

**PART III, ATTACHMENT 3**

**APPENDIX III-3A**

**AIRSPACE AND SITE LIFE CALCULATIONS**

**APPENDIX III-3A-1**  
**Airspace Calculations**

Date: 07/23/2020  
Made By: EWT  
Checked by: JBF  
Reviewed by: CGD

## AIRSPACE CALCULATIONS

### 1.0 OBJECTIVE

To determine the airspace gained from the proposed expansion of the Hawthorn Park Landfill.

### 2.0 GIVEN

- Existing ground data terrain model (DTM) from 2019 aerial survey
- Design/built waste or cover grades for existing landfills (under Permit No. MSW-2185 and MSW-1135)
- Design top of waste (TWST) grades for the expansion (PAA MSW-2185A)

### 3.0 METHOD

Use AutoCAD Civil 3D, a civil engineering software, to compare DTM's using volume surface comparison. The base surface DTM, bottom of waste (BWST) is a composite of the site's existing ground topography, the top of waste or cover for the existing landfill areas, and the proposed expansion area's protective cover design grades. The comparison surface DTM is the final waste design grades for Hawthorn Park Landfill expansion. The Civil3D software calculates the volume, in cubic yards, between the two DTM's and thus estimates the resulting airspace gained from the expansion.

### 4.0 CALCULATIONS

#### 4.1 Permitted Area Airspace

Permitted airspace remaining, comparing DTM to permitted waste grades (yd<sup>3</sup>):  $V = 71,724 \text{ yd}^3$

#### 4.2 Expansion Area Airspace

##### 4.2.1 Volume Surface Calculations

From AutoCAD Civil 3D, comparing TWST to BWST:  $V = 16,034,766 \text{ yd}^3$

### 5.0 CONCLUSIONS

#### 5.1 Total Airspace Resulting from Proposed Expansion

The total remaining airspace after the expansion is the permitted area airspace and expansion area airspace.

**Total airspace remaining after expansion:  $16,106,490 \text{ yd}^3$**



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Professional Engineering Firm  
Registration Number F-2578**

**INTENDED FOR PERMITTING  
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**APPENDIX III-3A-2  
Site Life Calculations**

## SITE LIFE CALCULATIONS

Date: 07/20/2020  
Made By: EWT  
Checked by: JBF  
Reviewed by: CGD

### 1.0 OBJECTIVE

Compute the anticipated site life for the proposed Hawthorn Park Landfill expansion based on the currently-permitted remaining airspace and additional airspace resulting from the expansion.

### 2.0 GIVEN

- |   |                            |
|---|----------------------------|
| (1) Initial waste (Year 1) receipts estimated at:                   | 150,000 tons per year      |
| (2) Year 2 of waste receipts estimated at:                          | 200,000 tons per year      |
| (3) Annual growth rate in waste receipts, after Year 2, assumed at: | 1.2% per year              |
| (4) Waste placement assumes an in-place density of:                 | 1500 lb/yd <sup>3</sup>    |
| (5) Remaining in-place disposal capacity (waste and weekly cover):  | 16,106,490 yd <sup>3</sup> |

### 3.0 CALCULATIONS

Incoming waste after year two:

$F = P(1 + GR)$ , where:

F = Yearly gate waste receipts (tons) - subsequent year  
P = Yearly gate waste receipts (tons) - previous year  
GR = Growth rate

$A = F(2000)/1500$ , where:

A = Yearly Airspace Consumed (yd<sup>3</sup>)  
F = Yearly gate waste receipts (tons)  
2000 / 1500 = Conversion from tons (2000 lbs/1 ton) to yd<sup>3</sup> (1500 lbs / 1 yd<sup>3</sup>)

Calculations provided in the table below.

### 4.0 CONCLUSION

Following approval of the expansion, the remaining site life of the Hawthorn Park Landfill will be approximately 46 years.



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Year	Yearly Gate Waste Receipts (F)	Yearly Airspace Consumed (A)	Cumulative Airspace Consumed	Remaining Disposal Airspace Volume
	(tons)	(yd <sup>3</sup> )	(yd <sup>3</sup> )	(yd <sup>3</sup> )
1	150,000	200,000	200,000	15,906,490
2	200,000	266,667	466,667	15,639,823
3	202,400	269,867	736,533	15,369,957
4	204,829	273,105	1,009,638	15,096,852
5	207,287	276,382	1,286,021	14,820,469
6	209,774	279,699	1,565,720	14,540,770
7	212,291	283,055	1,848,775	14,257,715
8	214,839	286,452	2,135,227	13,971,263
9	217,417	289,889	2,425,116	13,681,374
10	220,026	293,368	2,718,484	13,388,006
11	222,666	296,888	3,015,373	13,091,117
12	225,338	300,451	3,315,824	12,790,666
13	228,042	304,057	3,619,881	12,486,609
14	230,779	307,705	3,927,586	12,178,904
15	233,548	311,398	4,238,983	11,867,507
16	236,351	315,134	4,554,118	11,552,372
17	239,187	318,916	4,873,034	11,233,456
18	242,057	322,743	5,195,777	10,910,713
19	244,962	326,616	5,522,393	10,584,097
20	247,902	330,535	5,852,928	10,253,562
21	250,876	334,502	6,187,430	9,919,060
22	253,887	338,516	6,525,946	9,580,544
23	256,934	342,578	6,868,524	9,237,966
24	260,017	346,689	7,215,213	8,891,277
25	263,137	350,849	7,566,062	8,540,428
26	266,295	355,059	7,921,122	8,185,368
27	269,490	359,320	8,280,442	7,826,048
28	272,724	363,632	8,644,074	7,462,416
29	275,997	367,996	9,012,069	7,094,421
30	279,309	372,411	9,384,481	6,722,009
31	282,660	376,880	9,761,361	6,345,129
32	286,052	381,403	10,142,764	5,963,726
33	289,485	385,980	10,528,744	5,577,746
34	292,959	390,612	10,919,356	5,187,134
35	296,474	395,299	11,314,655	4,791,835
36	300,032	400,043	11,714,697	4,391,793
37	303,632	404,843	12,119,540	3,986,950
38	307,276	409,701	12,529,241	3,577,249
39	310,963	414,618	12,943,859	3,162,631
40	314,695	419,593	13,363,452	2,743,038
41	318,471	424,628	13,788,080	2,318,410
42	322,293	429,724	14,217,804	1,888,686
43	326,160	434,880	14,652,684	1,453,806
44	330,074	440,099	15,092,783	1,013,707
45	334,035	445,380	15,538,163	568,327
46	338,043	450,725	15,988,888	117,602
46.3	342,100	117,602	16,106,490	0