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SMITH+GARDNER
ENGINEERS

ADDRESS 14 N. Boylan Avenue, Raleigh NC 27603 TEL 919.828.0577 WEB www.smithgardnerinc.com

Scanned By	Date	DOC ID	Permit
Backus	07/26/2016	26522	9231-CDLF-2012

July 13, 2016

Ms. Pat Backus, P.E.
Permitting Engineer
NC DEQ, Division of Waste Management
1646 Mail Service Center
Raleigh, NC 27699-1646

RE: Brownfield Road C&D Landfill – Phase 2B (SWS Permit No. 92-31)
Landfill Gross Capacity Clarification
Raleigh, North Carolina

Dear Ms. Backus:

As you noted in an email dated June 10, 2016 to Don Misenheimer (**attached**), different volumes have been reported for the above referenced facility over the past 6 years. These variations have not been due to major changes in the landfill design, but due to the methods and assumptions used for calculations. The purpose of this letter is to present an accurate account of the gross disposal volume at the facility.

The below revised landfill volume, reported in **Table 1** and shown on **Figures 1-8 (attached)**, are intended to replace all previously reported information (i.e., volume, area, and site life).

Table 1: Total Operating Capacity and Life Expectancy

Phase	Area[1] (Acres)	Gross Capacity[2] (CY)	Net Capacity[3] (CY)	Life Expectancy[4] (Years)
1[5]	*19.2*	*1,636,000*	*1,599,539*	--
2A (Cell 1)[5]	*4.9*	*336,000*	*329,869*	--
2A (Cell 2)	*4.4*	*645,000*	*636,631*	*1.1*
2A (Stage 2)	*7.7*	*495,200*	*490,771*	*2.1*
2B	*8.9*	*1,710,600*	*1,687,715*	*7.3*
2C[6]	-	*1,380,900*	*1,313,833*	*5.7*
Northern Area[2]	45.1	6,283,400	6,065,348	18
Southern Area	24.2	2,223,100	2,145,049	9.2
TOTAL	**69.3**	**8,426,800**	**8,203,407**	**25.3**

Notes:

1. **Area** for Phases 1-2C is attached in **Figure 7** and verifies total acreage of Northern Area.
2. **Gross Capacity** is measured from the bottom of waste to the top of the final cover. Gross capacity is rounded to the nearest hundred to reflect the accuracy of capacity calculations.
3. **Net Capacity** excludes final cover soils.
4. Life expectancy for Phase 2A (Cell 2) unit is for Phases 1, 2A (Cell 1), and 2A (Cell 2) from 1/2/16. **Life expectancies** are based on a disposal rate of 115,000 tons/year and the calculated density. The density (i.e. 0.50 tons/cubic yard) used to calculate the life expectancy is based on the measured gate tonnage and the surveyed volume of landfill airspace consumed. The surveyed volume includes periodic cover soil. The surveys were performed approximately annually, from 2/23/12 to 1/2/16.

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5. Gross capacity for Phases 1 and 2A (Cell 1) is carried over from the October 9, 2014 Permit to Construct application. Phase 2A (Cell 1) was calculated by deducting the previously stated capacities from the total capacity (**Figure 1**) of Phases 1, 2A-Cell 1, and 2A-Cell 2.
6. Phase 2C is a vertical expansion above Phases 1-2B.
7. The Northern Area represents Phases 1 & 2.

Capacity variations have resulted from a variety of factors which are summarized below:

1. Net capacity (subgrade to top of intermediate cover) had previously been incorrectly reported as gross capacity for the facility. Net capacity does not include final cover soils.
2. Phase volumes have been re-distributed to better accommodate landfill operations. Updated waste filling models allow for equipment to operate the top of each phase.
3. Due to encounters with rock in Phase 2A-Stage 2 to subgrade in this area was raised, thus landfill volume reduced by 26,100 CY. A CQA report for construction of Phase 2A-Stage 2 will be submitted to NC DEQ.
4. Capacities were calculated assuming a 2-foot final cover thickness, which has been proposed as an alternate final cover system with the Phase 2B Permit to Construct Application.
5. Subgrade and final cover grades are fine-tuned each year to verify contours are cohesive. In some cases minor adjustments are made to re-align contours so that they are continuous, accurate, and constructible.

Sincerely,
SMITH GARDNER, INC.

DocuSigned by:
John R Fearrington
76DEE49820A9406...
7/13/2016

DocuSigned by:
Stacey A. Smith
27B482DF1A09438...
7/13/2016

NORTH CAROLINA PROFESSIONAL SEAL 023002 ENGINEER STACEY A. SMITH

John R. Fearrington, E.I.
Staff Engineer (ext. 125)
johnf@smithgardnerinc.com

Stacey A. Smith, P.E.
Senior Engineer (ext. 127)
stacey@smithgardnerinc.com

Attachments: Figures 1 through 7, Brownfield Road Capacity Spreadsheet, June 10th Email

cc: David Pepper, Waste Industries USA, Inc.

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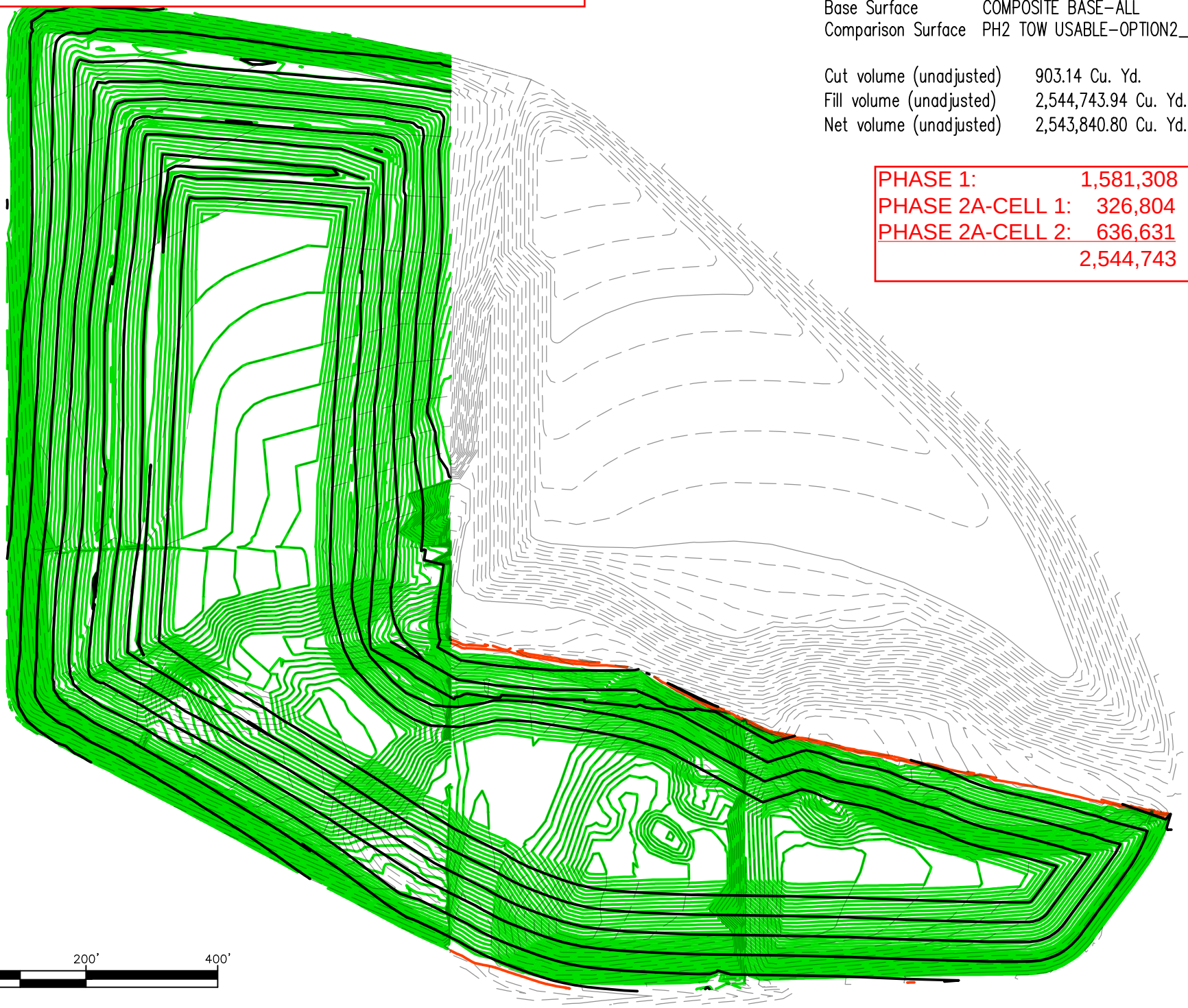
FIGURE 1: Phase 1 through Phase 2A-Cell 2 Net Capacity



Volume

Base Surface	COMPOSITE BASE-ALL
Comparison Surface	PH2 TOW USABLE-OPTION2_COMPOSITE

Cut volume (unadjusted)	903.14 Cu. Yd.
Fill volume (unadjusted)	2,544,743.94 Cu. Yd.
Net volume (unadjusted)	2,543,840.80 Cu. Yd.<Fill>

PHASE 1:	1,581,308
PHASE 2A-CELL 1:	326,804
PHASE 2A-CELL 2:	636,631
	2,544,743

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Figure 2: Phase 2A-Stage 2 Net Capacity

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Figure 3: Phase 2B Net Capacity

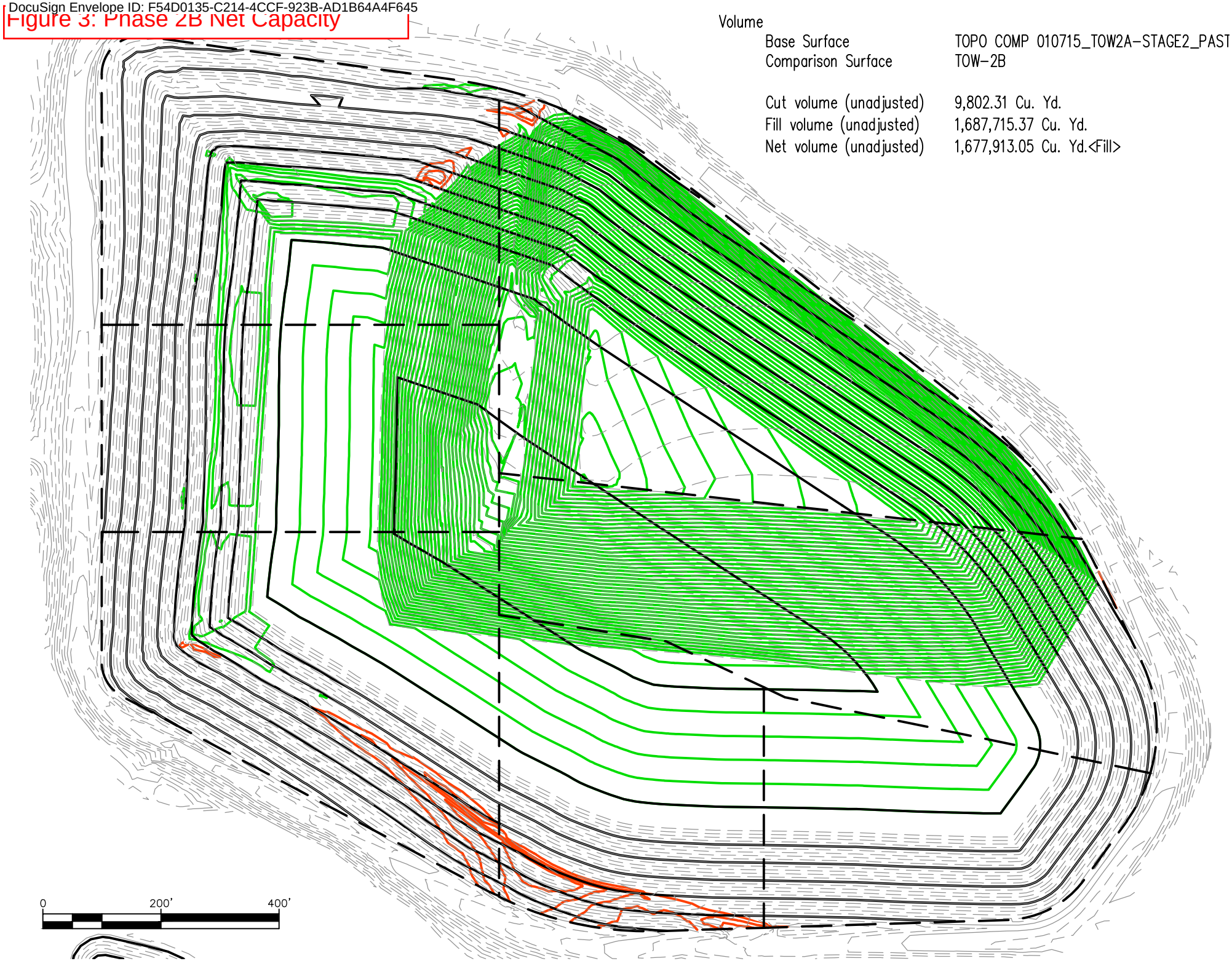

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Figure 4: Phase 2C Net Capacity

Volume

Base Surface	TOW-2B
Comparison Surface	PH2 TOP OF WASTE 012213
Cut volume (unadjusted)	23.13 Cu. Yd.
Fill volume (unadjusted)	1,313,833.00 Cu. Yd.
Net volume (unadjusted)	1,313,809.87 Cu. Yd.<Fill>

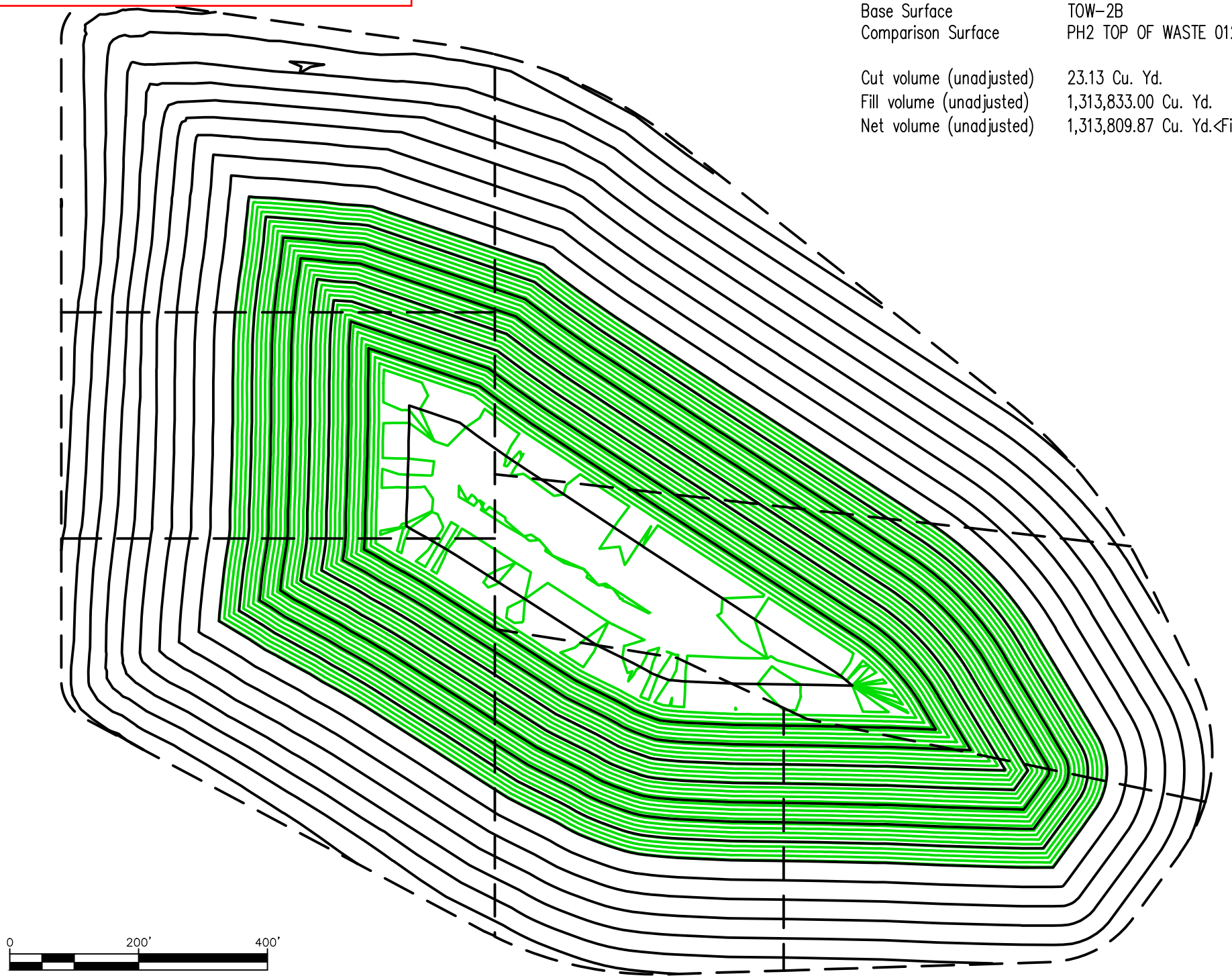

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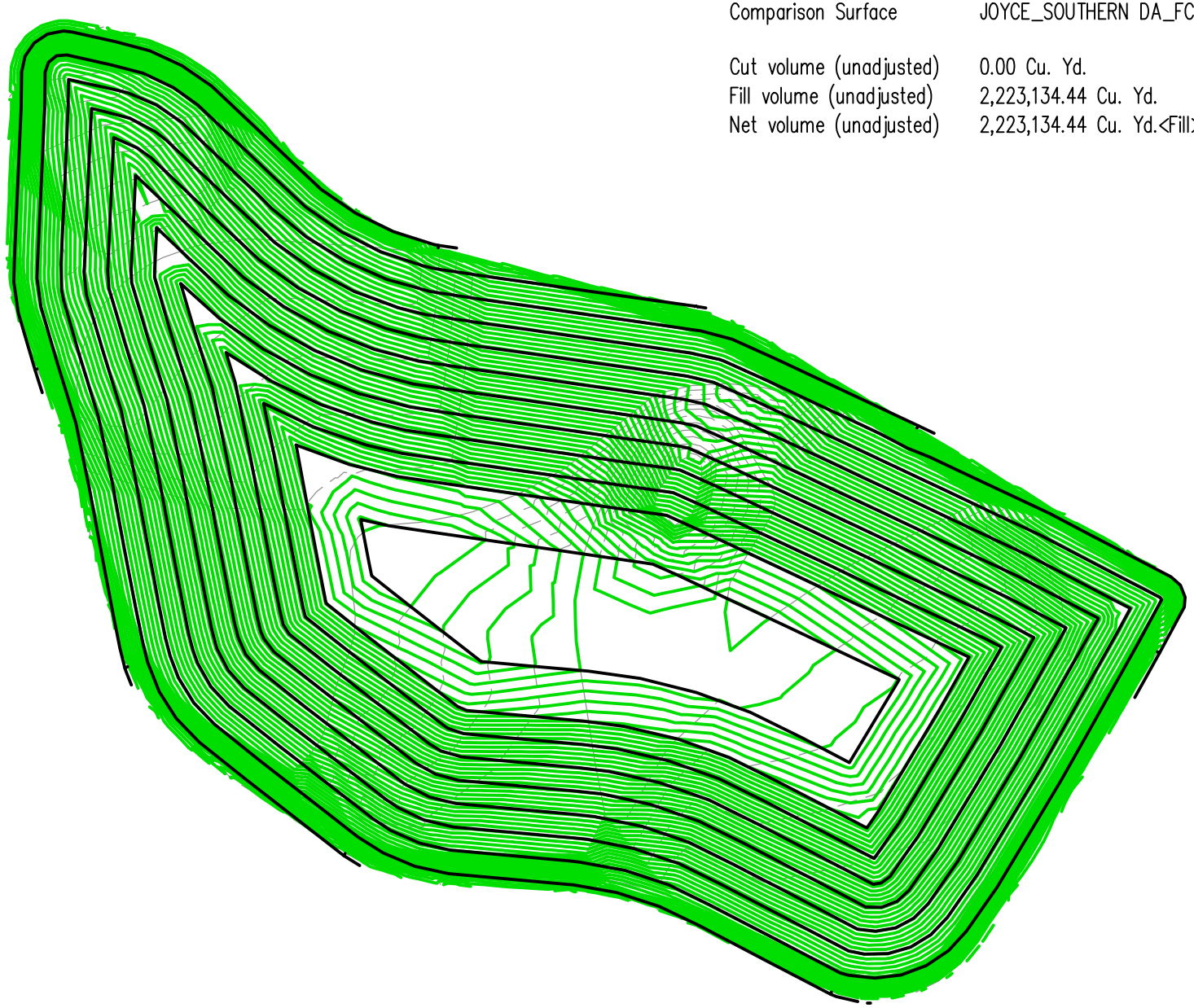
Figure 5: Southern Gross Capacity

Volume

Base Surface	JOYCE_SOUTHERN DA_BASE GRADES
Comparison Surface	JOYCE_SOUTHERN DA_FCVR
Cut volume (unadjusted)	0.00 Cu. Yd.
Fill volume (unadjusted)	2,223,134.44 Cu. Yd.
Net volume (unadjusted)	2,223,134.44 Cu. Yd.<Fill>



0 200' 400'

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Figure 6: Northern Area Net Capacity

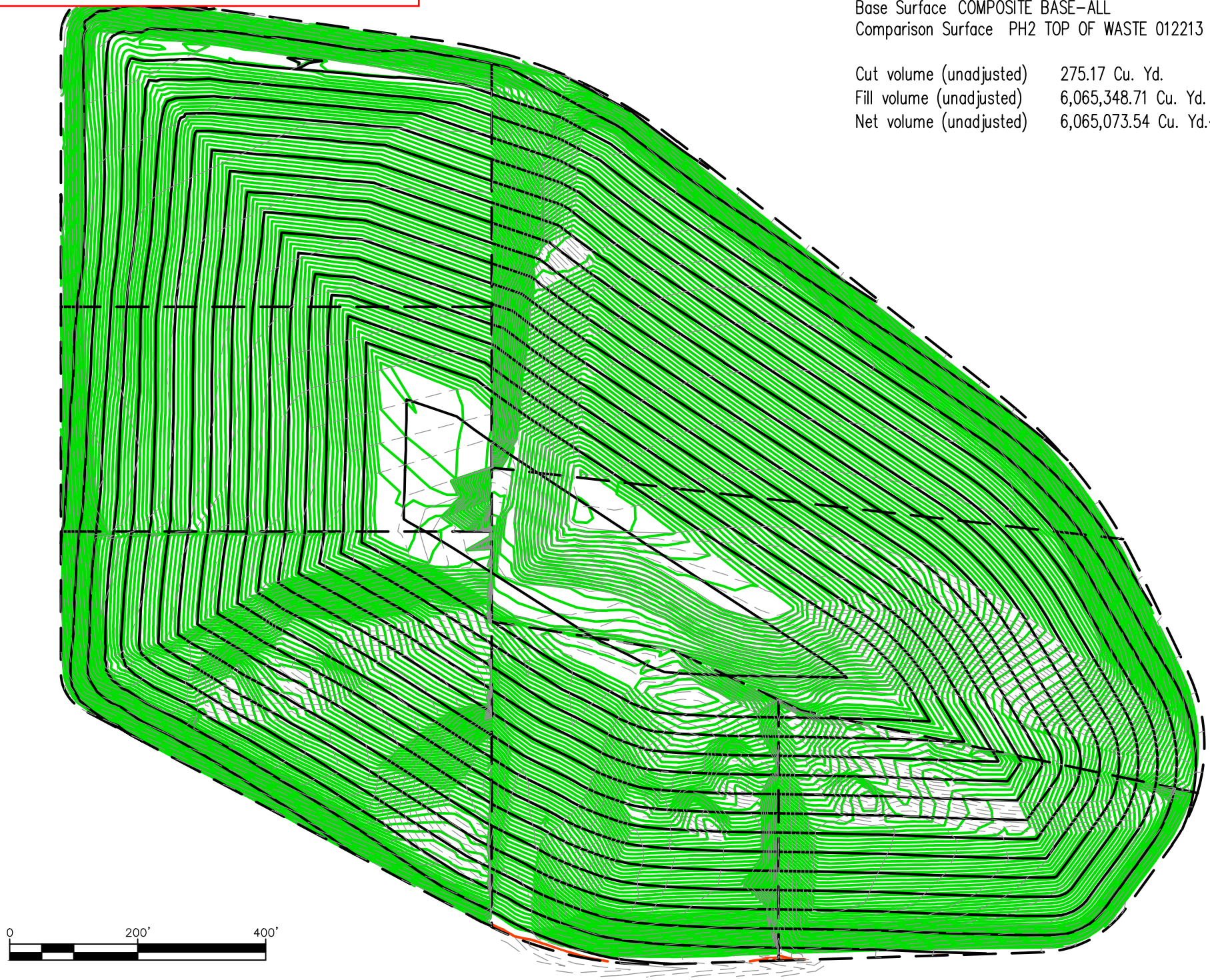

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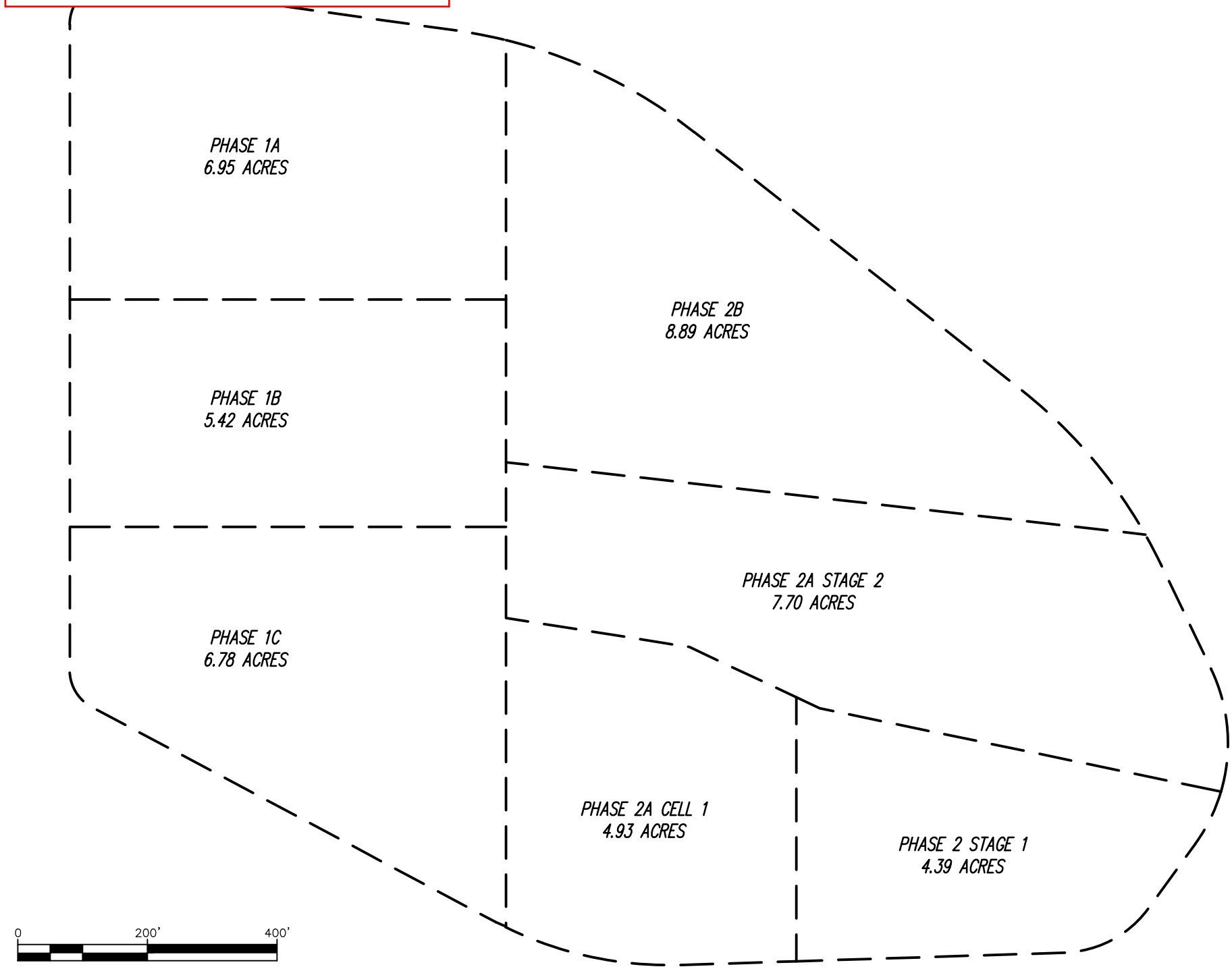
Figure 7: Northern Area Phase Areas



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TEL 919.828.0577

WEB www.smithgardnerinc.com

PROJECT Brownfield CDLF - Phase 2B PTC SHEET 1 OF 8 DATE 7/11/2016

COMPUTED BY JRF

SUBJECT Capacity Evaluation (Density & Life) JOB # BROWNFIELD-15-1 CHECKED BY

OBJECTIVE: To determine the capacity of landfill units. Also, to estimate the expected life of the landfill unit(s) given the proposed contours and the anticipated waste loading rate(s). As part of the evaluation, an evaluation or estimate of waste density will be required based on the known or assumed percentage of periodic cover soil.

ANALYSIS: The volume(s) will be calculated by using AutoCAD. Alternatively, the volume(s) will be calculated by taking cross sections of the landfill, using a planimeter to measure the area of the cross sections, and using the average end area method.

REFERENCES: WCA Material Recover, LLC, C&D Landfill (Phases 1 and 2A), Permit to Construct Application, June 2008 (revised through December 2010), David Garrett and Associates.

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PROJECT	Brownfield CDLF - Phase 2B PTC	SHEET	2/8
		JOB #	BROWNFIELD-15-1
SUBJECT	Capacity Evaluation - Phase 1	DATE	7/11/2016
		COMPUTED BY	JRF
		CHECKED BY	

Waste & Periodic Cover Parameters:

Waste Density (TCY) =	0.50
Waste Density (PCY) =	1,000

Note: The waste density is derived from gate tonnage records and annual survey results between 2/23/12 and 1/2/16. The surveyed volumes include waste and periodic cover soil.

Volume Calculations:

Volume From 2010 PTC (CY) = 1,636,000 (Top Subgrade to Top of Final Cover)

Net (Waste) Capacity (Tons) = 799,769

Life Expectancy Calculations:

Gross Capacity (Top of Subgrade to Top of Final Cover):

Adjustment For Other Layers (Add to Above):

	Area of Waste Footprint (Acres) =	11.3
1 feet	Compacted Soil Cap (CY) =	18,231
1 feet	Vegetative Soil Layer (CY) =	18,231
	Sum (CY) =	36,461
	Net Capacity (CY) =	1,599,539

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PROJECT	Brownfield CDLF - Phase 2B PTC	SHEET	3/8
		JOB #	BROWNFIELD-15-1
SUBJECT	Capacity Evaluation - Phase 2A-Cell 1	DATE	7/11/2016
		COMPUTED BY	JRF
		CHECKED BY	

Waste & Periodic Cover Parameters:

Waste Density (TCY) =	0.50
Waste Density (PCY) =	1,000

Note: The waste density is derived from gate tonnage records and annual survey results between 2/23/12 and 1/2/16. The surveyed volumes include waste and periodic cover soil.

Volume Calculations:

Volume From 2010 PTC (CY) = 336,000 (Top Subgrade to Top of Final Cover)

Net (Waste) Capacity (Tons) = 164,935

Life Expectancy Calculations:

Net Capacity (Top of Subgrade to Top of Final Cover):

Adjustment For Other Layers (Add to Above):

	Area of Waste Footprint (Acres) =	1.9
1 feet	Compacted Soil Cap (CY) =	3,065
1 feet	Vegetative Soil Layer (CY) =	3,065
	Sum (CY) =	6,131
	Net Capacity (CY) =	329,869

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PROJECT	Brownfield CDLF - Phase 2B PTC	SHEET	4/8
		JOB #	BROWNFIELD-15-1
SUBJECT	Capacity Evaluation - Phase 2A-Cell 2	DATE	7/11/2016
		COMPUTED BY	JRF
		CHECKED BY	

Waste & Periodic Cover Parameters:

Waste Density (TCY) = 0.50
Waste Density (PCY) = 1,000

Note: The waste density is derived from gate tonnage records and annual survey results between 2/23/12 and 1/2/16. The surveyed volumes include waste and periodic cover soil.

Volume Calculations:

Volume From AutoCAD (CY) = 636,631 (Top Subgrade to Top of Intermediate Cover)

Net (Waste) Capacity (Tons) = 318,316

Life Expectancy Calculations:

Annual Tonnage: 115,000 ton/year

Daily tonnage: 225 tons/day (based on 5 operating days per week)

Remaining Life: 2.8 years

Gross Capacity (Top of Subgrade to Top of Final Cover):

Adjustment For Other Layers (Add to Above):

Area of Waste Footprint (Acres) = 2.6

1 feet	Compacted Soil Cap (CY) =	4,195
1 feet	Vegetative Soil Layer (CY) =	4,195
	Sum (CY) =	8,389

Gross Capacity (CY) = 645,000

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PROJECT	Brownfield CDLF - Phase 2B PTC	SHEET	5/8
		JOB #	BROWNFIELD-15-1
SUBJECT	Capacity Evaluation - Phase 2A Stage 2	DATE	7/11/2016
		COMPUTED BY	JRF
		CHECKED BY	

Waste & Periodic Cover Parameters:

Waste Density (TCY) = 0.50
Waste Density (PCY) = 1,000

Note: The waste density is derived from gate tonnage records and annual survey results between 2/23/12 and 1/2/16. The surveyed volumes include waste and periodic cover soil.

Volume Calculations:

Volume From AutoCAD (CY) = 490,771 (Top Subgrade to Top of Intermediate Cover)

Net (Waste) Capacity (Tons) = 245,386

Life Expectancy Calculations:

Annual Tonnage: 115,000 ton/year

Daily tonnage: 225 tons/day (based on 5 operating days per week)

Remaining Life: 2.1 years

Gross Capacity (Top of Subgrade to Top of Final Cover):

Adjustment For Other Layers (Add to Above):

Area of Waste Footprint (Acres) = 1.4

1 feet	Compacted Soil Cap (CY) =	2,259
1 feet	Vegetative Soil Layer (CY) =	2,259
	Sum (CY) =	4,517
	Gross Capacity (CY) =	495,200

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PROJECT	Brownfield CDLF - Phase 2B PTC	SHEET	6/8
		JOB #	BROWNFIELD-15-1
SUBJECT	Capacity Evaluation - Phase 2B	DATE	7/11/2016
		COMPUTED BY	JRF
		CHECKED BY	

Waste & Periodic Cover Parameters:

Waste Density (TCY) = 0.50
Waste Density (PCY) = 1,000

Note: The waste density is derived from gate tonnage records and annual survey results between 2/23/12 and 1/2/16. The surveyed volumes include waste and periodic cover soil; therefore, the density accounts for the periodic cover soil.

Volume Calculations:

Volume From AutoCAD (CY) = 1,687,715 (Top of Subgrade to Top of Intermediate Cover)

Net (Waste) Capacity (Tons) = 843,858

Life Expectancy Calculations:

Annual Tonnage: 115,000 ton/year

Daily tonnage: 225 tons/day (based on 5 operating days per week)

Remaining Life: 7.3 years

Gross Capacity (Top of Subgrade to Top of Final Cover):

Adjustment For Other Layers (Add to Above):

Area of Waste Footprint (Acres) = 7.1

1 feet	Compacted Soil Cap (CY) =	11,455
1 feet	Vegetative Soil Layer (CY) =	11,455
	Sum (CY) =	22,909

Gross Capacity (CY) = 1,710,600

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PROJECT	Brownfield CDLF - Phase 2B PTC	SHEET	7/8
		JOB #	BROWNFIELD-15-1
SUBJECT	Capacity Evaluation - Phase 2C	DATE	7/11/2016
		COMPUTED BY	JRF
		CHECKED BY	

Waste & Periodic Cover Parameters:

Waste Density (TCY) = 0.50
Waste Density (PCY) = 1,000

Note: The waste density is derived from gate tonnage records and annual survey results between 2/23/12 and 1/2/16. The surveyed volumes include waste and periodic cover soil; therefore, the density accounts for the periodic cover soil.

Volume Calculations:

Volume From AutoCAD (CY) = 1,313,833 (Top of Subgrade to Top of Intermediate Cover)

Net (Waste) Capacity (Tons) = 656,917

Life Expectancy Calculations:

Annual Tonnage: 115,000 ton/year

Daily tonnage: 225 tons/day (based on 5 operating days per week)

Remaining Life: 5.7 years

Gross Capacity (Top of Subgrade to Top of Final Cover):

Adjustment For Other Layers (Add to Above):

Area of Waste Footprint (Acres) = 20.8

1 feet	Compacted Soil Cap (CY) =	33,557
1 feet	Vegetative Soil Layer (CY) =	33,557
	Sum (CY) =	67,115

Gross Capacity (CY) = 1,380,900

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PROJECT	Brownfield CDLF - Phase 2B PTC	SHEET	8/8
		JOB #	BROWNFIELD-15-1
SUBJECT	Capacity Evaluation - Southern Disposal Area	DATE	7/11/2016
		COMPUTED BY	JRF
		CHECKED BY	

Waste & Periodic Cover Parameters:

Waste Density (TCY) = 0.50
Waste Density (PCY) = 1,000

Note: The waste density is derived from gate tonnage records and annual survey results between 2/23/12 and 1/2/16. The surveyed volumes include waste and periodic cover soil; therefore, the density accounts for the periodic cover soil.

Volume Calculations:

Volume From AutoCAD (CY) = 2,223,134 (Top of Subgrade to Top of Final Cover, i.e., Gross Capacity)
Calculated Net Cacpacity (CY) = 2,145,049 (Deduct for final cover)

Net (Waste) Capacity (Tons) = 1,072,524

Life Expectancy Calculations:

Annual Tonnage: 115,000 ton/year

Daily tonnage: 225 tons/day (based on 5 operating days per week)

Remaining Life: 9.3 years

Gross Capacity (Top of Subgrade to Top of Final Cover):

Adjustment For Other Layers (Add to Above):

Area of Waste Footprint (Acres) = 24.2

1 feet	Compacted Soil Cap (CY) =	39,043
1 feet	Vegetative Soil Layer (CY) =	39,043
	Sum (CY) =	78,085

Gross Capacity (CY) = 2,223,100

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John Fearrington <johnf@smithgardnerinc.com>

Fwd: Permit No. 92-31 Brownfield Road C&D Landfill

1 message

Misenheimer <don@smithgardnerinc.com> Tue, Jul 12, 2016 at 2:04 PM
To: John Fearrington <johnf@smithgardnerinc.com>

From: "Backus, Pat" <pat.backus@ncdenr.gov>
Date: June 10, 2016 at 1:17:28 PM EDT
To: Don Misenheimer <don@smithgardnerinc.com>
Subject: RE: Permit No. 92-31 Brownfield Road C&D Landfill

Two more comments … just to make sure.

- The last line in the table says "Total (lined)" . This isn't a lined landfill.
- The total acres and gross capacity differed. Previous total acreage was 69.2 and this estimate is 63.4. Previous total gross capacity was 8,234,522 versus current 6,434,698 cubic yards. Do you think the previous estimate was in error or is the reduction due to a change in the design? If you were going the opposite way, it would be considered a significant change which might kick in other requirements. Just asking so we don't cause a problem down the road by lowering the capacity.

If the January 2016 is the only change, I wouldn't worry about correcting.

Just let me know what you think about the capacity calculation.

I think that is all I need to finish the permit.

Thanks,

Pat

Patricia M. (Pat) Backus, P.E.

Environmental Engineer

Division of Waste Management – Solid Waste Section

North Carolina Department of Environmental Quality

(919) 707-8257 office

pat.backus@ncdenr.gov

Office Location: 217 West Jones Street

Mail & Delivery: 1646 Mail Service Center

Raleigh, NC 27699-1646

Email correspondence to and from this address is subject to the

North Carolina Public Records Law and may be disclosed to third parties.

From: Don Misenheimer [mailto:don@smithgardnerinc.com]
Sent: Friday, June 10, 2016 12:33 PM
To: Backus, Pat <pat.backus@ncdenr.gov>; Donald Plessinger (Waste Industries) <donald.plessinger@wasteindustries.com>
Cc: madeline@smithgardnerinc.com
Subject: RE: Permit No. 92-31 Brownfield Road C&D Landfill

Pat:

You are correct. The nomenclature has changed slightly in that Phase 2C has become Phase 3. Table 1 on Page vii of the Executive Summary is correct, although a note added to the table stating that **Phase 3 will be vertical fill over Phases 1, 2A and 2B** would have provided some clarification on this matter.

Currently, all of Phase 2A (including Cell 1, Cell2 and Stage 2) have been constructed. **Stage 2 construction was begun this year and is complete except for final CQA documentation submittal**. Please note that page iii of the executive summary stated that "Phase 2A – Stage 2 …. with construction estimated to being **in January 2015**." This was a typo and should have read *….with construction estimated to being **in January 2016**.*

Please let me know if this clears things up for you, or if you need further documentation on this matter (revised pages etc.)

Thank you-

Don M. Misenheimer
Project Scientist

SMITH + GARDNER

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Raleigh, NC 27603

P (919) **828.0577**
C (919) **815.4315**

www.smithgardnerinc.com

From: Backus, Pat [mailto:pat.backus@ncdenr.gov]
Sent: Friday, June 10, 2016 11:17 AM
To: Don Misenheimer (don@smithgardnerinc.com); Donald Plessinger (Waste Industries)
Subject: Permit No. 92-31 Brownfield Road C&D Landfill

Don and Don,

I am trying to finish the permit and need to check with you. I think the nomenclature for the phases may have changed over the years which is confusing me (cells, stages, A, B,C, 1,2,3, etc.).

Phase 1 had Cells A, B, and C and they are all constructed.

Phase 2 has Phase 2A with a Cell 1, 2, and Stage 2 and a Phase 2B. (The 2014 permit listed a Phase 2C which was a vertical expansion, but it isn't on the last application. See table on page viii.) Cells 1 and 2 have been constructed. (CQA in 2014 was for 2A, Cell 2) Stage 2 was approved for construction previously. The executive summary of the application (page iii) stated that "Phase 2A – Stage 2 …. with construction estimated to being in January 2015." But it hasn't be built, has it? The application just reviewed was for a PTC for Phase 2B. Could you clear this up for me?

(See capacity tables in attached documents.)

Thanks,

Pat

Patricia M. (Pat) Backus, P.E.

Environmental Engineer

Division of Waste Management – Solid Waste Section

North Carolina Department of Environmental Quality

(919) 707-8257 office

pat.backus@ncdenr.gov

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Raleigh, NC 27699-1646

Nothing Compares

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