" for detail

Project management costs for third party contractor	\$199,135		\$206,949	Assumes contractor can complete labor at same cost as KCSWD; KC assumes 9% cost to manage - contingency is inherent to labor tasks
Wastewater utility	\$250,000		\$250,000	Assume reduced to average of 100 MG per year over the 30 years
<b>Base Estimate</b>	<b>\$2,676,747</b>		<b>\$2,761,383</b>	
Contingency	\$260,191		\$268,041	Contingency based on 25% of leachate & LFG system maintenance plus one \$5M project occurring between years 5 and 10
<b>TOTAL</b>	<b>\$2,936,938</b>		<b>\$3,029,424</b>	
<b>2013 Total</b>	<b>\$2,898,170</b>		<b>\$2,989,436</b>	2013 Adjustment (inflation -1.32%)
<b>2014 Total</b>	<b>\$2,913,240</b>		<b>\$3,004,981</b>	2014 Adjustment (inflation 0.52%)
<b>2015 Total</b>	<b>\$2,954,025</b>		<b>\$3,047,051</b>	2015 Adjustment (inflation 1.40%)
<b>2016 Total</b>	<b>\$3,030,830</b>		<b>\$3,126,274</b>	2016 Adjustment (inflation 2.6%)
<b>2017 Total</b>	<b>\$3,124,786</b>		<b>\$3,223,188</b>	2017 Adjustment (inflation 3.1%)

#### 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

2019 (2016\$) = 14.8362 Area 9, max height 800'

Calculation of Landfill Reserve Fund

2019 (2016\$) = 14.84

CIP Cash Flow Main Scenario Mar 2018  
OEFA forecast Aug 2017  
Ton forecast Feb 2018

		Closure				C91003 CH Post-Closure Maintenance				C91004 CH New Area Development				C91001 CH Facility Improvements				C91002		Total LRF	Contribution				
		per ton 19 (2016\$) =				per ton 19 (2016\$) =				per ton 19 (2016\$) =				per ton 19 (2016\$) =				\$1.558			Summary				
Year	Status	CH Disposal	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	Cash Inject	Year-end Balance	Contribution
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	1,061,917	31,763,748	762,193	31,669,856	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	1,820,412	(83,237)	35,407	33,248,242	2011	1,820,412	(83,237)	227,524	(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	(97,967)	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	922,003			-1.36%	8,603,099	188,326	1,329,322	19,980,634	2,132,496	414,066	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	forecast	931,177	20,873,863	931,177	-1.84%	11,634,144	(434,802)	4,459,984	26,719,993	4,619,617	(857,007)	0	47,905,489	2017	8,048,124	482,895	14,800,045	(29,067,620)	2,457,830	86,808	6,107,669	(6,443,391)		39,114,472	26,759,716
2018	forecast	953,421	19,920,442	953,421	-1.23%	6,212,622	(319,719)	7,738,015	24,874,881	3,317,221	(610,487)	0	50,612,223	2018	5,648,207	464,368	22,914,948	(45,869,993)	1,982,020	93,897	4,341,894	(8,709,368)		20,907,743	17,160,070
2019	forecast	963,089	18,957,353	963,089	-0.63%	5,623,514	(138,299)	11,235,171	19,124,926	1,890,109	(323,092)	0	52,179,240	2019	5,274,109	307,481	11,666,640	(51,955,042)	1,500,811	55,590	1,823,728	(8,976,694)		10,372,430	14,288,544
2020	forecast	1,007,056	17,950,297	1,007,056	-0.43%	5,880,238	(84,812)	4,567,291	20,353,061	1,976,396	(227,953)	0	53,927,683	2020	5,514,882	223,770	5,988,240	(52,204,630)	1,569,326	41,845	3,135,462	(10,500,986)		11,575,128	14,940,841
2021	forecast	1,030,711	16,919,586	1,030,711	-0.08%	6,018,359	(19,434)	602,526	25,749,461	2,022,820	(46,298)	0	55,904,205	2021	5,644,421	43,837	5,273,240	(51,789,612)	1,606,188	8,683	1,212,385	(10,098,500)		19,765,554	15,291,788
2022	forecast	1,070,056	15,849,530	1,070,056	0.11%	6,248,101	30,351	4,781,705	27,246,207	2,100,038	65,273	0	58,069,515	2022	5,859,888	(59,018)	5,273,240	(51,261,981)	1,667,501	(11,313)	1,212,385	(9,654,696)		24,399,045	15,875,528
2023	forecast	1,088,907	14,760,623	1,088,907	0.26%	6,358,168	79,445	578,816	33,105,003	2,137,032	155,900	0	60,362,447	2023	5,963,116	(134,446)	5,438,240	(50,871,550)	1,696,876	(23,215)	0	(7,981,035)		34,614,865	16,155,192
2024	forecast	1,129,620	13,631,004	1,129,620	0.32%	6,595,892	107,923	4,702,513	35,106,305	2,216,933	194,825	0	62,774,206	2024	6,186,070	(160,482)	5,713,240	(50,559,202)	1,760,320	(25,553)	1,923,078	(8,169,345)		39,151,964	16,759,215
2025	forecast	1,161,198	12,469,805	1,161,198	0.40%	6,780,283	145,639	4,114,823	37,917,404	2,278,908	255,449	0	65,308,563	2025	6,359,004	(211,321)	10,986,479	(55,397,999)	1,809,531	(29,035)	0	(6,388,849)		41,439,118	17,227,726
2026	forecast	1,201,570	11,268,235	1,201,570	0.47%	7,016,014	157,097	16,241,712	28,848,803	2,358,140	313,621	0	67,980,323	2026	6,580,089	(271,314)	10,821,479	(59,910,703)	1,872,443	(25,720)	0	(4,542,126)		32,376,296	17,826,686
2027	forecast	1,231,316	10,036,919	1,231,316	0.47%	7,189,702	106,792	19,607,582	16,537,715	2,416,518	326,361	0	70,723,201	2027	6,742,985	(266,694)	0	(53,434,413)	1,918,797	(16,900)	0	(2,640,228)		31,186,275	18,268,001
2028	forecast	1,273,235	8,763,685	1,273,235	0.47%	7,434,466	58,359	15,765,528	8,265,012	2,498,785	331,891	0	70,330,689	2028	6,972,541	(235,604)	0	(46,697,476)	1,984,120	(7,774)	0	(663,883)		31,234,342	
2029	forecast	1,228,518	7,535,167	1,228,518	0.47%	7,173,363	16,563	16,680,631	(1,225,693)	2,411,026	337,435	0	73,079,149	2029	6,727,661	(204,404)	0	(40,174,219)	1,914,437	1,384	0	1,251,937		32,931,175	218,468,342
2030	forecast	1,269,924	6,265,242	1,269,924	0.47%	7,415,138	(6,223)	7,602,315	(1,419,092)	2,492,288	350,591	0	75,922,028	2030	6,954,414	(173,099)	0	(33,392,904)	1,978,962	10,573	0	3,241,472		44,351,504	
2031	forecast	1,294,571	4,970,671	1,294,571	0.47%	7,559,052	728	4,412,242	1,728,445	2,540,659	364,114	0	78,826,802	2031	7,089,386	(140,793)	0	(26,444,311)	2,017,370	16,976	1,302,589	3,973,229		58,084,164	
2032	forecast	1,356,723	3,613,948	1,356,723	0.47%	7,921,960	11,228	6,618,363	3,043,269	2,662,635	378,104	0	81,867,541	2032	7,429,746	(107,214)	0	(19,121,780)	2,114,223	14,512	3,907,766	2,194,197		67,983,228	
2033	forecast	1,399,082	2,214,866	1,399,082	0.47%	8																			

### Tons Disposed at Cedar Hills Regional Landfill

Year	Tons Disposed	Average Monthly Tonnage	Comments
2010	830,932	69,244	Actual
2011	812,784	67,732	Actual
2012	806,914	67,243	Actual
2013	809,165	67,430	Actual
2014	843,321	70,277	Actual
2015	869,802	72,484	Actual
2016	922,000	76,833	Actual
2017	931,177	77,598	Actual
2018	953,421	79,452	Forecasted
2019	963,089	80,257	Forecasted
2020	1,007,056	83,921	Forecasted
2021	1,030,711	85,893	Forecasted
2022	1,070,056	89,171	Forecasted
2023	1,088,907	90,742	Forecasted
2024	1,129,620	94,135	Forecasted
2025	1,161,198	96,767	Forecasted
2026	1,201,570	100,131	Forecasted
2027	1,231,316	102,610	Forecasted
2028	1,273,325	106,110	Forecasted
2029	1,228,518	102,377	Forecasted
2030	1,269,924	105,827	Forecasted
2031	1,294,571	107,881	Forecasted
2032	1,356,723	113,060	Forecasted
2033	1,399,082	116,590	Forecasted
2034	1,464,612	122,051	Forecasted
2035	1,503,669	125,306	Forecasted
2036	1,572,348	131,029	Forecasted
2037	1,613,314	134,443	Forecasted
2038	1,685,518	140,460	Forecasted
2039	1,728,658	144,055	Forecasted
2040	1,804,555	150,380	Forecasted

**Source:** Alexander Rist, KCSWD  
**Updated:** 3/30/2018