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MEMORANDUM

Date: July 31, 2019
To: John Arnau and David Tieu, OC Waste & Recycling
From: Laith Ezzet and April Hamud, HF&H Consultants, LLC
Subject: Anticipated Closure Date of Olinda Alpha Landfill

The purpose of the memorandum is to estimate the anticipated closure date of the Olinda Alpha Landfill (OAL). Pursuant to OAL's Solid Waste Facility Permit, the landfill is permitted to operate until December 31, 2021. The landfill is projected to have remaining airspace beyond the permitted closure date. This memorandum has been prepared to describe the projections utilized to develop the anticipated date when the landfill reaches full tonnage capacity. OC Waste & Recycling intends to use the information for the purposes of revising OAL's Solid Waste Facility Permit with a new closure date.

Background

The Final Environmental Impact Report (EIR 588) dated April 17, 2007 projected that OAL would reach the maximum vertical elevation of 1,415 feet by December 2021 (permitted closure date), "based on current population projections, daily tonnage, compaction densities, approved landfill elevations and existing disposal technologies." However, as of June 2019, OAL is at the vertical elevation of approximately 1,290 feet, and 125 feet of vertical elevation remain.

The Cooperative Agreement between the County of Orange and the City of Brea limits daily waste disposal to an annual average of 7,000 TPD (which equates to approximately 2.15 million tons per year based on 307 operating days per year). However, average daily tonnage received at OAL from 2008-2018 was approximately 5,800 TPD.

County of Orange staff estimates that it will take longer to fill up the landfill to capacity than originally anticipated in EIR 588, due to a variety of factors which include the following:

- OAL received less refuse than projected due to the 2009 Great Recession, which began in December 2007 and resulted in major declines in all economic activity, including disposal tonnage.
- OAL used less soil for daily cover than originally anticipated with the use of green material alternative daily cover (ADC) and geosynthetic tarps.
- Increased operational efficiencies including effective refuse placement and compaction methods.

- The long-term effects of settlement that increases waste density over time, allowing for greater capacity than anticipated.
- Increased waste reduction and recycling mandates on jurisdictions, including mandatory commercial recycling (AB 341), mandatory organics recycling (AB 1826), short-lived climate pollutants act (SB 1383), and green material used as alternative daily cover (AB 1594).

Analysis

OCWR requested HF&H Consultants, LLC (HF&H) to estimate the revised closure date for the continued operation of the Olinda Alpha Landfill, with the landfill operating until reaching its permitted final elevation of 1,415 feet. Using a variety of factors including remaining refuse capacity, projected tonnage demand, and inflow restrictions, the estimated date for OAL to reach full tonnage capacity is December 2036. The modeling estimates are provided in Table 1 below.

Table 1: Estimated Closure Date and Modeling Estimates

Row	Category	Description
1	Current Closure Date	December 2021
2	Estimated Closure Date	December 2036
3	Approximate Refuse Capacity as of 12/31/2018 ⁽¹⁾	19.3 million tons
4	Annual Tonnage	As projected for organics diversion, recession, and population growth. (See below.)
5	Alternative Daily Cover (ADC)	Green material ADC will continue to be used until December 31, 2019. As of January 1, 2020, green material ADC will no longer be used. Instead OCWR will use tarps to cover refuse.
6	Inflow Limitations	<ul style="list-style-type: none"> • When approximately 4.4 million tons of refuse remain, reduce daily inflow capacity to maximum of 2,000 tons/day (614,000 tons/year). • When approximately 2.5 million tons of refuse remain, reduce daily inflow capacity to maximum of 1,400 tons/day (429,000 tons/year).
7	Importation	Continue until approximately 4.4 million tons of refuse remain

(1) Approximate Remaining Site Disposal Tonnages were provided by SWT and are based on Olinda Alpha Landfill remaining volume capacity per the current JTD Conceptual Final Grading Plan (Drawing 4; JTD 2019) and the LEA 2018 Annual Capacity Report. The Remaining Tonnages range accounts for operational variables that impact the density of waste.

(2) Permitted Maximum Capacity under the Solid Waste Facility Permit is 8,000 tpd for 271 days and 10,000 tpd for 36 days. City of Brea Cooperative Agreement limits annual daily average capacity to 7,000 tpd on a calendar year basis.

In order to project the OAL closure date, the following estimates and variables were used:

1. Approximate Remaining Tonnage as of December 31, 2018: SWT provided the estimated remaining landfill capacity (in refuse tons) as of December 31, 2018 for Olinda Alpha Landfill, and provided a high landfill capacity (19.3 million tons) estimate based on operational variables that impact the density of waste. Remaining landfill capacity estimate (in refuse tons) was based on remaining volume capacity per the current JTD Conceptual Final Grading Plan and August 30, 2018 topographic information (Drawing 4; JTD 2019), and the LEA 2018 Annual Capacity Report. The

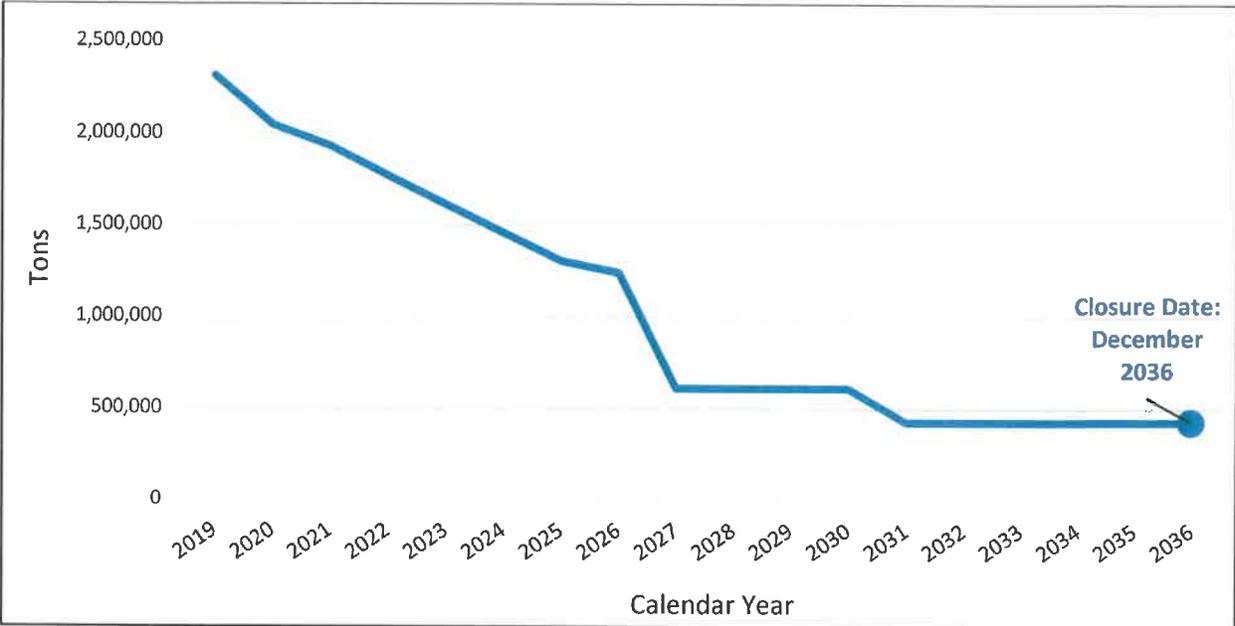
Airspace Utilization Factor (AUF) is based on tonnage disposed divided by consumed airspace for that specific disposal period. The County has been tracking the AUF at OAL since 2000. The high landfill capacity estimate uses an increased site AUF of 0.800 tons/cy, projected from an increasing site AUF historic trend, to account for potential increased operational efficiencies (such as the use of tarps, use of heavy equipment, and orientation/placement of waste) and increased settlement as the waste prism thickens.

2. Continuation of ADC tons as Diversion Until December 31, 2019: Due to Assembly Bill (AB) 1594, green material alternative daily cover (ADC) will no longer count as diversion as of January 1, 2020. The analysis assumes that the County will receive and use 836 tons per day (TPD) of green material ADC until December 31, 2019, then no longer receive or use green material ADC starting January 1, 2020. Prior to January 1, 2020, green material ADC is considered exempt tonnage under the current Brea cooperative agreement and does not count towards the 7,000 TPD cap.
3. Tonnage Inflow Assumptions due to Reduced Deck Size – As the landfill nears full capacity, the waste mass will pyramid up and the working surface (deck size) will become smaller. Thus, tonnage inflow will need to be reduced due to these operational limitations. Per SWT, when approximately 4.4 million tons of refuse capacity remain, daily maximum inflow tonnage will reduce to 2,000 TPD (614,000 tons per year (TPY)), and when approximately 2.5 million tons of refuse capacity remain, daily maximum inflow tonnage will reduce to 1,400 TPD (429,000 TPY).
4. Importation – The analysis assumes importation at OAL will continue until approximately 4.4 million tons of refuse capacity remain. At approximately 4.4 million tons of remaining refuse capacity, tonnage inflow will need to be reduced due to decreasing deck size (see Assumption #3 above). In-County tonnage has priority over importation tonnage. Importation tonnage is estimated to be redirected to other OCWR landfills during CY 2028.
5. Economic Downturns – The analysis assumes a recession will start in CY 2021 resulting in a 25% cumulative decline over six years, then a recovery in the following six years (twelve years total). The twelve year period was estimated using statewide and countywide historical tonnage figures during the 2009 Great Recession.
6. Tonnage Growth due to Population Growth – After the recession recovery in CY 2033, the analysis assumes tonnage demand will increase at the same rate as population growth.
7. Organics Regulation Impacts – SB 1383 establishes a target to achieve a 75 percent reduction in the level of the statewide disposal of organic waste from the 2014 level by calendar year 2025. Based on the 2014 CalRecycle Waste Characterization Study, approximately 57% of the disposed tonnage at landfills sampled in the Southern California region are comprised of organic material (including food, branches, paper, and wood waste). This projection assumes 75% recovery of in-County organics by CY 2025 (based on CY 2014 tonnage levels), which results in a reduction of approximately 380,600 tons per year by CY 2025.

Projection

Using CY 2018 actual tonnage as the baseline starting point for future projections, the above assumptions and variables were used to estimate the anticipated closure date. The projected annual tonnage capacity and estimated closure date are in Figure 1 below.

Figure 1: Projected Annual Tonnage Capacity and Estimated Closure Date



**TABLE 4B - LONGEST REASONABLE SITE LIFE
OLINDA ALPHA LANDFILL
DIMINISHING LANDFILL CAPACITY PROJECTION**

ASSUMPTIONS

AERIAL TOPOGRAPHY DATE:	August 30, 2018
INITIAL REMAINING AIRSPACE:	25,185,700 CY (as of 8/30/2018) ⁽¹⁾
DAYS/WK REFUSE ACCEPTED:	6 DAYS/WK
LONG-TERM AIRSPACE UTILIZATION FACTOR (AUF) ⁽³⁾:	0.80000 TONS/CY
WASTE TO SOIL RATIO:	4 : 1 until 2020, 3:1 thereafter
WASTE INFLOW DATA:	HF&H 2019 Analysis Tonnage Data

CAPACITY PROJECTION SPREADSHEET

CALENDAR YEAR ⁽²⁾	PHASE	CUMULATIVE CONSTRUCTED AIRSPACE (CY)	YEARLY BURIED TONNAGE ⁽²⁾⁽⁴⁾⁽⁵⁾	YEARLY CONSUMED AIRSPACE (CY)	CUMULATIVE BURIED TONNAGE	CUMULATIVE CONSUMED AIRSPACE (CY)	DAILY COVER SOIL CONSUMPTION (CY)	AVAILABLE AIRSPACE AT END OF YEAR (CY)
2018	REMAINING	25,185,700	692,894	1,113,137	692,894	1,113,137	222,627	24,072,563
2019		25,185,700	2,313,124	2,891,405	3,006,018	4,004,542	578,281	21,181,158
2020		25,185,700	2,046,000	2,557,500	5,052,018	6,562,042	639,375	18,623,658
2021		25,185,700	1,930,418	2,413,023	6,982,436	8,975,065	603,256	16,210,636
2022		25,185,700	1,770,203	2,212,754	8,752,639	11,187,818	553,188	13,997,882
2023		25,185,700	1,612,815	2,016,019	10,365,454	13,203,837	504,005	11,981,863
2024		25,185,700	1,458,146	1,822,683	11,823,600	15,026,520	455,671	10,159,181
2025		25,185,700	1,306,092	1,632,615	13,129,692	16,659,135	408,154	8,526,566
2026		25,185,700	1,242,184	1,552,730	14,371,876	18,211,865	388,183	6,973,836
2027		25,185,700	1,321,885	1,652,356	15,693,761	19,864,221	413,089	5,321,479
2028		25,185,700	614,000	767,500	16,307,761	20,631,721	191,875	4,553,979
2029		25,185,700	614,000	767,500	16,921,761	21,399,221	191,875	3,786,479
2030		25,185,700	614,000	767,500	17,535,761	22,166,721	191,875	3,018,979
2031		25,185,700	429,800	537,250	17,965,561	22,703,971	134,313	2,481,729
2032		25,185,700	429,800	537,250	18,395,361	23,241,221	134,313	1,944,479
2033		25,185,700	429,800	537,250	18,825,161	23,778,471	134,313	1,407,229
2034		25,185,700	429,800	537,250	19,254,961	24,315,721	134,313	869,979
2035		25,185,700	429,800	537,250	19,684,761	24,852,971	134,313	332,729
2036		25,185,700	266,183	332,729	19,950,944	25,185,700	83,182	0

Estimated Closure Date: **Aug-2036**

NOTES:

(1) Aerial topo date is 8/30/2018 with a gross remaining capacity of 26,592,700 CY* - 1,407,000 CY* for Final Cover Soil = 25,185,700 CY net remaining refuse capacity. Final cover soil is calculated by the unfilled closure area multiplied by 3 feet on the deck and 4 feet on slopes and roads divided by 27 cubic feet per cubic yard.

(2) 2018 Calendar Year is a partial year starting at 8/30/2018 (Topo Date) and the tonnage reflects this condition.

A) 2018: 8/30/2018 (Topo Date) to 12/31/2018 (4 months) = 692,894 tons* or approximately 1,113,137 CY* of airspace consumed (LEA 2018 Annual Capacity Report).

B) 2019: 1/1/2019 through 12/31/2019 is based on projected tonnage from HF&H 2019 Analysis Tonnage Data of 192,760 tons (or 240,950 CY) per month [2,313,124 tons divided by 12 months] at projected 0.80000 AUF; Therefore, the projected Yearly Consumed Airspace for the partial 2019 Calendar Year [1/1/2019 through 7/31/2019 (7 months)] is projected at 1,686,650 CY (240,950 CY x 7 months).

C) The **Net Remaining Airspace (as of 8/1/2019)** is approximately **22,385,913 MCY** (25,185,700 CY minus 1,113,137 CY airspace consumed [from 8/30/2018 topo date to 12/31/2018] minus 1,686,650 CY airspace consumed [from 1/1/2019 to 7/31/2019]).

(3) Current AUF used in Calendar Year 2018 calculation provided by OC Waste & Recycling (AUF=0.62247) from the LEA 2018 Annual Capacity Report. Projected AUF for Calendar Year 2019 through closure (AUF=0.80000) per HF&H 2019 Analysis Tonnage Data as discussed in JTD Section B.3.3.1.

(4) Tonnage Projections for Calendar Year 2019 through closure are based on HF&H 2019 Analysis Tonnage Data.

(5) Assume Out-of-County import agreements continue until site closure per HF&H 2019 Analysis Tonnage Data.

(6) All back up information is included in Appendix D of this JTD.

* Per LEA 2018 Annual Capacity Report