NLR/AE CONSULTANTS

TECHNICAL MEMORANDUM

Issue Date:	April 30, 2024	**File:**	2024-3650.010
To:	Joe Angevine	**Previous Issue Date:**	NA
From:	Stan Reimer, P.Eng.		
Client:	Foothills Regional Services Commission		
Project Name:	2024 Waste Access and Staging Plan	**Project No.:**	2024-3650-01
Subject:	Waste Access and Staging Plan		

1 INTRODUCTION

Foothills Regional Services Commission (FRSC) engaged NLR/AE Consultants (NLR/AE) to complete the Waste Access and Staging Plan (WASP) for the waste staging at 1 year, 3 year, 5 year, 10 year and 15 year intervals (Planning Interval(s)). The WASP will be used for near-term waste placement in existing cells as well as planning for the construction timing of future cells. This technical memo details the development and waste staging timeline of the WASP and is a subsequent analysis to the Long-Term Planning Models completed in April 2024 (attached for reference).

2 DEVELOPMENT OF THE WASP

The WASP models for each Planning Interval were modeled within the umbrella of the Long-Term Planning Models and translate the cell capacities into a waste fill timeline.

Development of the WASP is based on the following parameters, criteria, and considerations:

- Cells 1 to 3 are at capacity and are partially capped.
- Cells 4 and 5 are near capacity and will be filled post year 3 planning interval.
- Cell 6 is approximately 90% filled and will remain at the current fill level and used as a pad and staging area for equipment and material storage, as well as access to successive cells.
- Cell 7 will see the majority of the near-term waste placement until it reaches 75% capacity. At which time Cell 8 will be constructed.
- The east access into Cell 6 will be kept operational until Cell 9 is constructed.
- The timing of waste mining from the existing old landfill/compost pad must be considered for future cell development. Waste mining must be completed for a subsequent cell prior to the current cell reaching 75% filled.
- A 1 m frost protection layer must be placed immediately following cell construction.
- The overall progression of waste across the cells is assumed at 3 m lifts, including daily cover material.
- The waste density factor is calculated to be 0.49 tonnes/m^3.
- The 2023 Annual Report Survey was set as the existing waste surface in the WASP models.
- The waste density factor is calculated to be 0.49 tonnes/m^3. This conversion factor was calculated based on the total tonnes of waste received by the FRSC Landfill and the total volume of waste surveyed (including waste cover material) for the 2017 to 2022 Annual Reports.

3 ANNUAL WASTE INTAKE

Table 3-1 below details the annual waste volumes from 2017-2023, as provided by the FRSC, with the average waste intake being 74,073 m^3/year, or 36,296 tonnes/year. Considering there's not a significant increase in annual waste intake over this period, the average annual waste intake was assumed to remain constant for this WASP, which is 74,100 m^3/year.

Table 3-1
Annual Waste Intake

Year	Survey Date	Intake Volume (m^3)	Intake Volume (tonnes)
2017	November 19, 2017	76,530	37,500
2018	November 18, 2018	92,530	45,340
2019	November 25, 2019	72,550	35,550
2020	November 22, 2020	80,530	39,460
2021	November 21, 2021	65,450	32,071
2022	December 7, 2022	58,430	28,631
2023	November 23, 2023	72,490	35,520
Average		**74,073**	**36,296**

4 WASTE FILL VOLUMES

Utilizing the average annual waste volume the following waste volumes were modeled for each planning interval.

Waste volumes for each Planning Interval and cumulative volumes are presented in **Table 4-1** below. Future mined waste from the existing old landfill/compost pad have not been included at this point as

Table 4-1
Waste Volumes per Planning Interval

Year	Planning Interval Waste Volume (m^3)	Mined Waste Volume	Cumulative
1	75,600	0	75,600
3	147,000	0	222,600
5	148,000	0	370,600
10	375,600	0	746,200
15	367,100	0	1,113,300

The above volumes were distributed across the cells as presented in the **Table 4-2** below.

Table 4-2
Waste Placement per Cell

Year	Cells 4/5			Cell 7			Cell 8		
	m^3	tonnes	% filled	m^3	tonnes	% filled*	m^3	tonnes	% filled**
1	-	-	-	75,600	37,100	12%	-	-	-
3	-	-	-	222,600	109,100	36%	-	-	-
5	48,600	23,900	100%	322,000	157,800	51%	-	-	-
10	-	-	-	656,800	321,900	105%	89,400	43,900	15%
15	-	-	-	-	-	-	367,200	180,000	63%

* when compared to the Long-Term Planning model for Cell 7.
** when compared to Cell 8 at 75% filled.

5 FUTURE CELL CONSTRUCTION

The cell construction schedule is driven by the remaining capacity of the prior cell. Once a cell reaches 75% fill, the consecutive cell should be constructed. Based on the cell capacities, volume staging of each cell, and the anticipated waste fill rate, FRSC will need to construct new cells as follows:

- Cell 8 will need to be constructed by approximately Year 8 (2031).
- Cell 9 will need to be constructed within a couple years after Year 15 (2038).

The timing of future cell construction will depend on when mining of the old landfill waste begins and at what rate the waste is mined. Cell 8, as currently planned, can be constructed without having to mine waste from its footprint. Therefore, the earliest that mining waste is required would be for Cell 9 construction, and based on the anticipated waste intake volumes, mining of old waste could be delayed to around Year 15 or 2038.

6 CLOSURE

Please see attached for the InfraWorks Sketches as part of the Waste Access and Staging Plan (WASP). The WASP offers a practical framework for the management of waste fill and the construction of new cells.

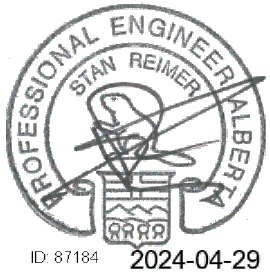
We trust that the contents of this Technical Memorandum meet the requirements of the Foothills Regional Services Commission.

Prepared by:

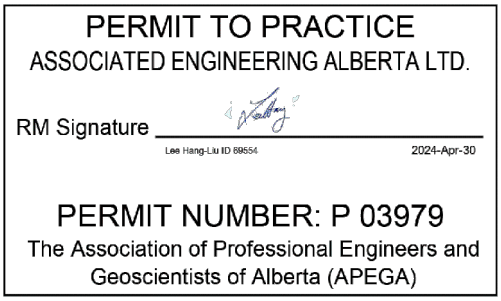
Amy Huang, E.I.T.

AH

Reviewed by:



Stan Reimer, P.Eng.
Engineer of Record



Attachments

- Technical Memo: Long-Term Planning Models for the Waste Access and Staging Plan (WASP)
- WASP InfraWorks Sketches
- Cross-Sections/Profile Views

ATTACHMENT – Technical Memo: Long-Term Planning Models for the Waste Access and Staging Plan (WASP)

NLR/AE CONSULTANTS

TECHNICAL MEMORANDUM

Issue Date:	April 5, 2024	File:	
To:	Joe Angevine	Previous Issue Date:	NA
From:	Stan Reimer, P.Eng.		
Client:	Foothills Regional Services Commission		
Project Name:	2024 Waste Access and Staging Plan	Project No.:	2024-3650-01
Subject:	Long-Term Planning Models for the Waste Access and Staging Plan (WASP)		

1 INTRODUCTION

Foothills Regional Services Commission (FRSC) engaged NLR/AE Consultants (NLR/AE) to complete the Waste Access and Staging Plan (WASP) for the waste staging at 1 year, 3 years, 5 years, 10 years, and 15 years from January 2024. To generate the WASP, Long-Term Planning Models were developed to determine the layout of future cells and the corresponding waste configuration.

2 CELL CAPACITY

The WASP assumes Cells 1 to 5 are at capacity and are partially capped, while Cells 6 and 7 are currently in operation. The capacities of each available cell are as listed below in Table 2-1. The table shows the capacity to accept general waste and mined waste (planned to be relocated in stages) from the existing old landfill/compost pad. The cell capacities used for the Long-Term Planning Models are based on the latest Development Plan (see attachments). As each cell reaches capacity and new cells are designed and built, there may be adjustments to the actual capacities noted below. The density of waste is assumed to be 0.49 tonne/m^3.

Table 2-1 Cell Capacities

Cell (Phase)	Waste Volume (tonnes)	Waste Volume (m^3)	Mined Waste Volume (m^3)	Cumulative - All Landfill Cells (m^3)
6	22,473*	45,753*	-	1,789,490**
7	355,668	724,110	-	2,513,600
8	373,746	760,915	126,365	3,400,880
9	333,219	678,405	174,135	4,253,420

* Remaining air space in Cell 6.

**Includes Cells 1 to 6 waste volumes.

3 FUTURE CELL LAYOUT

Long Term Planning Models were developed for Cells 6, 7, 8, and 9 based on the following criteria and parameters:

- Existing waste surface based on the November 2023 Annual Report survey.
- Cell layout, cell sizes of future cells, waste slopes, and waste heights are as per the latest Development Plan (see attachments).
- Maintain access in the waste to fill Cells 6, 7, 8 and 9.
- Continue using the east access road until Cell 9 is constructed.
- Maintain use of the north access road for the lifespan of all Cells (6, 7, 8, and 9), except during Cell 8 construction.
- Fill cells successively to optimize space usage and facilitate smooth transitions between using existing and new cells.

Based on the above criteria, the Long-Term Planning Models were developed. The models represent long-term plans for successive cell fills, whilst optimizing space usage and transitions to future cells as they are constructed. The successive cell fill plans and waste configurations are represented in the attached InfraWorks sketches for Cells 6, 7, 8, and 9. The Cell 6 waste surface will remain at the current fill level and used as a pad and working area for equipment and material storage and access to successive cells.

The first stage in the Long-Term Planning Models starts with fill in Cell 6 to 90% and Cell 7 newly constructed. The remaining stages show progressive fills in each cell to 75% filled before the subsequent cell is constructed. See Tables 3-1, 3-2, and 3-3 for a summary of the fill percentages, fill tonnages, and fill volumes, respectively.

Table 3-1 Long-Term Plan Model Cell Fill Percentages

Stage	Cells Status/Fill Description	Cell 6	Cell 7	Cell 8	Cell 9
Stage 1	Cell 6 filled/held at 90%, and Cell 7 constructed.	90%	Newly Constructed 0%	NA	NA
Stage 2	Cell 6 filled/held at 90%, and Cell 7 filled to 25%.	90%	25%	NA	NA
Stage 3	Cell 6 filled/held at 90%, Cell 7 filled to 75%, and Cell 8 constructed.	90%	75%	Newly Constructed 0%	NA
Stage 4	Cell 6 filled/held at 90%, Cell 7 filled to 100%, and Cell 8 filled to 25%.	90%	100%	25%	NA
Stage 5	Cell 6 filled/held at 90%, Cell 7 filled to 100%, Cell 8 filled to 75%, and Cell 9 constructed.	90%	100%	75%	Newly Constructed 0%

Table 3-2 Long-Term Plan Model Cell Fill Tonnages

Stage	Cells Status/Fill Description	Cell 6 (tonnes)	Cell 7 (tonnes)	Cell 8 (tonnes)	Cell 9 (tonnes)	Cumulative Cells 6, 7, 8, & 9 (tonnes)
Stage 1	Cell 6 filled/held at 90%, and Cell 7 constructed.	202,257	Newly Constructed	NA	NA	202,257
Stage 2	Cell 6 filled/held at 90%, and Cell 7 filled to 25%.	202,257	89,704	NA	NA	291,960
Stage 3	Cell 6 filled/held at 90%, Cell 7 filled to 75%, and Cell 8 constructed.	202,257	268,632	Newly Constructed	NA	470,889
Stage 4	Cell 6 filled/held at 90%, Cell 7 filled to 100%, and Cell 8 filled to 25%.	202,257	307,204	93,935	NA	603,395
Stage 5	Cell 6 filled/held at 90%, Cell 7 filled to 100%, Cell 8 filled to 75%, and Cell 9 constructed.	202,257	307,204	284,460	Newly Constructed	793,920

Table 3-3 Long-Term Plan Model Cell Fill Volumes

Stage	Cells Status/Fill Description	Cell 6 (m^3)	Cell 7 (m^3)	Cell 8 (m^3)	Cell 9 (m^3)	Cumulative Cells 6, 7, 8, & 9 (m^3)
Stage 1	Cell 6 filled/held at 90%, and Cell 7 constructed.	411,777	Newly Constructed	NA	NA	411,777
Stage 2	Cell 6 filled/held at 90%, and Cell 7 filled to 25%.	411,777	182,629	NA	NA	594,406
Stage 3	Cell 6 filled/held at 90%, Cell 7 filled to 75%, and Cell 8 constructed.	411,777	546,912	Newly Constructed	NA	958,689
Stage 4	Cell 6 filled/held at 90%, Cell 7 filled to 100%, and Cell 8 filled to 25%.	411,777	625,441	191,243	NA	1,228,461
Stage 5	Cell 6 filled/held at 90%, Cell 7 filled to 100%, Cell 8 filled to 75%, and Cell 9 constructed.	411,777	625,441	579,135	Newly Constructed	1,616,353

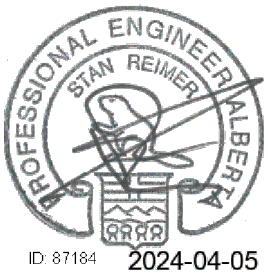
4 CLOSURE

We trust that the information presented within this Technical Memorandum meets the requirements of Foothills Regional Services Commission.

Prepared by:

Amy Huang, E.I.T.
AH

Reviewed by:



Stan Reimer, P.Eng.
Signature/Seal

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.

RM Signature _____
Lee Hang-Liu ID 69554 2024-Apr-05

PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Attachments:

- Development Plan
- Long-Term Plan Model InfraWorks Sketches

FOOTHILLS REGIONAL LRRC
LANDFILL & RESOURCE RECOVERY CENTRE

DRAWING INDEX			
DRAWING NUMBER	REVISION	DRAWING TITLE	DESCRIPTION
GENERAL			
3650-03-G-001	C	DRAWING INDEX AND COVER SHEET	
CIVIL			
3650-03-C-101	C	SITE PLAN - CELL	
3650-03-C-102	C	SITE PLAN - WASTE	
3650-03-C-103	C	WASTE FILL PHASE PLANS	SHEET 1 OF 6
3650-03-C-104	C	WASTE FILL PHASE PLANS	SHEET 2 OF 6
3650-03-C-105	B	WASTE FILL PHASE PLANS	SHEET 3 OF 6
3650-03-C-106	B	WASTE FILL PHASE PLANS	SHEET 4 OF 6
3650-03-C-107	B	WASTE FILL PHASE PLANS	SHEET 5 OF 6
3650-03-C-108	A	WASTE FILL PHASE PLANS	SHEET 6 OF 6
3650-03-C-301	B	WASTE FILL PHASE SECTIONS	

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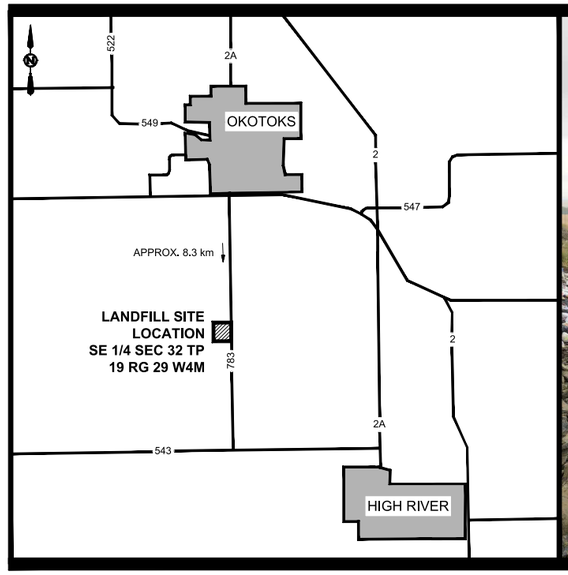
FOOTHILLS REGIONAL LRRC
DEVELOPMENT PLAN

CLASS II LANDFILL
OKOTOKS, ALBERTA



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ISSUED FOR: INFORMATION

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B	2022MAR28	B. JARDINE	T. JOHNSTON	ISSUED FOR DRAFT
A	2022MAR18	B. JARDINE	T. JOHNSTON	ISSUED FOR DRAFT

DRAWING	REVISION
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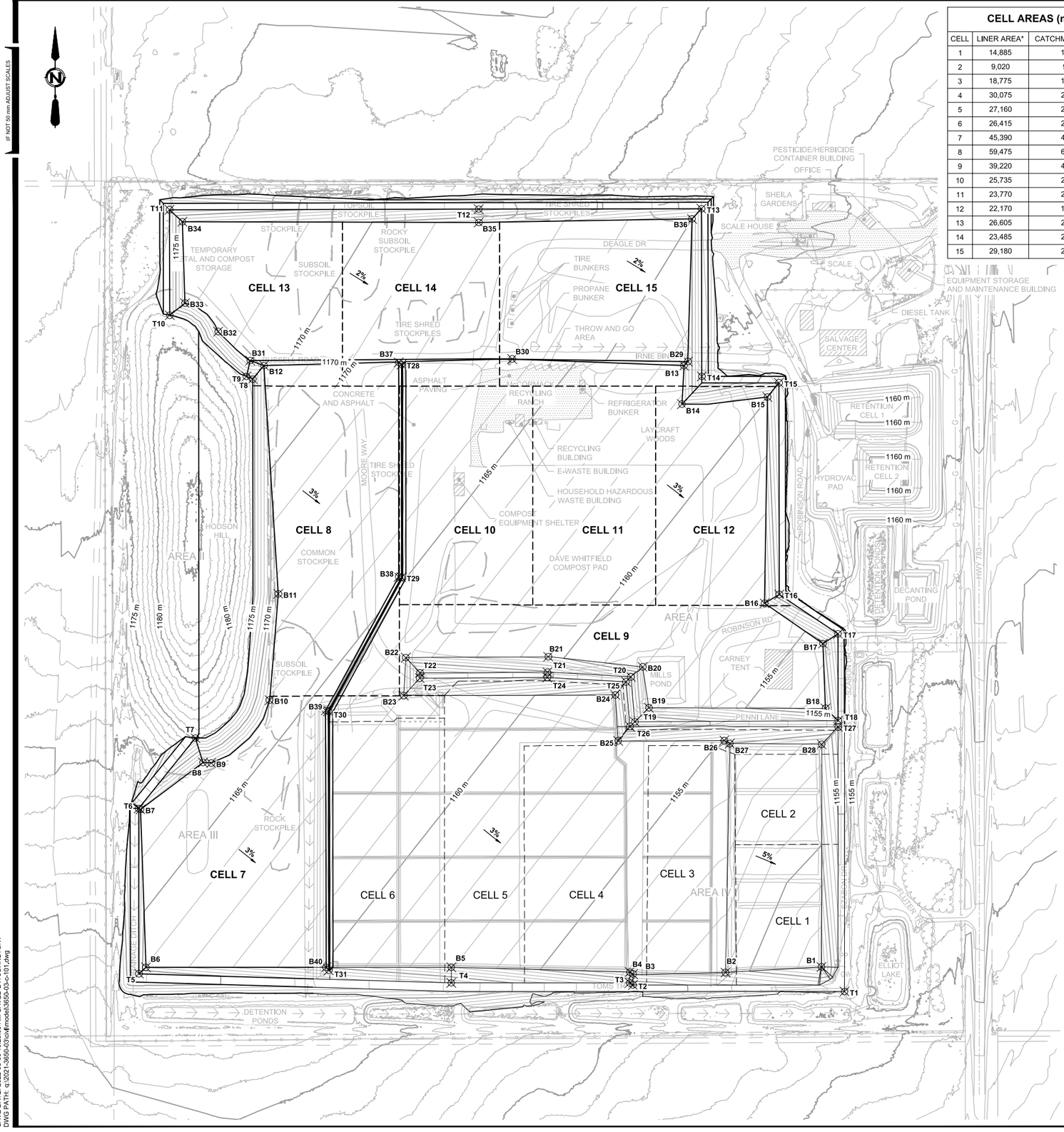

CELL AREAS (m²)

CELL	LINER AREA*	CATCHMENT AREA**
1	14,885	17,455
2	9,020	9,880
3	18,775	19,315
4	30,075	29,640
5	27,160	26,455
6	26,415	23,900
7	45,390	47,225
8	59,475	62,370
9	39,220	41,830
10	25,735	25,730
11	23,770	23,760
12	22,170	19,380
13	26,605	26,580
14	23,485	22,000
15	29,180	25,840

DESIGN ELEVATION TABLE

POINT	ELEVATION
B1	1147.000
B2	1151.000
B3	1152.812
B4	1152.923
B5	1157.051
B6	1163.972
B7	1166.905
B8	1166.325
B9	1166.124
B10	1165.926
B11	1167.613
B12	1172.000
B13	1162.480
B14	1161.843
B15	1160.028
B16	1156.423
B17	1154.385
B18	1153.176
B19	1157.189
B20	1158.055
B21	1160.377
B22	1163.591
B23	1162.960
B24	1158.177
B25	1157.299
B26	1154.896
B27	1154.944
B28	1152.500
B29	1163.698
B30	1166.489
B31	1170.599
B32	1171.383
B33	1172.178
B34	1173.000
B35	1168.324
B36	1165.000

DESIGN ELEVATION TABLE

POINT	ELEVATION
B37	1169.000
B38	1165.187
B39	1164.462
B40	1159.888
T1	1152.026
T2	1156.229
T3	1156.340
T4	1161.894
T5	1166.103
T6	1167.500
T7	1173.943
T8	1175.500
T9	1175.600
T10	1177.000
T11	1177.000
T12	1172.500
T13	1168.000
T14	1168.071
T15	1163.801
T16	1161.136
T17	1159.375
T18	1156.714
T19	1161.930
T20	1162.000
T21	1165.238
T22	1168.051
T23	1168.061
T24	1165.238
T25	1162.000
T26	1161.542
T27	1156.714
T28	1169.804
T29	1166.000
T30	1165.281
T31	1160.682

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LEGEND

1160 m — TOPOGRAPHIC MAJOR CONTOUR, CONTOUR INTERVAL = 5.0m

TOPOGRAPHIC MINOR CONTOUR

CELL DIVISIONS

EARTH WORKS SUMMARY

CELL CONSTRUCTION CUT = 615,540m³
CELL CONSTRUCTION FILL = 24,090m³
CELL CONSTRUCTION NET = 591,450m³ (CUT)

CELL CONSTRUCTION STRIPPING = 58,920m³
(EXISTING CELLS NOT INCLUDED)

CAPPING REQUIREMENT (ALL PHASES)

CAPPING VOLUME TOP/SUBSOIL 0.55m = 237,330m³
CAPPING VOLUME CLAY 0.60m = 258,910m³

*BASED ON STRIPPED SURFACE OF 0.300m
*NO FACTORS ADDED TO CUTS OR FILLS
*OG SURVEY INCLUDED RECORD CELLS 1-6 THEREFORE EARTHWORKS SUMMARY EXCLUDES CUT/FILL VALUES

NOTES:
1. BOLD LINES AND TEXT REFERS TO NEW CONSTRUCTION.

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA — BOB JARDINE
2022-05-09

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
RM Signature
Duane Strayer, P.Eng ID 50010 9 May 2022
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

REV	DATE	DESIGN	DRAWN	DESCRIPTION
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B	2022MAR28	B. JARDINE	T. JOHNSTON	ISSUED FOR DRAFT
A	2022MAR18	B. JARDINE	T. JOHNSTON	ISSUED FOR DRAFT

FOOTHILLS REGIONAL LRRC
LANDFILL & RESOURCE RECOVERY CENTRE

FOOTHILLS REGIONAL LRRC DEVELOPMENT PLAN CLASS II LANDFILL 20223650-03

SCALE: 1:4000

CIVIL
SITE PLAN - CELL

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3650-03-C-101	C

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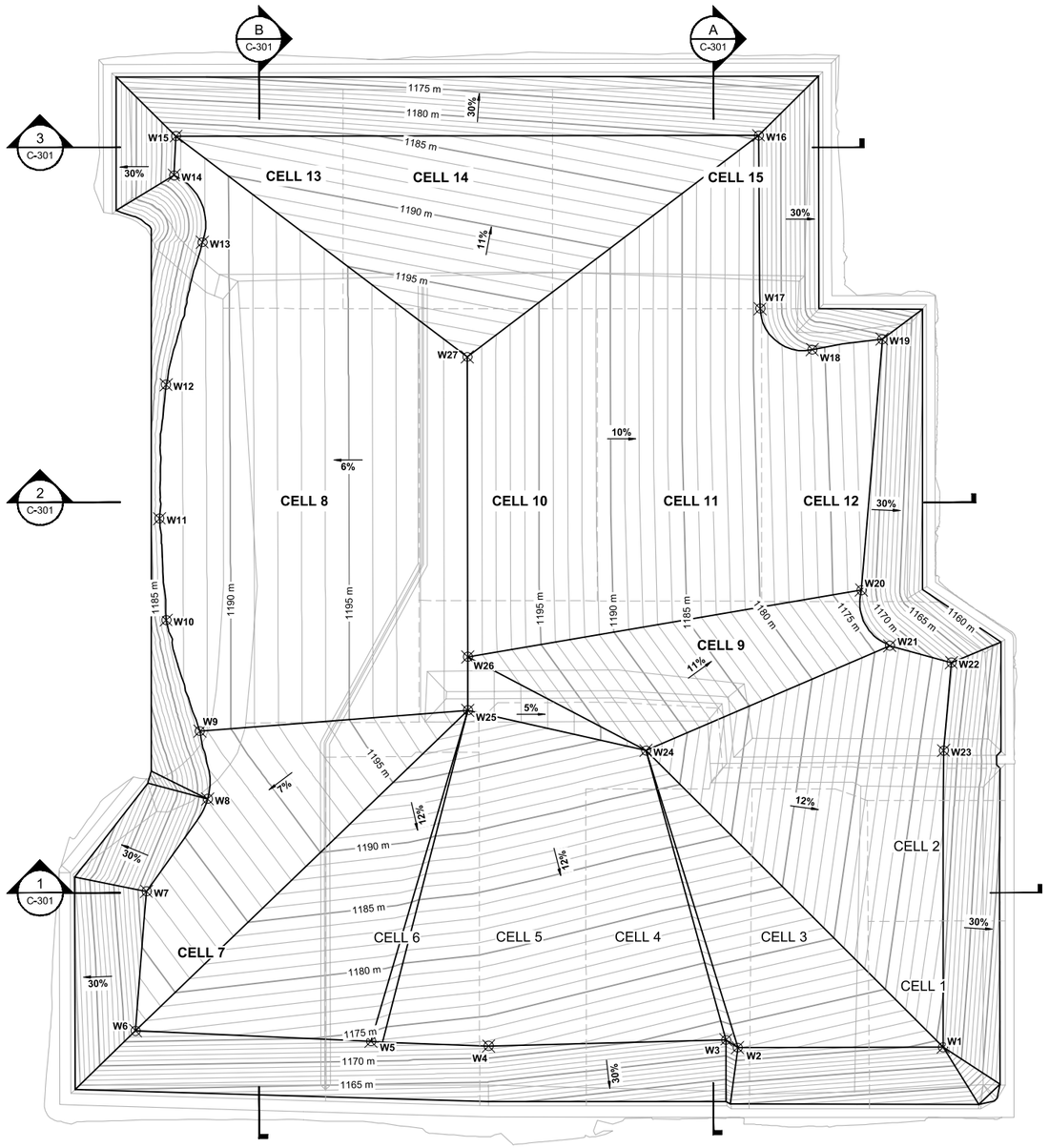


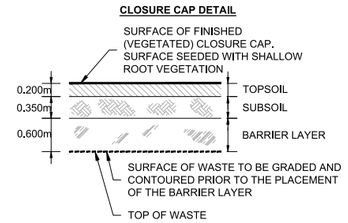
WASTE ELEVATION TABLE	
POINT	ELEVATION
W1	1164.366
W2	1168.000
W3	1168.371
W4	1172.583
W5	1174.231
W6	1177.259
W7	1181.862
W8	1187.064
W9	1188.686
W10	1187.281
W11	1187.000
W12	1187.320
W13	1188.891
W14	1187.717
W15	1187.807
W16	1179.649
W17	1179.532
W18	1175.878
W19	1171.000
W20	1173.052
W21	1173.788
W22	1168.309
W23	1167.886
W24	1193.289
W25	1200.000
W26	1200.000
W27	1200.000

LEGEND

1180m — TOPOGRAPHIC MAJOR CONTOUR
CONTOUR INTERVAL = 5.0m

TOPOGRAPHIC MINOR CONTOUR

CLOSURE CAP DETAIL



*OR APPROVED ALTERNATIVE FINAL COVER SYSTEM

NOTES:
1. BOLD LINES AND TEXT REFERS TO NEW CONSTRUCTION.

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA BOB JARDINE
2022-05-09
(c 2376)

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
RM Signature
Dianne Bhrayer, P.Eng ID 50010 9 May 2022
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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FOOTHILLS REGIONAL LRRC
DEVELOPMENT PLAN
CLASS II LANDFILL
20223650-03

SCALE: 1:4000

CIVIL
SITE PLAN - WASTE

DRAWING	REVISION
3650-03-C-102	C

FOR INFORMATION ONLY

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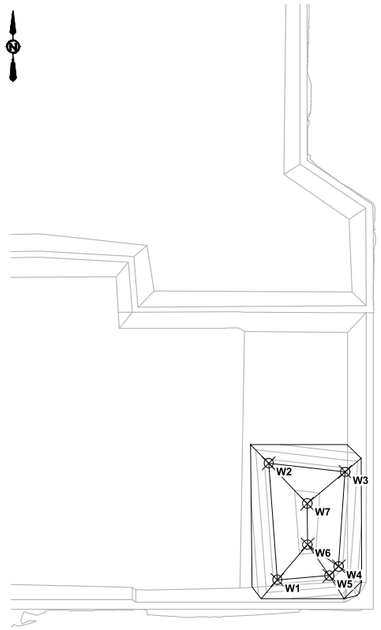
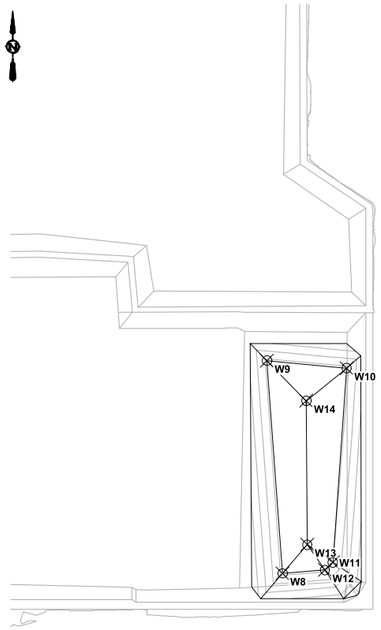
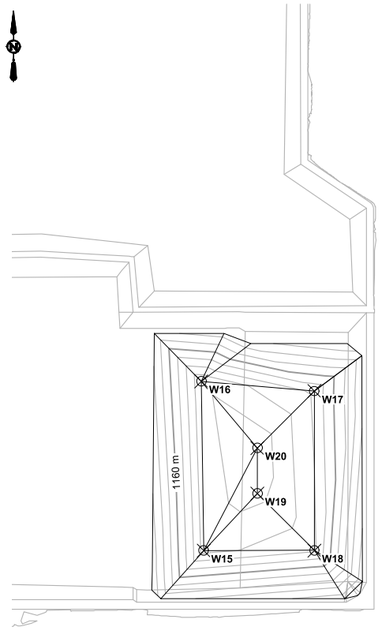


PHASE 1
(CELL 1)



PHASE 2
(CELL 2)



PHASE 3
(CELL 3)

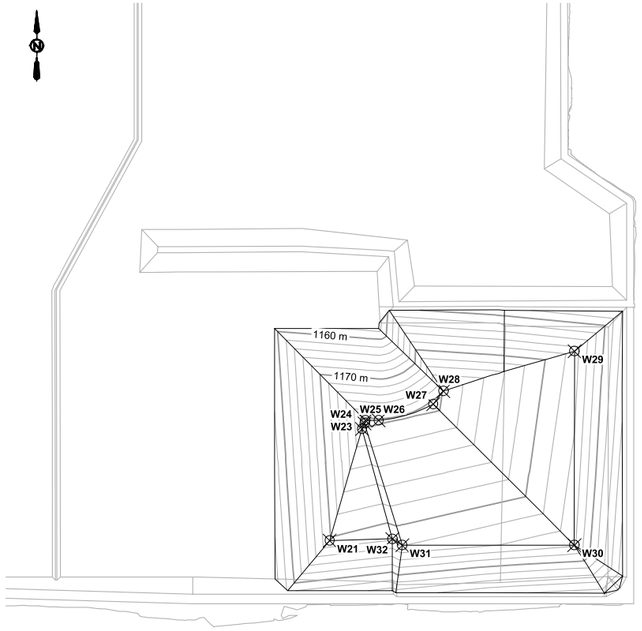
WASTE ELEVATION TABLE	
POINT	ELEVATION
W1	1157.000
W2	1157.000
W3	1157.000
W4	1157.000
W5	1157.000
W6	1158.369
W7	1158.492
W8	1158.500
W9	1158.500
W10	1158.500
W11	1158.102
W12	1158.500
W13	1159.459
W14	1160.017
W15	1166.747

WASTE ELEVATION TABLE	
POINT	ELEVATION
W16	1167.646
W17	1163.648
W18	1164.366
W19	1168.600
W20	1169.450
W21	1169.698
W23	1179.663
W24	1180.406
W25	1180.663
W26	1180.385
W27	1180.748
W28	1179.916
W29	1167.165
W30	1164.366
W31	1168.069

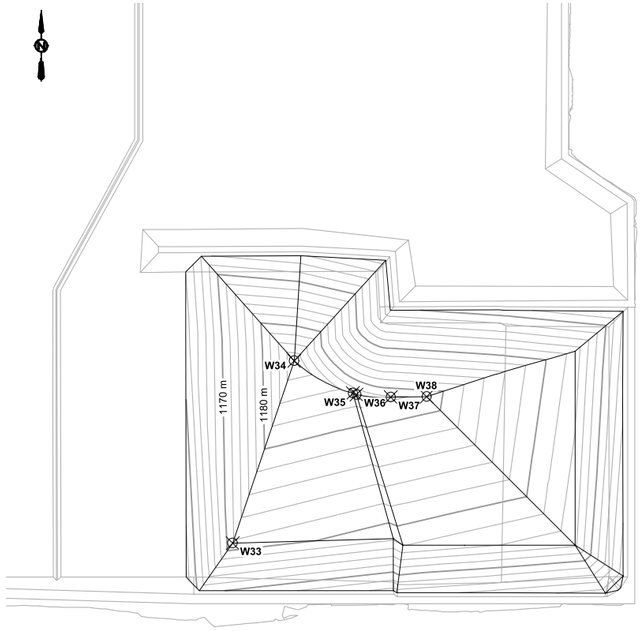
WASTE ELEVATION TABLE	
POINT	ELEVATION
W32	1168.371
W33	1171.767
W34	1187.751
W35	1183.333
W36	1183.318
W37	1182.332
W38	1181.614
W39	1172.583
W40	1173.797
W41	1187.568
W42	1186.953
W43	1188.934
W44	1188.773

CAPPING AREA SUMMARY (m²)		
PHASE	PER PHASE	CUMULATIVE
5	60,145	60,145
6	19,730	79,875
7	48,570	128,445
8	37,390	165,835
9	37,420	203,255
10	23,275	226,530
11	31,945	258,475
12	55,400	313,875
13	20,785	334,660
14	32,865	367,525
15	64,140	431,665

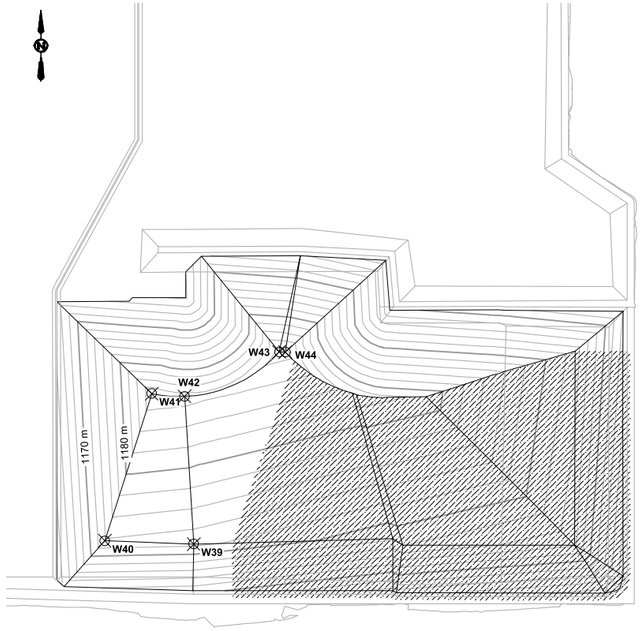
WASTE CELL FILL SUMMARY (m³)			
PHASE	FILL PER PHASE	WASTE MINING	CUMULATIVE
1	65,980	0	65,980
2	53,460	0	119,440
3	244,680	0	364,120
4	500,810	0	864,930
5	467,030	0	1,331,960
6	457,530	0	1,789,490
7	724,110	0	2,513,600
8	760,915	126,365	3,400,880
9	678,405	174,135	4,253,420
10	617,685	227,075	5,098,180
11	663,820	191,310	5,953,310
12	603,590	0	6,556,900
13	279,620	0	6,836,520
14	548,400	0	7,384,920
15	691,630	0	8,076,550



PHASE 4
(CELL 4)



PHASE 5
(CELL 5)



PHASE 6
(CELL 6)

FOR INFORMATION ONLY

NLR/AE CONSULTANTS

LEGEND

1160 m — TOPOGRAPHIC MAJOR CONTOUR
CONTOUR INTERVAL = 10.0m

TOPOGRAPHIC MINOR CONTOUR

PROPOSED CAPPING

EXISTING CAPPING

NOTES:

1. UTM NAD83 ZONE 11 GRID COORDINATE SYSTEM WITH ELLIPSOID ELEVATIONS.
2. BOLD LINES AND TEXT REFER TO NEW CONSTRUCTION.
3. ELEVATION LABELS ARE SHOWN ONLY IF THE ELEVATION CHANGES FROM ONE PHASE TO THE NEXT, FOR CLARITY.
4. ELEVATIONS IN PHASE 15 ARE FOR FINISHED WASTE SURFACE.

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA
BOB JARDINE
2022-05-09

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
RM Signature
Dianne Strayer, P.Eng ID 50010 9 May 2022
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

REV	DATE	DESIGN	DRAWN	DESCRIPTION
C	2022MAY09	B. JARDINE	T. JOHNSTON	ISSUED FOR INFORMATION
B	2022MAR28	B. JARDINE	T. JOHNSTON	ISSUED FOR DRAFT
A	2022MAR18	B. JARDINE	T. JOHNSTON	ISSUED FOR DRAFT

FOOTHILLS REGIONAL LRRC
LANDFILL & RESOURCE RECOVERY CENTRE

FOOTHILLS REGIONAL LRRC DEVELOPMENT PLAN CLASS II LANDFILL 20223650-03

SCALE: 1:5000

CIVIL
WASTE FILL PHASE PLANS
SHEET 1 OF 6

DRAWING	REVISION
3650-03-C-103	C

SAVE DATE: 2022-05-06 6:13:18 PM SAVED BY: JOHNSTONT
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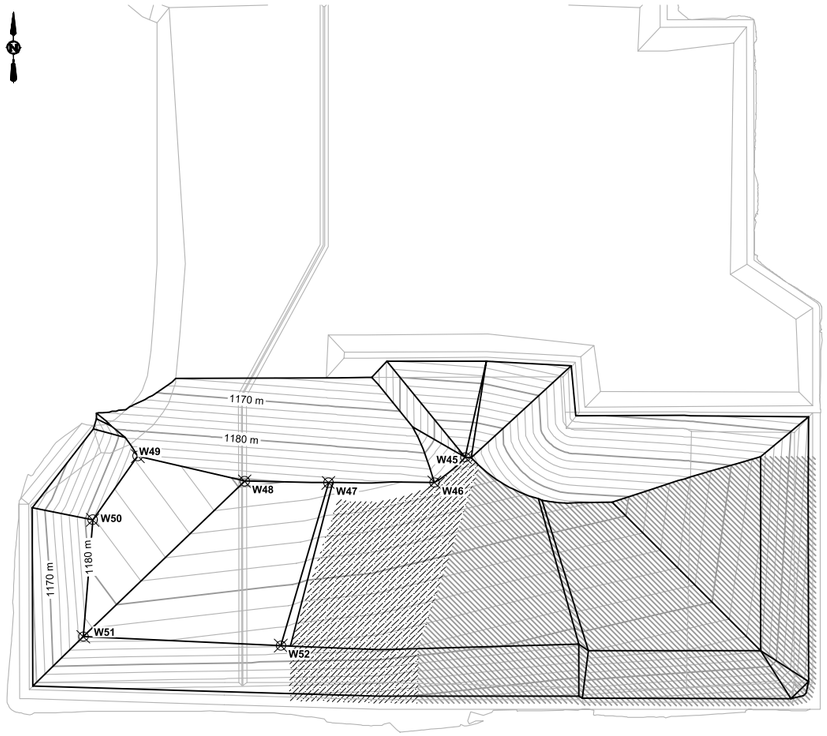
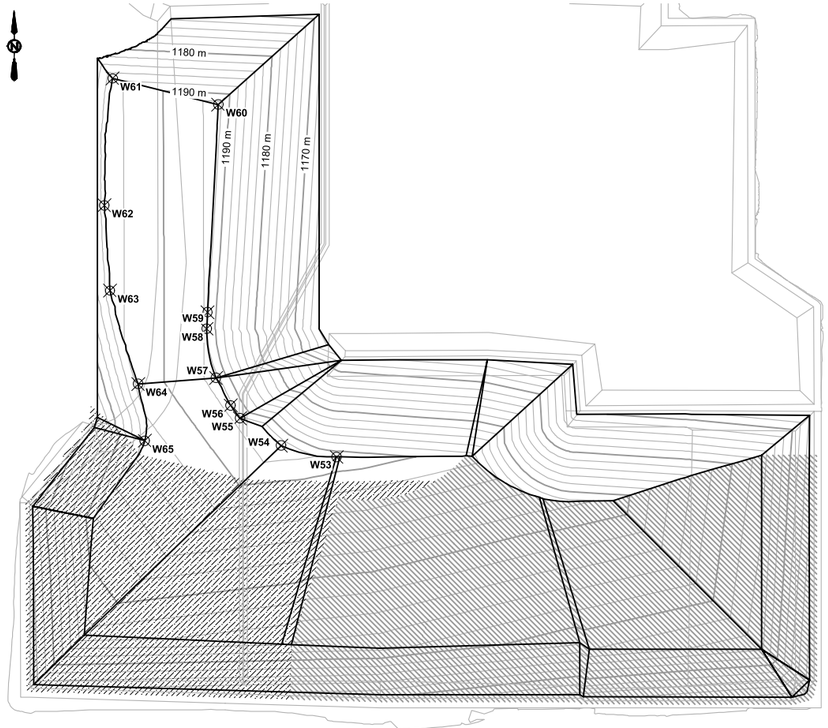
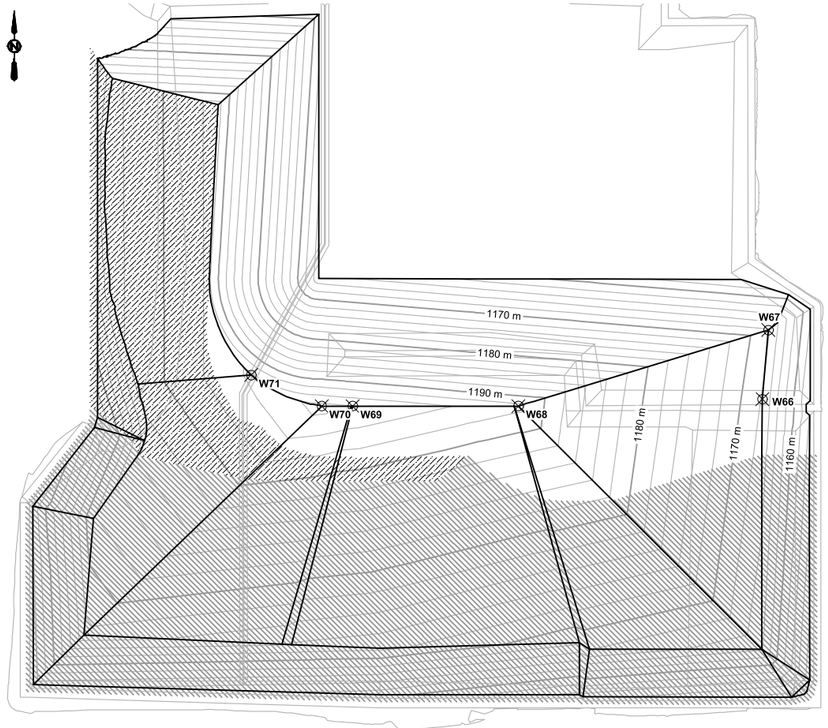
IF NOT 50 mm ADJUST SCALES



PHASE 7
(CELL 7)



PHASE 8
(CELL 8)



PHASE 9
(CELL9)

FOR INFORMATION ONLY

WASTE ELEVATION TABLE	
POINT	ELEVATION
W45	1188.934
W46	1187.248
W47	1189.265
W48	1190.513
W49	1186.280
W50	1181.862
W51	1177.259
W52	1174.231
W53	1191.486
W54	1193.418
W55	1192.418
W56	1192.429
W57	1192.597
W58	1192.136

WASTE ELEVATION TABLE	
POINT	ELEVATION
W59	1192.181
W60	1192.757
W61	1187.466
W62	1187.000
W63	1187.281
W64	1188.686
W65	1187.064
W66	1167.808
W67	1168.287
W68	1192.609
W69	1196.137
W70	1196.768
W71	1194.382

NLR/AE CONSULTANTS

LEGEND

1160 m — TOPOGRAPHIC MAJOR CONTOUR CONTOUR INTERVAL = 10.0m

TOPOGRAPHIC MINOR CONTOUR

PROPOSED CAPPING

EXISTING CAPPING

NOTES:

1. UTM NAD83 ZONE 11 GRID COORDINATE SYSTEM WITH ELLIPSOID ELEVATIONS.
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4. ELEVATIONS IN PHASE 15 ARE FOR FINISHED WASTE SURFACE.

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA BOB JARDINE
2022-05-09

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
RM Signature
Dalene Strayer, P.Eng ID 50010 9 May 2022
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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FOOTHILLS REGIONAL LRRC
LANDFILL & RESOURCE RECOVERY CENTRE

FOOTHILLS REGIONAL LRRC DEVELOPMENT PLAN CLASS II LANDFILL 20223650-03

SCALE: 1:5000

CIVIL
WASTE FILL PHASE PLANS
SHEET 2 OF 6

DRAWING	REVISION
3650-03-C-104	C

SAVE DATE: 2022-05-06 6:13:19 PM SAVED BY: JOHNSTONT
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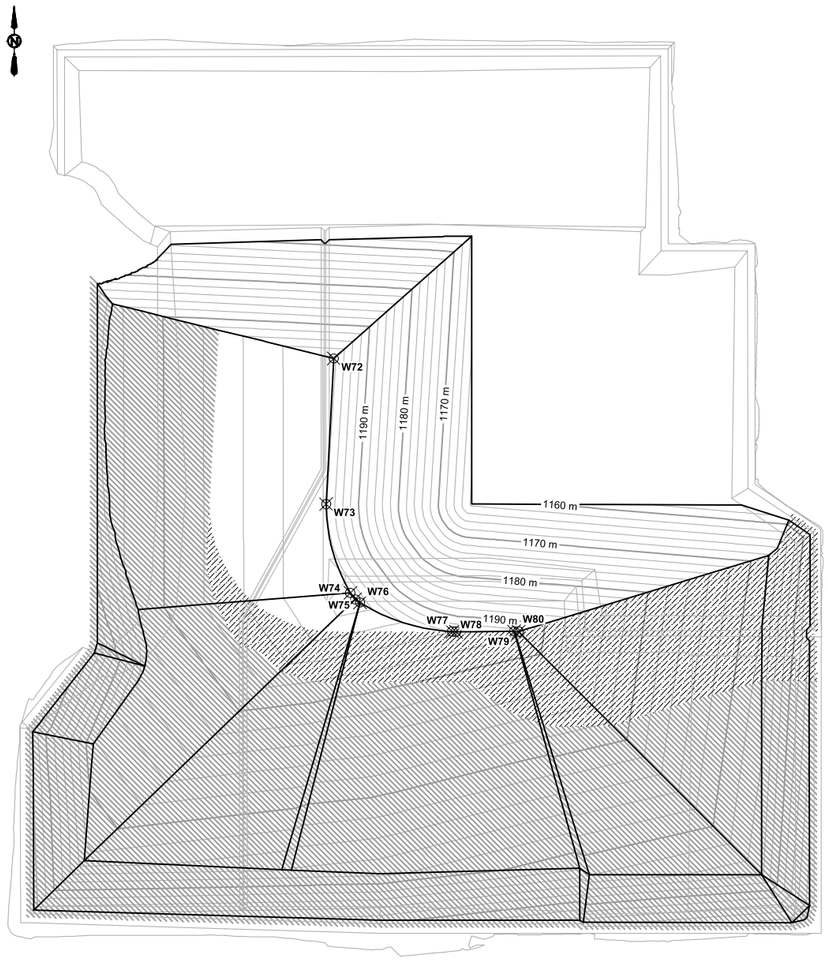
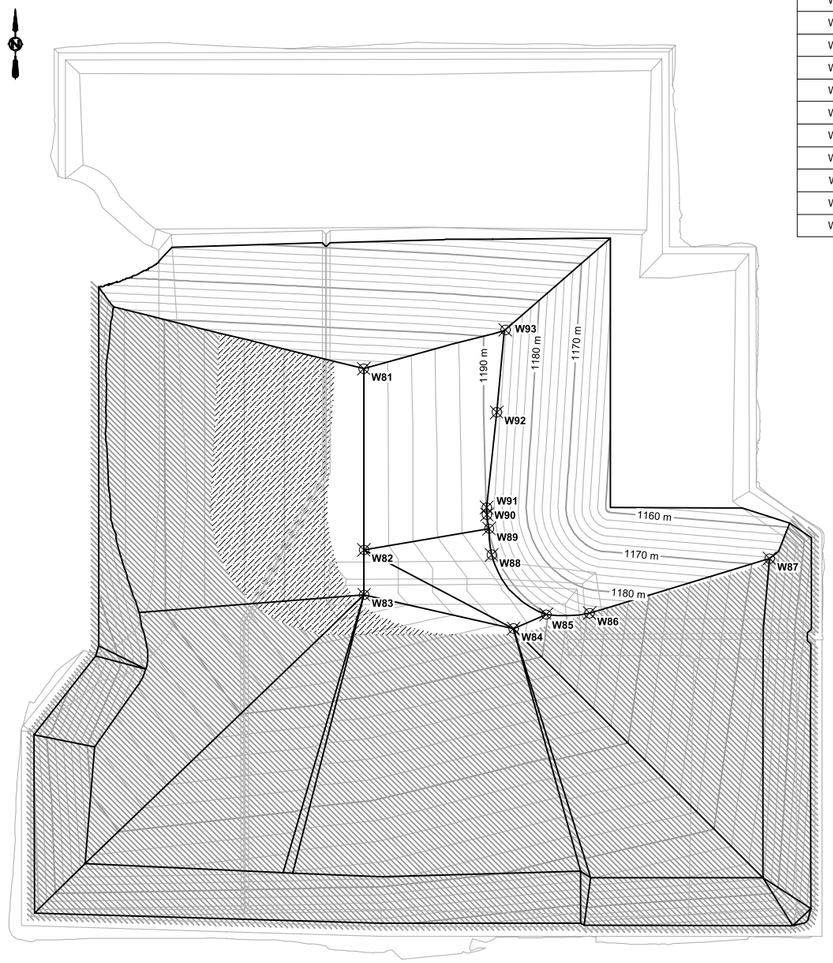


PHASE 10
(CELL 10)



PHASE 11
(CELL 11)

WASTE ELEVATION TABLE	
POINT	ELEVATION
W72	1198.547
W73	1198.152
W74	1199.359
W75	1199.391
W76	1199.018
W77	1194.000
W78	1193.944
W79	1192.691
W80	1192.609
W81	1200.000
W82	1200.000
W83	1200.000
W84	1193.289
W85	1190.171
W86	1185.796
W87	1168.287
W88	1190.982
W89	1189.798
W90	1189.944
W91	1189.948
W92	1188.925
W93	1188.037

NLR/AE CONSULTANTS

LEGEND

1160 m — TOPOGRAPHIC MAJOR CONTOUR CONTOUR INTERVAL = 10.0m

TOPOGRAPHIC MINOR CONTOUR

PROPOSED CAPPING

EXISTING CAPPING

NOTES:

1. UTM NAD83 ZONE 11 GRID COORDINATE SYSTEM WITH ELLIPSOID ELEVATIONS.
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4. ELEVATIONS IN PHASE 15 ARE FOR FINISHED WASTE SURFACE.

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA BOB JARDINE
2022-05-09
E 27763

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
RM Signature
Duane Strayer, P.Eng ID 58010 9 May 2022
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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B	2022MAY09	B. JARDINE	T. JOHNSTON	ISSUED FOR INFORMATION
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FOOTHILLS REGIONAL LRRC
LANDFILL & RESOURCE RECOVERY CENTRE

FOOTHILLS REGIONAL LRRC
DEVELOPMENT PLAN
CLASS II LANDFILL
20223650-03

SCALE: 1:5000

CIVIL
WASTE FILL PHASE PLANS
SHEET 3 OF 6

DRAWING	REVISION
3650-03-C-105	B

FOR INFORMATION ONLY

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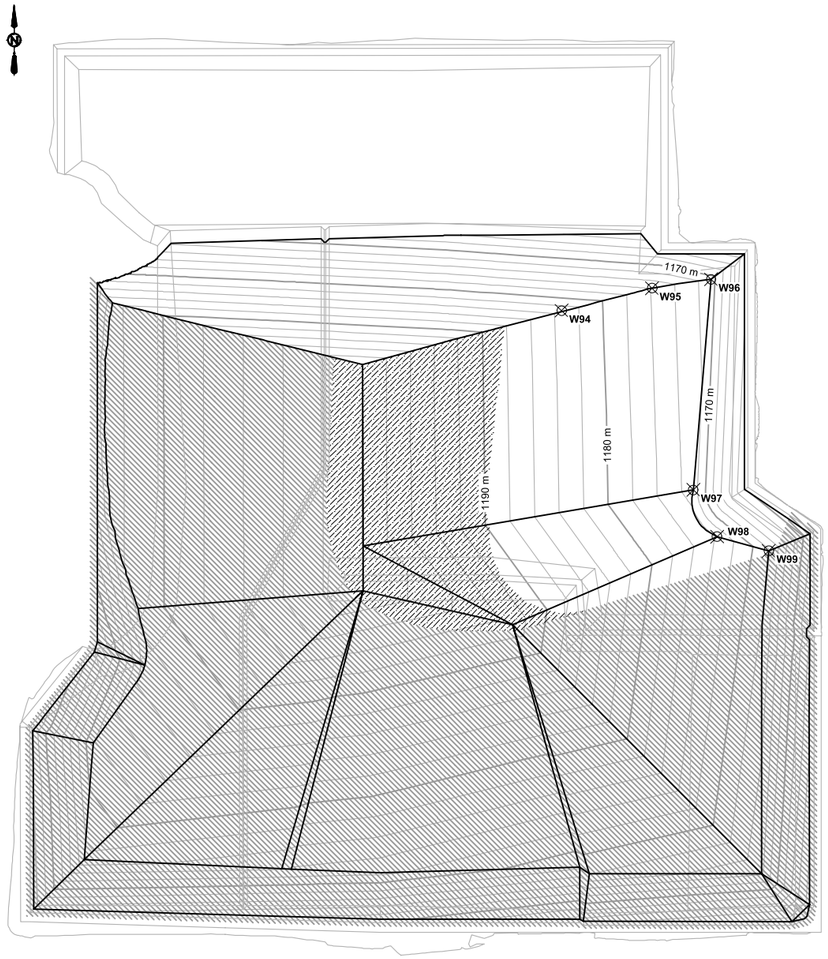
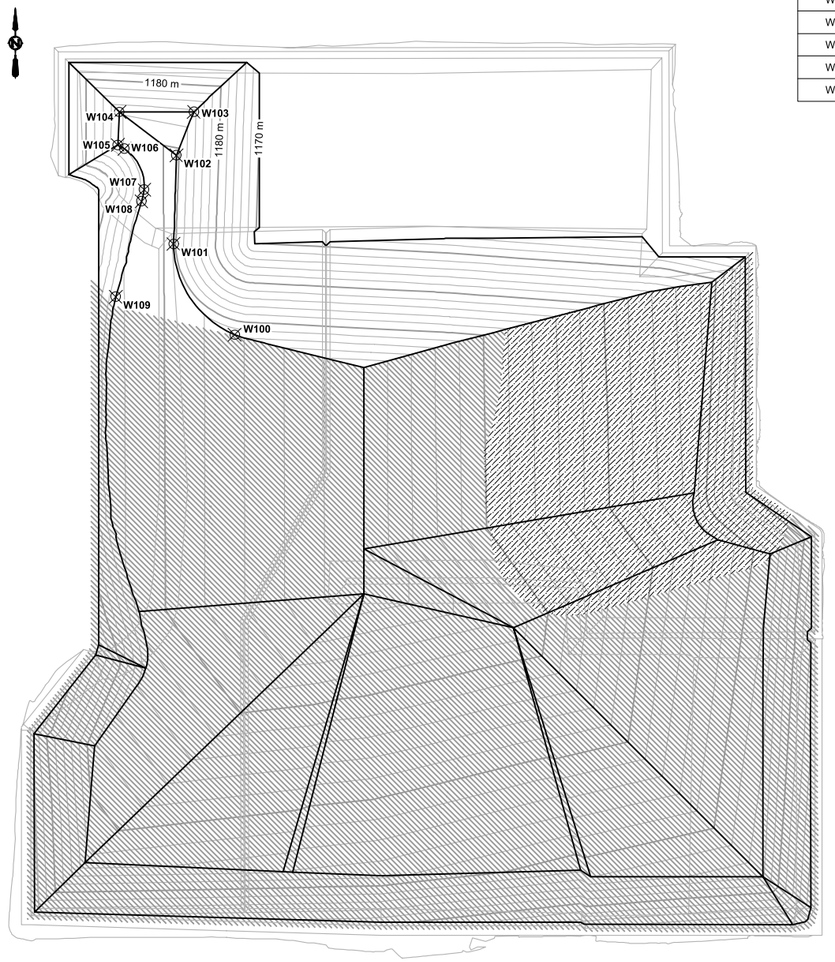
IF NOT 50 mm ADJUST SCALES

WASTE ELEVATION TABLE	
POINT	ELEVATION
W94	1183.204
W95	1175.878
W96	1170.967
W97	1173.052
W98	1173.788
W99	1168.309
W100	1193.528
W101	1190.494
W102	1190.651
W103	1186.561
W104	1187.807
W105	1187.717
W106	1188.049
W107	1189.026
W108	1188.890
W109	1187.573



PHASE 12
(CELL 12)



PHASE 13
(CELL 13)

FOR INFORMATION ONLY

NLR/AE CONSULTANTS

LEGEND

1160 m	TOPOGRAPHIC MAJOR CONTOUR CONTOUR INTERVAL = 10.0m
	TOPOGRAPHIC MINOR CONTOUR
	PROPOSED CAPPING
	EXISTING CAPPING

NOTES:

1. UTM NAD83 ZONE 11 GRID COORDINATE SYSTEM WITH ELLIPSOID ELEVATIONS.
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3. ELEVATION LABELS ARE SHOWN ONLY IF THE ELEVATION CHANGES FROM ONE PHASE TO THE NEXT, FOR CLARITY.
4. ELEVATIONS IN PHASE 15 ARE FOR FINISHED WASTE SURFACE.

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA BOB JARDINE
2022-05-09

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
RM Signature _____
Dianne Strayer, P.Eng ID 50010 9 May 2022
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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A	2022MAR28	B. JARDINE	T. JOHNSTON	ISSUED FOR DRAFT

FOOTHILLS REGIONAL LRRC
LANDFILL & RESOURCE RECOVERY CENTRE

FOOTHILLS REGIONAL LRRC
DEVELOPMENT PLAN
CLASS II LANDFILL
20223650-03

SCALE: 1:5000

CIVIL
WASTE FILL PHASE PLANS
SHEET 4 OF 6

DRAWING	REVISION
3650-03-C-106	B

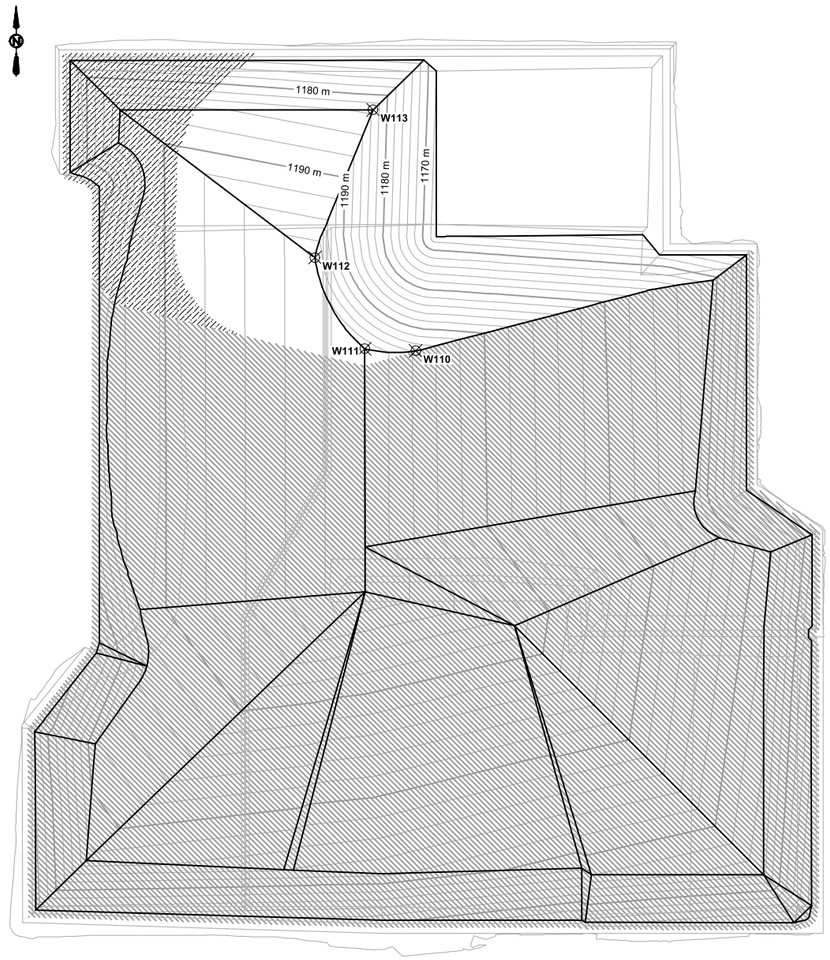
SAVE DATE: 2022-05-06 @ 1:13:18 PM SAVED BY: JOHNSTONT
DWG PATH: q:\2021-3650\4-03\civil\mxsrc\3650-03-_-103-108.dwg

IF NOT 50 mm ADJUST SCALES

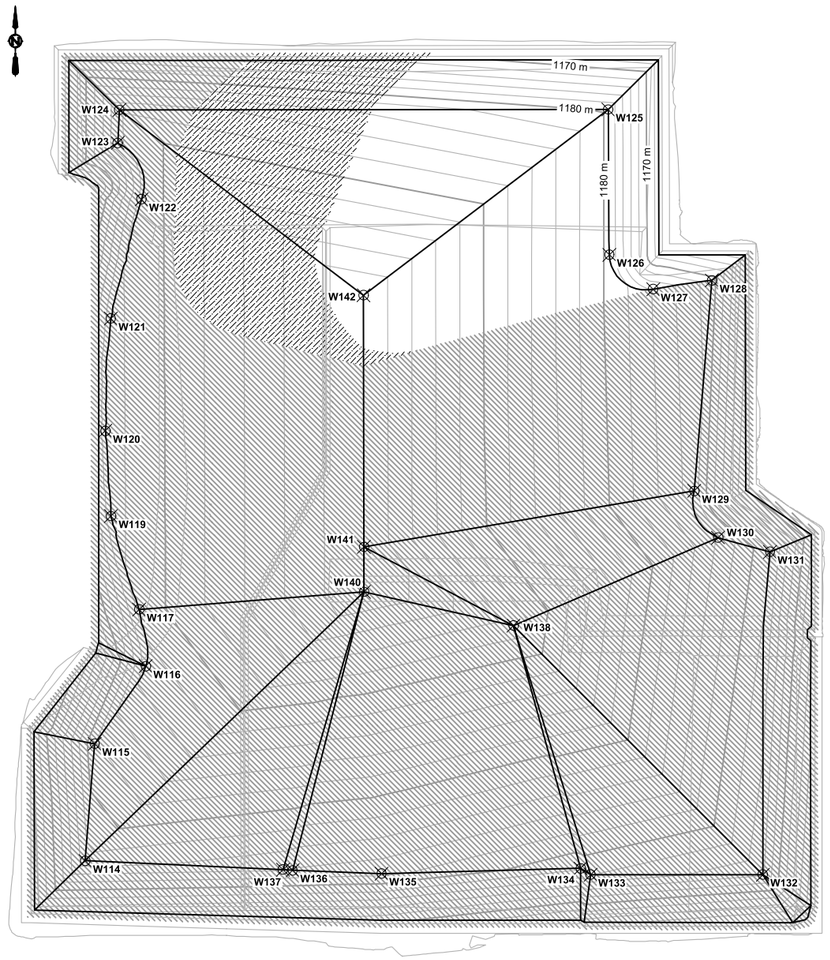
WASTE ELEVATION TABLE	
POINT	ELEVATION
W110	1195.747
W111	1200.000
W112	1197.523
W113	1183.589
W114	1177.259
W115	1181.862
W116	1187.064
W117	1188.686
W119	1187.281
W120	1187.013
W121	1187.320

WASTE ELEVATION TABLE	
POINT	ELEVATION
W122	1188.891
W123	1187.717
W124	1187.807
W125	1179.649
W126	1179.532
W127	1175.878
W128	1170.967
W129	1173.052
W130	1173.788
W131	1168.309
W132	1164.366

WASTE ELEVATION TABLE	
POINT	ELEVATION
W133	1168.069
W134	1168.371
W135	1172.583
W136	1173.797
W137	1174.231
W138	1193.289
W140	1200.000
W141	1200.000
W142	1200.000



PHASE 14
(CELL 14)



PHASE 15
(CELL 15)

FOR INFORMATION ONLY

LEGEND

- 1160 m — TOPOGRAPHIC MAJOR CONTOUR, CONTOUR INTERVAL = 10.0m
- TOPOGRAPHIC MINOR CONTOUR
- PROPOSED CAPPING
- EXISTING CAPPING

NOTES:

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PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA
BOB JARDINE
2022-05-09
(c 2754)

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
RM Signature
Duane Strayer, P.Eng. ID 50010 9 May 2022
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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FOOTHILLS REGIONAL LRRC
DEVELOPMENT PLAN
CLASS II LANDFILL
20223650-03

SCALE: 1:5000

CIVIL
WASTE FILL PHASE PLANS
SHEET 5 OF 6

DRAWING	REVISION
3650-03-C-107	B

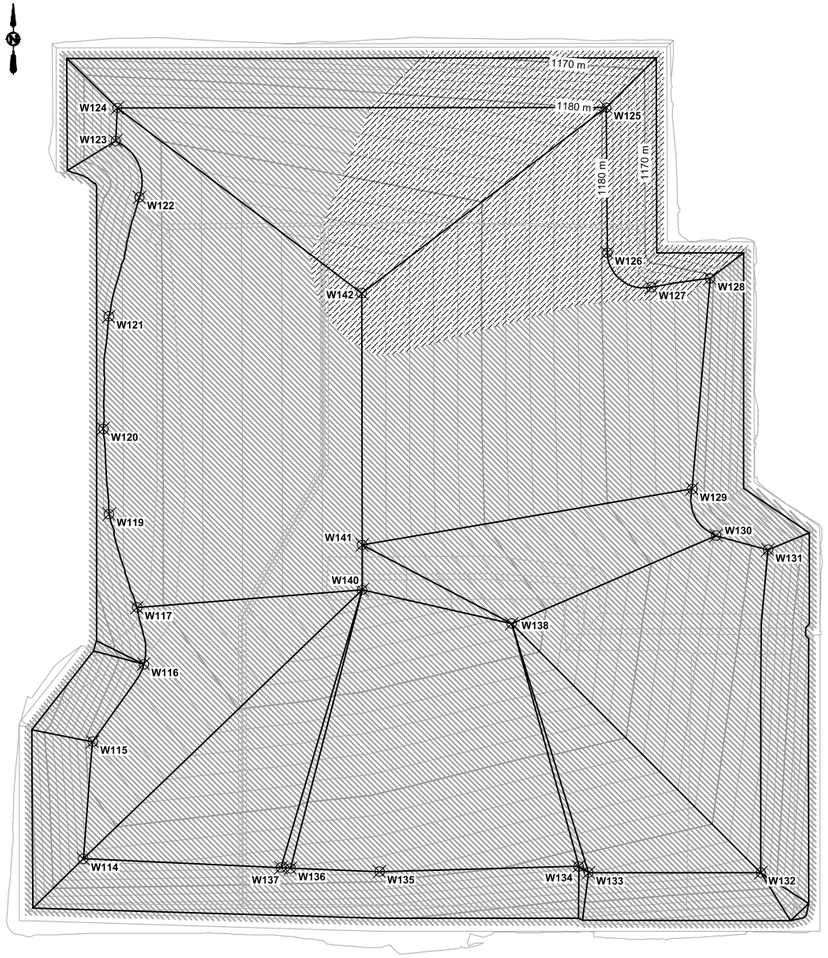
SAVE DATE: 2022-06-06 6:13:19 PM SAVED BY: JOHNSTONT
DWG PATH: q:\2021-3650-03\civil\model\3650-03-c-103-109.dwg

IF NOT 50 mm ADJUST SCALES

WASTE ELEVATION TABLE	
POINT	ELEVATION
W110	1195.747
W111	1200.000
W112	1197.523
W113	1183.589
W114	1177.259
W115	1181.862
W116	1187.064
W117	1188.686
W119	1187.281
W120	1187.013
W121	1187.320

WASTE ELEVATION TABLE	
POINT	ELEVATION
W122	1188.891
W123	1187.717
W124	1187.807
W125	1179.649
W126	1179.532
W127	1175.878
W128	1170.967
W129	1173.052
W130	1173.788
W131	1168.309
W132	1164.366

WASTE ELEVATION TABLE	
POINT	ELEVATION
W133	1168.069
W134	1168.371
W135	1172.583
W136	1173.797
W137	1174.231
W138	1193.289
W140	1200.000
W141	1200.000
W142	1200.000



PHASE 16
(FINAL CAP)

FOR INFORMATION ONLY

NLR/AE CONSULTANTS

LEGEND

1160 m — TOPOGRAPHIC MAJOR CONTOUR (CONTOUR INTERVAL = 10.0m)	
TOPOGRAPHIC MINOR CONTOUR	
PROPOSED CAPPING	
EXISTING CAPPING	

NOTES:

1. UTM NAD83 ZONE 11 GRID COORDINATE SYSTEM WITH ELLIPSOID ELEVATIONS.
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4. ELEVATIONS IN PHASE 15 ARE FOR FINISHED WASTE SURFACE.

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA BOB JARDINE
2022-05-09
(c 2754)

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
RM Signature
Dianne Strayer, P.Eng. ID 50010 9 May 2022
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

REV	DATE	DESIGN	DRAWN	DESCRIPTION
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FOOTHILLS REGIONAL LRRC
LANDFILL & RESOURCE RECOVERY CENTRE

FOOTHILLS REGIONAL LRRC
DEVELOPMENT PLAN
CLASS II LANDFILL
20223650-03

SCALE: 1:5000

CIVIL
WASTE FILL PHASE PLANS
SHEET 6 OF 6

DRAWING	REVISION
3650-03-C-108	A

SAVE DATE: 2022-06-06 6:13:19 PM SAVED BY: JOHNSTONT
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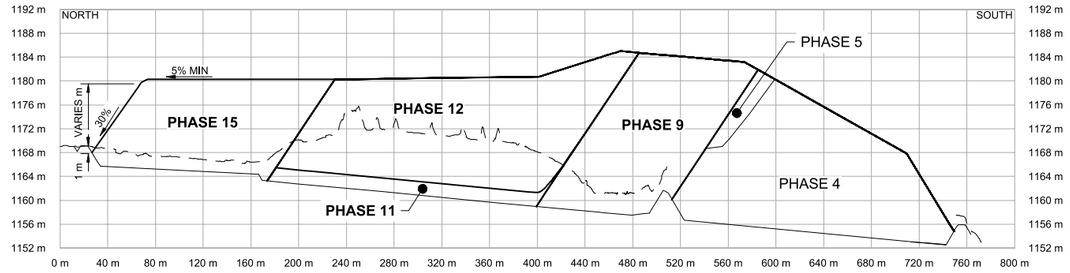
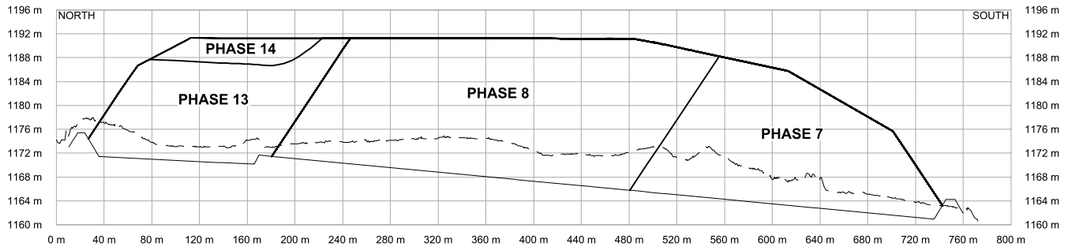
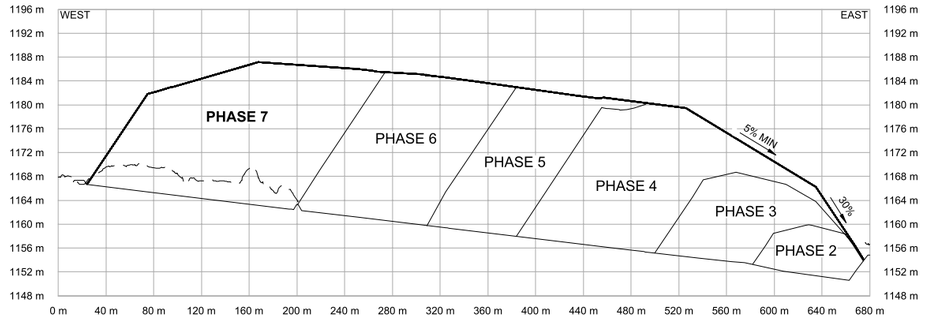
IF NOT 50 mm ADJUST SCALES



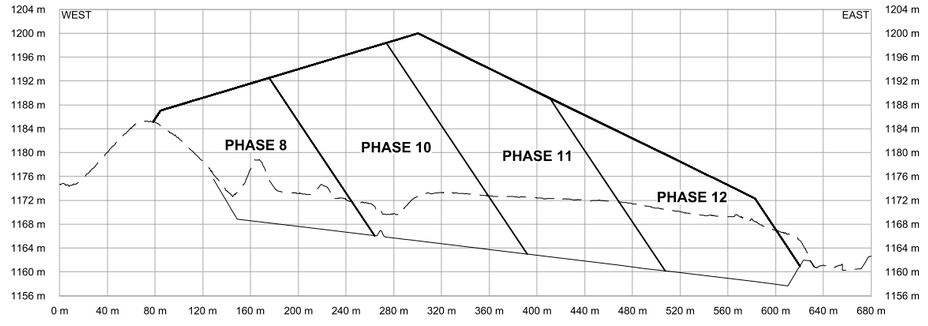
A C-102 SECTION H 1:5000 V 1:1000



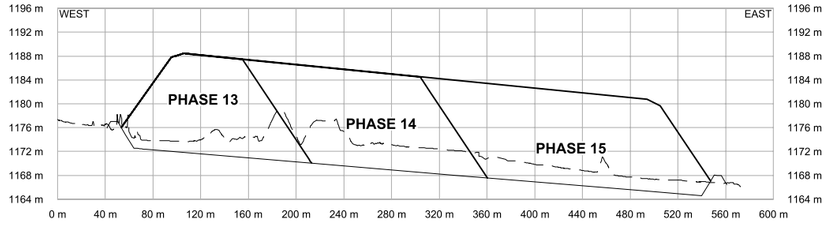
B C-102 SECTION H 1:5000 V 1:1000



1 C-102 SECTION H 1:5000 V 1:1000



2 C-102 SECTION H 1:5000 V 1:1000



3 C-102 SECTION H 1:5000 V 1:1000

FOR INFORMATION ONLY

LEGEND

PHASE 15 — PROPOSED WASTE FILL PHASE

PHASE 4 — EXISTING WASTE FILL PHASE

ORIGINAL GROUND

NOTES:

1. BOLD LINES AND TEXT REFER TO NEW CONSTRUCTION.

PROFESSIONAL LICENSEE (ENGINEERING) ALBERTA BOB JARDINE
2022-05-09

PERMIT TO PRACTICE
ASSOCIATED ENGINEERING ALBERTA LTD.
RM Signature
Dianne Strayer, P.Eng ID 50010 9 May 2022
PERMIT NUMBER: P 03979
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

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A	2022MAR28	B. JARDINE	T. JOHNSTON	ISSUED FOR DRAFT

FOOTHILLS REGIONAL LRRC
DEVELOPMENT PLAN
CLASS II LANDFILL
20223650-03

SCALE: AS SHOWN

CIVIL
WASTE FILL PHASE SECTIONS

DRAWING	REVISION
3650-03-C-301	B

SAVE DATE: 2022-05-06 5:47:54 PM SAVED BY: JOHNSTONT
DWG PATH: q:\2021-3650-03\civil\model\3650-03-c-301.dwg

Existing Conditions

Stage 1: Cell 6 at 90% Full

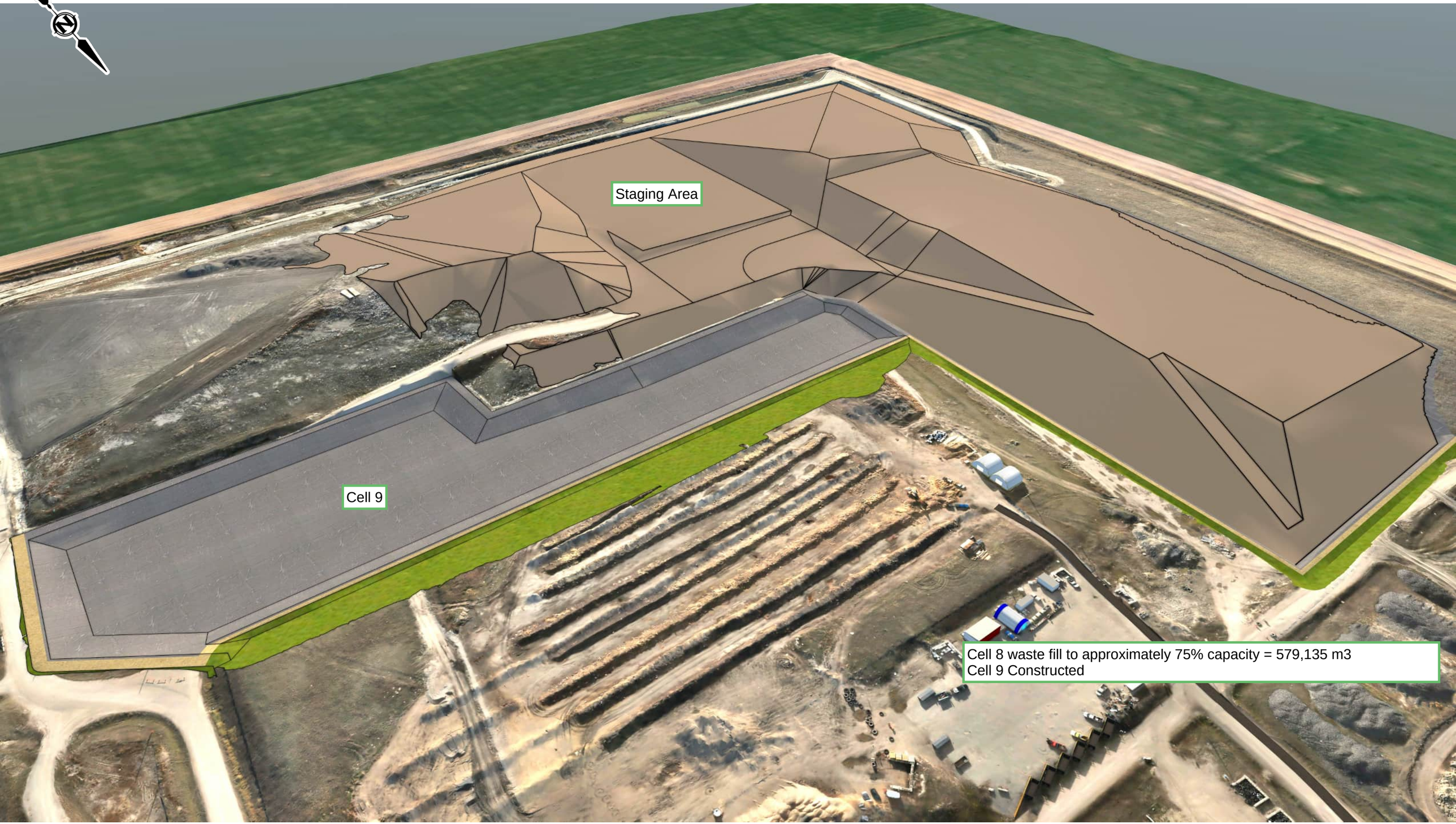
Stage 1: Cell 6 at 90% Full, Cell 7 at 0% Full

Stage 2: Cell 6 at 90% Full, Cell 7 at 25% Full

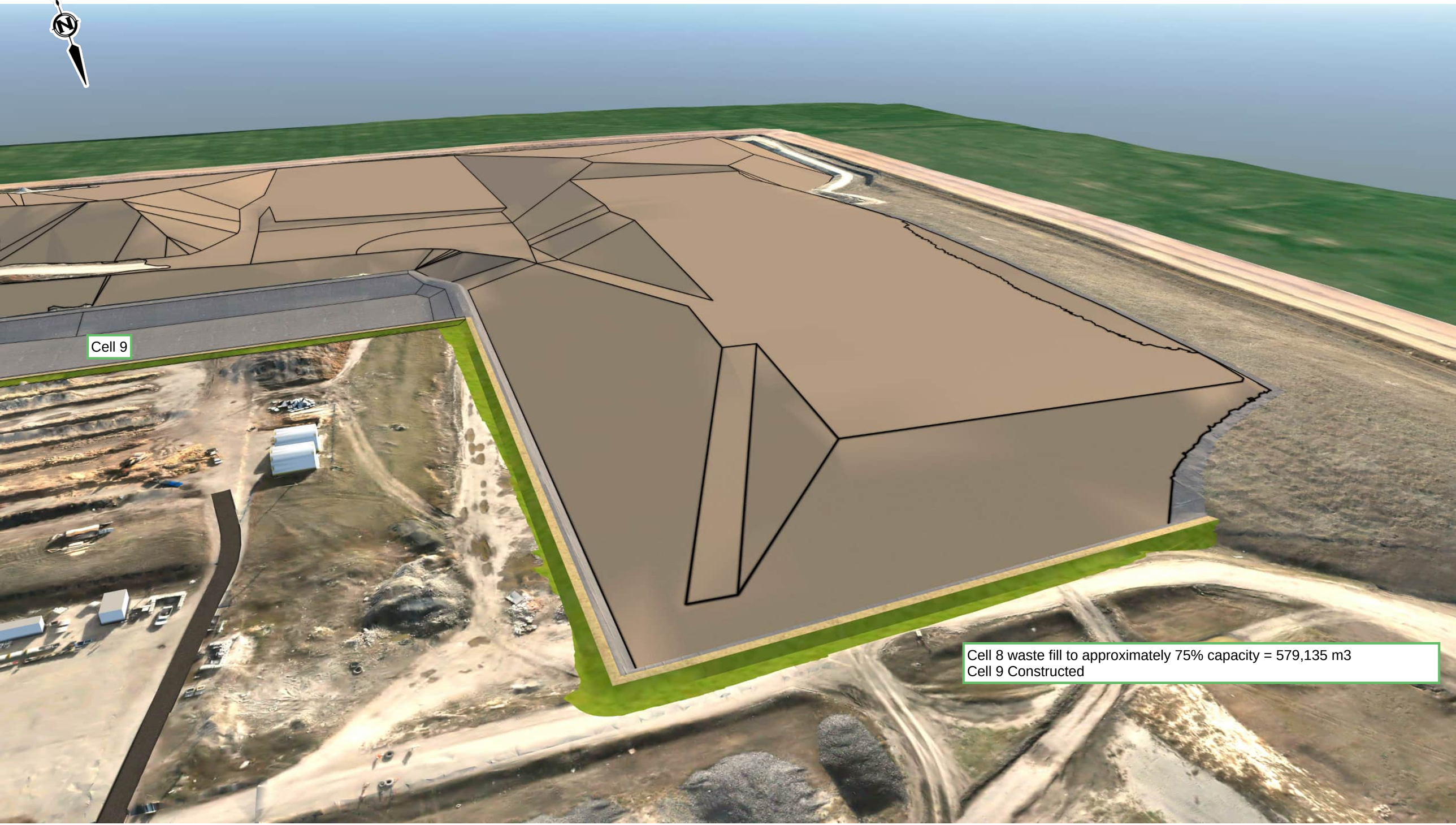
Stage 3: Cell 7 at 75% Full, Cell 8 at 0% Full

Stage 4: Cell 7 at 100% Full, Cell 8 at 25% Full

Stage 5: Cell 8 at 75% Full, Cell 9 at 0% Full



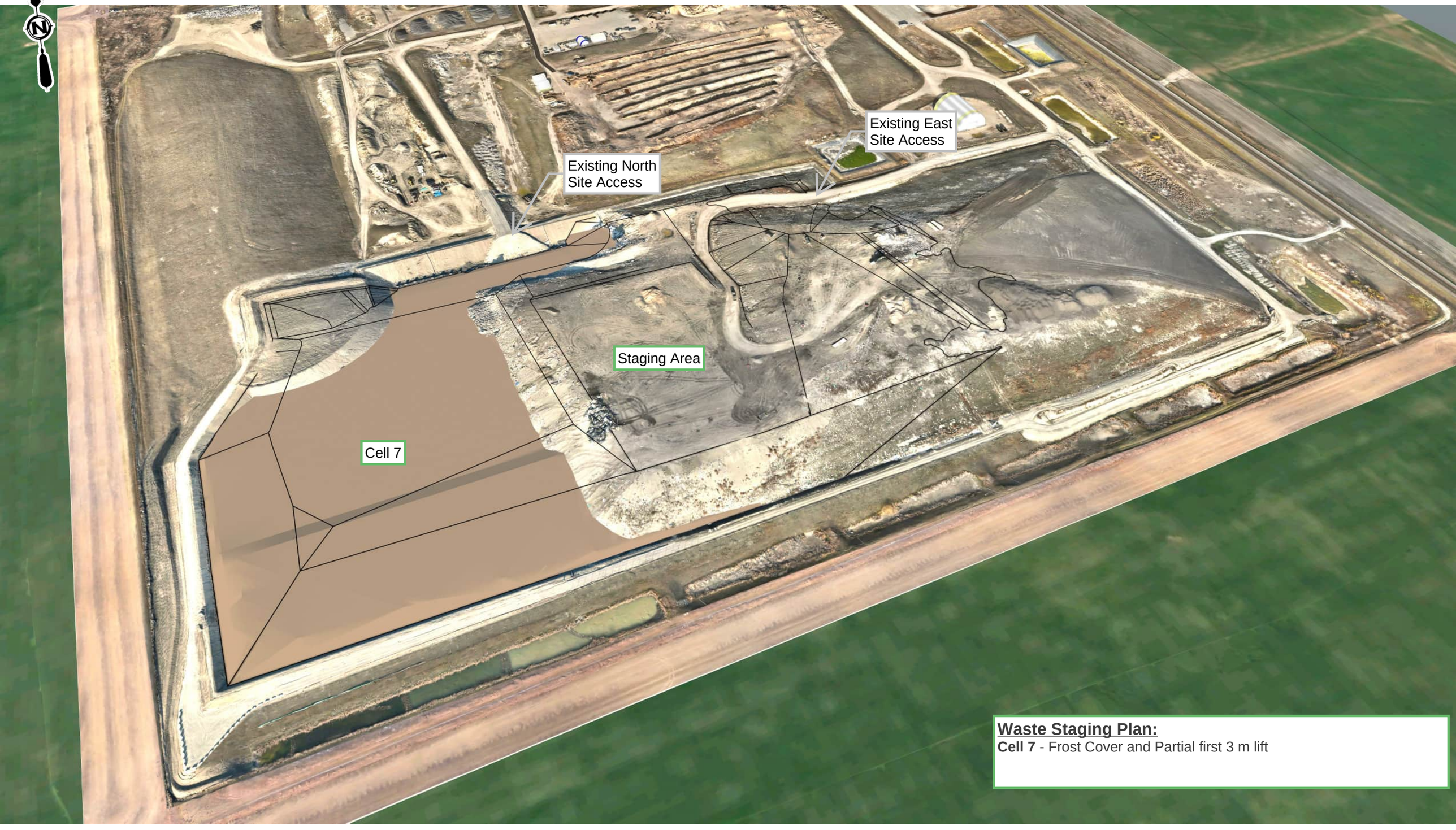
Stage 5: Cell 8 High Access



ATTACHMENT – WASP InfraWorks Sketches

Existing Conditions - November 2023

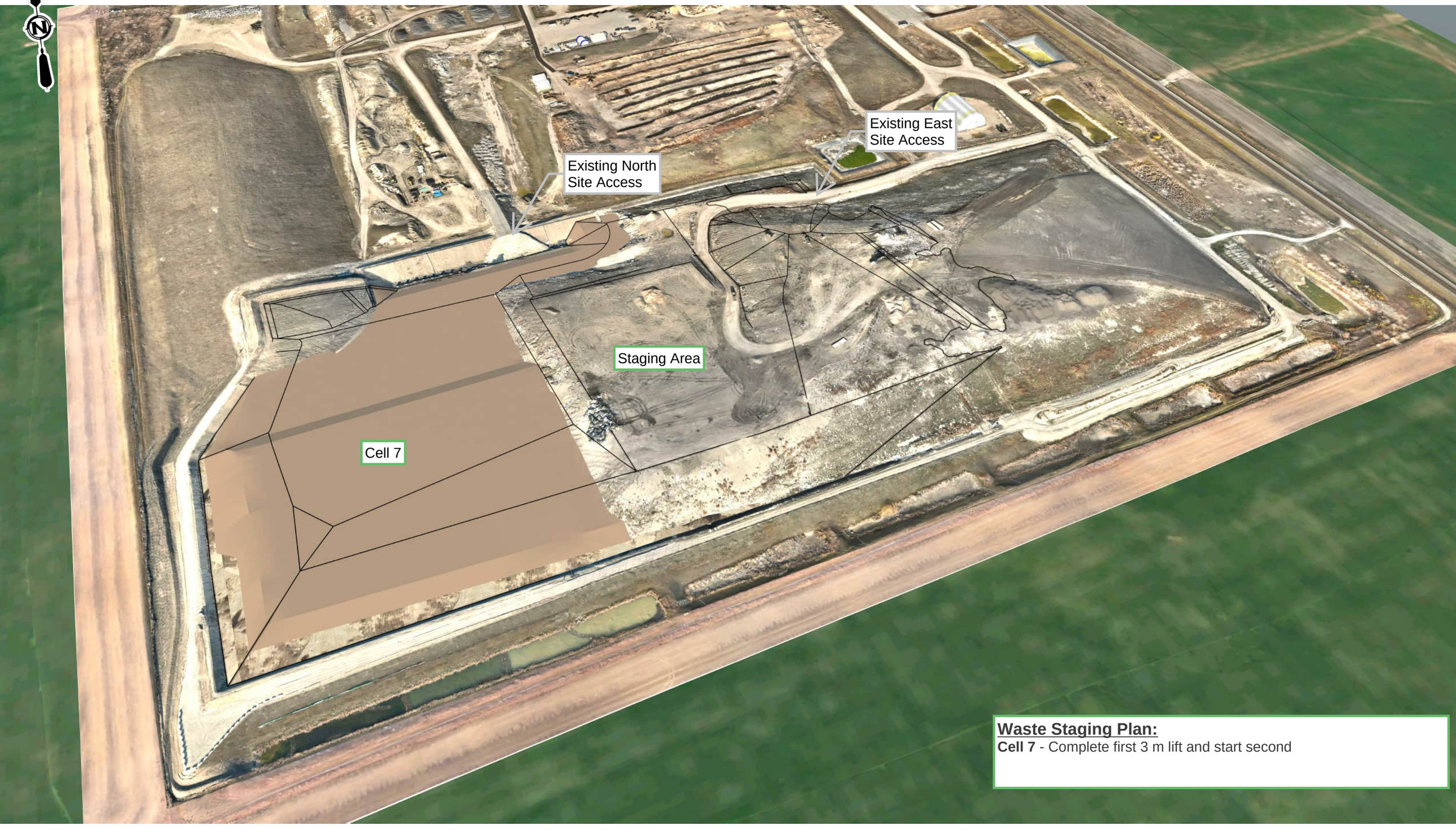
Planning Interval: Year 1 (2024)



Waste Staging Plan:

Cell 7 - Frost Cover and Partial first 3 m lift

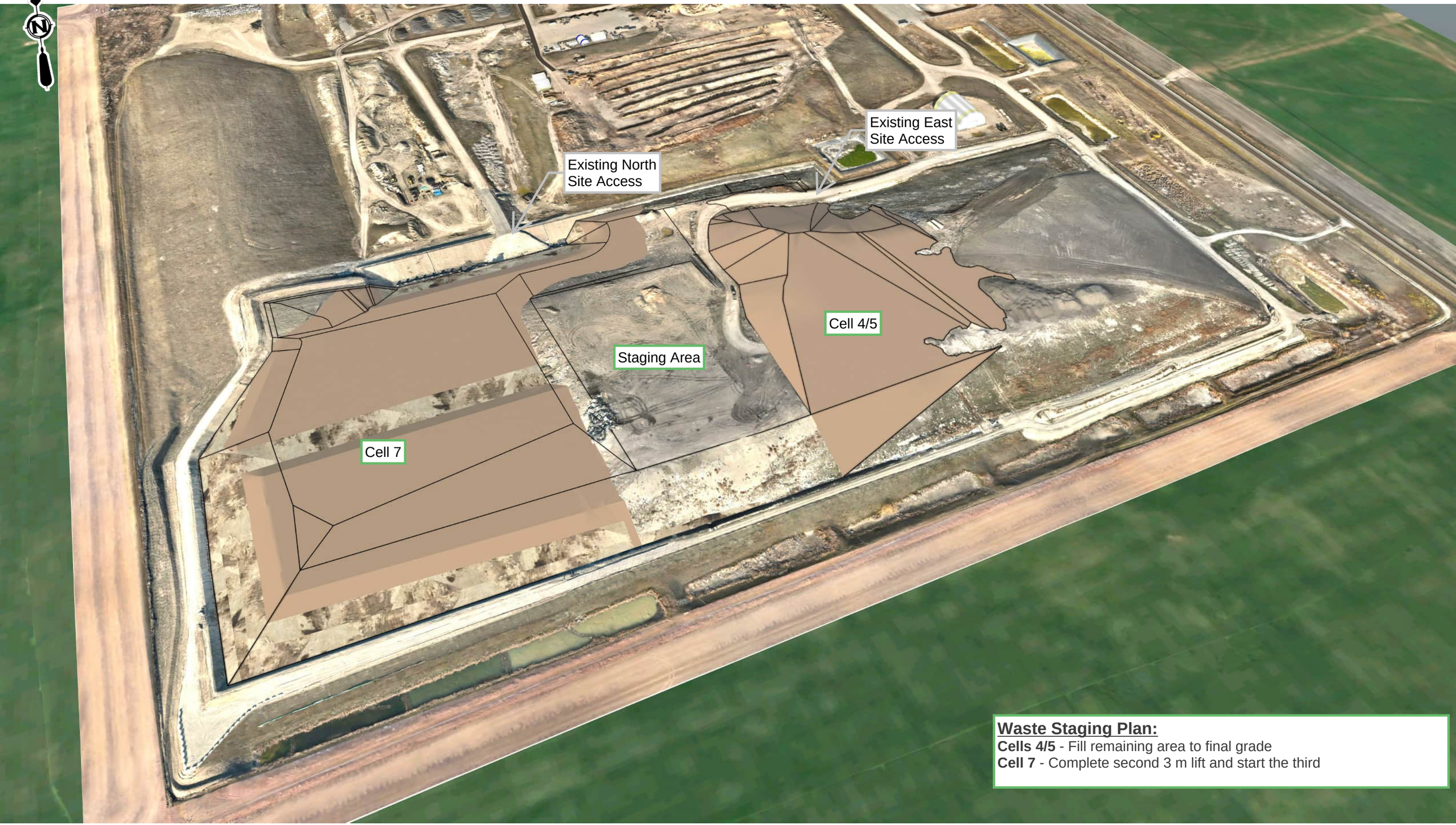
Planning Interval: Year 3 (2026)



Waste Staging Plan:

Cell 7 - Complete first 3 m lift and start second

Planning Interval: Year 5 (2028)

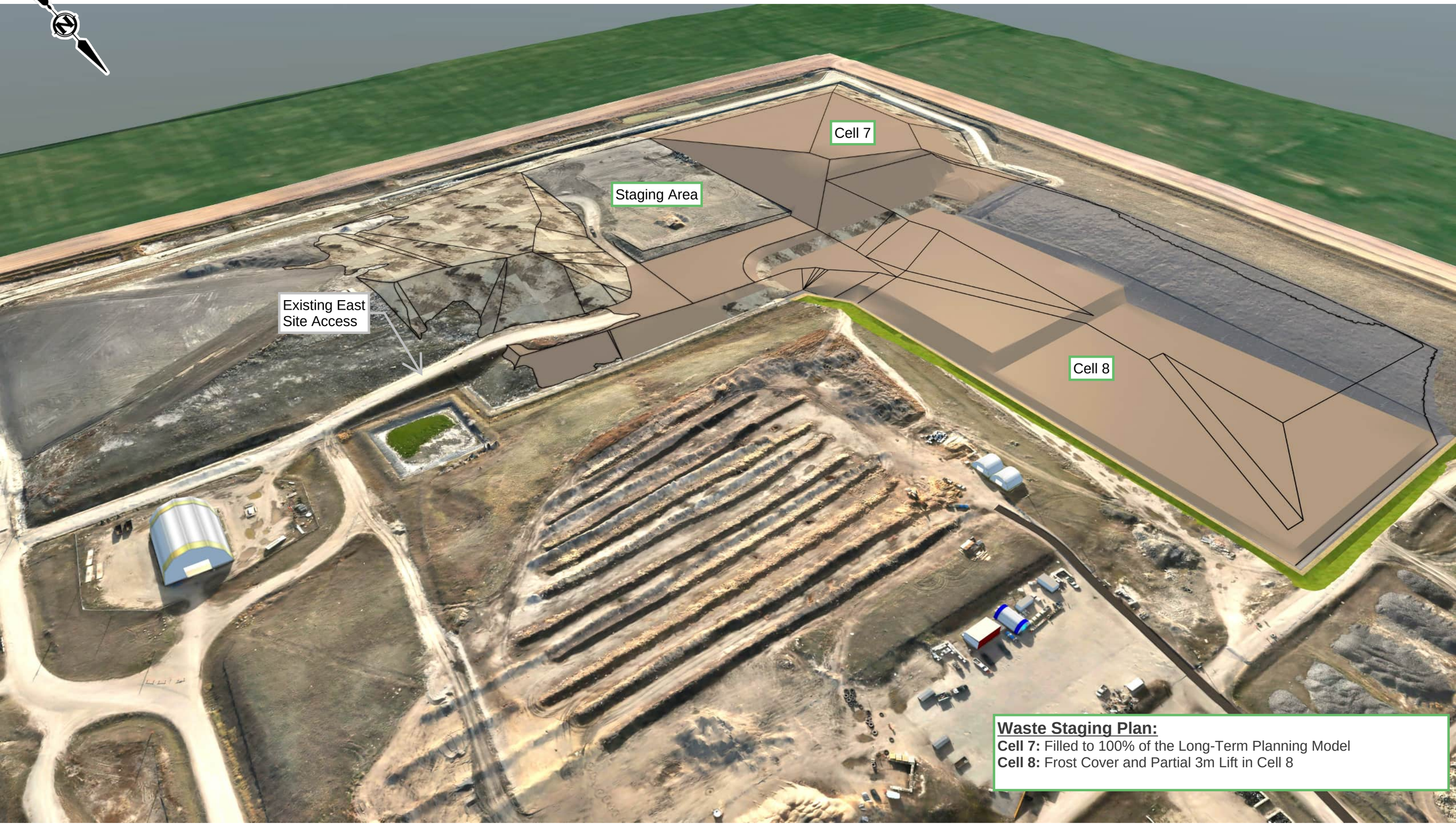


Waste Staging Plan:

Cells 4/5 - Fill remaining area to final grade

Cell 7 - Complete second 3 m lift and start the third

Planning Interval: Year 10 (2033)

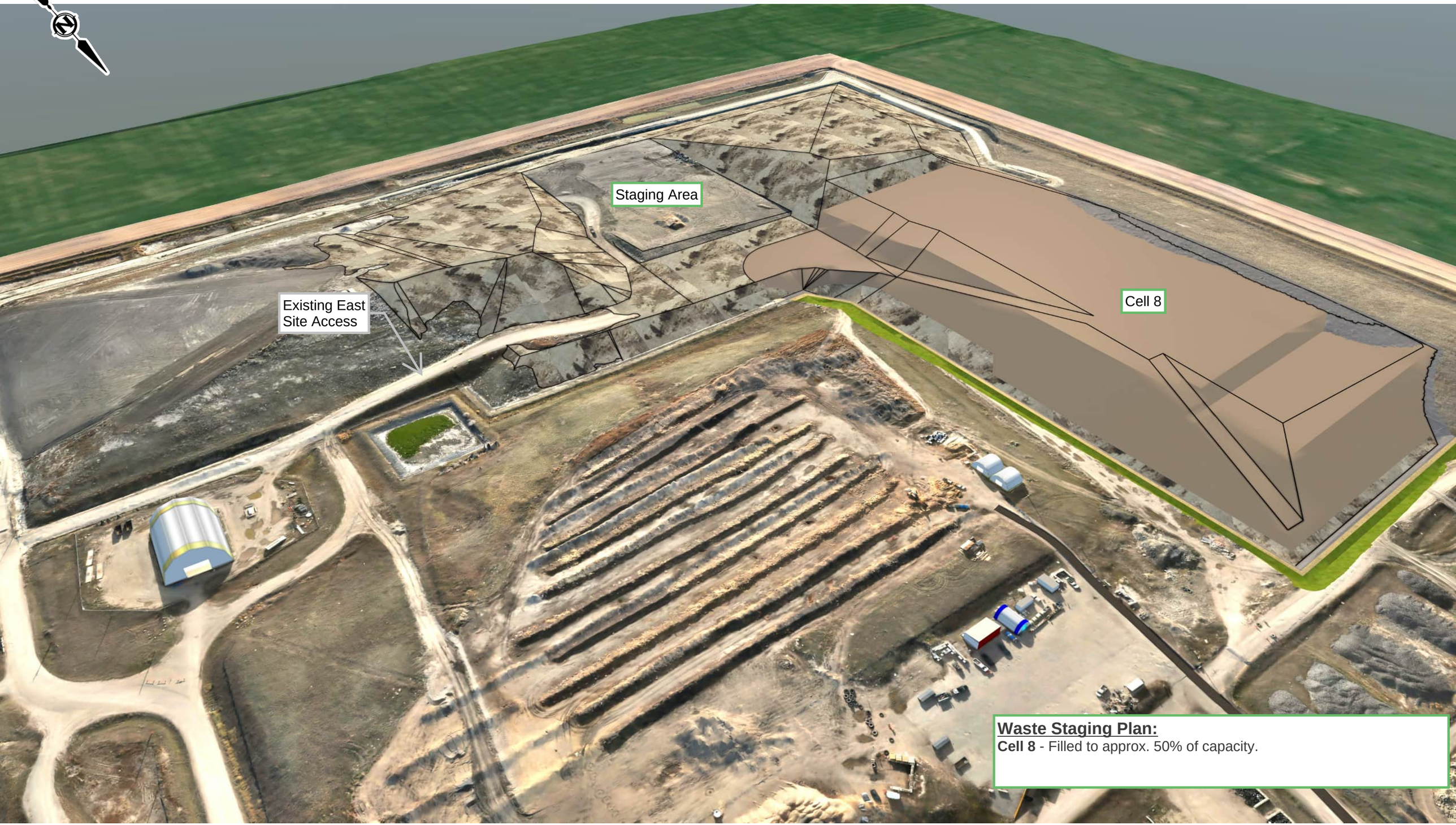


Waste Staging Plan:

Cell 7: Filled to 100% of the Long-Term Planning Model

Cell 8: Frost Cover and Partial 3m Lift in Cell 8

Planning Interval: Year 15 (2038)

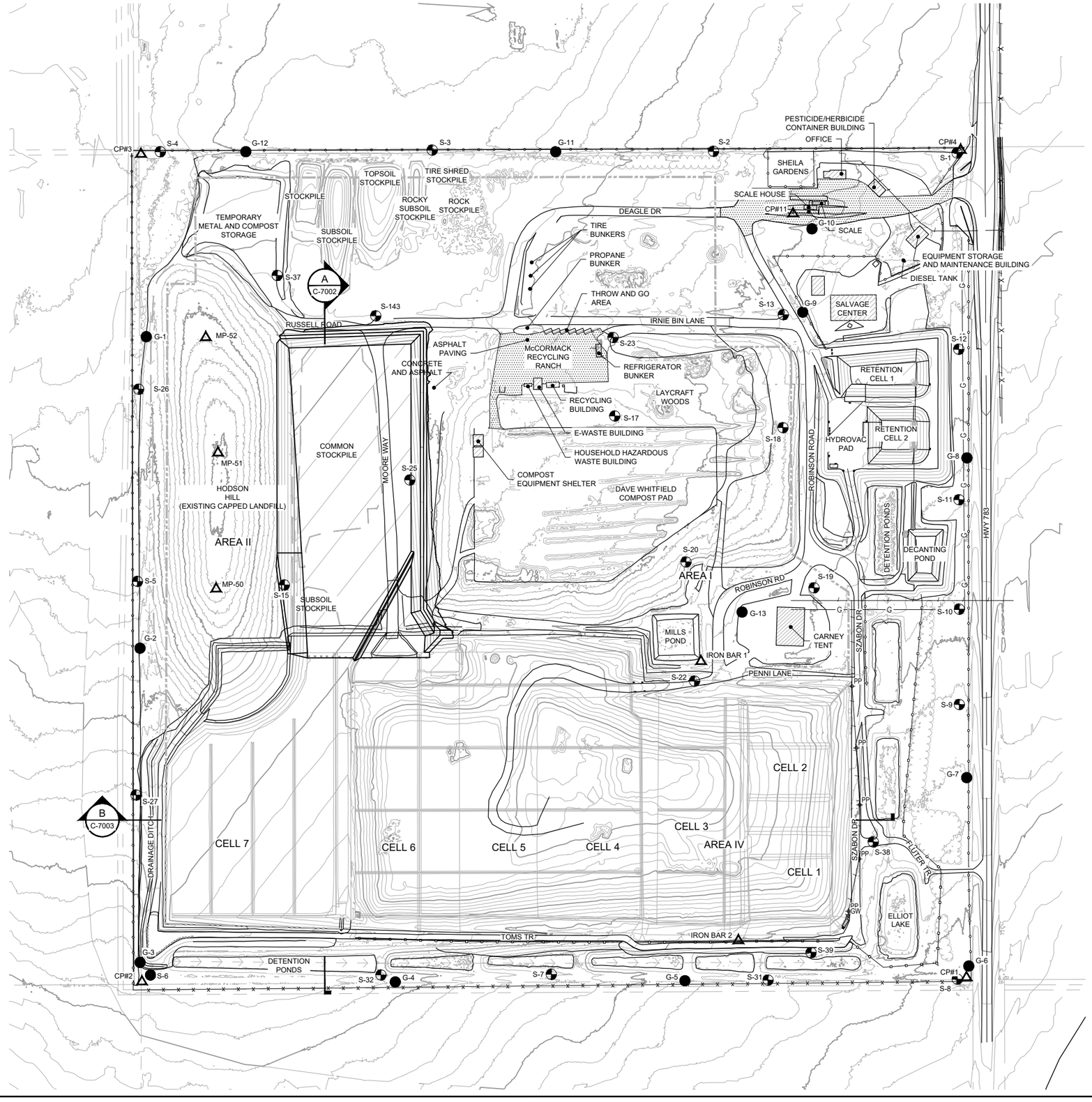


Waste Staging Plan:

Cell 8 - Filled to approx. 50% of capacity.

ATTACHMENT – Cross-Sections/Profile Views

IF NOT 50mm ADJUST SCALES



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NLR/AE CONSULTANTS

LEGEND

- 1160 m — TOPOGRAPHIC MAJOR CONTOUR CONTOUR INTERVAL = 5.0m
- TOPOGRAPHIC MINOR CONTOUR
- OVERHEAD POWER
- G — GAS
- TREES
- DRAINAGE FLOW DIRECTION
- FENCE
- CULVERT
- ASPHALT
- BUILDINGS
- S-12 — MONITORING WELL
- G-12 — MONITORING WELL - GAS
- IRON BAR 1 — CONTROL POINT
- APPROVED LANDFILL FOOTPRINT

NOTES:

1. COORDINATES SHOWN ARE NAD83 3TM 114 GRID.
2. CONTOUR SHOWN INCLUDE SURVEY COMPLETED ON 2023NOV23.

REV	DATE	DESIGN	DRAWN	DESCRIPTION
A	2024APR19	S. REIMER	NA. RICHARDS	ISSUED FOR INFORMATION

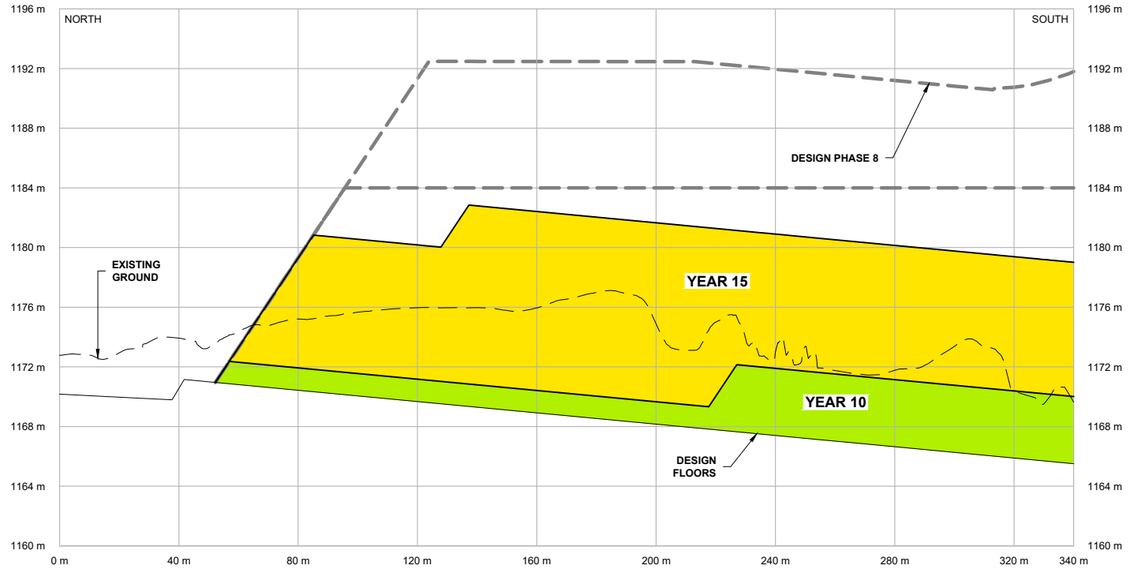
FOOTHILLS REGIONAL LRRC
WASTE ACCESS STAGING PLAN
CLASS II LANDFILL
2024-3650-01

SCALE: 1:4000

FIGURE
OVERALL SITE PLAN

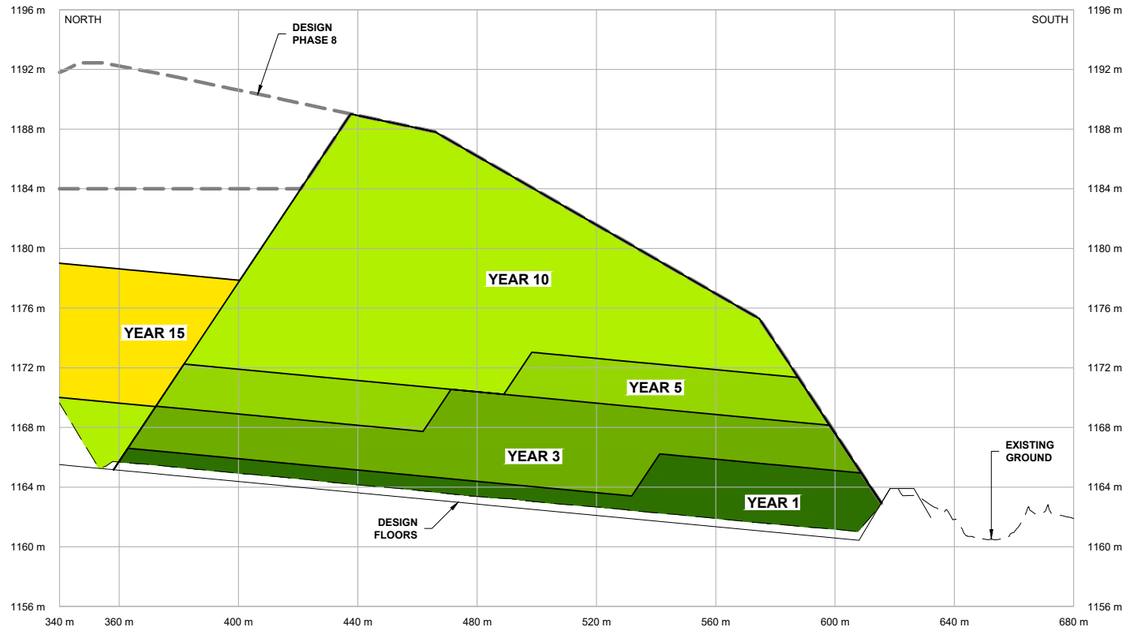
DRAWING	REVISION
3650-01-C-7001	A

IF NOT 50mm ADJUST SCALES



A C-7001 **SECTION** H 1:2000 V 1:400

0 m - 340 m



A C-7001 **SECTION** H 1:2000 V 1:400

340 m - 680 m

LEGEND

- YEAR 1 — PROPOSED WASTE FILL PHASE
- DESIGN FLOORS
- EXISTING GROUND

NOTES:

1. COORDINATES SHOWN ARE NAD83 3TM 114 GRID.
2. CONTOUR SHOWN INCLUDE SURVEY COMPLETED ON 2023NOV23.

REV	DATE	DESIGN	DRAWN	DESCRIPTION
A	2024APR19	S. REIMER	NA. RICHARDS	ISSUED FOR INFORMATION

FOOTHILLS REGIONAL LRRC
WASTE ACCESS STAGING PLAN
CLASS II LANDFILL
2024-3650-01

SCALE: AS SHOWN

FIGURE
CROSS SECTIONS
SHEET 1 OF 2

DRAWING	REVISION
3650-01-C-7002	A

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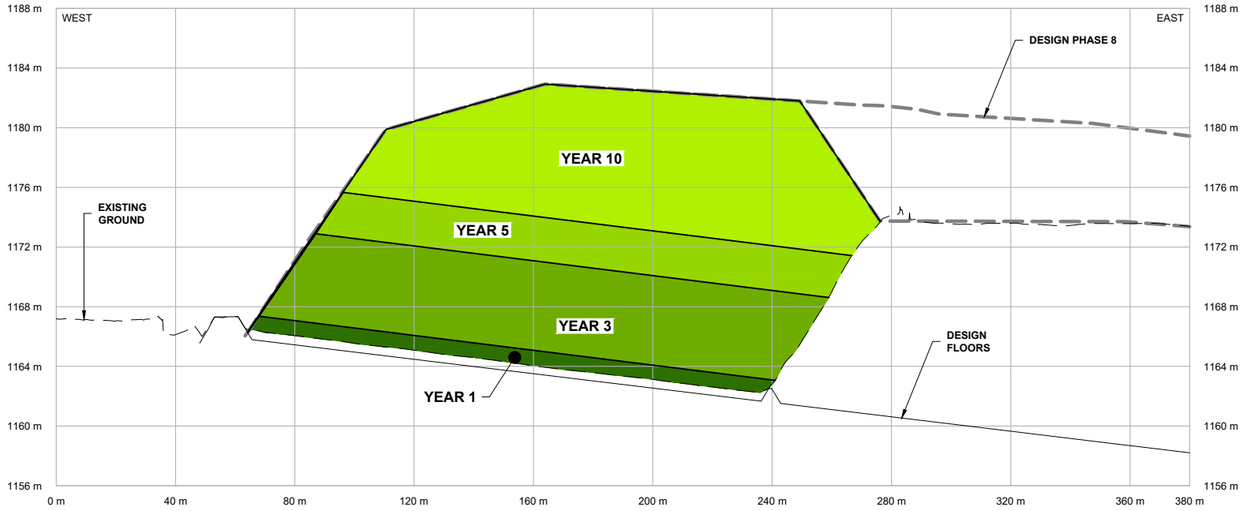
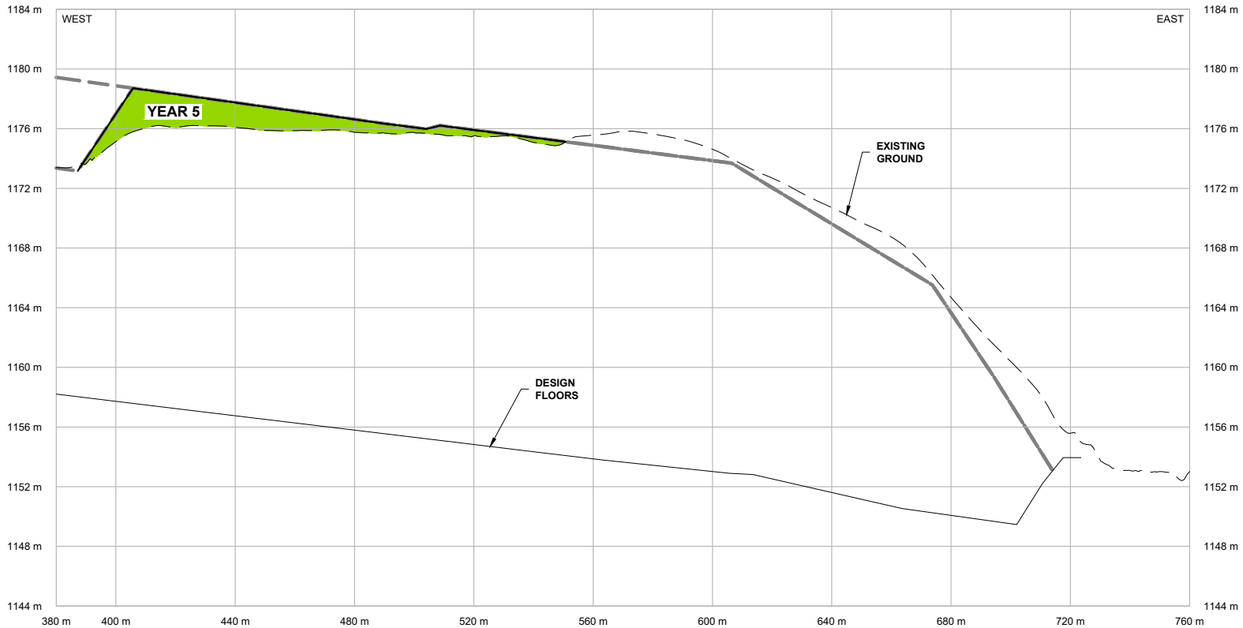
IF NOT 50mm ADJUST SCALES



B / C-7001 SECTION H 1:2000 V 1:400
0 m - 380 m



B / C-7001 SECTION H 1:2000 V 1:400
380 m - 380 m

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NLR/IAE CONSULTANTS

LEGEND

YEAR 1 — PROPOSED WASTE FILL PHASE

DESIGN FLOORS

EXISTING GROUND

NOTES:

1. COORDINATES SHOWN ARE NAD83 3TM 114 GRID.
2. CONTOUR SHOWN INCLUDE SURVEY COMPLETED ON 2023NOV23.

REV	DATE	DESIGN	DRAWN	DESCRIPTION
A	2024APR19	S. REIMER	NA. RICHARDS	ISSUED FOR INFORMATION

FOOTHILLS REGIONAL LRRC
LANDFILL & RESOURCE RECOVERY CENTRE

FOOTHILLS REGIONAL LRRC
WASTE ACCESS STAGING PLAN
CLASS II LANDFILL
2024-3650-01

SCALE: AS SHOWN

FIGURE
CROSS SECTIONS
SHEET 2 OF 2

DRAWING	REVISION
3650-01-C-7003	A