Airspace Management Report

Southeastern Public Service Authority

Regional Landfill, Cells V and VI

Suffolk, Virginia

Issued for Review January 2020

Final Report March 18, 2020

COMMONWEALTH OF VIRGINIA
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Purpose

This Airspace Management Report has been prepared to assist the Southeastern Public Service Authority (SPSA) with management of the remaining airspace for the Regional Landfill Cells V and VI. The report describes the assumptions and calculations used to estimate the remaining airspace, municipal solid waste (MSW) in-place density, and remaining life expectancy of the landfill.

Tonnage Data

HDR Engineering, Inc. (HDR) has compiled the following information regarding the quantity of waste accepted at the landfill.

- Based on scale records provided by SPSA, a total of **11,466,983 tons** of MSW, construction demolition debris (CDD), and ash were disposed of in Cells V and VI at the Regional Landfill from May 2000 through December 5, 2019. A total of **289,198 tons** were disposed in the 2019 reporting period December 18, 2018 – December 5, 2019.
- Since January 24, 2018 when MSW from the western communities has been discharged at the Regional Landfill, the average monthly disposal rate for MSW, CDD, and ash is **25,858 tons per month (tpm)**. Figure A (attached) shows the monthly and rolling 12-month average tonnage disposed at the landfill through **December 2019**.
- The average monthly disposal rate for just MSW and CDD at the landfill since January 24, 2018 is **11,896 tpm**.
- The average monthly disposal rate for ash (ash and non-qualifying ash) at the landfill over the past 12 months is **13,163 tpm**, which is about 10% less than the 14,597 tpm in 2018.

Operating Airspace

Topography

Since Cell V began operation in May 2000, annual topographic surveys have been prepared to assist in managing the landfill airspace. Cell VI began accepting part of the incoming waste in May 2006, but did not take all of the incoming waste until November 2006, when Cell V stopped taking waste. The following topographic files have been utilized in determining consumed and remaining airspace including the in-place density of the compacted MSW in Cells V and VI.

- July 28, 2000, As-Built Regional Landfill Cell V prepared by G.R. Jenkins – Land Surveyor.
- May 11, 2006, Cell VI Phase 1 operational cover as-built prepared by Bateman Civil Survey Company, P.C.
- November 30, 2007, Cell VI Phase 2 operational cover as-built prepared by Bateman Civil Survey Company, P.C.
- December 17, 2018 topography prepared by Hoggard-Eure Associates, P.C.
- December 5, 2019 topography prepared by Hoggard-Eure Associates, P.C.

Airspace

The AutoCAD Civil 3D program was used to calculate remaining and consumed gross volume. A three-dimensional surface was created for the operational cover surface for Cell V and VI and the **December 5, 2019** topo. The 3-D surfaces were compared to determine volumes. As appropriate, volumes representing final cover system thickness were accounted for in determining the operating airspace. Operating airspace is defined as the volume determined between the top of operational cover and the bottom of the final cover system, and is comprised of MSW and daily and intermediate cover.

In addition to determining operating airspace, the volumes were utilized to determine cumulative in-place densities. In-place densities were determined by dividing tonnage by consumed airspace. The following table summarizes the periodic consumption of airspace and densities.

To keep records of the landfill development, drawings have been prepared to indicate the consumption of available airspace. Drawings C-01 and C-02 depict the existing conditions as of the surveys on December 17, 2018 and December 5, 2019. Drawings C-03 through C-06 include the calculations of airspace consumed over the last year, airspace remaining, recoverable airspace remaining (neglects minor fills on lower slopes of Cell V and revised filling to accommodate existing roadway and settlement of slopes), and total airspace consumed to date. Drawings C-07 through C-09 depict several cross-sections of the landfill depicting the bottom of waste, filling completed in 2019, airspace gained in 2019 through settlement, the permitted final top of waste grades, and the recoverable top of waste grades.

Table A

Airspace Management Report	Survey Date	Disposed To Date (Tons) [1]	Airspace Consumed To Date (CY)	Operating Airspace Remaining (CY)	Disposed In-place Density (lbs/CY)[1, 2]	Operational In-place Density (lbs/CY)[4]
-	1/1/02	1,116,510	1,460,210	4,743,610	1,529	-
February 2003 (V)	12/31/02	1,784,480	2,392,010	3,825,430	1,492	-
March 2004	1/1/04	2,607,251	3,534,252	2,669,678	1,475	-
February 2005	12/30/04	3,553,472	4,637,630	1,566,300	1,532	-
January 2006	12/15/05	4,439,204	5,356,656	847,274	1,657	-
February 200	12/8/06	5,114,737	6,187,197	16,733	1,653	-
February 2008 (V&VI)	12/27/07	6,753,342	7,942,485	7,292,881	1,701	-
February 2009	12/28/09	7,768,309	9,310,547	6,144,716	1,669	-
November 2009	10/29/09	8,274,614	9,550,947	5,712,089	1,733	
January 2011	1/5/11	8,618,420	9,859,976	5,395,091	1,748	-
February 2012	1/31/12	8,825,464	9,808,952	5,419,716	1,799	-
February 2013	2/14/13	9,078,922	9,901,716	5,336,169	1,833	-
March 2014[3]	3/18/14	9,647,921	10,075,542	5,173,609	1,915	-
March 2015	3/15/15	9,992,157	10,320,231	4,918,558	1,900	-
November 2015	11/24/15	10,274,587	10,489,200	4,740,401	1,959	-
January 2017	1/19/17	10,627,401	10,697,546	4,543,105	1,987	2,533
December 2017	12/16/17	10,865,168	10,831,703	4,412,901	2,008	2,326
December 2018	12/17/18	11,177,785	11,152,613	3,728,814	2,005	1,854
December 2019[5]	**12/5/19**	**11,466,983**	**11,423,983**	**3,408,065**	**2,008**	**1,738**

(1) Disposed includes both MSW and ash up to survey dates. Tonnage of clean soil fill from Clearfield used for daily and intermediate cover have been deducted from the disposed tons in 2019.

(2) Density reported is cumulative since the beginning of operations in May 2000.

(3) The March 2014 report figures shown include soils used for Cell V regrading, which is responsible for the large increase in Disposed In-place Density.

(4) Operational In-Place Density calculated from the periodic airspace consumed in the active fill area and tons disposed, and does not consider site wide airspace consumed and settlement of waste.

(5) The Operating Airspace Remaining for 2018 and 2019 are calculated for recoverable airspace which is adjusted for settlement of existing surfaces at the limit of filling, and the configuration of existing access roadway.

Remaining Site Life

We understand that the current landfill operations include receipt of MSW ash residue and MSW waste materials from western SPSA communities. This operation is likely to remain similar through at least June 30, 2027 at which time the contract with Wheelabrator will expire. While there is only two years of operating experience with this new mix of waste, it is clear that the airspace consumption rate will be considerably higher than recent history. The operational in-place density for the tons managed in 2019 was **1,738 lbs/CY**.

If we were to assume that the total quantity of waste received in Calendar Year 2019 [**300,196 tons, 1,154 tons per day** (5 day per week operation)] were to continue beyond June 30, 2027 without any growth at all, and an operational in-place density of **1,738 lbs/CY**, Cell V and VI would last until approximately October 2029.

Figure B depicts the tonnage and airspace scenario for Cell V and VI based on the 2019 operational tonnage and in-place density and if SPSA were to see a 1% annual increase or decrease in disposed tons during the operating life. This is within a reasonable sensitivity range for population and material management changes. Under a 1% annual increase scenario, the capacity could be reached as early as April 2029, assuming that the Wheelabrator agreement were extended beyond June 2027. If the Wheelabrator agreement is not extended, and all the MSW from the SPSA communities are disposed of at the Regional Landfill, the capacity could be consumed by May 2028.

Figure C depicts the tonnage scenario for future operations, if SPSA continues to accept 300,196 tons per year of ash, MSW and CDD for disposal, Cell VI could reach capacity as early as November 2027 if the operational in-place density approaches 1400 lbs/CY. If operations are able to successfully work and compact the waste materials to maintain the airspace utilization rate at 1600 lbs/CY or 1800 lbs/CY, then capacity would not be reached until January 2029 or February 2030, respectfully.

Findings

The remaining airspace volume has not been adjusted to address the fact that there may be difficulty in maintaining the outside slopes at or above the proposed elevations as the height of the fill progresses or to address the relocation of the access road. As the waste settles and degrades over the next few years, the 3H: 1V slopes may become flatter. The most critical area to meet or become steeper than the proposed contours is the first couple of lifts above the stormwater benches. This is the most difficult area to revisit with waste placement and it has the most effect on the capacity at higher grades. It is difficult to predict how settlement will affect the slopes during the remaining active life.

Review of the existing topographic surveys indicates that the exterior slopes of the landfill are being filled in general accordance with the permit slopes of 3H:1V and fill plan. As waste filling elevations continue to go higher in Cell V and as Cell VI is further developed, conformance with the exterior permit slopes should be confirmed in order to utilize as much of the available capacity as practical.

Future Capacity

In addition to Cells V and VI, the SPSA Regional Landfill includes a 56-acre lateral expansion known as Cell VII. Cell VII was approved by the Virginia Department of Environmental Quality on June 8, 2011. The capacity of Cell VII is approximately 10,800,000 cubic yards of operating airspace, as permitted. Without the permitted overlap onto Cell V, the available airspace would be reduced to approximately 8,600,000 CY. Site life estimates for Cell VII and life estimate of future phases for various disposal rates and densities are included as an attachment. Drawing C-10 is also enclosed to depict the Master Plan Buildout and life for the future cells based on current disposal rates and density.

Attachments

Figure A, Tonnage History
Figure B, Tonnage Scenario
Figure C, Varying Density Calculations
Calendar Year and Fiscal Year Tonnage Reports
Airspace Calculations
Cell VII –XII Life Estimates
Airspace Drawings

Figure A

Tonnage History

SPSA Regional Landfill Cells V & VI

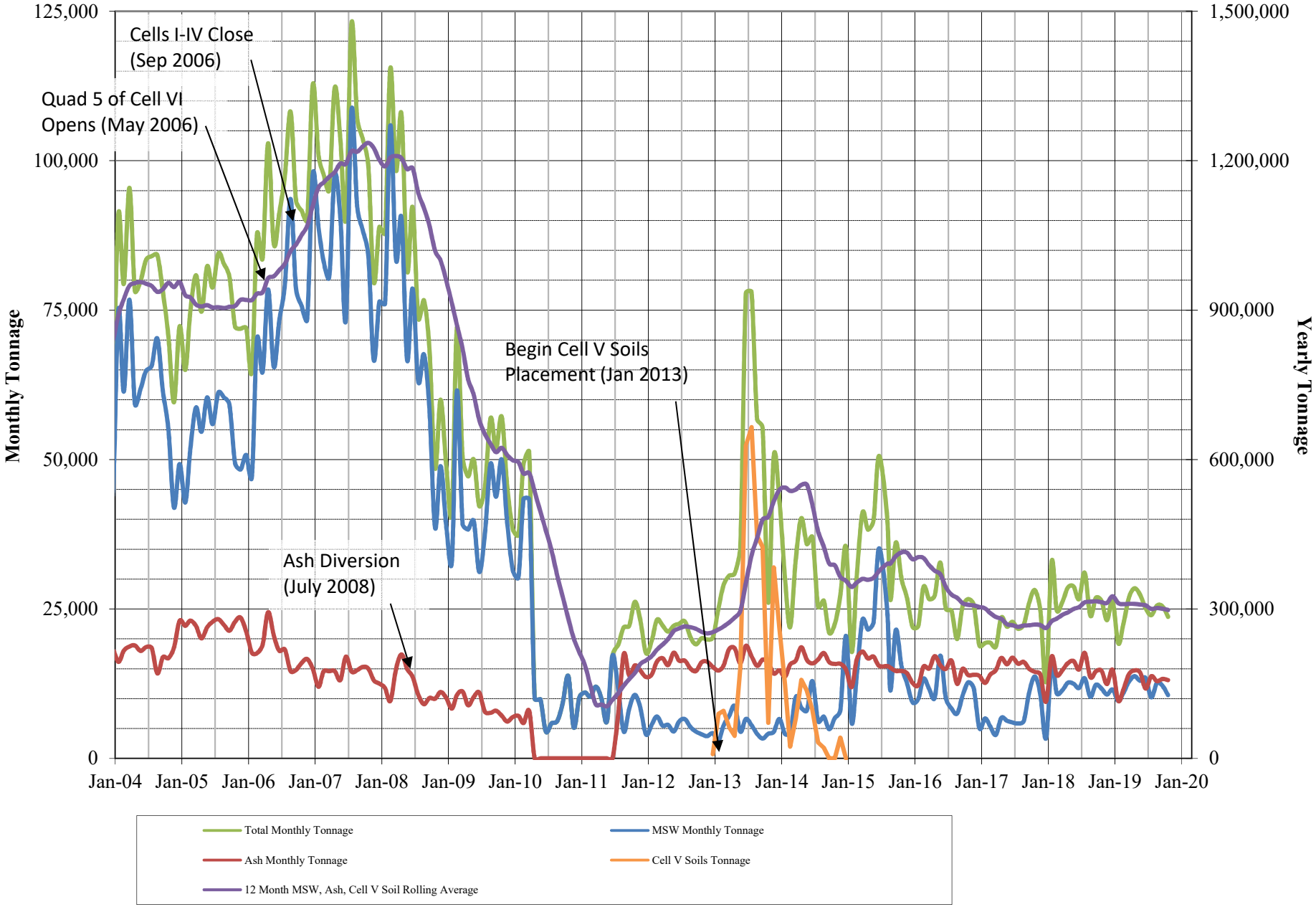


Figure B

Tonnage Scenario

SPSA Regional Landfill Cells V & VI

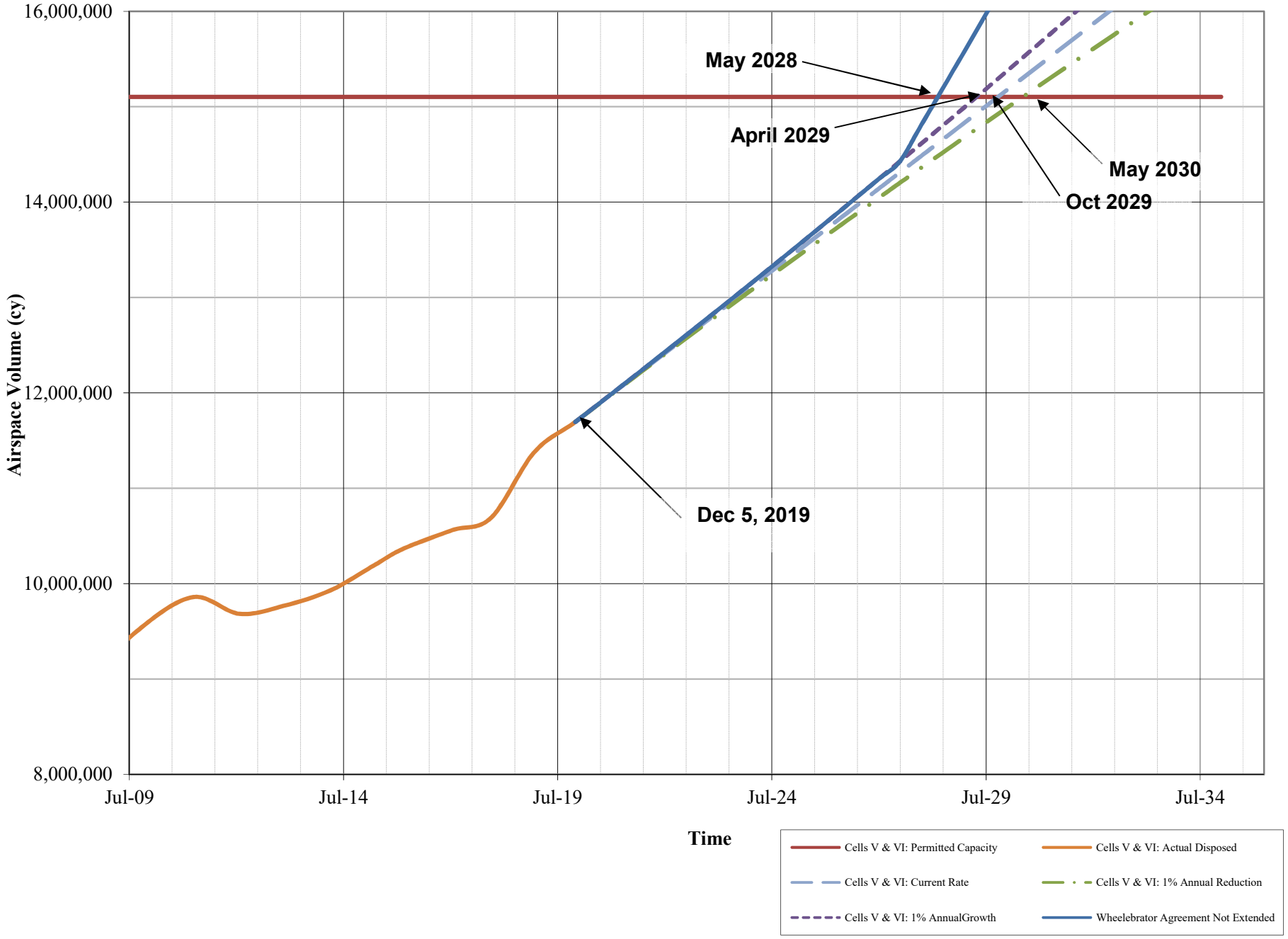
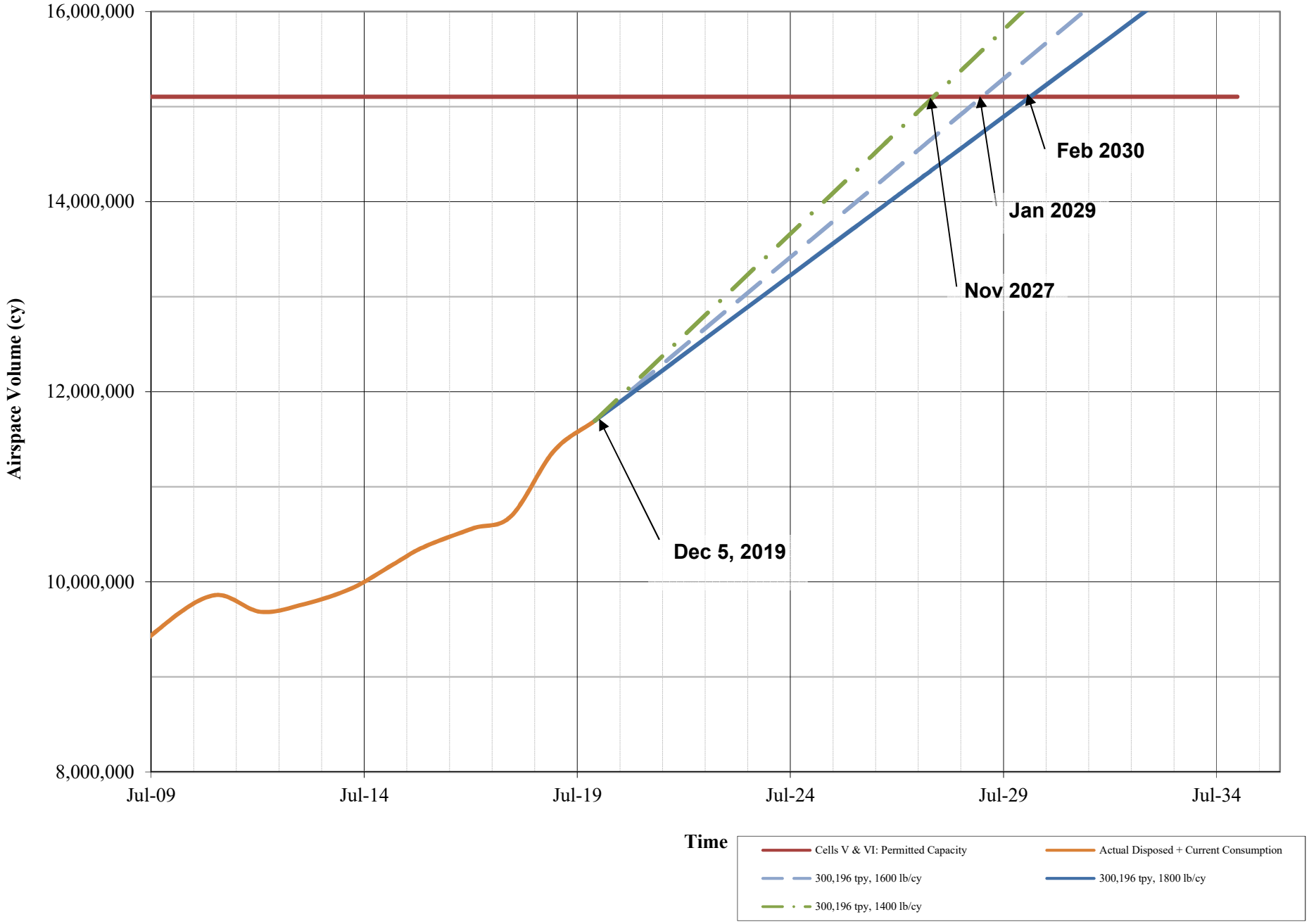


Figure C

Varying Density Scenario

SPSA Regional Landfill Cells V & VI



Regional Landfill Waste Stream

Calendar Year 2019 Tonnage

Types of Waste (tons)	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Totals CY2019		
CDD	822	664	729	923	800	694	1,138	870	873	930	624	686	9,754	813	tons/month since Jan 1 2019
Sludge - Norfolk	493	417	364	440	561	503	845	386	300	330	304	395	5,338	445	tons/month since Jan 1 2019
Sludge - Suffolk	-	-	-	-	-	-	-	-	-	-	-	-	-		
Industrial Waste	7	9	15	35	48	12	7	37	5	39	33	4	251	21	tons/month since Jan 1 2019
Fines C&D	-	-	-	-	-	-	-	-	-	-	-	-	-		
Soils	1,158	499	531	681	611	466	399	609	635	788	702	1,005	8,083	674	tons/month since Jan 1 2019
Brick & Block	-	-	-	-	-	-	-	-	-	-	-	-	-		
Clean Fill	110	-	68	-	-	5,672	15,174	6,048	11,466	27,663	15,676	8,948	90,824	7,569	tons/month since Jan 1 2019
Peanut Dust/Peanut Hulls	358	300	383	387	683	261	399	247	308	509	290	265	4,391	366	tons/month since Jan 1 2019
Municipal Solid Waste [1]	-	-	-	-	-	-	-	-	-	-		-	-		
Suffolk Municipal NP Solid Waste	27	11	16	15	43	13	22	37	36	5	8	21	255	21	tons/month since Jan 1 2019
Southampton Cty Municipal NP Solid Waste	-	-	-	-	-	-	-	-	-	-	-	-	-		
Chesapeake Municipal NP Solid Waste	-	-	-	-	-	-	-	1	2	-	-	3	6		
Portsmouth Municipal NP Solid Waste							-	-	10	3	-	-	13		
Virginia Beach Municipal NP Solid Waste	-	-	-	-	-	-	-	-	-	-	-	-	-		
Norfolk Municipal NP Solid Waste	-	-	-	-	-	-	-	-	-	0	-	-	0		
NP from Municipal HHW Users	46	40	47	64	71	85	83	78	88	69	75	57	802	67	tons/month since Jan 1 2019
Navy Waste [1]	20	29	25	35	32	51	19	51	11	62	28	15	377		
Contract Processable Waste	-	-	-	-	-	-	-	-	-	-	-	-	-		
Non-Processible Commercial Waste [2]	64	50	24	31	39	49	46	40	46	65	63	28	544	45	tons/month since Jan 1 2019
Fluff from BiMetals	-	-	-	-	-	-	-	-	-	-	-	-	-		
Concrete/Asphalt	-	-	-	-	-	-	83	-	-	20	-	-	103	9	tons/month since Jan 1 2019
Shredded Tires	64	435	552	585	620	381	513	766	466	626	543	457	6,007	501	tons/month since Jan 1 2019
Ash	11,180	4,706	2,672	348	2,596	5,956	2,231	6,912	3,176	3,209	7,708	9,986	60,679	5,057	tons/month since Jan 1 2019
Non-Qualifying Ash	3,644	4,943	8,874	13,755	12,119	8,421	9,442	6,831	9,746	10,083	5,376	4,038	97,272	8,106	tons/month since Jan 1 2019
Cell V Slope	-	-		-	-	-	-	-	-	-	-	-	-	-	tons/month since Jan 24 2018
MSW from Tsf Stations	8,464	7,090	8,108	9,614	9,797	8,539	9,196	7,094	8,361	8,671	7,816	8,526	101,278	8,440	tons/month since Jan 1 2019
Clean Fill - Clearfield (1.35 factor)	2,892	4,328	1,966	4,782	794	5,405	5,935	4,971	6,521	5,179	5,783	4,706	53,260	4,438	tons/month since Jan 1 2019
Clearfield Residual (1.35 factor)	-	57	-	38	57	76	-	-	76	38	104	76	520		
Non Processible Waste (from Tsf Stations)	-	-	-	-	-		-	-	-	-	-	-	-		
Non-Processible Waste (from RDF)	-	-	-	-	-		-	-	-	-	-	-	-		
Diverted Processible Waste (from RDF)	-	-	-	-	-		-	-	-	-	-	-	-		
Diverted Processible Waste (fromTsf Stations)	-	-	151	-	395	1,852	699	-	1,428	-	-		4,524	411	tons/month since Jan 1 2019
Total	29,348	23,578	24,523	31,731	29,264	38,437	46,233	34,977	43,554	58,288	45,133	39,216	444,281	37,023	tons/month since Jan 1 2019
Total without clean fill	26,347	19,250	22,489	26,949	28,471	27,360	25,124	23,958	25,567	25,447	23,673	25,562	300,196	25,016	tons/month since Jan 1 2019
Total without ash	11,524	9,601	10,943	12,846	13,756	12,982	13,451	10,216	12,645	12,156	10,590	11,538	142,246	11,854	tons/month since Jan 1 2019
Total non-MSW	3,060	2,511	2,835	3,232	3,959	4,443	4,255	3,122	4,284	3,484	2,773	3,012	40,969	3,414	tons/month since Jan 1 2019

[1] Represents CDD from Suffolk Contractors

[2] Boats, Flour, Frozen Foods, Other items too large for Suffolk Transfer Station

Fiscal Year 2014-2020 Tonnage

Regional Landfill Waste Stream

Types of Waste (tons)	FY2014	FY2015	FY2016	FY2017	Jul-17	Aug-17	Sep-17	Oct-17	Nov-17	Dec-17	Jan 1-24,18	1/24/18-2/28/18	Mar-18	Apr-18	May-18	Jun-18	FY2018	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Totals	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19	FY2019	Jul-19	Aug-19	Sep-19	Oct-19	Nov-19	Dec-19	Totals	FY2020	1/24/2018 12/30/2019 Days 705.00 months 23.17808
CDD	9,014	10,066	11,486	14,252	1,045	1,388	1,365	1,918	2,747	965	572	960	742	835	861	1,453	14,850	906	1,353	863	839	531	683	6,019	822	664	729	923	800	694	9,808	1,138	870	873	930	624	686	5,122	853	tons/month since Jan 24 2018
Sludge - Norfolk	7,705	5,866	4,611	4,782	417	515	430	425	453	408	383	573	439	326	591	626	5,586	649	636	391	511	613	461	3,261	493	417	364	440	561	503	6,040	845	386	300	330	304	395	2,561	481	tons/month since Jan 24 2018
Sludge - Suffolk	-	1,332	701	144	21	17	18	11	17	20	-	22	5	-	-	-	131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Industrial Waste	1,245	1,552	873	847	7	52	40	26	49	26	25	19	17	29	76	12	379	60	23	19	25	28	14	169	7	9	15	35	48	12	294	7	37	5	39	33	4	125	25	tons/month since Jan 24 2018
Fines C&D	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Soils	8,519	34,168	66,379	18,934	800	737	814	686	857	844	318	1,822	834	835	864	581	9,990	670	725	716	990	774	809	4,969	1,158	499	531	681	611	466	8,630	399	609	635	788	702	1,005	4,138	764	tons/month since Jan 24 2018
Brick & Block	-	3,193	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Clean Fill	20,042	56,311	92,733	25,369	976	907	202	6,196	7,938	8,318	252	1,444	-	117	46	-	26,396	-	90	-	-	-	-	90	110	-	68	-	-	5,672	5,939	15,174	6,048	11,466	27,663	15,676	8,948	84,975	3,992	tons/month since Jan 24 2018
Peanut Dust/Peanut Hulls	778	2,893	3,202	5,650	1,101	1,242	1,782	518	581	1,268	1,605	502	208	252	130	175	9,366	223	234	194	357	350	293	1,657	358	300	383	387	683	261	4,023	399	247	308	509	290	265	2,019	315	tons/month since Jan 24 2018
Municipal Solid Waste [1]	1,800	5,390	943	5,497	1,481	266	901	365	459	121	61	27	-	-	-	-	3,681	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Suffolk Municipal NP Solid Waste	1,482	343	830	263	2	15	36	7	-	2	-	-	-	14	21	12	110	11	-	16	13	10	14	74	27	11	16	15	43	13	190	22	37	36	5	8	21	129	16	tons/month since Jan 24 2018
Southampton Cty Municipal NP Solid Waste		2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Chesapeake Municipal NP Solid Waste		13	12	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	2	-	-	-	-	-	-	2	-	-	1	2	-	3	6		
Portsmouth Municipal NP Solid Waste																																		10	3	-	-	13		
Virginia Beach Municipal NP Solid Waste	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Norfolk Municipal NP Solid Waste			74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0	-	-	0		
NP from Municipal HHW Users		491	589	719	45	87	62	59	72	50	31	48	68	61	61	39	682	50	62	43	45	75	48	323	46	40	47	64	71	85	674	83	78	88	69	75	57	450	60	tons/month since Jan 24 2018
Navy Waste [1]	136	36	87	149	13	53	9	30	2	-	-	-	6	16	13	12	154	19	10	6	60	71	1	167	20	29	25	35	32	51	358	19	51	11	62	28	15	186	25	tons/month since Jan 24 2018
Contract Processable Waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Non-Processible Commercial Waste [2]	1,467	4,216	4,432	3,797	215	231	249	246	216	196	105	22	36	45	251	138	1,949	40	88	58	64	46	45	341	64	50	24	31	39	49	597	46	40	46	65	63	28	287	59	tons/month since Jan 24 2018
Fluff from BiMetals	5,524	5,708	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Concrete/Asphalt	822	639	417	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	133	-	133	-	-	-	-	-	-	133	83	-	-	20	-	-	103	10	tons/month since Jan 24 2018
Shredded Tires	2,176	2,587	3,051	3,289	240	333	329	367	302	290	258	468	452	539	436	574	4,586	86	872	421	514	473	391	2,757	64	435	552	585	620	381	5,393	513	766	466	626	543	457	3,371	485	tons/month since Jan 24 2018
Ash	193,710	192,754	177,492	174,420	16,487	15,840	16,143	14,978	14,465	14,052	9,488	17,017	13,902	14,773	15,928	16,289	179,361	14,872	17,651	13,592	14,551	13,984	11,871	84,521	11,180	4,706	2,672	348	2,596	5,956	113,977	2,231	6,912	3,176	3,209	7,708	9,986	33,222	9,712	tons/month since Jan 24 2018
Non-Qualifying Ash	-	-	-	-													-	-	-	-	-	681	561	1,242	3,644	4,943	8,874	13,755	12,119	8,421	52,998	9,442	6,831	9,746	10,083	5,376	4,038	45,515	4,250	tons/month since Jan 24 2018
Cell V Slope	285,669	12,642	-	-	-	-		-	-		-	-					-							-							-							-	
MSW from Tsf Stations												11,451	8,057	8,464	9,274	8,764	46,011	9,020	9,286	7,519	8,869	8,590	7,806	42,290	8,464	7,090	8,108	9,614	9,797	8,539	102,704	9,196	7,094	8,361	8,671	7,816	8,526	49,665	8,559	tons/month since Jan 24 2018
Clean Fill - Clearfield (1.35 factor)											-	1,266	3,402	2,174	3,610	4,045	14,496	3,345	4,328	5,802	6,180	-	11,718	31,373	2,892	4,328	1,966	4,782	794	5,405	51,540	5,935	4,971	6,521	5,179	5,783	4,706	33,094	4,277	tons/month since Jan 24 2018
Clearfield Residual (1.35 factor)											-	-	-	-	85	95	180	38	123	38	9	-	-	47	-	57	-	38	57	76	435	-	-	76	38	104	76	293	39	tons/month since Jan 24 2018
Non Processible Waste (from tsf Stations)	-	-	-	-	-	-		-	-		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Non-Processible Waste (from RDF)		302	-	-	-	-		-	-		-	-					-							-							-							-	
Diverted Processible Waste (from RDF)	-	3	-	-	-	-		-	-		-	-					-							-							-							-	
Diverted Processible Waste (fromtsf Stations)	8,568	22,097	1,780	11,336	-	-		201	-		-	-	-	-	-	-	201	-	-	-	-	-	120	120	-	-	151	-	395	1,852	2,517	699	-	1,428	-	-	-	2,127	200	tons/month since Jan 24 2018
Total	548,663	362,604	369,692	269,460	22,851	21,682	22,379	26,032	28,158	26,561	13,097	35,641	28,169	28,479	32,247	32,813	318,109	29,988	35,480	29,678	33,030	26,360	34,835	153,353	29,348	23,578	24,523	31,731	29,264	38,437	366,252	46,233	34,977	43,554	58,288	45,133	39,216	267,400	34,127	tons/month since Jan 24 2018
Total without clean fill	528,620	306,293	276,960	244,090	21,874	20,775	22,178	19,836	20,220	18,243	12,845	32,931	24,767	26,189	28,590	28,769	277,217	26,643	31,062	23,876	26,850	26,360	23,117	127,246	26,347	19,250	22,489	26,949	28,471	27,360	308,772	25,124	23,958	25,567	25,447	23,673	25,562	149,332	25,858	tons/month since Jan 24 2018
Total without ash												15,914	10,865	11,416	12,662	12,480		11,771	13,411	10,284	12,299	11,695	10,685	70,345	11,524	9,601	10,943	12,846	13,756	12,982		13,451	10,216	12,645	12,156	10,590	11,538		11,896	tons/month w/o ash
Total non-MSW												4,436	2,808	2,952	3,389	3,715		2,751	4,125	2,765	3,430	3,105	2,879	17,055	3,060	2,511	2,835	3,232	3,959	4,443		4,255	3,122	4,284	3,484	2,773	3,012		3,336	tons/month other waste

[1] Represents CDD from Suffolk Contractors

[2] Boats, Flour, Frozen Foods, Other items too large for Suffolk Transfer Station

annual report data point

Project:	**SPSA**	Computed: TAP	3/17/2020
Subject:	**Regional Landfill Cell V & VI**	Checked: JSM	3/18/2020
Task:	**Airspace Calculations**	Sheet: 1	Of: 2

Base Drawing for volume calculations: Cell V Design Subgrade (Design Bottom of Clay) and Cell VI Operational Cover

A 15,103,930 cy Permit Net Airspace Capacity for MSW, D&I Cover (No Final Cover)
(Permitted operational capacity; refer to permit for Cell VI)

B 11,423,445 cy Volume Consumed as of 12-05-19 (AutoCADD, Base Drawings vs. 12-05-19 Survey)

C 0 cy Cell V subgrade surface modified to top of operational cover in 2018
44.6 Acres
1.1 Clay Liner, assumed additional 0.1' of over build
1.6 Op Cover, assumed additional 0.1' of over build

D 11,423,445 cy Airspace Consumed as of 12-5-19 **(B-C)**
Includes MSW, D&I Cover

Airspace Consumption Check

E 11,152,613 cy Airspace Consumed in Cells V&VI as of 12-17-18 (Base Drawing vs. 12-17-18 Survey)

F 270,870 cy Airspace Consumed between 12-17-18 and 12-05-19 (12-17-18 Survey vs. 12-05-19 Survey)

G 11,423,483 cy Airspace Consumed as of 12-17-18 based on the 12-16-17 survey and the 12-17-18 survey **(E + F)**

0.00% % Difference of the Consumed AutoCADD and calculated Consumed Airspace **(1-G/D)**

H 11,423,464 cy Airspace Consumed (avg of AutoCADD volume and calculated volume) **(Average of D & G)**

0.00% % Difference of the Consumed Average and calculated Consumed Airspace **(1-H/D)**

Airspace Remaining Check

I 3,820,291 cy Remaining Airspace as of 12-05-19 (12-05-19 survey vs. 3:1 Top of Waste, AutoCADD)

J 3,680,485 cy calculated Remaining Airspace as of 12-5-19 **(A - D)**
(Permit Net Airspace less Airspace Consumed)

K 3.80% % Difference of the Remaining AutoCADD and calculated Remaining Airspace **(1-I/J)**

L 3,408,065 cy Recoverable Remaining Airspace as of 12-05-19 (12-05-19 vs Revised Top of Waste, AutoCADD)

M 12.10% % Difference Calculated vs Recoverable Airspace **(1-I/L)**

N 3,820,291 cy Total Remaining Airspace as of 12-5-19 **(I)**
Includes MSW, D&I Cover

O 3,408,065 cy Recoverable Airspace Remaining as of 12-5-19 **(L)**
Includes MSW, D&I Cover

Project:	**SPSA**	Computed: TAP	3/17/2020
Subject:	**Regional Landfill Cell V & VI**	Checked: JSM	3/18/2020
Task:	**Estimated Life Calculations**	Sheet: 2	Of: 2

Given

A	15,103,930	cy Airspace Capacity for MSW, D&I Cover (@ 3:1 Grade, AutoCADD)
B	11,423,445	cy Cummulative Airspace Consumed as of 12/05/19 includes waste, daily & intermediate cover soil
C	11,466,983	tons from 5/00 through 12/19 (includes MSW, Ash, and Cell V soils)
D1	25,016	tons/month (TPM) Curernt Disposal Rate

Estimated Effective Density over the life of Cell VI.

	0.869	tons/cy Operational Density (Current Period)
	1,738	lbs/cy Effective Density
E	**0.869**	**tons/cy Effective Density**

Determine the remaining life of Cells V and VI based on 25,016 TPM.

F	3,408,065	cy Recoverable Remaining Airspace of Cells V and VI at December 05, 2019
G	118.4	months Estimated Remaining Life **(E * F / D)**
H	12/5/2019	Base Date

I	**10/16/2029**	**Estimated Full Date @ 25,016 TPM (300,196 TPY)**	**(H + (G / 12 * 365.25))**

Project:	**SPSA Life Projections**	Computed: TAP	Date: 3/17/2020
Subject:	**Varying Disposal Materials**	Checked: JSM	Date: 3/18/2020
Task:	**Airspace & Timeline For Ash/MSW/CDD**	Sheet: 1	Of: 2

			Capacity at 1800 lbs/CY	
Date of Survey:	***12/5/2019***			
Permitted airspace for Cells 5 and 6	**15,103,930** cy		13,593,537	
Airspace consumed as of December 5, 2019	**11,423,445** cy		10,281,101	
Calculated Airspace Remaining for Cells 5-6	**3,680,485** cy		3,312,437	
Recoverable Airspace Remaining for Cells 5-6	**3,408,065** cy		3,067,259	
Permitted Airspace for Cell 7	**8,600,000**	12,008,065	7,740,000	**1800**
Estimated Airspace for Cells 8 and 9	**15,696,181**	27,704,246	14,126,563	
Estimated Airspace for Cells 10-12	**21,326,523**	49,030,769	19,193,871	

Month-Year Site Life Expires

Incoming waste volume, tons/yr	***Cumulative Life Estimations***			
	Cells 5/6 3.4M CY 3.07M Tons	***Cell 7 8.6M CY 7.7M Tons***	***Cells 8/9 15.7M CY 14.1M Tons***	***Cells 10/11/12 21.3M CY 19.2M Tons***
200,000	**2035**	**2073**	**2144**	**2240**
300,000	**2030**	**2055**	**2103**	**2167**
400,000	**2027**	**2046**	**2082**	**2130**
500,000	**2026**	**2041**	**2069**	**2108**
600,000	**2025**	**2037**	**2061**	**2093**
700,000	**2024**	**2035**	**2055**	**2082**

Notes:

1 ***Landfill life estimates assume 0.900 tons/CY or 1800 lbs/CY density for life of landfill***
2 ***Life estimates based on 3.4M CY of recoverable airspace remaining in Cell 5/6 as of December 5, 2019***
3 ***Cell 7 volume assumes reduction in permitted capacity with no overlap onto Cell V as shown on drawing.***
4 ***Cells 8 and 9 volumes are based on preliminary grading plans for 40' max depth, 200' top elevation.***
5 ***Cells 10 through 12 volumes are estimated as a 20' max depth and 200' top elevation.***

Project:	**SPSA Life Projections**	Computed: TAP	Date: 3/17/2020
Subject:	**Varying Disposal Materials**	Checked: JSM	Date: 3/18/2020
Task:	**Airspace & Timeline For MSW**	Sheet: 2	Of: 2

				Capacity at 1400 lbs/CY	
Date of Survey:	***12/5/2019***				
Permitted airspace for Cells 5 and 6	**15,103,930** cy			10,572,751	
Airspace consumed as of December 5, 2019	**11,375,116** cy			7,962,581	
Calculated Airspace Remaining for Cells 5-6	**3,728,814** cy			2,610,170	
Airspace Remaining for Cells 5-6	**3,408,065** cy			2,385,646	
Permitted Airspace for Cell 7	**8,600,000**	8,600,000		6,020,000	**1400**
Estimated Airspace for Cells 8 and 9	**15,696,181**	24,296,181		10,987,327	
Estimated Airspace for Cells 10-12	**21,326,523**	45,622,704		14,928,566	

Month-Year Site Life Expires

Incoming waste volume, tons/yr	***Cumulative Life Estimations***			
	Cells 5/6 3.4M CY 3.07M Tons	***Cell 7 8.6M CY 6.0M Tons***	***Cells 8/9 15.7M CY 10.9M Tons***	***Cells 10/11/12 21.3M CY 14.9M Tons***
200,000	**2035**	**2065**	**2120**	**2194**
300,000	**2030**	**2050**	**2086**	**2136**
400,000	**2027**	**2042**	**2070**	**2107**
500,000	**2026**	**2038**	**2060**	**2089**
600,000	**2025**	**2035**	**2053**	**2078**
700,000	**2024**	**2032**	**2048**	**2069**

Notes:

1 ***Assume 0.70 tons MSW per cubic yard density for filling in Cells 7-12. Life of Cell 5/6 assumes 0.9 tons/CY for exisitng conditions***

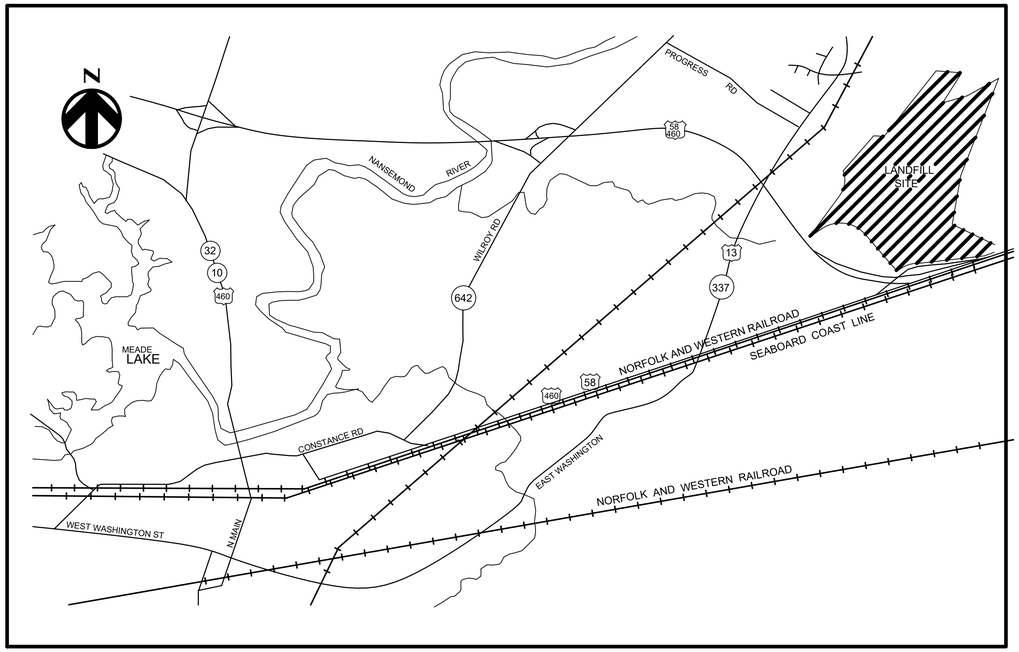
2 ***Cell 7 volume assumes reduction in permitted capacity with no overlap onto Cell V as shown on drawing.***

3 ***Cells 10 through 12 volumes are estimated as a 20' intragradient base and 200' top elevation.***

4 ***Cell 7-12 Life calculated from end of Cell V/VI based on Ash, MSW and C&D filling***

SPSA WASTE SOLUTIONS

HDR
249 Central Park Avenue, Suite 201
Virginia Beach, VA 23462
Phone: (757) 222-1500



LOCATION MAP
1" = 2000'

Contract Drawings For

Regional Landfill

2020 Airspace Management

Issued for Review
January 2020

Final Report
February 12, 2020

Project No.
10190659

Suffolk, Virginia

COMMONWEALTH OF VIRGINIA
JEFFREY S. MURRAY
Lic. No. 48265
2/12/20
PROFESSIONAL ENGINEER

INDEX OF DRAWINGS

N

SCALE IN FEET

0 150 300

LEGEND

EXISTING MINOR CONTOUR

170 EXISTING MAJOR CONTOUR

PHASE BOUNDARY LIMITS

NOTES:

1. EXISTING TOPOGRAPHY SHOWN HEREON COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED DECEMBER 17, 2018, AND PREPARED BY HOGGARD-EURE ASSOCIATES, P.C.
2. ELEVATIONS REFER TO NATIONAL GEODETIC SURVEY (NGS) NGS MEAN SEA LEVEL HORIZONTAL CONTROL BASED UPON VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE NORTH AMERICAN DATUM (NAD) 1983.

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B	02/2020	ISSUED WITH FINAL REPORT
A	01/2020	ISSUED FOR REVIEW

PROJECT MANAGER	J. MURRAY, P.E.
DESIGNED BY:	T. PREDDY, E.I.
DESIGNED BY:	
DRAWN BY:	T. PREDDY, E.I.
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PROJECT NUMBER	10190659

COMMONWEALTH OF VIRGINIA
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Lic. No. 48265
2/12/20
PROFESSIONAL ENGINEER

SPSA WASTE SOLUTIONS

REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

EXISTING SITE CONDITIONS DECEMBER 17, 2018

0 1" 2"

FILENAME	00C-01.DWG
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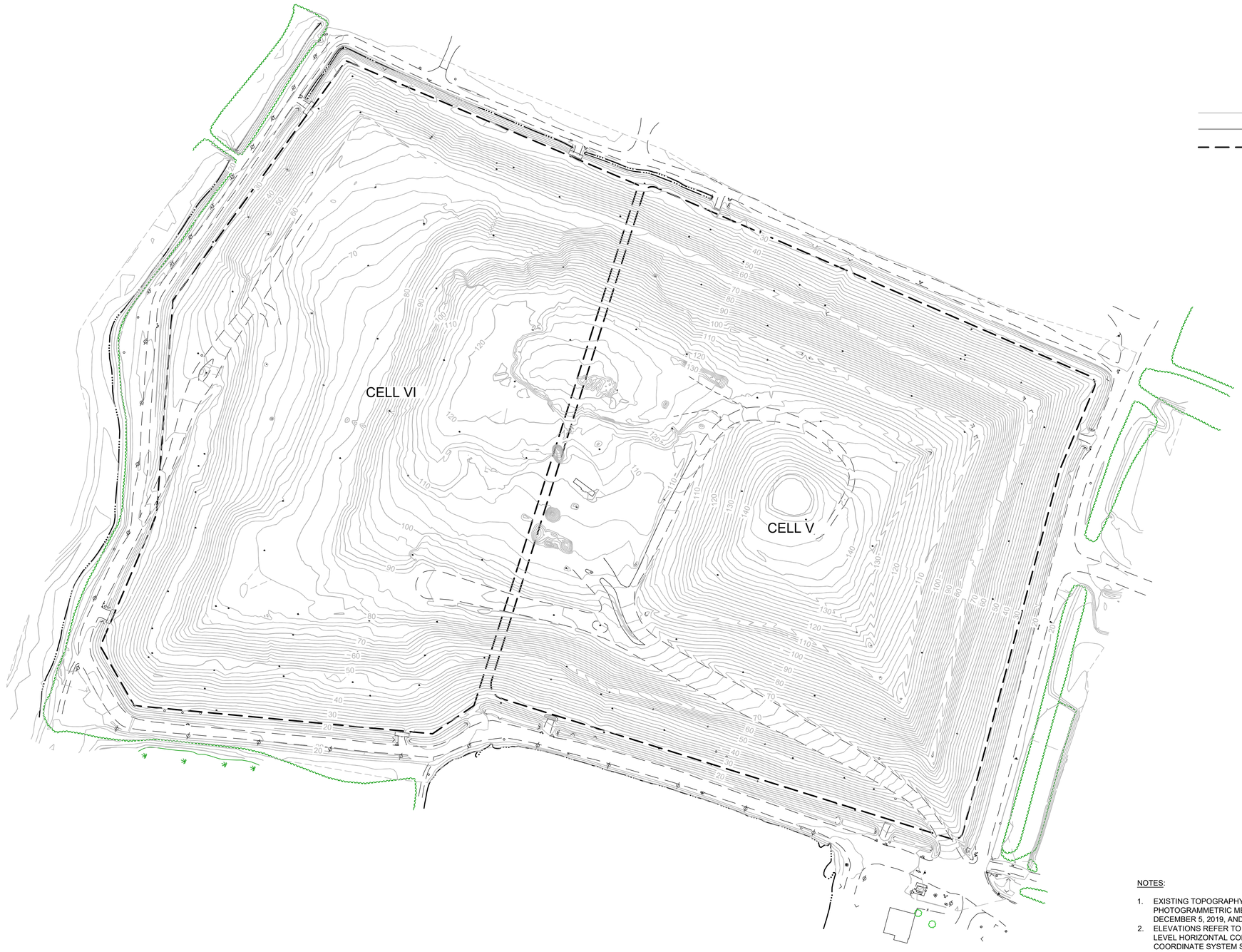
SHEET	00C-01
DWG NO.	XXX



NOTES:

1. EXISTING TOPOGRAPHY SHOWN HEREON COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED DECEMBER 5, 2019, AND PREPARED BY HOGGARD-EURE ASSOCIATES, P.C.
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SPSA WASTE SOLUTIONS

REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

EXISTING SITE CONDITIONS DECEMBER 5, 2019

0 1" 2"

FILENAME	00C-02.DWG
SCALE	1"=150'
SHEET	00C-02
DWG NO.	XXX

N

SCALE IN FEET

0 150 300

LEGEND

- EXISTING MINOR CONTOUR
- 170 EXISTING MAJOR CONTOUR
- PHASE BOUNDARY LIMITS
- ACTIVE FILLING AREA LIMITS
- × 16.5 CUT
- × 16.5 FILL

	SETTLEMENT (CY)	FILL (CY)	NET AIRSPACE CONSUMED (CY)
2018 TO 2019	61,846	332,716	270,870

NOTES:

1. ELEVATIONS AND CORRESPONDING COLORS REPRESENT DIFFERENCE BETWEEN DECEMBER 17, 2018 AND DECEMBER 5, 2019 SURVEYS.

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SPSA WASTE SOLUTIONS

REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

AIRSPACE CONSUMED
2018 AERIAL SURVEY VS 2019 AERIAL SURVEY

0 1" 2"

FILENAME 00C-03.DWG
SCALE 1"=150

SHEET 00C-03
DWG NO. XXX

N

SCALE IN FEET

0 150 300

LEGEND

- EXISTING MINOR CONTOUR
- 170 EXISTING MAJOR CONTOUR
- PHASE BOUNDARY LIMITS
- 170 PROPOSED MAJOR CONTOUR
- × 16.5 CUT
- × 16.5 FILL

	CUT (CY)	FILL (CY)	NET AIRSPACE REMAINING (CY)
2019 TO TOP OF WASTE	16,253	3,836,544	3,820,291

NOTES:

1. ELEVATIONS AND CORRESPONDING COLORS REPRESENT DIFFERENCE BETWEEN 2019 AERIAL SURVEY AND TOP OF WASTE GRADES.
2. PROPOSED GRADES REPRESENT TOP OF WASTE (INTERMEDIATE COVER), OR 3.5' BELOW PERTMITTED FINAL GRADES.

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REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

AIRSPACE REMAINING
2019 AERIAL SURVEY VS TOP OF WASTE GRADES

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SCALE 1"=150

SHEET 00C-04

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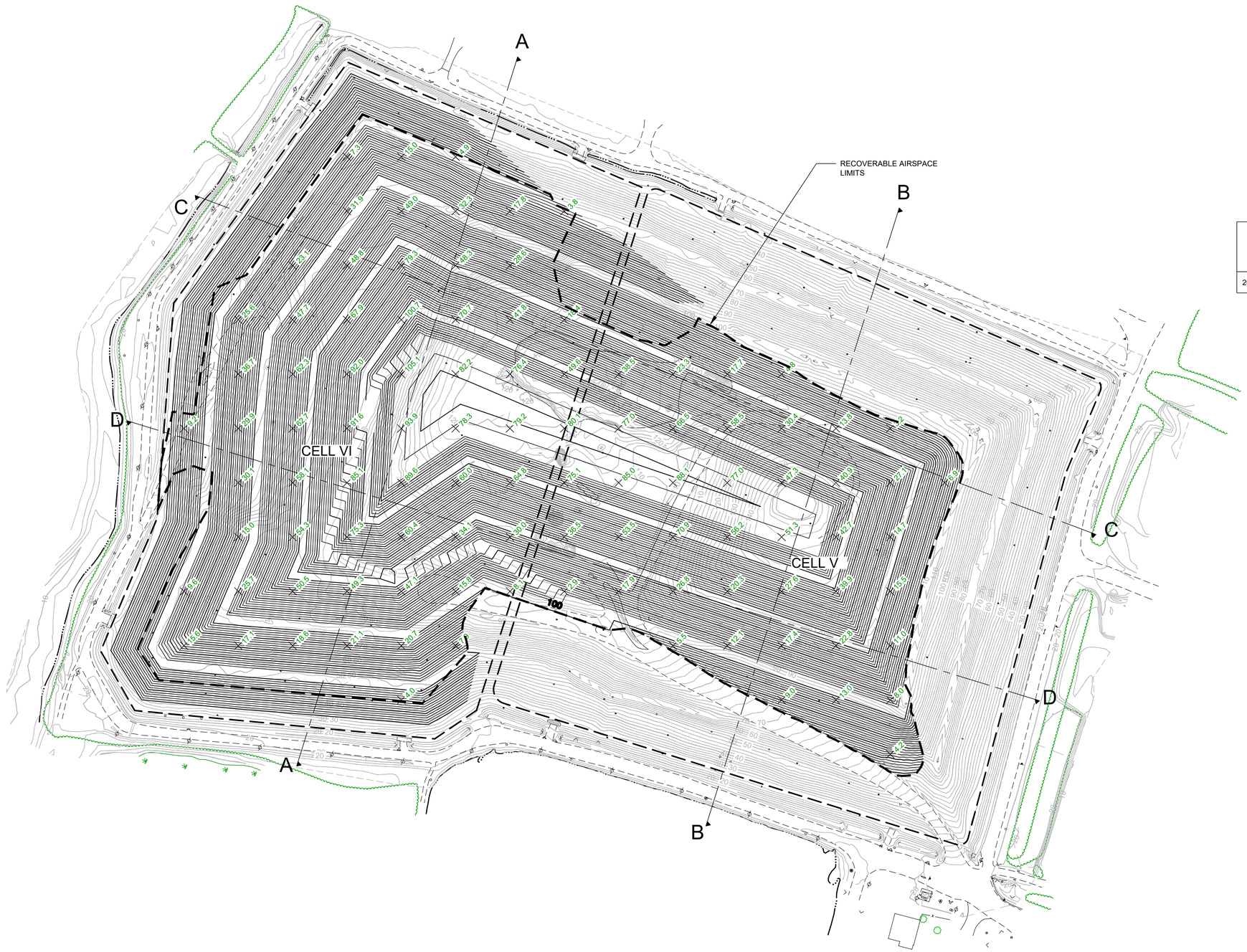

N

SCALE IN FEET

0 150 300

LEGEND

- EXISTING MINOR CONTOUR
- 170 EXISTING MAJOR CONTOUR
- PHASE BOUNDARY LIMITS
- 170 PROPOSED MAJOR CONTOUR
- × 16.5 CUT
- × 16.5 FILL

	CUT (CY)	FILL (CY)	NET RECOVERABLE AIRSPACE REMAINING (CY)
2019 TO TOP OF WASTE	216	3,408,281	3,408,065

NOTES:

1. ELEVATIONS AND CORRESPONDING COLORS REPRESENT DIFFERENCE BETWEEN 2019 AERIAL SURVEY AND RECOVERABLE TOP OF WASTE GRADES.
2. PROPOSED RECOVERABLE AIRSPACE FINAL GRADES WERE DEVELOPED TO COORDINATE WITH EXISTING GRADES AND AREAS WHERE FILLING CAN BE ACHIEVED DURING OPERATION OF CELL VI.
3. PROPOSED GRADES REPRESENT TOP OF WASTE (INTERMEDIATE COVER), OR 3.5' BELOW REVISED RECOVERABLE GRADES

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SPSA WASTE SOLUTIONS

REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

RECOVERABLE AIRSPACE REMAINING 2019 AERIAL SURVEY VS TOP OF WASTE GRADES RECOVERABLE

0 1" 2"

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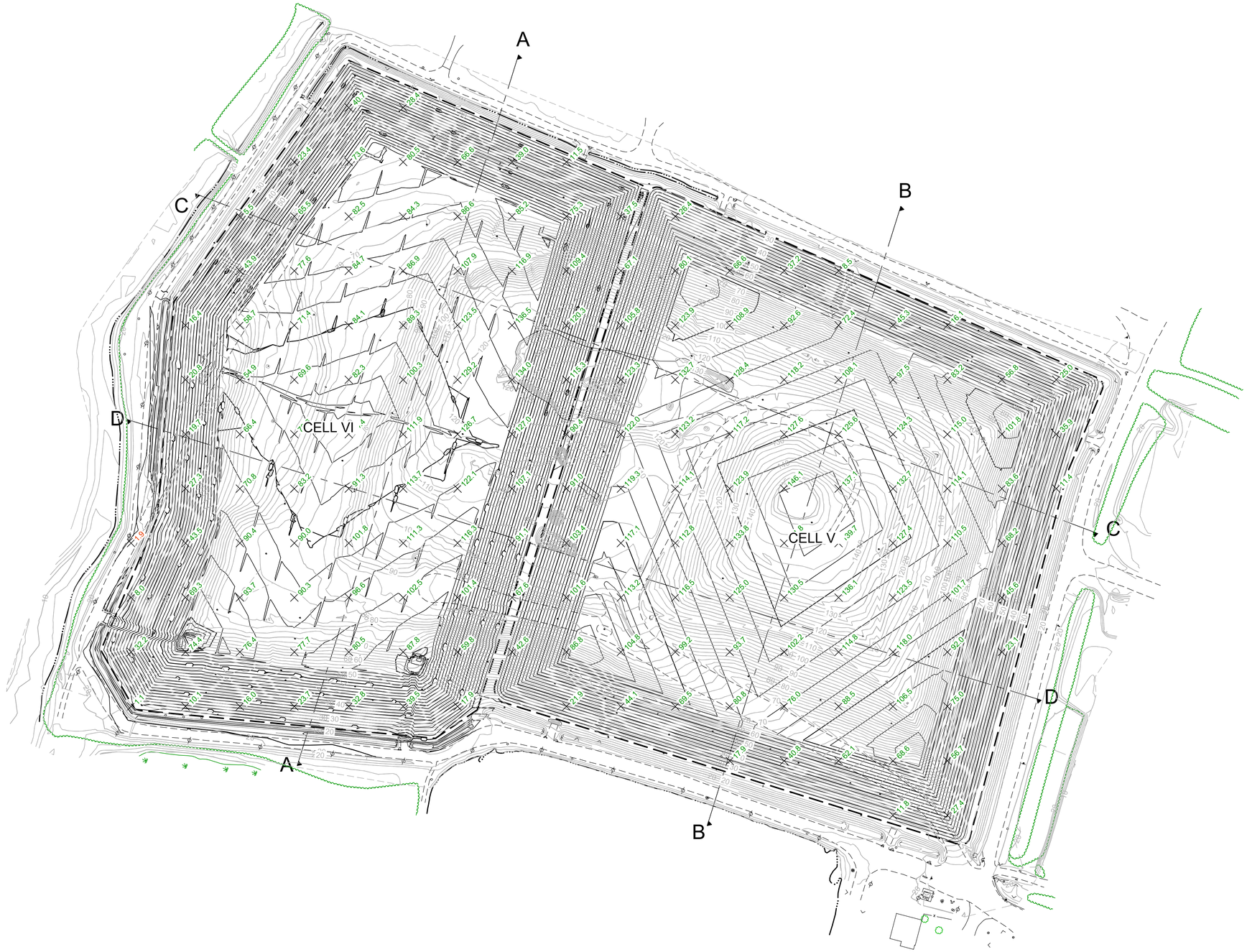

N

SCALE IN FEET

0 150 300

LEGEND

- EXISTING MINOR CONTOUR
- 170 EXISTING MAJOR CONTOUR
- PHASE BOUNDARY LIMITS
- 170 PROPOSED MAJOR CONTOUR
- × 16.5 CUT
- × 16.5 FILL

	AIRSPACE CONSUMED (CY)
BOTTOM OF WASTE VS 2019	11,423,445

NOTES:

1. ELEVATIONS AND CORRESPONDING COLORS REPRESENT DIFFERENCE BETWEEN BOTTOM OF WASTE GRADES AND 2019 AERIAL SURVEY.
2. BOTTOM OF WASTE GRADES REPRESENT OPERATIONAL COVER.

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REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

TOTAL AIRSPACE CONSUMED
BOTTOM OF WASTE GRADES VS 2019 AERIAL SURVEY

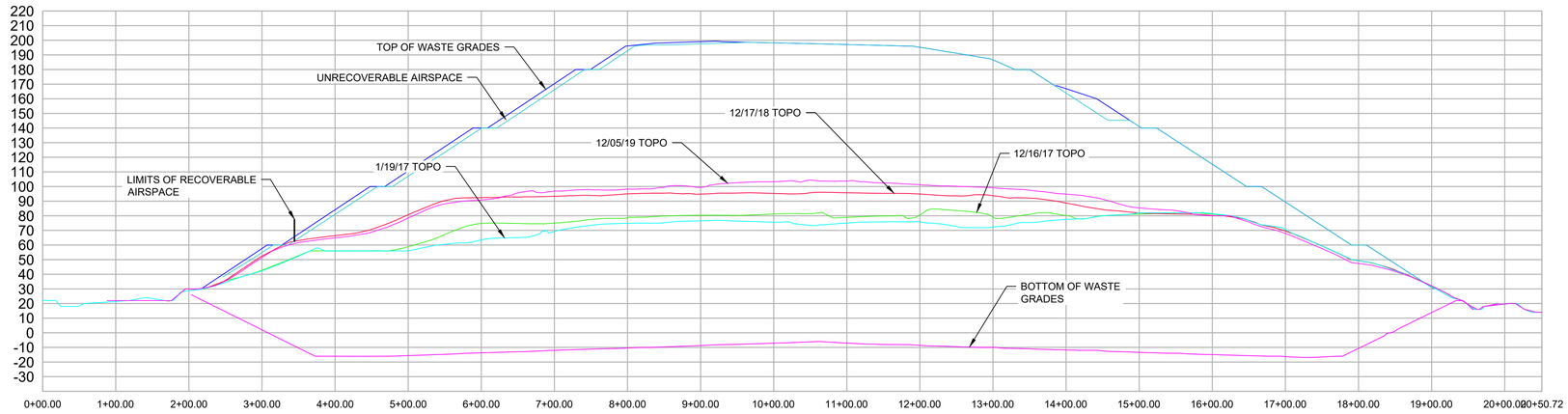
0 1" 2"

FILENAME 00C-06.DWG

SCALE 1"=150

SHEET 00C-06

DWG NO. XXX



A
-
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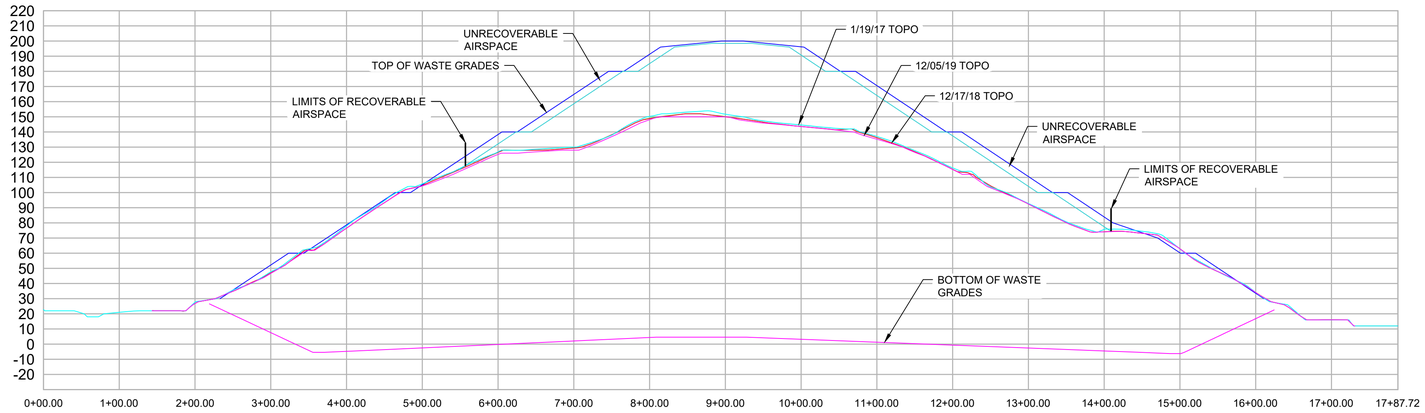

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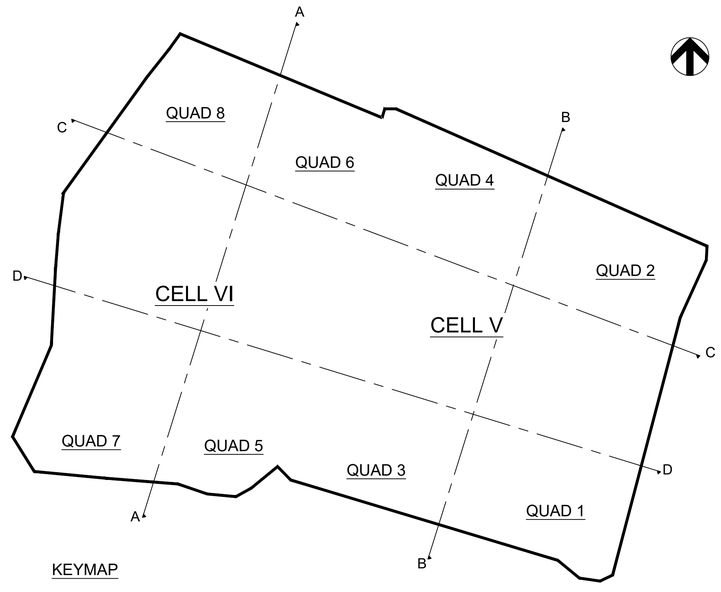

KEYMAP

SCALE IN FEET
−100 −50 0 100 200

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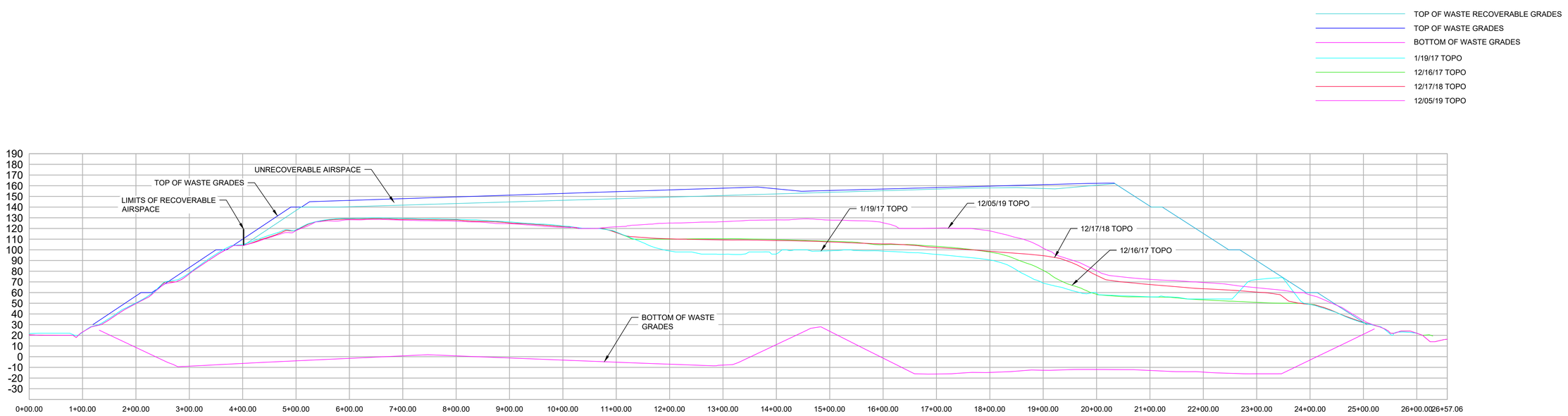
SPSA WASTE SOLUTIONS

REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

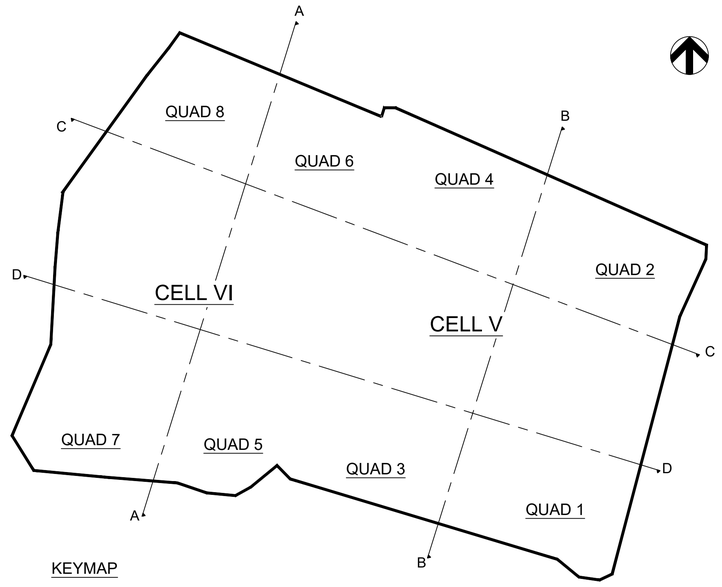
SITE CROSS SECTIONS
(SHEET 1 OF 3)

0 1" 2"

FILENAME	00C-07.DWG
SCALE	1"=100'
SHEET	00C-07
DWG NO.	XXX



C - SECTION C
H: 1"=100' ; V: 1"=50'



KEYMAP

SCALE IN FEET
-100 -50 0 100 200

			PROJECT MANAGER	J. MURRAY, P.E.
			DESIGNED BY:	T. PREDDY, E.I.
			DESIGNED BY:	
			DRAWN BY:	T. PREDDY, E.I.
			CHECKED BY:	T. YANOSCHAK, P.E.
B	02/2020	ISSUED WITH FINAL REPORT		
A	01/2020	ISSUED FOR REVIEW		
ISSUE	DATE	DESCRIPTION	PROJECT NUMBER	10190659

COMMONWEALTH OF VIRGINIA
JEFFREY S. MURRAY
Lic. No. 48265
2/12/20
PROFESSIONAL ENGINEER

SPSA WASTE SOLUTIONS

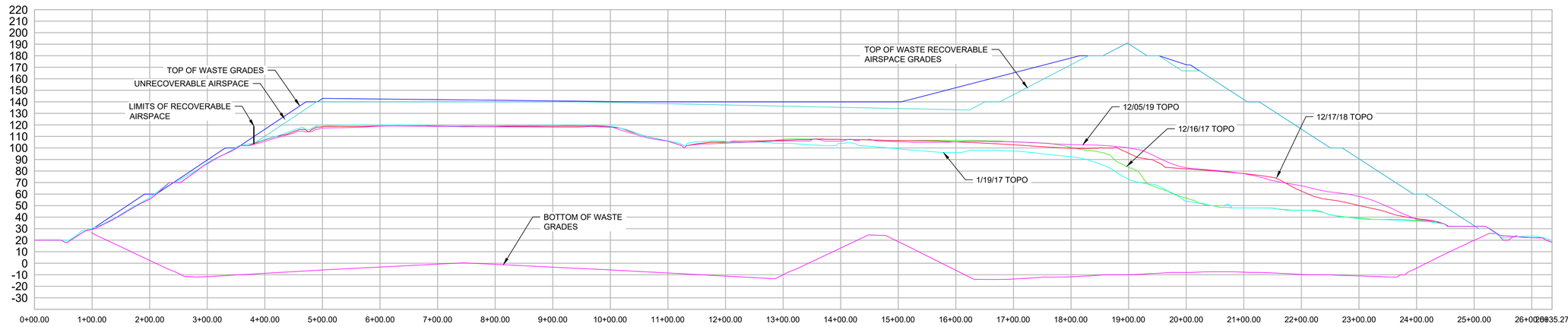
REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

SITE CROSS SECTIONS
(SHEET 2 OF 3)

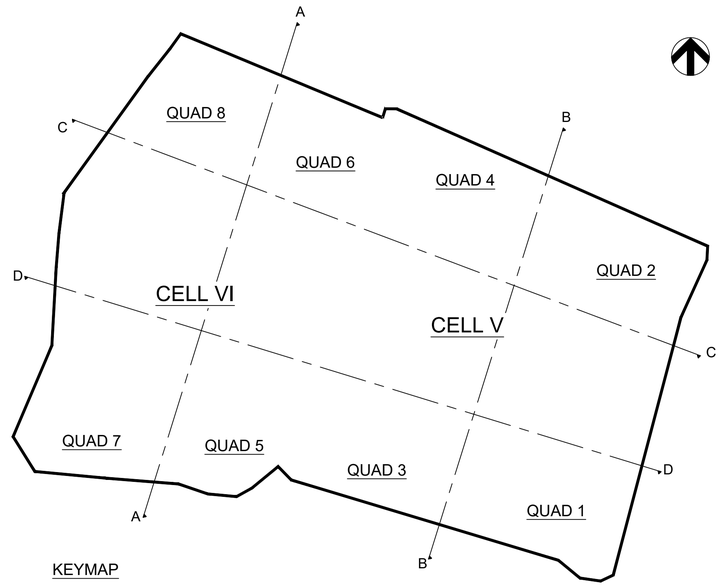
0 1" 2"

FILENAME 00C-08.DWG
SCALE 1"=100'

SHEET 00C-08
DWG NO. XXX



D SECTION D
H: 1"=100' ; V: "=50'



SCALE IN FEET
-100 -50 0 100 200

ISSUE	DATE	DESCRIPTION
B	02/2020	ISSUED WITH FINAL REPORT
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PROJECT MANAGER	J. MURRAY, P.E.
DESIGNED BY:	T. PREDDY, E.I.
DESIGNED BY:	
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COMMONWEALTH OF VIRGINIA
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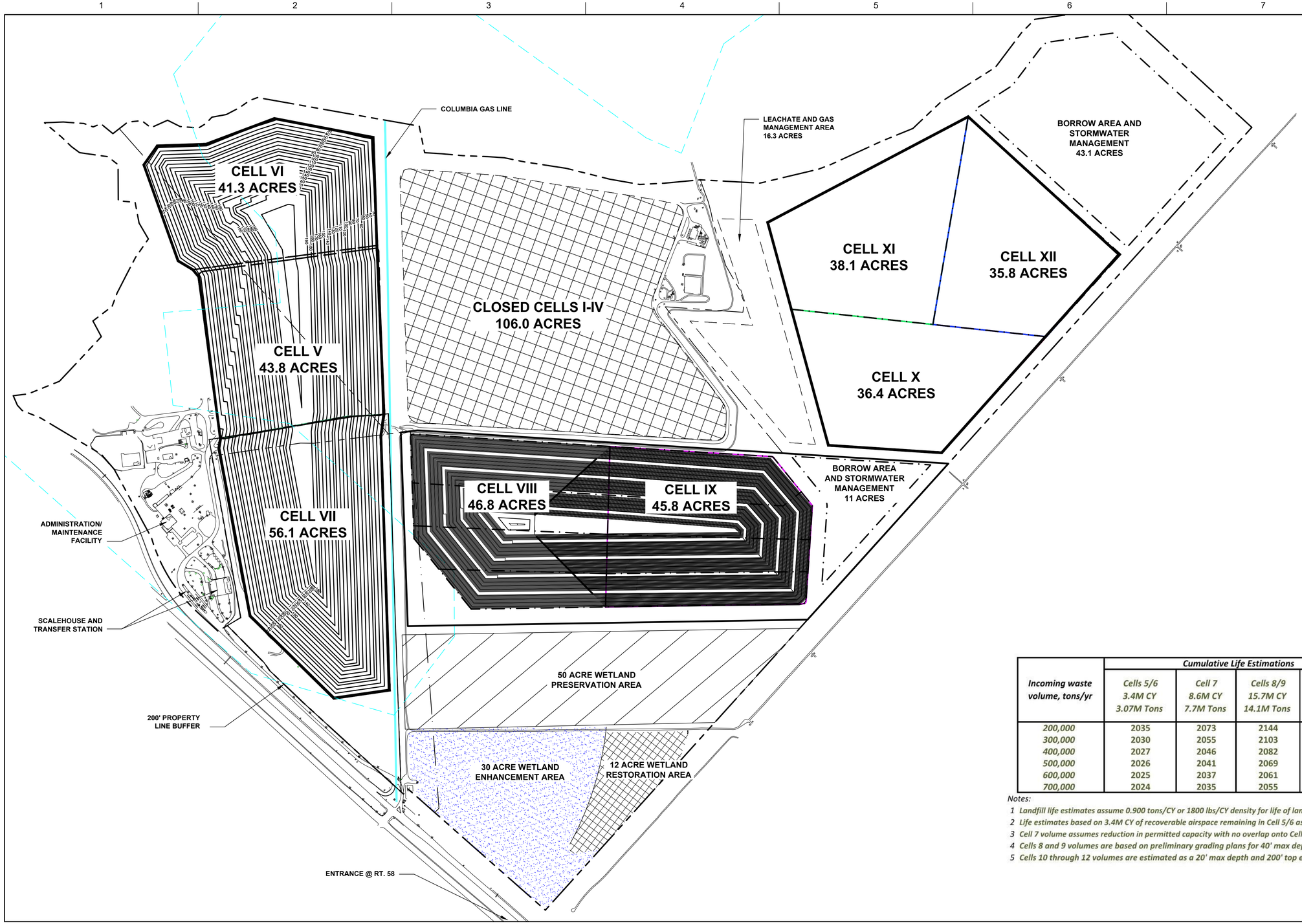
REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

SITE CROSS SECTIONS
(SHEET 3 OF 3)

0 1" 2"

FILENAME 00C-09.DWG
SCALE 1"=100'

SHEET 00C-09
DWG NO. XXX



Incoming waste volume, tons/yr	Cumulative Life Estimations			
	Cells 5/6 3.4M CY 3.07M Tons	Cell 7 8.6M CY 7.7M Tons	Cells 8/9 15.7M CY 14.1M Tons	Cells 10/11/12 21.3M CY 19.2M Tons
200,000	2035	2073	2144	2240
300,000	2030	2055	2103	2167
400,000	2027	2046	2082	2130
500,000	2026	2041	2069	2108
600,000	2025	2037	2061	2093
700,000	2024	2035	2055	2082

Notes:

1. *Landfill life estimates assume 0.900 tons/CY or 1800 lbs/CY density for life of landfill*
2. *Life estimates based on 3.4M CY of recoverable airspace remaining in Cell 5/6 as of December 5, 2019*
3. *Cell 7 volume assumes reduction in permitted capacity with no overlap onto Cell V as shown on drawing.*
4. *Cells 8 and 9 volumes are based on preliminary grading plans for 40' max depth, 200' top elevation.*
5. *Cells 10 through 12 volumes are estimated as a 20' max depth and 200' top elevation.*

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SPSA WASTE SOLUTIONS

REGIONAL LANDFILL
2020 AIRSPACE MANAGEMENT

MASTER PLAN BUILDOUT

0 1" 2"

FILENAME 00C-10.DWG
SCALE 1"=150

SHEET 00C-10
DWG NO. XXX