



# Airspace Management Report

Southeastern Public Service Authority

Regional Landfill, Cells V and VI

*Suffolk, Virginia*

Issued for Review January 2021

Final Report January 27, 2021





# Table of Contents

<b>Table of Contents</b> .....	<b>i</b>
<b>Purpose</b> .....	<b>1</b>
<b>Tonnage Data</b> .....	<b>1</b>
<b>Operating Airspace</b> .....	<b>1</b>
Topography .....	1
Airspace .....	2
<b>Remaining Site Life</b> .....	<b>3</b>
<b>Findings</b> .....	<b>4</b>
Future Capacity.....	4

## **Attachments**

- Figure A, Tonnage History
- Figure B, Existing Tonnage Scenario
- Figure C, Varying Density
- Calendar Year and Fiscal Year Tonnage Reports
- Airspace Calculations
- Cell VII Life Estimates
- Drawings C-01 and C-02, 2019 and 2020 Surveys
- Drawing C-03 Airspace Consumed December 2019 to December 2020
- Drawing C-04 Airspace Remaining December 2020 to Top of Waste
- Drawing C-05 Recoverable Airspace Remaining
- Drawing C-06 Total Airspace Consumed Bottom of Waste to December 2020
- Drawings C-07 thru C-09, Site Cross Sections
- Drawing C-10 Master Plan Buildout

# 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 **11,805,770 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 15, 2020. A total of **338,787 tons** were disposed in the 2020 reporting period December 5, 2019 – December 15, 2020.
- 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 **26,404 tons per month (tpm)**. Figure A (attached) shows the monthly and rolling 12-month average tonnage disposed at the landfill through **December 2020**.
- The average monthly disposal rate for just MSW and CDD at the landfill since January 24, 2018 is **12,074 tpm**.
- The average monthly disposal rate for ash (ash and non-qualifying ash) at the landfill over the past 12 months is **15,144 tpm**, which is about 15% more than the 13,163 tpm in 2019.

# 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 5, 2019 topography prepared by Hoggard-Eure Associates, P.C.

- December 15, 2020 topography prepared from aerial drone photography by SPSA utilizing Propeller Trimble Stratus software.

## 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 15, 2020** 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 5, 2019 and December 15, 2020. 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 2020, airspace gained in 2020 through settlement, the permitted final top of waste grades, and the recoverable top of waste grades.

We note that there were considerable differences between the 2020 and 2019 surveys outside of the active filling area due to differing survey methodology. It is assumed that the drone photogrammetry may be more sensitive to vegetation or other minor changes in topographic features than the aerial photogrammetry using airplane. This has resulted in a net fill of over 300,000 CY of airspace consumed in areas that were not operated over in 2020. We have therefore discounted this volume when evaluating airspace consumed in 2020 and have identified the fill quantity in the active filling area. In 2019 the settlement in areas outside of the active filling area resulted in a net gain of about 62,000 CY. We are unable to determine any settlement quantities and capacity gained in 2020 due to the different survey methods. We anticipate that the 2021 survey will be more comparable to 2020 surface and we can better assess settlement and net airspace consumed and remaining.





Table A

Airspace Management Report	Survey Date	Disposed To Date (Tons) <sup>(1)</sup>	Airspace Consumed To Date (CY)	Operating Airspace Remaining (CY)	Disposed In-place Density (lbs/CY) <sup>(1, 2)</sup>	Periodic Airspace Consumed (CY) <sup>(4)</sup>	Operational In-place Density (lbs/CY) <sup>(4)</sup>
-	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 <sup>(3)</sup>	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	278,569	2,533
December 2017	12/16/17	10,865,168	10,831,703	4,412,901	2,008	204,462	2,326
December 2018 <sup>(5)</sup>	12/17/18	11,177,785	11,152,613	3,728,814	2,005	337,261	1,854
December 2019 <sup>(5)</sup>	12/5/19	11,466,983	11,423,983	3,408,065	2,008	332,716	1,738
<b>December 2020 <sup>(5)</sup></b>	<b>12/15/20</b>	<b>11,805,770</b>	<b>11,821,884</b>	<b>3,036,939</b>	<b>1,997</b>	<b>355,981</b>	<b>1,903</b>

- (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, 2019 and 2020 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 three 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 2020 was **1,903 lbs/CY** based on the periodic airspace consumed in the active area of 355,981 CY and 338,787 tons disposed between the 2019 and 2020 surveys.

If we were to assume that the total quantity of waste received in Calendar Year 2020 [**317,349 tons, 1,221 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 **1,903 lbs/CY**, Cell V and VI would last until approximately January 2030.

Figure B depicts the tonnage and airspace scenario for Cell V and VI based on the 2020 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 July 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 June 2028.

Figure C depicts the tonnage scenario for future operations, if SPSA continues to accept 317,349 tons per year of ash, MSW and CDD for disposal, Cell VI could reach capacity as early as August 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 August 2028 or July 2029, 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

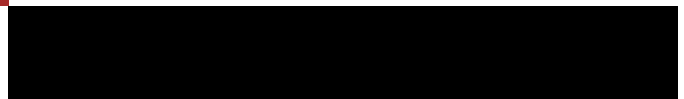


Figure A

# Tonnage History

## SPSA Regional Landfill Cells V & VI

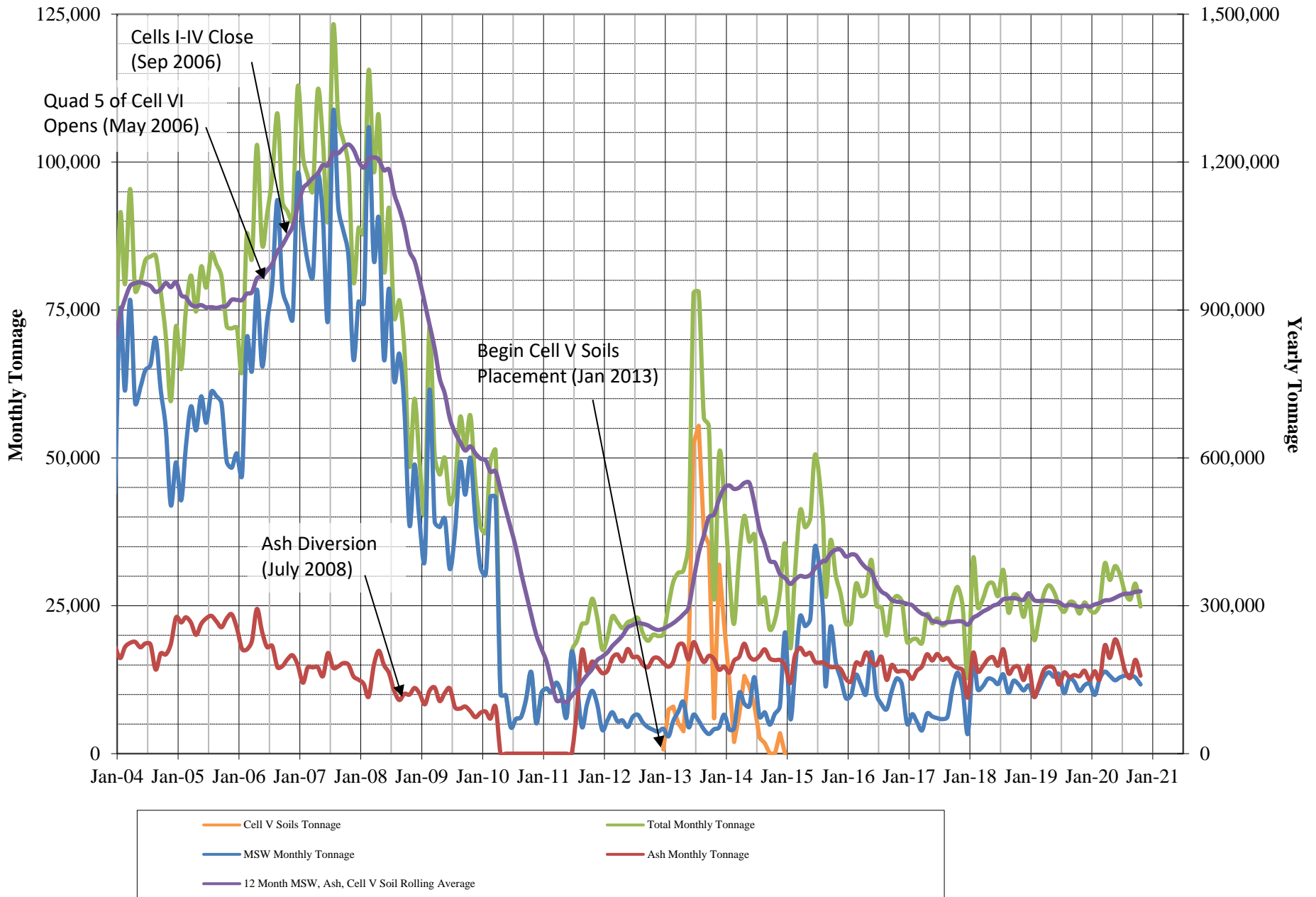
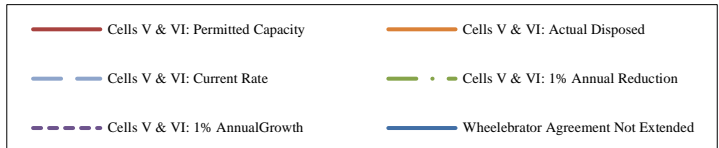
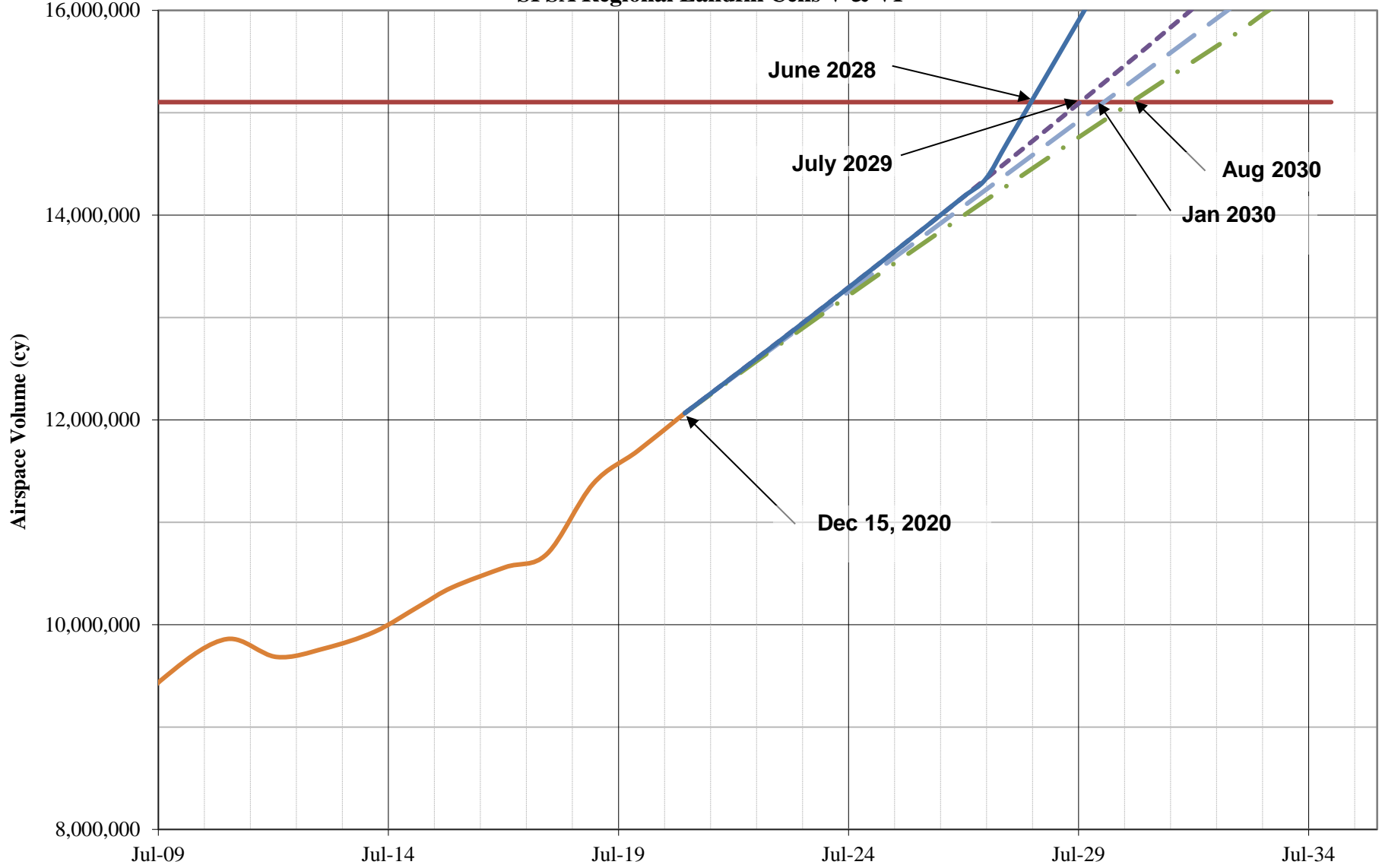
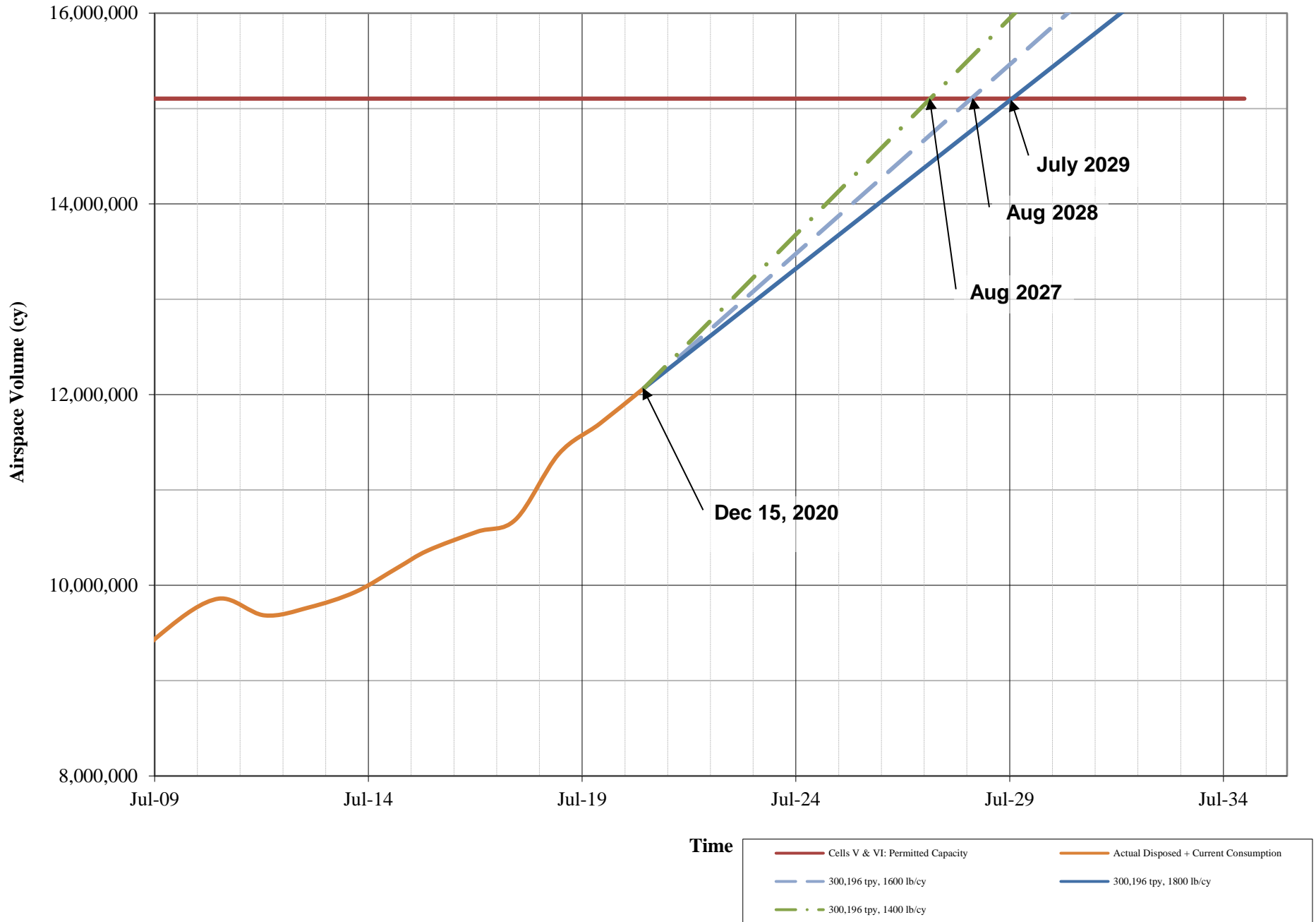


Figure B  
**Tonnage Scenario**  
 SPSA Regional Landfill Cells V & VI





# Figure C Varying Density Scenario SPSA Regional Landfill Cells V & VI



**Regional Landfill Waste Stream**

Calendar Year 2020 Tonnage

Types of Waste (tons)													Totals	
	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	CY2020	
CDD	814	759	954	504	629	531	514	615	568	580	493	277	7,237	603 tons/month since Jan 1 2020
Sludge - Norfolk	306	313	397	307	451	391	426	352	295	321	469	187	4,215	351 tons/month since Jan 1 2020
Sludge - Suffolk	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Industrial Waste	-	6	9	90	329	101	12	21	11	383	-	-	963	80 tons/month since Jan 1 2020
Fines C&D	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Soils	831	448	533	179	229	244	439	610	538	680	379	36	5,147	429 tons/month since Jan 1 2020
Brick & Block	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clean Fill	5,736	509	5,648	1,092	-	11	805	337	534	283	185	-	15,141	1,262 tons/month since Jan 1 2020
Peanut Dust/Peanut Hulls	674	336	493	489	395	502	477	382	394	383	336	138	4,998	417 tons/month since Jan 1 2020
Municipal Solid Waste <sup>1</sup>	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Suffolk Municipal NP Solid Waste	2	15	25	76	125	274	468	631	200	390	196	108	2,509	209 tons/month since Jan 1 2020
Southampton Cty Municipal NP Solid Waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chesapeake Municipal NP Solid Waste	5	15	25	5	24	46	-	-	-	-	-	2	123	-
Portsmouth Municipal NP Solid Waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Virginia Beach Municipal NP Solid Waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norfolk Municipal NP Solid Waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-
NP from Municipal HHW Users	67	44	59	50	49	66	62	76	70	66	59	25	694	58 tons/month since Jan 1 2020
Navy Waste <sup>1</sup>	13	9	6	18	-	5	7	3	15	17	11	22	127	-
Contract Processable Waste	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-Processible Commercial Waste <sup>2</sup>	113	41	45	50	55	82	36	46	62	72	91	45	738	61 tons/month since Jan 1 2020
Fluff from BiMetals	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Concrete/Asphalt	-	-	-	-	-	13	-	-	-	-	-	-	13	1 tons/month since Jan 1 2020
Shredded Tires	222	523	536	532	566	394	724	304	860	578	357	96	5,693	474 tons/month since Jan 1 2020
Ash	11,324	11,882	10,983	15,462	13,198	16,514	14,844	12,734	11,545	14,862	12,149	6,657	152,154	12,679 tons/month since Jan 1 2020
Non-Qualifying Ash	1,145	2,058	1,572	2,846	2,987	2,788	2,537	1,251	1,267	1,007	1,030	1,266	21,754	1,813 tons/month since Jan 1 2020
Cell V Slope	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MSW from Tsf Stations	8,777	7,398	9,555	11,537	10,239	9,714	9,655	10,061	10,169	9,305	9,207	4,725	110,341	9,195 tons/month since Jan 1 2020
Clean Fill - Clearfield (1.35 factor)	1,380	5,254	3,137	3,572	4,082	7,352	5,670	5,387	3,232	3,912	3,534	2,835	49,347	4,112 tons/month since Jan 1 2020
Clearfield Residual (1.35 factor)	-	19	-	19	76	38	76	76	76	95	95	76	646	-
Non Processible Waste (from Tsf Stations)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Non-Processible Waste (from RDF)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diverted Processible Waste (from RDF)	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diverted Processible Waste (from Tsf Stations)	-	-	-	-	-	-	-	-	-	-	-	-	-	- tons/month since Jan 1 2020
<b>Total</b>	<b>31,409</b>	<b>29,628</b>	<b>33,978</b>	<b>36,829</b>	<b>33,434</b>	<b>39,066</b>	<b>36,752</b>	<b>32,885</b>	<b>29,835</b>	<b>32,934</b>	<b>28,591</b>	<b>16,495</b>	<b>381,836</b>	<b>31,820 tons/month since Jan 1 2020</b>
Total without clean fill	24,293	23,866	25,192	32,165	29,352	31,703	30,277	27,161	26,068	28,740	24,872	13,660	317,349	26,446 tons/month since Jan 1 2020
Total without ash	11,824	9,925	12,638	13,856	13,168	12,401	12,896	13,176	13,257	12,871	11,693	5,737	143,441	11,953 tons/month since Jan 1 2020
Total non-MSW	3,047	2,527	3,083	2,319	2,929	2,687	3,241	3,115	3,088	3,566	2,486	1,012	33,100	2,758 tons/month since Jan 1 2020

<sup>1</sup> Represents CDD from Suffolk Contractors

<sup>2</sup> Boats, Flour, Frozen Foods, Other items too large for Suffolk Transfer Station



<b>Project:</b>	<b>SPSA</b>	Computed: TMY	1/12/2021
<b>Subject:</b>	<b>Regional Landfill Cell V &amp; VI</b>	Checked: JSM	1/14/2021
<b>Task:</b>	<b>Airspace Calculations</b>	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** 11,821,884 cy Volume Consumed as of 12-15-20 (AutoCADD, Base Drawings vs. 12-15-20 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

<b>D</b> 11,821,884 cy Airspace Consumed as of 12-5-19	(B-C)
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Includes MSW, D&I Cover

**Airspace Consumption Check**

**E** 11,423,445 cy Airspace Consumed in Cells V&VI as of 12-05-19 (Base Drawing vs. 12-05-19 Survey)

**F** 355,062 cy Airspace Consumed between 12-05-19 and 12-15-20 (12-05-19 Survey vs. 12-15-20 Survey)  
(includes only volume consumed within active fill area)

**G** 11,778,507 cy Airspace Consumed as of 12-15-20 based on the 12-05-19 survey and the 12-05-19 survey (E + F)

0.37% % Difference of the Consumed AutoCADD and calculated Consumed Airspace (I-G/D)

**H** 11,800,196 cy Airspace Consumed (avg of AutoCADD volume and calculated volume) (Average of D & G)

0.18% % Difference of the Consumed Average and calculated Consumed Airspace (I-H/D)

**Airspace Remaining Check**

**I** 3,429,157 cy Remaining Airspace as of 12-15-20 (12-15-20 survey vs. 3:1 Top of Waste, AutoCADD)

**J** 3,282,046 cy calculated Remaining Airspace as of 12-15-20 (A - D)  
(Permit Net Airspace less Airspace Consumed)

**K** 4.48% % Difference of the Remaining AutoCADD and calculated Remaining Airspace (I-I/J)

**L** 3,036,939 cy Recoverable Remaining Airspace as of 12-15-20 (12-15-20 vs Revised Top of Waste, AutoCADD)

**M** 12.91% % Difference Calculated vs Recoverable Airspace (I-I/L)

<b>N</b> 3,429,157 cy Total Remaining Airspace as of 12-15-20	(I)
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Includes MSW, D&I Cover

<b>O</b> 3,036,939 cy Recoverable Airspace Remaining as of 12-15-20	(L)
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Includes MSW, D&I Cover

Project:	SPSA	Computed: TMY	1/12/2021
Subject:	Regional Landfill Cell V & VI	Checked: JSM	1/14/2021
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 11,821,884 cy Cummulative Airspace Consumed as of 12/15/20 includes waste, daily & intermediate cover soil
- C 11,805,770 tons from 5/00 through 12/20 (includes MSW, Ash, and Cell V soils)
- D1 26,446 tons/month (TPM) Curent Disposal Rate

**Estimated Effective Density over the life of Cell VI.**

0.952 tons/cy Operational Density (Current Period)

1,904 lbs/cy Effective Density

E **0.952 tons/cy Effective Density**

**Determine the remaining life of Cells V and VI based on 26,446 TPM.**

F 3,036,939 cy Recoverable Remaining Airspace of Cells V and VI at December 15, 2020

G 109.3 months Estimated Remaining Life (**E \* F / D**)

H 12/15/2020 Base Date

I **1/24/2030 Estimated Full Date @ 26,446 TPM (317,352 TPY)** (**H + (G / 12 \* 365.25)**)



Project:	<b>SPSA Life Projections</b>	Computed: TMY	Date: 1/12/21
Subject:	<b>Varying Disposal Materials</b>	Checked: JSM	Date: 1/14/21
Task:	<b>Airspace &amp; Timeline For Ash/MSW/CDD</b>	Sheet: 1	Of: 2

Date of Survey:	<b>12/15/2020</b>			Capacity at 1800 lbs/CY	
				<u>Tons</u>	
Permitted airspace for Cells 5 and 6	<b>15,103,930</b> cy			13,593,537	
Airspace consumed as of December 15, 2020	<b>11,821,884</b> cy			10,639,696	
Calculated Airspace Remaining for Cells 5-6	<b>3,282,046</b> cy			2,953,841	
Recoverable Airspace Remaining for Cells 5-6	<b>3,036,939</b> cy			2,733,245	
Permitted Airspace for Cell 7	<b>8,600,000</b>	11,636,939		7,740,000	<b>1800</b>
Estimated Airspace for Cells 8 and 9	<b>15,696,181</b>	27,333,120		14,126,563	
Estimated Airspace for Cells 10-12	<b>21,326,523</b>	48,659,643		19,193,871	

**Year Site Life Expires**

Incoming waste volume, tons/yr	Cumulative Life Estimations			
	Cells 5/6 3.0M CY 2.7M 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	2034	2073	2143
300,000	2030	2055	2102	2166
400,000	2027	2047	2082	2130
500,000	2026	2041	2070	2108
600,000	2025	2038	2061	2093
700,000	2024	2035	2056	2083

Notes:

- 1 Landfill life estimates assume 0.900 tons/CY or 1800 lbs/CY density for life of landfill
- 2 Life estimates based on 3.0 M CY of recoverable airspace remaining in Cell 5/6 as of December 15, 20
- 3 Cell 7 volume assumes reduction in permitted capacity with no overlap onto Cell V as shown on draw
- 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.

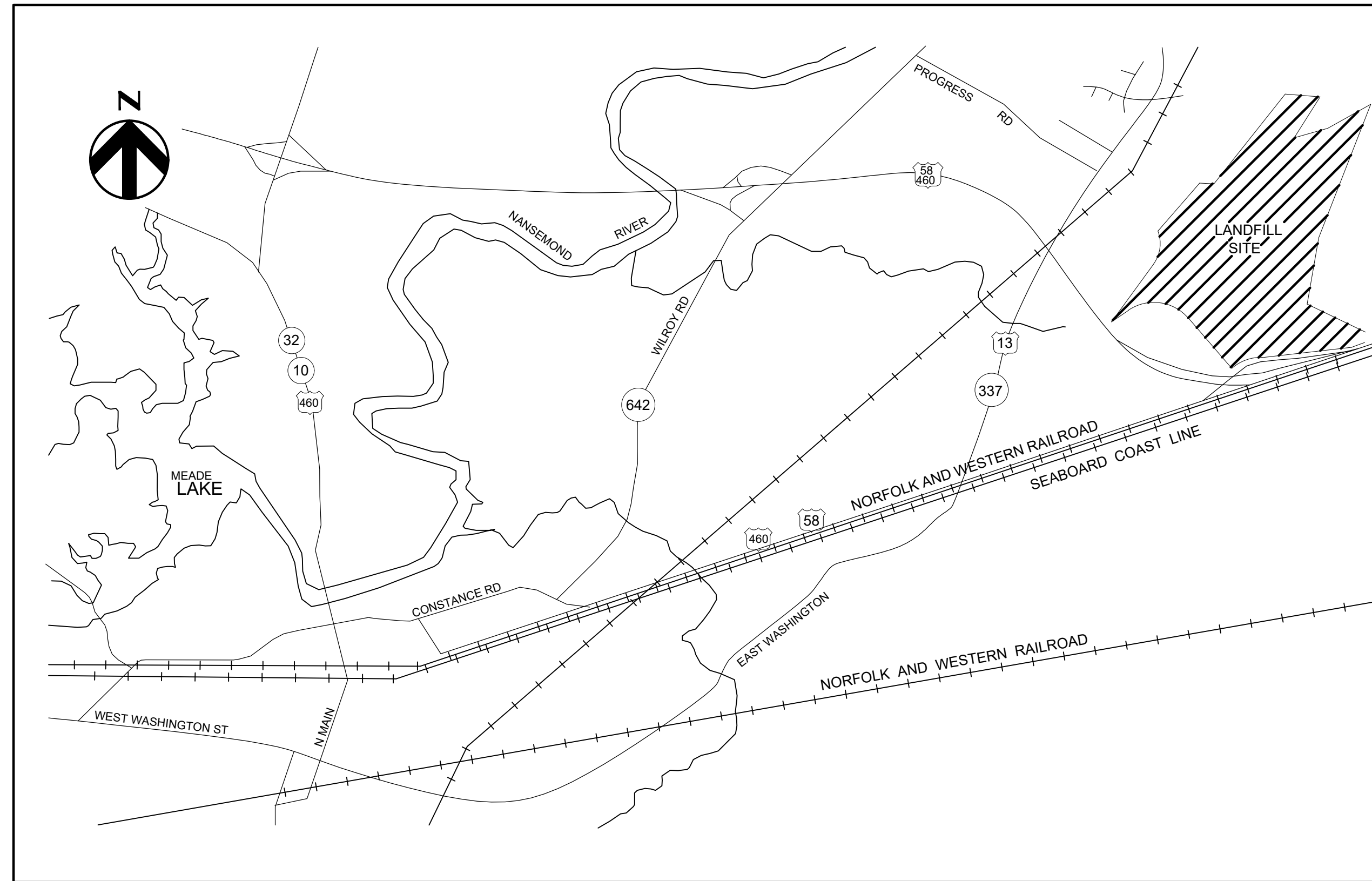
<b>Project:</b>	<b>SPSA Life Projections</b>	Computed: TMY	Date: 1/12/21
<b>Subject:</b>	<b>Varying Disposal Materials</b>	Checked: JSM	Date: 1/14/21
<b>Task:</b>	<b>Airspace &amp; Timeline For MSW</b>	Sheet: 2	Of: 2

Date of Survey:	<b>12/15/2020</b>		Capacity at 1400 lbs/CY	
			Tons	
Permitted airspace for Cells 5 and 6	<b>15,103,930</b> cy		10,572,751	
Airspace consumed as of December 15, 2020	<b>11,821,884</b> cy		8,275,319	
Calculated Airspace Remaining for Cells 5-6	<b>3,282,046</b> cy		2,297,432	
Recoverable Airspace Remaining for Cells 5-6	<b>3,036,939</b> cy		2,125,857	
Permitted Airspace for Cell 7	<b>8,600,000</b>	8,600,000	6,020,000	<b>1400</b>
Estimated Airspace for Cells 8 and 9	<b>15,696,181</b>	24,296,181	10,987,327	
Estimated Airspace for Cells 10-12	<b>21,326,523</b>	45,622,704	14,928,566	

**Year Site Life Expires**

<b>Incoming waste volume, tons/yr</b>	<b>Cumulative Life Estimations</b>			
	<b>Cells 5/6</b>	<b>Cell 7</b>	<b>Cells 8/9</b>	<b>Cells 10/11/12</b>
	<b>3.0M CY 2.1M Tons</b>	<b>8.6M CY 6.0M Tons</b>	<b>15.7M CY 10.9M Tons</b>	<b>21.3M CY 14.9M Tons</b>
<b>200,000</b>	<b>2034</b>	<b>2064</b>	<b>2119</b>	<b>2194</b>
<b>300,000</b>	<b>2030</b>	<b>2050</b>	<b>2086</b>	<b>2136</b>
<b>400,000</b>	<b>2027</b>	<b>2042</b>	<b>2070</b>	<b>2107</b>
<b>500,000</b>	<b>2026</b>	<b>2038</b>	<b>2060</b>	<b>2090</b>
<b>600,000</b>	<b>2025</b>	<b>2035</b>	<b>2053</b>	<b>2078</b>
<b>700,000</b>	<b>2024</b>	<b>2033</b>	<b>2049</b>	<b>2070</b>

- 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 existing 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



LOCATION MAP  
1" = 2000'

Contract Drawings For

# Regional Landfill

## 2021 Airspace Management

Issued for Review  
January 2021

Project No.  
10236713

Suffolk, Virginia



### INDEX OF DRAWINGS

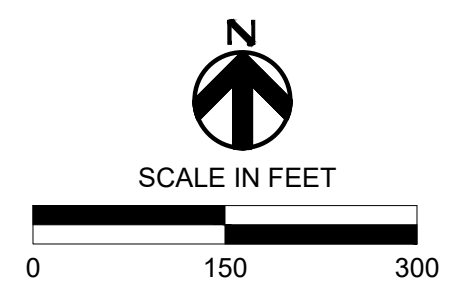
**GENERAL**

00G-01 COVER SHEET

**CIVIL**

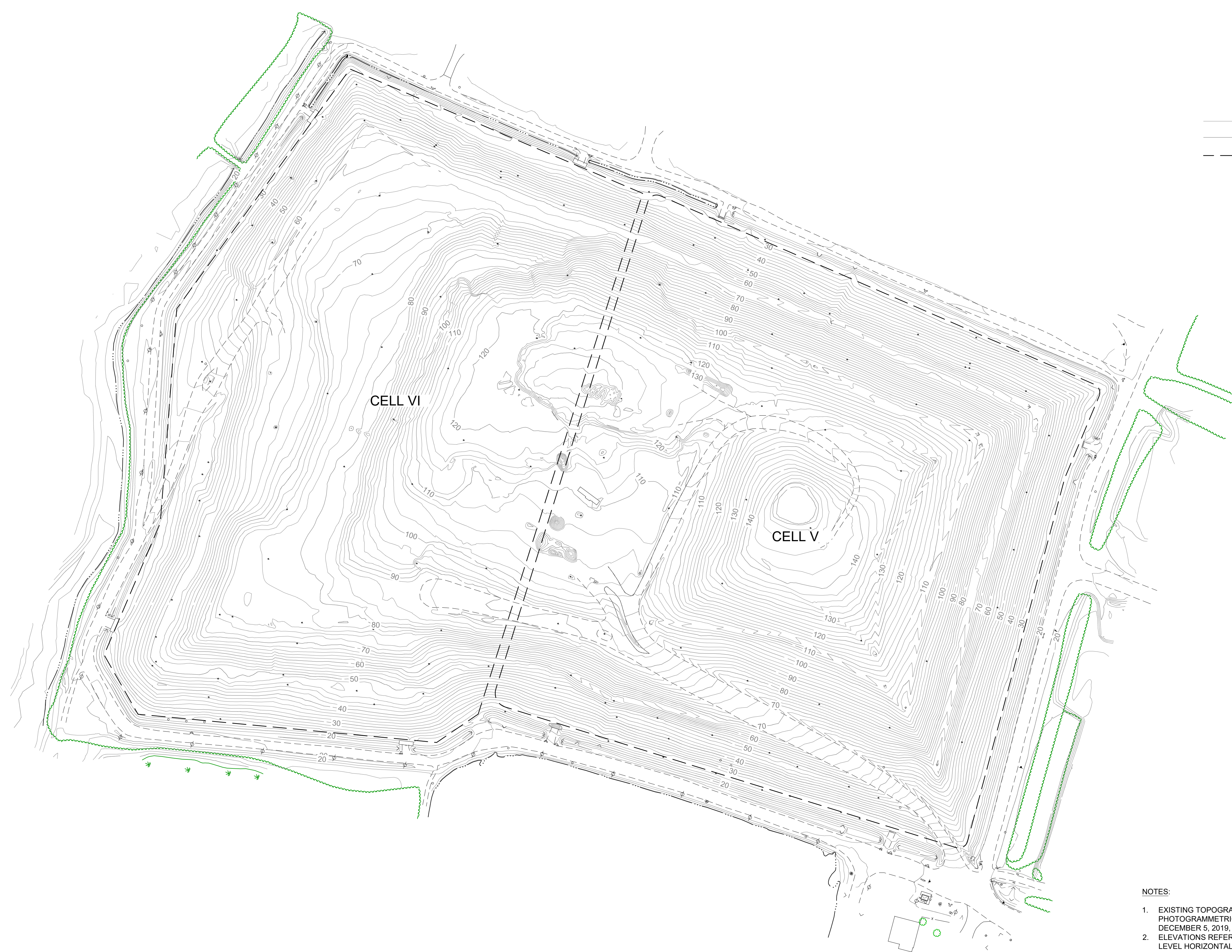
- 00C-01 EXISTING SITE CONDITIONS (DECEMBER 5, 2019)
- 00C-02 EXISTING SITE CONDITIONS (DECEMBER 15, 2020)
- 00C-03 AIRSPACE CONSUMED - 2019 VS 2020
- 00C-04 AIRSPACE REMAINING - 2020 VS TOP OF WASTE
- 00C-05 RECOVERABLE AIRSPACE - 2020 VS TOP OF WASTE RECOVERABLE
- 00C-06 TOTAL AIRSPACE CONSUMED - BOTTOM OF WASTE VS 2020
- 00C-07 SITE CROSS SECTIONS (SHEET 1 OF 3)
- 00C-08 SITE CROSS SECTIONS (SHEET 2 OF 3)
- 00C-09 SITE CROSS SECTIONS (SHEET 3 OF 3)
- 00C-10 MASTER PLAN BUILDOUT



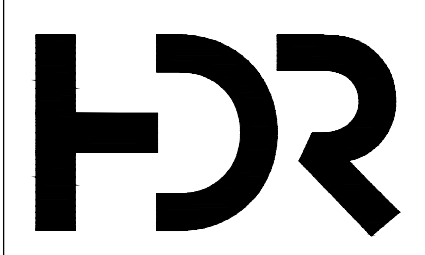


**LEGEND**

	EXISTING MINOR CONTOUR
	EXISTING MAJOR CONTOUR
	PHASE BOUNDARY LIMITS



- NOTES:**
- EXISTING TOPOGRAPHY SHOWN HEREON COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL PHOTOGRAPHY DATED DECEMBER 5, 2019, AND PREPARED BY HOGGARD-EURE ASSOCIATES, P.C. ELEVATIONS REFER TO NATIONAL GEODETIC SURVEY (NGS) MEAN SEA LEVEL HORIZONTAL CONTROL BASED UPON VIRGINIA STATE PLANE COORDINATE SYSTEM SOUTH ZONE NORTH AMERICAN DATUM (NAD) 1983.



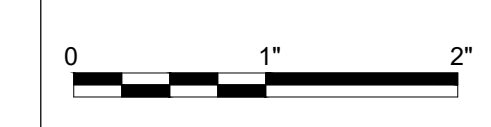
ISSUE	DATE	DESCRIPTION
A	01/2021	ISSUED FOR REVIEW

<b>PROJECT MANAGER</b>	J. MURRAY, P.E.
DESIGNED BY:	D. DIXON
DRAWN BY:	D. DIXON
CHECKED BY:	T. YANOSCHAK, P.E.
<b>PROJECT NUMBER</b>	10236713



**REGIONAL LANDFILL  
2021 AIRSPACE MANAGEMENT**

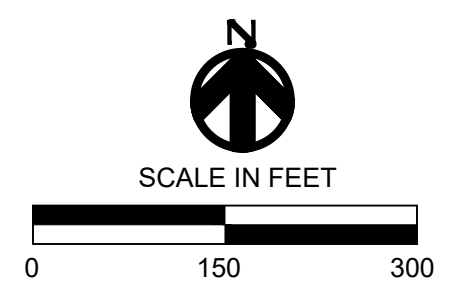
**EXISTING SITE CONDITIONS  
DECEMBER 5, 2019**



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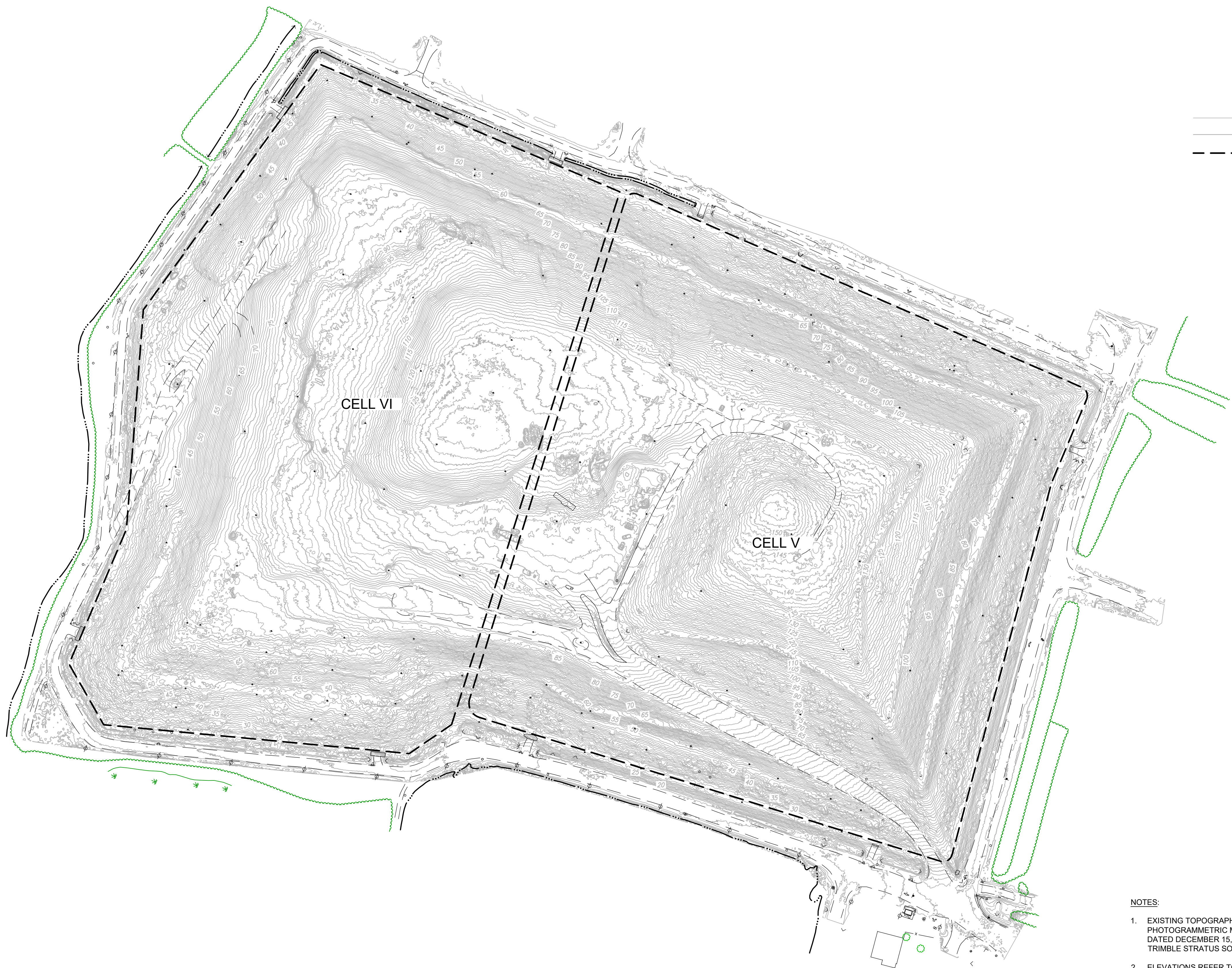
SHEET | **00C-01**  
DWG NO. | XXX



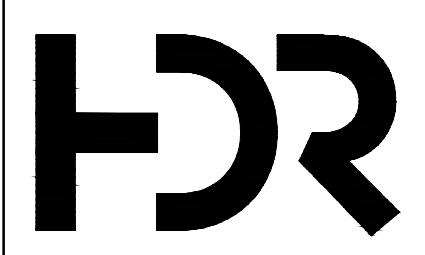


**LEGEND**

	EXISTING MINOR CONTOUR
	EXISTING MAJOR CONTOUR
	PHASE BOUNDARY LIMITS



- NOTES:**
- EXISTING TOPOGRAPHY SHOWN HEREON COMPILED BY PHOTOGRAMMETRIC METHODS FROM AERIAL DRONE PHOTOGRAPHY DATED DECEMBER 15, 2020 AND PREPARED BY SPSA UTILIZING PROPELLOR TRIMBLE STRATUS SOFTWARE.
  - 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.



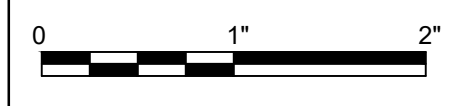
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**REGIONAL LANDFILL  
2021 AIRSPACE MANAGEMENT**

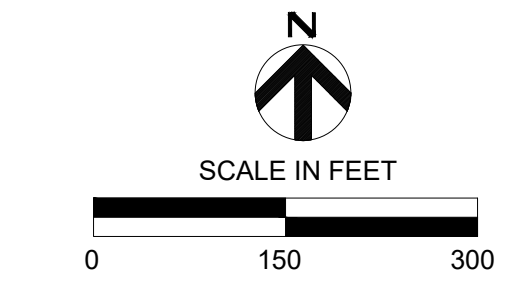
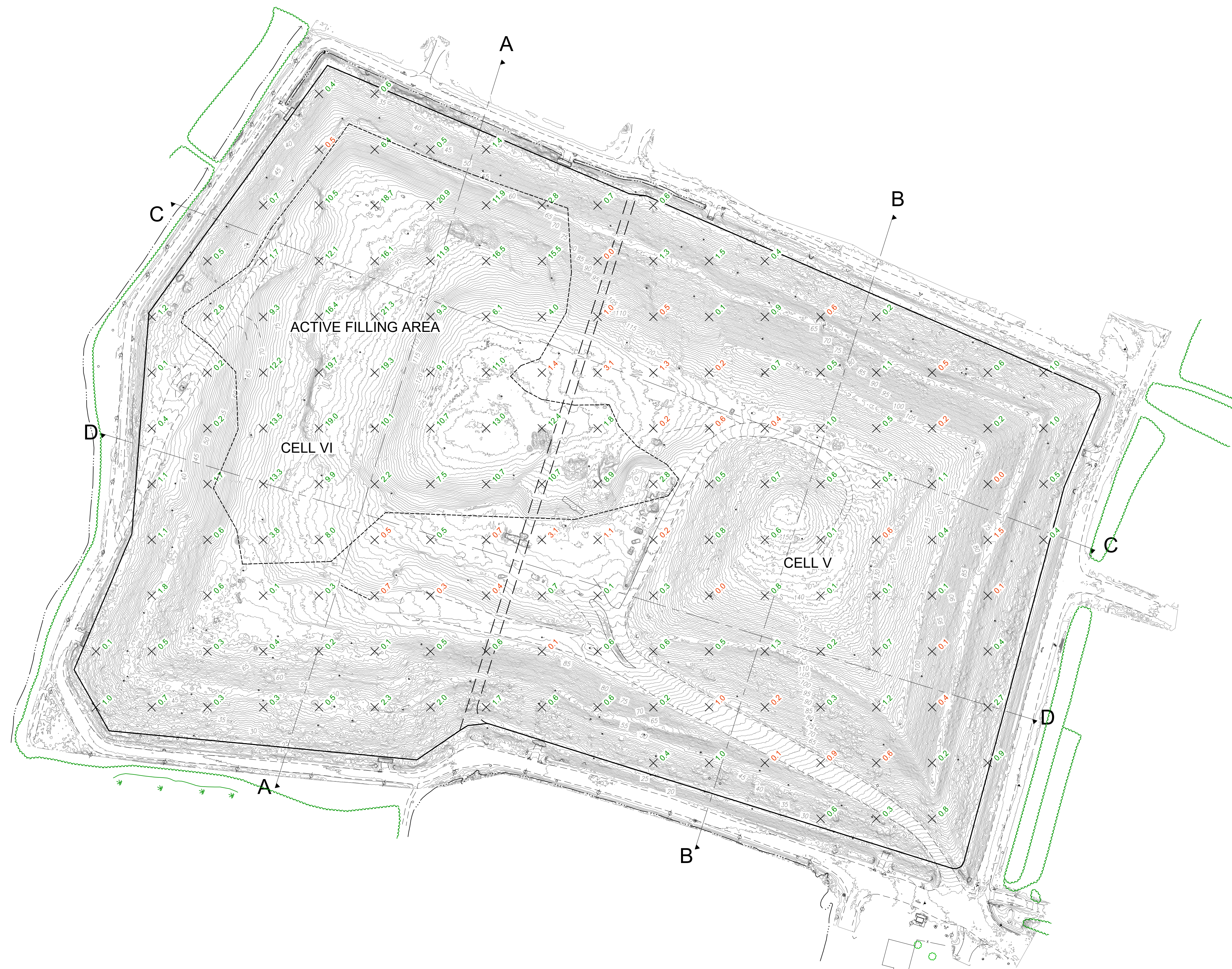
**EXISTING SITE CONDITIONS  
DECEMBER 15, 2020**



FILENAME | 00C-02.DWG  
SCALE | 1"=150'

SHEET	DWG NO.
<b>00C-02</b>	XXX





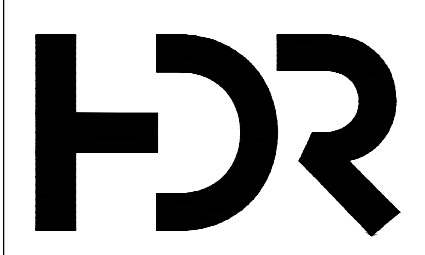
LEGEND

	EXISTING MINOR CONTOUR
	EXISTING MAJOR CONTOUR
	PHASE BOUNDARY LIMITS
	ACTIVE FILLING AREA LIMITS
	CUT
	FILL

ENTIRE LANDFILL AREA			
	SETTLEMENT (CY)	FILL (CY)	NET AIRSPACE CONSUMED (CY)
2019 TO 2020	20,574	708,743	688,169

ACTIVE FILLING AREA ONLY			
	SETTLEMENT (CY)	FILL (CY)	NET AIRSPACE CONSUMED (CY)
2019 TO 2020	919	355,981	355,062

NOTES:  
 1. ELEVATIONS AND CORRESPONDING COLORS REPRESENT DIFFERENCE BETWEEN DECEMBER 5, 2019 AND DECEMBER 15, 2020 SURVEYS.

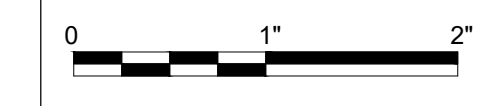


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REGIONAL LANDFILL  
2021 AIRSPACE MANAGEMENT

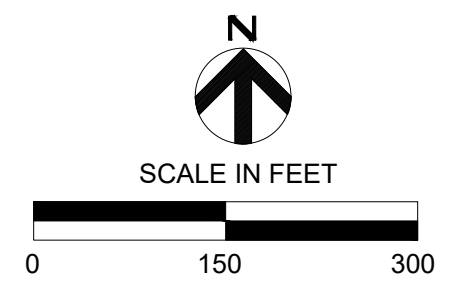


AIRSPACE CONSUMED  
2019 AERIAL SURVEY VS 2020 AERIAL SURVEY

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

SHEET 00C-03  
DWG NO. XXX



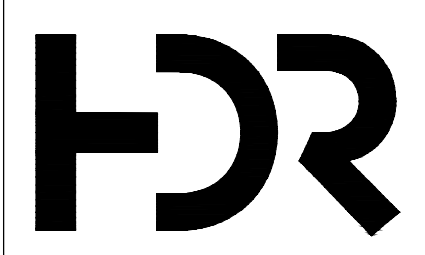
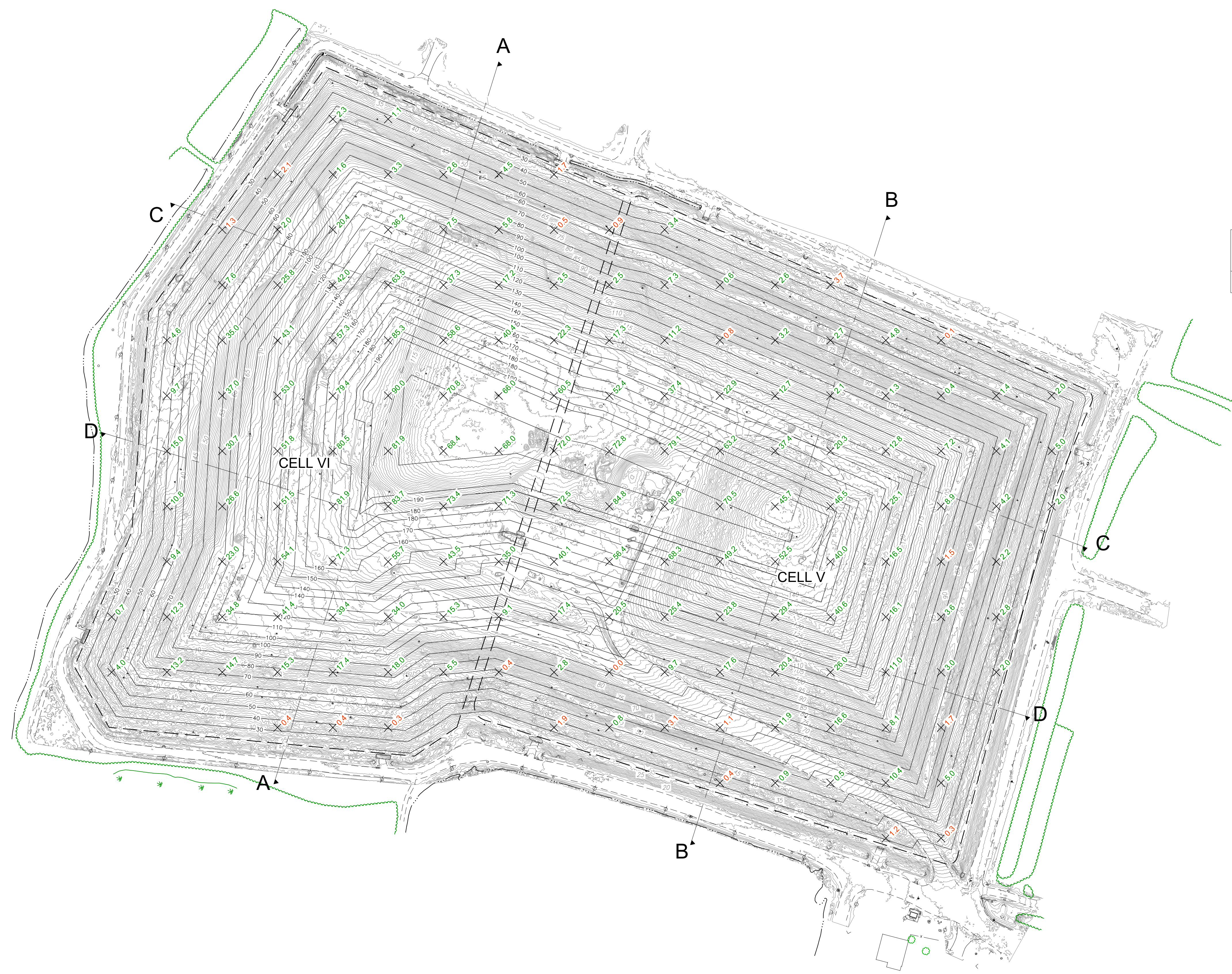


**LEGEND**

	EXISTING MINOR CONTOUR
	EXISTING MAJOR CONTOUR
	PHASE BOUNDARY LIMITS
	PROPOSED MAJOR CONTOUR
	CUT
	FILL

	CUT (CY)	FILL (CY)	NET AIRSPACE REMAINING (CY)
2020 TO TOP OF WASTE	22,914	3,452,071	3,429,157

- NOTES:**
- ELEVATIONS AND CORRESPONDING COLORS REPRESENT DIFFERENCE BETWEEN 2020 AERIAL SURVEY AND TOP OF WASTE GRADES.
  - PROPOSED GRADES REPRESENT TOP OF WASTE (INTERMEDIATE COVER), OR 3.5' BELOW PERMITTED FINAL GRADES.

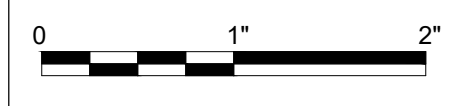


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<b>PROJECT NUMBER</b>	10236713



**REGIONAL LANDFILL  
2021 AIRSPACE MANAGEMENT**

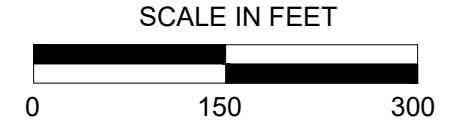


**AIRSPACE REMAINING  
2020 AERIAL SURVEY VS TOP OF WASTE GRADES**

FILENAME 00C-04.DWG  
SCALE 1"=150'

SHEET **00C-04**  
DWG NO. XXX





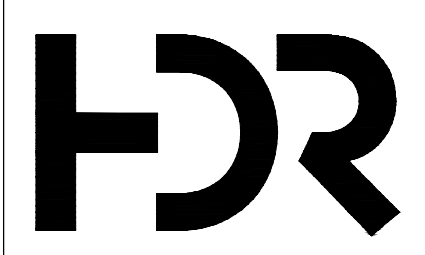
LEGEND

- 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)
2020 TO TOP OF WASTE	996	3,037,935	3,036,939

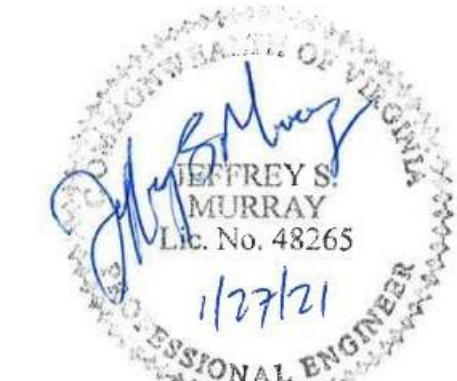
NOTES:

1. ELEVATIONS AND CORRESPONDING COLORS REPRESENT DIFFERENCE BETWEEN 2020 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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REGIONAL LANDFILL  
2021 AIRSPACE MANAGEMENT

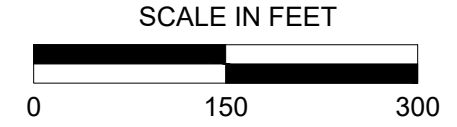
RECOVERABLE AIRSPACE REMAINING  
2020 AERIAL SURVEY VS  
TOP OF WASTE GRADES RECOVERABLE



FILENAME 00C-05.DWG  
SCALE 1"=150'

SHEET 00C-05  
DWG NO. XXX





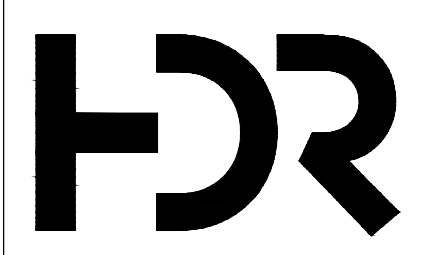
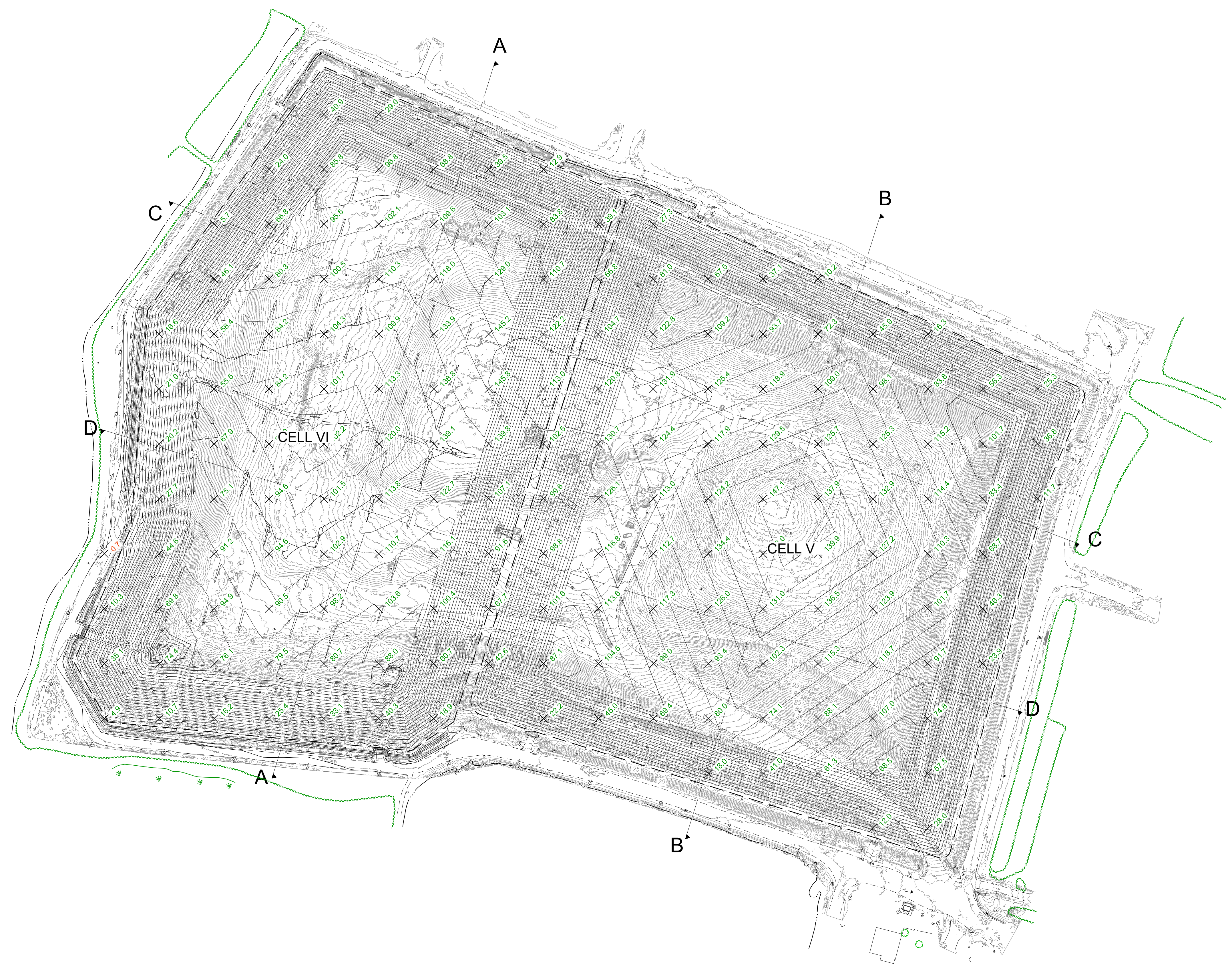
**LEGEND**

- 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 2020	11,821,884

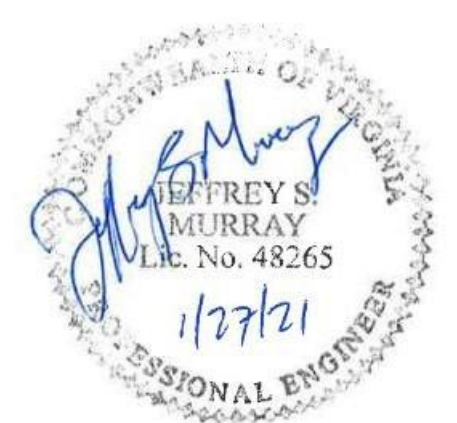
**NOTES:**

1. ELEVATIONS AND CORRESPONDING COLORS REPRESENT DIFFERENCE BETWEEN BOTTOM OF WASTE GRADES AND 2020 AERIAL SURVEY.
2. BOTTOM OF WASTE GRADES REPRESENT OPERATIONAL COVER.

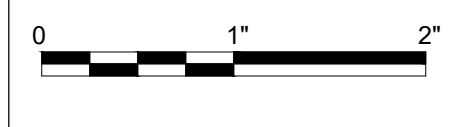


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<b>PROJECT NUMBER</b>	10236713



**REGIONAL LANDFILL  
2021 AIRSPACE MANAGEMENT**

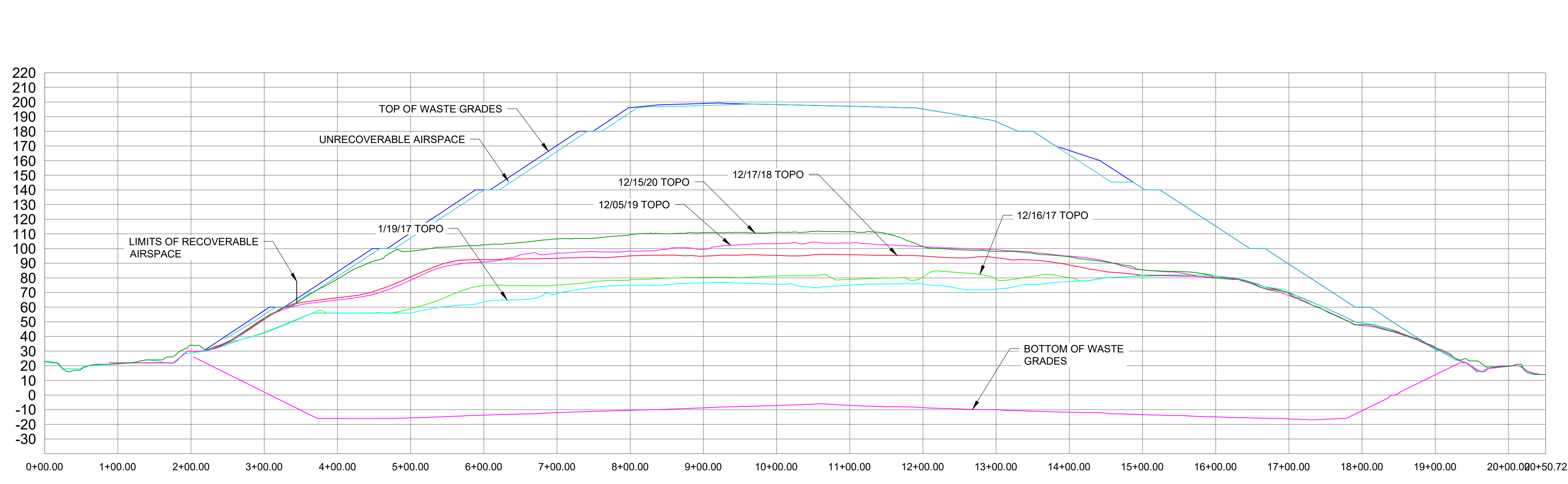


**TOTAL AIRSPACE CONSUMED  
BOTTOM OF WASTE GRADES VS 2020 AERIAL SURVEY**

FILENAME | 00C-06.DWG  
SCALE | 1"=150'

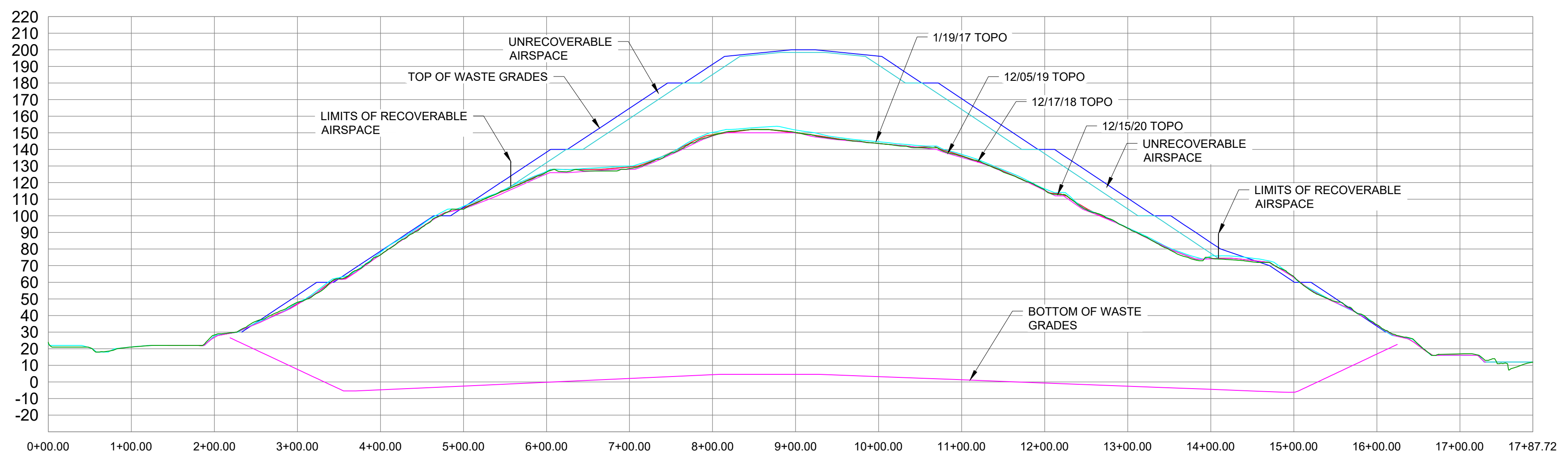
SHEET | **00C-06** | DWG NO. | XXX



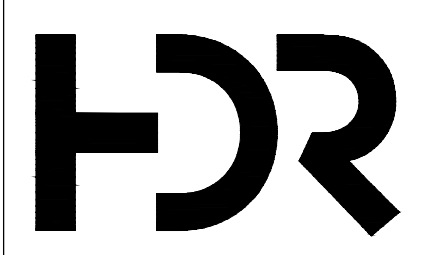
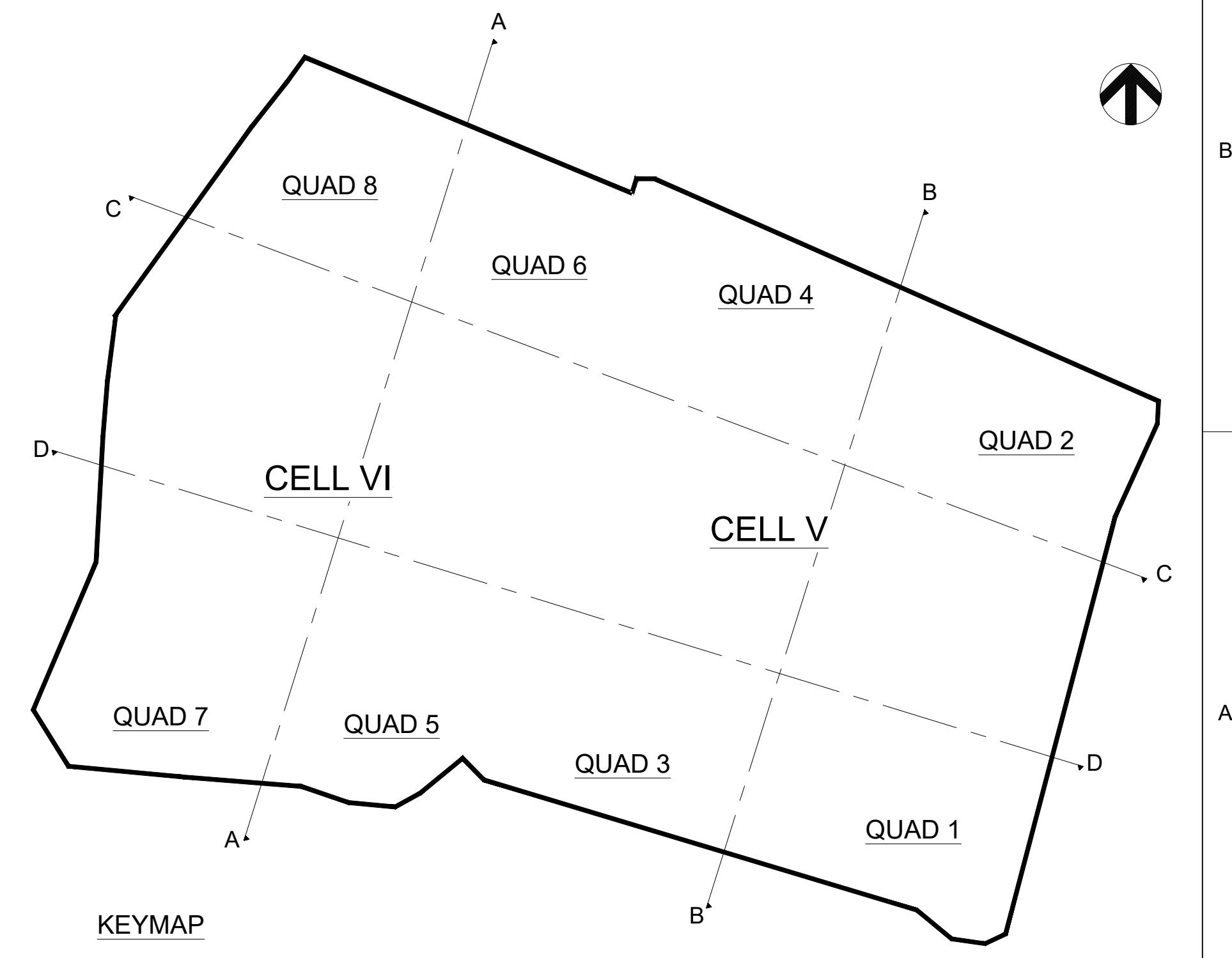


**SECTION A**  
H: 1"=100' ; V: 1"=50'

- TOP OF WASTE RECOVERABLE GRADES
- TOP OF WASTE GRADES
- BOTTOM OF WASTE GRADES
- 1/19/17 TOPO
- 12/16/17 TOPO
- 12/17/18 TOPO
- 12/05/19 TOPO
- 12/15/20 TOPO



**SECTION B**  
H: 1"=100' ; V: 1"=50'



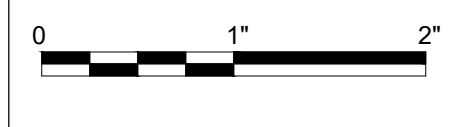
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<b>PROJECT NUMBER</b>	10236713



**REGIONAL LANDFILL  
2021 AIRSPACE MANAGEMENT**

**SITE CROSS SECTIONS  
(SHEET 1 OF 3)**



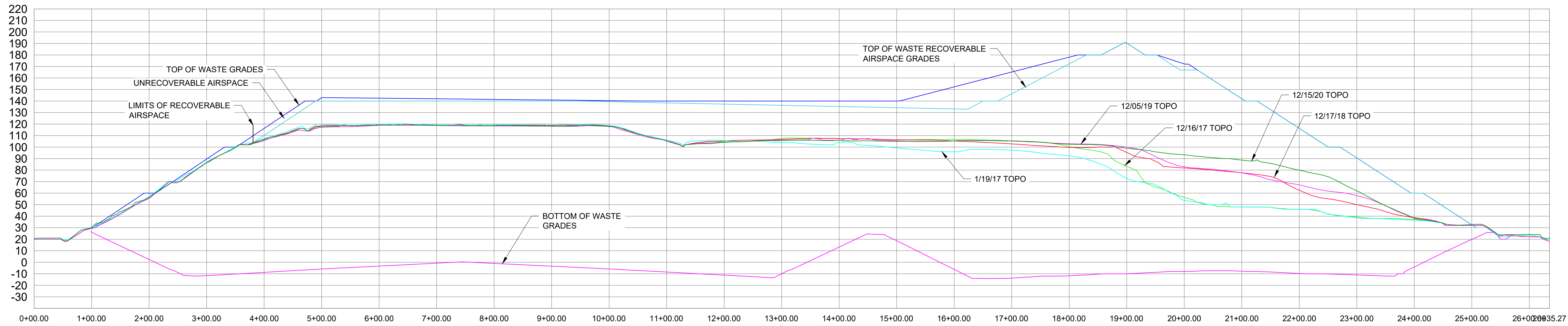
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SCALE | 1"=100'

SHEET | 00C-07  
DWG NO. | XXX

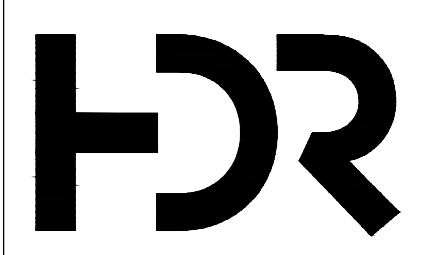
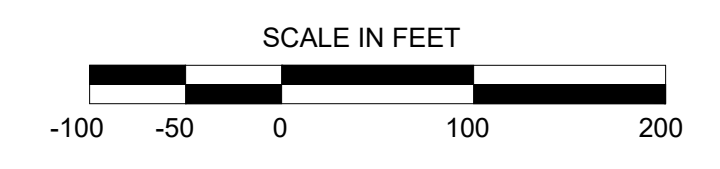
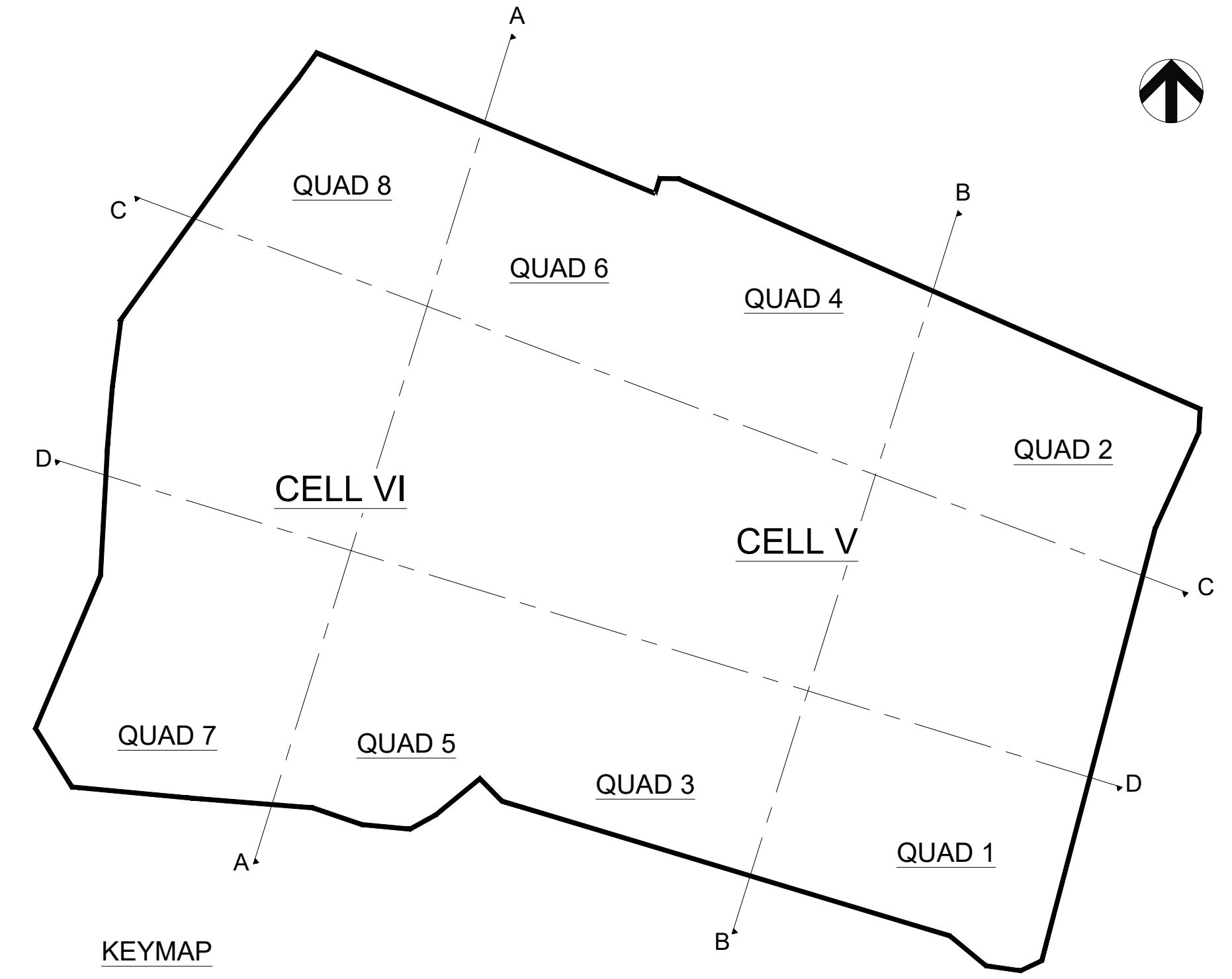




- TOP OF WASTE RECOVERABLE GRADES
- TOP OF WASTE GRADES
- BOTTOM OF WASTE GRADES
- 1/19/17 TOPO
- 12/16/17 TOPO
- 12/17/18 TOPO
- 12/05/19 TOPO
- 12/15/20 TOPO



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



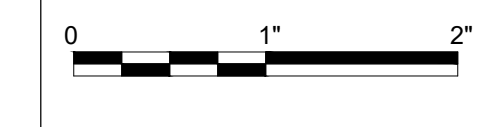
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**REGIONAL LANDFILL  
2021 AIRSPACE MANAGEMENT**

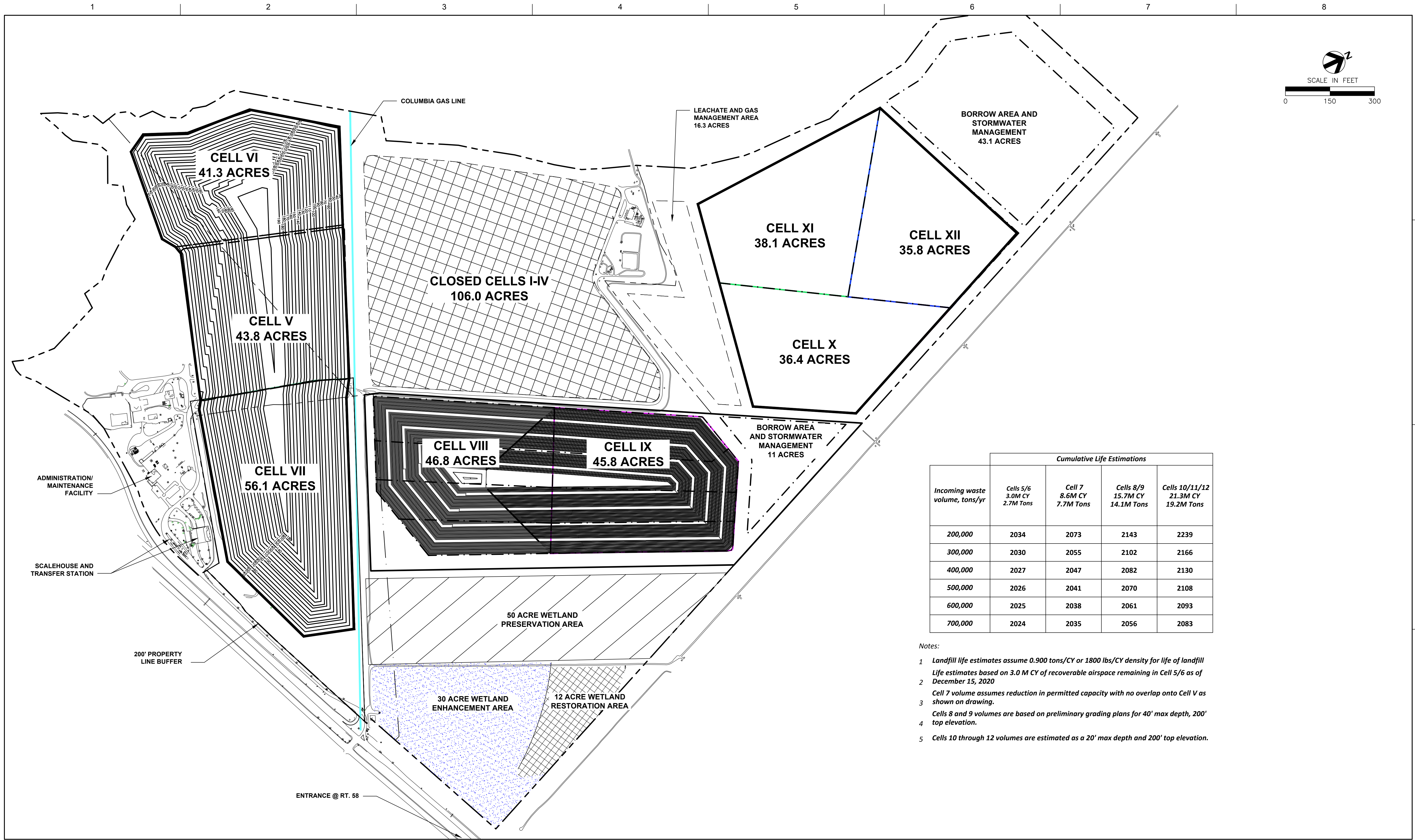
**SITE CROSS SECTIONS  
(SHEET 3 OF 3)**



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

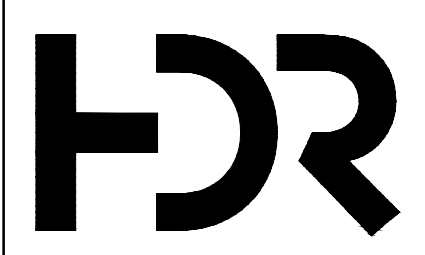
SHEET | **00C-09**  
DWG NO. | XXX





Cumulative Life Estimations				
Incoming waste volume, tons/yr	Cells 5/6 3.0M CY 2.7M 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	2034	2073	2143	2239
300,000	2030	2055	2102	2166
400,000	2027	2047	2082	2130
500,000	2026	2041	2070	2108
600,000	2025	2038	2061	2093
700,000	2024	2035	2056	2083

- Notes:
- 1 Landfill life estimates assume 0.900 tons/CY or 1800 lbs/CY density for life of landfill
  - 2 Life estimates based on 3.0 M CY of recoverable airspace remaining in Cell 5/6 as of December 15, 2020
  - 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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PROJECT NUMBER	10236713



**REGIONAL LANDFILL  
2021 AIRSPACE MANAGEMENT**

**MASTER PLAN BUILDOUT**



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

SHEET | **00C-10** | DWG NO. | XXX