Appendix F

Noise Technical Memo ***and Addendum***

King County

QSI DOCUMENT: QSI 2020-02
KING CO. CONTRACT: E00364E15

CEDAR HILLS REGIONAL LANDFILL
2020 SITE DEVELOPMENT PLAN
ENVIRONMENTAL IMPACT STATEMENT

NOISE TECHNICAL REPORT

Prepared for:

King County Solid Waste Division
201 South Jackson Street
Seattle, WA 98104

Submitted by:

Herrera Environmental Consultants, Inc.
2200 6th Ave, Suite #1100
Seattle, WA 98121

August 24, 2020

415 SE 177th Ave., #345 / Vancouver, WA 98683
Phone (425) 337-9472
Fax (425) 337-9578

DOCUMENT: Cedar Hills Regional Landfill
2020 Site Development Plan
Environmental Impact Statement

Noise Technical Report

QSI Document: QSI 2020-02

Original Issue Date: August 24, 2020

QSI DOCUMENT: QSI 2020-02

CEDAR HILLS REGIONAL LANDFILL
2020 SITE DEVELOPMENT PLAN
ENVIRONMENTAL IMPACT STATEMENT

NOISE TECHNICAL REPORT

Prepared for:

King County Solid Waste Division
201 S. Jackson Street, Suite 701
Seattle, WA 98104

Prepared for:

Herrera Environmental Consultants, Inc.
2200 6th Ave, Suite #1100
Seattle, WA 98121

Prepared by:

Quietly Superior, Inc.
415 SE 177th Ave #345
Vancouver, WA 98683

Greg Price

John Alberti

Issue Date: August 24, 2020

LOG OF REVISIONS

Rev	Date	Affected Pages / Changes	Initial
IR.	August 24, 2020		JRA

TABLE OF CONTENTS

SECTION	TITLE	PAGE
1.0	INTRODUCTION	1.1
2.0	DEFINITIONS AND ACRONYMS	2.1
3.0	NOISE CONCEPTS	3.1
4.0	REGULATORY BASIS	4.1
4.1	King County Noise Code	4.1
4.2	Renton Noise Code	4.2
4.3	State Environmental Protection Act (SEPA) Standards	4.3
5.0	ALTERNATIVES DESCRIPTIONS	5.1
5.1	No Action Alternative	5.1
5.2	Alternative 1	5.3
5.3	Alternative 2	5.5
5.4	Alternative 3	5.7
5.5	Option 1 – South Facilities Location	5.1
5.6	Option 2 – North Facilities Location	5.3
5.7	Option 3 – Renton Facilities Location	5.4
6.0	SITE DESCRIPTIONS	6.1
6.1	CHRLF	6.1
6.1.1	General	6.1
6.1.2	Landfill Operations	6.4
6.1.3	Noise Environment	6.7
6.2	Renton	6.8
7.0	EXISTING CONDITIONS: COMMUNITY NOISE LEVELS NEAR CHRLF	7.1
7.1	Instrumentation	7.1
7.2	Measurement Results	7.1
7.3	Noise Time Histories from NFS Study	7.14
8.0	CHRLF EQUIPMENT SOUND LEVELS	8.1
9.0	CHRLF CONDITIONS	9.1
9.1	Daytime Noise Conditions	9.1
9.2	Nighttime Operations	9.2
9.3	Trip and Model Data	9.3
10.0	PROJECTED CHRLF NOISE LEVELS	10.1
10.1	Description of Evaluated Topographic Conditions	10.1
10.2	Noise Model	10.10
10.3	Noise Propagation Conditions	10.12
11.0	NO ACTION ALTERNATIVE NOISE CONTOURS	11.1
11.1.1	No Action Alternative Early Morning Noise Levels	11.2
11.1.2	No Action Alternative Daytime Noise Levels	11.5
12.0	UNMITIGATED ALTERNATIVE NOISE LEVELS	12.1
12.1	South /Option 1 Facilities 6 a.m.	12.2
12.2	South/Option 1 Facilities 10 a.m.	12.5
12.3	North /Option 2 Facilities 6 a.m.	12.8

12.4 North / Option 2 Facilities 10 a.m. 12.11
12.5 Option 3 Facilities 6 a.m. 12.14
12.6 Option 3 Facilities 10 a.m. 12.17

13.0 PROPOSED CHRLF MITIGATION 13.1
13.1 Mitigation Common to All Options 13.1
13.2 South Facilities / Option 1 Mitigation 13.3
13.3 North Facilities / Option 2 Mitigation 13.3
13.4 Area 9 Mitigation 13.6
13.5 Other Mitigation Comments 13.10
13.5.1 Screen Operation 13.10
13.5.2 Backup Alarms 13.10
13.5.3 Tailgate Noise 13.11

14.0 CHRLF MITIGATED NOISE LEVELS 14.1
14.1 Alternative 3 Option 1 /South Facilities Mitigated Noise Levels 6 a.m. 14.1
14.2 Alternative 3 Option 1 / South Facilities Mitigated Noise Levels 10 a.m. 14.8
14.3 Alternative 3 Option 2 / North Facilities Mitigated Noise Levels 6 a.m. 14.14
14.4 Alternative 3 Option 2 / North Facilities Mitigated Noise Levels 10 a.m. 14.20
14.5 Alternative 3 Option 3 / Renton Facilities Mitigated Noise Levels 6 a.m. 14.26
14.6 Alternative 3 Option 3 / Renton Facilities Mitigated Noise Levels 10 a.m. 14.32

15.0 CHRLF SEPA NOISE COMPARISON 15.1
15.1 SEPA Analysis 6 a.m. 15.2
15.2 SEPA Analysis 10 a.m. 15.5

16.0 CHRLF CONSTRUCTION NOISE 16.1

17.0 EXISTING CONDITIONS: RENTON 17.1
17.1 Long Term Monitoring 17.1
17.2 Renton Ambient Noise Model 17.5

18.0 RENTON EQUIPMENT SOUND POWER LEVELS 18.10

19.0 RENTON NO ACTION ALTERNATIVE NOISE LEVELS 19.1

20.0 RENTON UNMITIGATED ALTERNATIVE NOISE LEVELS 20.1

21.0 RENTON MITIGATION DESCRIPTION 21.1

22.0 RENTON MITIGATED NOISE LEVELS 22.1

23.0 RENTON SEPA NOISE COMPARISON 23.1

24.0 CONCLUSIONS 24.1

LIST OF FIGURES

FIGURE TITLE PAGE

FIGURE 3.1: A-WEIGHTING SCALE 3.2
FIGURE 3.2: TYPICAL SOUND LEVELS 3.3
FIGURE 5.1: NO ACTION ALTERNATIVE TOPOGRAPHY 5.2
FIGURE 5.2: ALTERNATIVE 1 TOPOGRAPY 5.4
FIGURE 5.3: ALTERNATIVE 2 TOPOGRAPHY 5.6
FIGURE 5.4: ALTERNATIVE 3 TOPOGRAPHY 5.8
FIGURE 5.5: CHRLF FACILITIES OPTIONS 1 AND 2OVERVIEW MAP 5.1
FIGURE 5.6: CHRLF OPTION 1 - SOUTH FACILITIES DETAIL 5.2
FIGURE 5.7: OPTION 2 - NORTH FACILITIES DETAIL 5.3
FIGURE 5.8: OPTION 3 - RENTON SITE PLAN 5.4
FIGURE 5.9: FACILITIES ELEVATIONS – RENTON 5.5
FIGURE 5.10: FACILITIES FLOORPLAN – RENTON 5.6
FIGURE 6.1: ZONING NEAR CHRLF 6.2
FIGURE 6.2: CHRLF SITE MAP 6.3
FIGURE 6.3: RECENT LANDFILL AERIAL PHOTO 6.4
FIGURE 6.4: CHRLF AREA MAP 6.6
FIGURE 6.5: NORTH FLARE STATION LAYOUT 6.8
FIGURE 6.6: RENTON TRANSFER STATION AERIAL IMAGE 6.9
FIGURE 6.7: ZONING NEAR RENTON TRANSFER STATION 6.10
FIGURE 7.1: LONG TERM NOISE MONITORING POSITIONS 7.3
FIGURE 7.2:NM1 (OUTSIDE PUMP #3), AUG. 8-10 .... 7.4
FIGURE 7.3: NM2 (NEAR GP#18), AUG 8-10 .... 7.5
FIGURE 7.4: NM3 (WEST PROPERTY LINE UNDER POWER LINES), AUG 10-12 .... 7.6
FIGURE 7.5: NM3 (WEST PROPERTY LINE UNDER POWER LINES), AUG 13-15 .... 7.6
FIGURE 7.6: NM4 (BETWEEN GP#32 & #33), AUG 15-18 .... 7.7
FIGURE 7.7:NM5 (NEAR GP#35), AUG 13-15 .... 7.8
FIGURE 7.8: NM5 (NEAR GP#35), AUG 15-18 .... 7.8
FIGURE 7.9: NM6 (23323 SE 169$^{TH)}$, SEPT 30-OCT 2 .... 7.9
FIGURE 7.10: NM7 (23327 SE 156TH) SEPT 30-OCT 2 .... 7.9
FIGURE 7.11:NM8 (16214 230TH AVE SE), OCTOBER 3-5. .... 7.10
FIGURE 7.12: NM9 (22917 SE 159TH ST), OCT 3-5 .... 7.11
FIGURE 7.13: NM10 (20725 SE 162ND WAY), OCT 5-7 .... 7.12

FIGURE 7.14: NM11 (15809 209TH AVE SE), OCT 5-7 ..... 7.13
FIGURE 7.15: NM12 NOVEMBER 20 – 23, 2013 ..... 7.14
FIGURE 7.16: NM12 DECEMBER 14-16, 2013 ..... 7.14
FIGURE 7.17: NM12 DECEMBER 16 – 18, 2013 ..... 7.15
FIGURE 7.18: NM13 NOVEMBER 20-23, 2013 ..... 7.16
FIGURE 7.19: NM14 DECEMBER 13-15, 2013 ..... 7.16
FIGURE 7.20: NM14 DECEMBER 16-18, 2013 ..... 7.17
FIGURE 7.21: NM15 OCTOBER 21-23, 2013 ..... 7.18
FIGURE 7.22: NM16 OCTOBER 18-20, 2013 ..... 7.19
FIGURE 7.23: NM17 OCTOBER 21-23, 2013 ..... 7.19
FIGURE 7.24: NM18 OCTOBER 18-20, 2013 ..... 7.20
FIGURE 8.1: BEW NOISE MONITORING POSITIONS 8.4
FIGURE 10.1: NO ACTION ALTERNATIVE (FINAL CONTOURS) 10.2
FIGURE 10.2: NO ACTION ALTERNATIVE (AS EVALUATED FOR NOISE) 10.3
FIGURE 10.3: ALTERNATIVE 2 COMPLETED (FINAL CONTOURS) 10.4
FIGURE 10.4: ALTERNATIVE 2 (AS EVALUATED) 10.5
FIGURE 10.5: ALTERNATIVE 3 (FINAL CONTOURS) 10.6
FIGURE 10.6: ALTERNATIVE 3 (AS EVALUATED) 10.7
FIGURE 10.7: NOISE AREAS 10.8
FIGURE 10.8: NOISE SOURCE POSITIONS 10.9
FIGURE 10.9: SOUTHERN TRUCK ROUTE OPTIONS 10.11
FIGURE 11.1: NO ACTION ALTERNATIVE 39 DBA CONTOUR – AREA 6 LANDFILLING 11.2
FIGURE 11.2: NO ACTION ALTERNATIVE 39 DBA CONTOUR –AREA 5N LANDFILLING 11.2
FIGURE 11.3: NO ACTION ALTERNATIVE 49 DBA CONTOUR –AREA 8 LANDFILLING 11.3
FIGURE 11.4: NO ACTION ALTERNATIVE 39 DBA CONTOUR –AREA 5 LANDFILLING 11.3
FIGURE 11.5: NO ACTION ALTERNATIVE 39 DBA CONTOUR – AREA 6N LANDFILLING 11.4
FIGURE 11.6: NO ACTION ALTERNATIVE 54 DBA NIGHTTIME L_{MAX} CONTOUR – AREA 6 LANDFILLING 11.4
FIGURE 11.7: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR – AREA 6 LANDFILLING 11.5
FIGURE 11.8: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR AREA 5N LANDFILLING 11.5
FIGURE 11.9: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR - AREA 5 LANDFILLING 11.6
FIGURE 11.10: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR - AREA 8 LANDFILLING 11.6
FIGURE 11.11: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR - AREA AREA 6N LANDFILLING 11.7
FIGURE 11.12: NO ACTION ALTERNATIVE DAYTIME 64 DBA LMAX CONTOUR – AREA 8 LANDFILLING 11.7
FIGURE 12.1: ALTERNATIVE 2 39 DBA NOISE CONTOUR - AREA 9 LANDFILLING 12.2
FIGURE 12.2: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 9 LANDFILLING 12.2
FIGURE 12.3: ALTERNATIVE 2 39 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.3

FIGURE 12.4: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.3
FIGURE 12.5: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA NW-3 LANDFILLING..... 12.4
FIGURE 12.6: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 9-LOW LANDFILLING..... 12.4
FIGURE 12.7: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING..... 12.5
FIGURE 12.8: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING..... 12.5
FIGURE 12.9: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.6
FIGURE 12.10: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.6
FIGURE 12.11: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA NW-3 LANDFILLING..... 12.7
FIGURE 12.12: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9-LOW LANDFILLING..... 12.7
FIGURE 12.13: ALTERNATIVE 2 39 DB NOISE CONTOUR - AREA 9 LANDFILLING..... 12.8
FIGURE 12.14: ALTERNATIVE 3 39 DB NOISE CONTOUR - AREA 9 LANDFILLING..... 12.8
FIGURE 12.15: ALTERNATIVE 2 39 DB NOISE CONTOUR - AREA 5N LANDFILLING..... 12.9
FIGURE 12.16: ALTERNATIVE 3 39 DB NOISE CONTOUR - AREA 5N LANDFILLING..... 12.9
FIGURE 12.17: ALTERNATIVE 3 39 DB NOISE CONTOUR - AREA NW-3 LANDFILLING..... 12.10
FIGURE 12.18: ALTERNATIVE 3 39 DB NOISE CONTOUR - AREA 9-LOW LANDFILLING 12.10
FIGURE 12.19: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING..... 12.11
FIGURE 12.20: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING..... 12.11
FIGURE 12.21: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.12
FIGURE 12.22: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.12
FIGURE 12.23: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA NW-3 ..... 12.13
FIGURE 12.24: ALTERNATIVE 2 39 DBA NOISE CONTOUR - AREA 9 LANDFILLING..... 12.14
FIGURE 12.25: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 9 LANDFILLING..... 12.14
FIGURE 12.26: ALTERNATIVE 2 39 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.15
FIGURE 12.27: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.15
FIGURE 12.28: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA NW-3 LANDFILLING..... 12.16
FIGURE 12.29: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 9-LOW LANDFILLING..... 12.16
FIGURE 12.30: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING..... 12.17
FIGURE 12.31: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING..... 12.17
FIGURE 12.32: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.18
FIGURE 12.33: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING 12.18
FIGURE 12.34: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA NW-3 LANDFILLING..... 12.19
FIGURE 12.35: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9-LOW LANDFILLING..... 12.19
FIGURE 13.2: NORTH FACILITIES NOISE MITIGATION..... 13.5
FIGURE 13.3: AREA 9 FILL SEQUENCE 1..... 13.7
FIGURE 13.4: AREA 9 FILL SEQUENCE 2..... 13.8
FIGURE 13.5: CROSS SECTION OF AREA 9 FILLING 13.9

FIGURE 14.1: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6 LANDFILLING 14.2
FIGURE 14.2: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N LANDFILLING 14.2
FIGURE 14.3: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N LANDFILLING 14.3
FIGURE 14.4: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 9 LANDFILLING 14.3
FIGURE 14.5: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 8 ..... 14.4
FIGURE 14.6: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5 LANDFILLING 14.4
FIGURE 14.7: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. NE-3 LANDFILLING 14.5
FIGURE 14.8: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. NW-3 LANDFILLING 14.5
FIGURE 14.9: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N-3 LANDFILLING 14.6
FIGURE 14.10: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N-3 LANDFILLING 14.6
FIGURE 14.11: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 9-LOW LANDFILLING 14.7
FIGURE 14.12: ALTERNATIVE 3 SOUTH FACILITIES NW-3 LANDFILLING LMAX 14.7
FIGURE 14.13: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6 LANDFILLING 14.8
FIGURE 14.14: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N LANDFILLING 14.8
FIGURE 14.15: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N LANDFILLING 14.9
FIGURE 14.16: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9 LANDFILLING 14.9
FIGURE 14.17: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 8 ..... 14.10
FIGURE 14.18: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5 LANDFILLING 14.10
FIGURE 14.19: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. NE-3 LANDFILLING 14.11
FIGURE 14.20: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. NW-3 LANDFILLING 14.11
FIGURE 14.21: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N-3 LANDFILLING 14.12
FIGURE 14.22: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N-3 LANDFILLING 14.12
FIGURE 14.23: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9-LOW LANDFILLING 14.13
FIGURE 14.24: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9 LANDFILLING LMAX 14.13
FIGURE 14.25: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6 LANDFILLING 14.14
FIGURE 14.26: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N LANDFILLING 14.14
FIGURE 14.27: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N LANDFILLING 14.15
FIGURE 14.28: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 9 LANDFILLING 14.15
FIGURE 14.29: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 8 ..... 14.16
FIGURE 14.30: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5 LANDFILLING 14.16
FIGURE 14.31: NORTH FACILITIES ALTERNATIVE 3 6 A.M. NE-3 LANDFILLING 14.17
FIGURE 14.32: NORTH FACILITIES ALTERNATIVE 3 6 A.M. NW-3 LANDFILLING 14.17
FIGURE 14.33: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N-3 LANDFILLING 14.18
FIGURE 14.34: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N-3 LANDFILLING 14.18
FIGURE 14.35: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 9-LOW LANDFILLING 14.19
FIGURE 14.36: NORTH FACILITIES ALTERNATIVE 3 6 A.M. NW-3 LANDFILLING LMAX 14.19

FIGURE 14.37: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6 LANDFILLING 14.20
FIGURE 14.38: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N LANDFILLING 14.20
FIGURE 14.39: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N LANDFILLING 14.21
FIGURE 14.40: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9 LANDFILLING 14.21
FIGURE 14.41: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 8 .... 14.22
FIGURE 14.42: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5 LANDFILLING 14.22
FIGURE 14.43: NORTH FACILITIES ALTERNATIVE 3 10 A.M. NE-3 LANDFILLING 14.23
FIGURE 14.44: NORTH FACILITIES ALTERNATIVE 3 10 A.M. NW-3 LANDFILLING 14.23
FIGURE 14.45: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N-3 LANDFILLING 14.24
FIGURE 14.46: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N-3 LANDFILLING 14.24
FIGURE 14.47: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9-LOW LANDFILLING 14.25
FIGURE 14.48: ALTERNATIVE 3 NORTH FACILITIES NW-3 LANDFILLING LMAX 14.25
FIGURE 14.49: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 6 LANDFILLING 14.26
FIGURE 14.50: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N LANDFILLING 14.26
FIGURE 14.51: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N LANDFILLING 14.27
FIGURE 14.52: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 9 LANDFILLING 14.27
FIGURE 14.53: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 8 .... 14.28
FIGURE 14.54: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 5 LANDFILLING 14.28
FIGURE 14.55: RENTON FACILITIES ALTERNATIVE 3 6 A.M. NE-3 LANDFILLING 14.29
FIGURE 14.56: RENTON FACILITIES ALTERNATIVE 3 6 A.M. NW-3 LANDFILLING 14.29
FIGURE 14.57: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N-3 LANDFILLING 14.30
FIGURE 14.58: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N-3 LANDFILLING 14.30
FIGURE 14.59: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 9-LOW LANDFILLING 14.31
FIGURE 14.60: ALTERNATIVE 3 RENTON FACILITIES NW-3 LANDFILLING LMAX 14.31
FIGURE 14.61: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 6 LANDFILLING 14.32
FIGURE 14.62: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N LANDFILLING 14.32
FIGURE 14.63: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N LANDFILLING 14.33
FIGURE 14.64: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 9 LANDFILLING 14.33
FIGURE 14.65: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 8 LANDFILLING 14.34
FIGURE 14.66: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 5 LANDFILLING 14.34
FIGURE 14.67: RENTON FACILITIES ALTERNATIVE 3 10 A.M. NE-3 LANDFILLING 14.35
FIGURE 14.68: RENTON FACILITIES ALTERNATIVE 3 10 A.M. NW-3 LANDFILLING 14.35
FIGURE 14.69: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N-3 LANDFILLING 14.36
FIGURE 14.70: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N-3 LANDFILLING 14.36
FIGURE 14.71: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 9-LOW LANDFILLING 14.37
FIGURE 14.72: ALTERNATIVE 3 RENTON FACILITIES SE CORNER LMAX 14.37

TABLE 16.1: CONSTRUCTION TRUCK TRIPS 16.2
FIGURE 17.1: RENTON NOISE MONITORING POSITIONS 17.2
FIGURE 17.2: POSITION P1 LEQ TIME HISTORY 17.3
FIGURE 17.3: POSITION P2 LEQ TIME HISTORY 17.3
FIGURE 17.4: POSITION P3 LEQ TIME HISTORY 17.4
FIGURE 17.5: POSITION P4 LEQ TIME HISTORY 17.4
FIGURE 17.6: POSITION P1 AND R4 SOUND LEVELS 17.5
FIGURE 17.7: NE 3RD/4TH ST TRAFFIC NOISE 0600-0700 ..... 17.6
FIGURE 17.8: NE 3RD/4TH ST TRAFFIC NOISE 1000-1100 ..... 17.6
FIGURE 17.9: PROJECTED LIBERTY RIDGE LOCAL TRAFFIC NOISE 0600-0700 ..... 17.7
FIGURE 17.10: PROJECTED LIBERTY RIDGE LOCAL TRAFFIC NOISE 1000-1100 ..... 17.8
FIGURE 17.11: COMBINED LIBERTY RIDGE LOCAL TRAFFIC + NE 3RD/4TH ST NOISE 0600-0700 ..... 17.9
FIGURE 17.12: COMBINED LIBERTY RIDGE LOCAL TRAFFIC + NE 3RD/4TH ST NOISE 1000-1100 ..... 17.9
FIGURE 19.1: NO ACTION ALTERNATIVE TRANSFERE STATION NOISE CONTOURS 10 A.M. 19.1
FIGURE 19.2: CUMULATIVE NO ACTION ALTERNATIVE NOSIE LEVELS RENTON 10 A.M. 19.2
FIGURE 20.1: RENTON ALTERNATIVE 3 UNMITIGATED 6-7 A.M. 20.1
FIGURE 20.2: RENTON ALTERNATIVE 3 UNMITIGATED SOUND 10-11 A.M. 20.2
FIGURE 21.1: POTENTIAL RENTON MITIGATION WITH DRAFT SITE PLAN 21.2
FIGURE 21.2: POTENTIAL RENTON NOISE MITIGATION WITHOUT SITE PLAN 21.3
FIGURE 22.1: RENTON ALTERNATIVE 1 LEQ CONTOURS 6 A.M. 22.2
FIGURE 22.2: RENTON ALTERNATIVE 2 LEQ CONTOURS 6 A.M. 22.3
FIGURE 22.3: RENTON ALTERNATIVE 3 LEQ CONTOURS 6 A.M. 22.4
FIGURE 22.4: CUMULATIVE ALTERNATIVE 3 FACILITIES AND TRANSFER STATION LEQ 10 A.M. 22.5
FIGURE 23.1: RENTON ALTERNATIVE 3 INCREASE ABOVE EXISTING AMBIENT 6 A.M. (SEPA COMPARISON) 23.1

LIST OF TABLES

TABLE TITLE PAGE

TABLE 7.1: COMMUNITY AND PROPERTY LINE NOISE MONITORING SUMMARY....7.2
TABLE 8.1: EQUIPMENT SOUND POWER LEVELS (L_{EQ})....8.5
TABLE 8.2: FACILITIES SOUND POWER (L_{EQ})....8.6
TABLE 8.3: EQUIPMENT SOUND POWER (L_{MAX})....8.9
TABLE 8.4: FACILITIES SOUND POWER (L_{MAX})....8.10
TABLE 9.1: MONTHLY WASTE DISTRIBUTION....9.3
TABLE 9.2: CHRLF HOURLY TRIP DISTRIBUTION....9.4
TABLE 9.3: CHRLF CAPACITY YEAR TRIPS....9.5
TABLE 9.4: CHRLF NO ACTION ALTERNATIVE TRIPS....9.6
TABLE 9.5: CHRLF ALTERNATIVE 1 TRIPS....9.7
TABLE 9.6: CHRLF ALTERNATIVE 2 TRIPS....9.8
TABLE 9.7: CHRLF ALTERNATIVE 3 TRIPS....9.9
TABLE 9.8: CHRLF NOISE MODEL OPERATIONS INPUTS OPTIONS 1-2....9.10
TABLE 9.9: CHRLF NOISE MODEL OPERATIONS INPUTS OPTION 3....9.11
TABLE 9.10: RENTON NOISE MODEL OPERATIONS INPUTS OPTION 3....9.12
FIGURE 13.1: SOUTH MITIGATION....13.2
TABLE 15.1: COMPARISON OF SOUTH FACILITIES 6 A.M. ACTION / NO ACTION NOISE LEVELS....15.2
TABLE 15.2: NORTH FACILITIES 6 A.M. NOISE IMPACTS VS. NO ACTION....15.3
TABLE 15.3: OPTION 3 FACILITIES 6 A.M. NOISE IMPACTS VS. NO ACTION....15.4
TABLE 15.4: SOUTH FACILITIES 10 A.M. NOISE IMPACTS VS. NO ACTION....15.5
TABLE 15.5: NORTH FACILITIES 10 A.M. NOISE IMPACTS VS. NO ACTION....15.6
TABLE 15.6: OPTION 3 FACILITIES 10 A.M. NOISE IMPACTS VS. NO ACTION....15.7
TABLE 18.1: SOUND POWER LEVELS FOR RENTON ANALYSIS (LEQ)....18.11
TABLE 18.2: SOUND POWER LEVELS FOR RENTON ANALYSIS (LMAX)....18.12

REFERENCES

1. Federal Transit Administration Report FTA-VA-90-1003-06, *Transit Noise and Vibration Impact Assessment*, May 2006

2. JR 336, *Noise and Vibration Study of Cedar Hills Regional Landfill North Flare Station,* J R Engineering, May 2014

3. *Revised Site Development Plan for Cedar Hills Regional Landfill,* Herrera Environmental Consultants, HDR, BHC Consultants, June 2016

4. *Noise and Vibration Control Engineering – Principals and Applications,* Beranek & Ver, 1992

5. International Standards Organization ISO-9613-2*, Acoustics – General Method of Sound Propagation Outdoors,* 1996

6. King County Solid Waste Division, *Final Environmental Impact Statement, Cedar Hills Regional Landfill 2010 Site Development Plan*, July 2010

7. Engineering Coordination Memo (ECM), JRE-HECI-009, ROM Noise Mitigation Costs (Draft), April 27, 2017

8. *Cedar Hills Regional Landfill Transportation Analysis Methods and Assumption Memo*, Transpo Group, April 16, 2020.

9. *Noise Modeling Assessment Cedar Hills Regional Landfill*, Amec Foster Wheeler et al, October 2015

10. *Cedar Hills Regional Landfill Support Facilities Evaluation - Phase 2*, CH2M Hill, January 2019

11. ARP 866A*, Standard Values of Atmospheric Absorption as a Function of Temperature and Humidity,* Society of Automotive Engineers*, March 1975*

12. King County Solid Waste Division, *Preliminary Draft Environmental Impact Statement: Cedar Hills Regional Landfill*, TBR

1.0 INTRODUCTION

This report presents the results of the Phase 2 environmental noise assessment performed for the Cedar Hills Regional Landfill (CHRLF) 2020 Site Development Plan, Environmental Impact Statement (EIS). The noise assessment covers three Action Alternatives, each having three Options, as well as the No Action Alternative. The analysis was comprised of new and previous measurements of existing community noise levels at positions around the applicable property perimeters, measurement of existing noise sources on the sites, and projection of future noise levels for the No Action and Action Alternatives under consideration.

Under the No Action Alternative, CHRLF will continue to operate under the existing Special Permit. The landfill is expected to reach capacity in mid-2028. At that point the landfill will close to new waste and steps will be taken to complete environmental responsibilities. Main landfill support facilities will remain in their current location, including removal, refurbishment or replacement of some facilities at the end of their useful life, and may include use of interim off-site facilities.

The three Action Alternatives are described in Reference 12 and aspects impacting noise are summarized herein. Each of the three Action Alternatives increases the capacity of CHRLF and additional waste will be landfilled while maintaining a 1,000-ft buffer between refuse areas and the property line. Landfill capacity, landfill area footprint, and landfill life-span all increase from Action Alternative 1 to Action Alternative 3. Each of the Action Alternatives includes landfilling in proposed Area 9, which would be a new area in the southeast corner of the existing landfilling area. Development of Area 9 will require removal of much of the existing support facilities. For each Action Alternative, there are three Options related to the relocation of the landfill support facilities.

At CHRLF, the noise footprint of Action Alternatives 1 and 2 and the No Action Alternative are generally similar, as would be expected, since the equipment used is the same and the haul routes between the front gate and the active landfilling areas are about the same for each alternative. The primary variables are the number of waste loads imported and the location of the support facilities. Action Alternative 3 expands further into the north, so the footprint of the Action Alternative 3 noise contours are greater.

Under adverse atmospheric sound propagation conditions with typical landfilling equipment operations and facilities operations, it was found that noise levels at adjacent properties could potentially exceed the limits set in the King County Noise Code if present equipment were retained. Mitigation is proposed herein that would reduce projected noise levels to within the applicable limits for normal weekday operations. Generally, a noise wall would be required along the main access road up to about the existing gate. Height of the noise wall would vary. Beyond this, mitigation for the individual facilities locations is developed.

Facilities Option 3 relocates most support facilities offsite to a parcel in Renton next to the existing Renton Recycling and Transfer Station. Extensive mitigation is necessary to meet the Renton noise code limits.

In all cases, after mitigation measures are implemented, the noise from the proposed combinations of Action Alternatives and Options would not create adverse noise impacts to the community. Noise impacts were evaluated relative to the No Action Alternative and no significant unavoidable noise impacts were found.

2.0 DEFINITIONS AND ACRONYMS

A-Scale is a frequency weighting designed to emulate human response to noise of various frequencies. A-Scale emphasizes the 1,000 to 5,000 Hz part of the spectrum (maximum emphasis at 2,500 Hz) and de-emphasizes the low frequency end of the spectrum.

BEW: BioEnergy of Washington

CHRLF: Cedar Hills Regional Landfill

CUP: Conditional Use Permit

QSI: Quietly Superior, Inc.

KCC: King County Code

KCSWD: King County Solid Waste Division

L_A (A-Scale Level): Overall Sound Pressure Level (in dB re: 20 microPascal -- also dBA) measured by a system having A-Scale frequency response. Throughout this memo, A-weighted sound levels are noted as dBA.

L_{EQ} (Energy Equivalent Sound Level): The level of a constant sound over a specific time period that has the same sound energy as an unsteady sound over the same period. Throughout this report, the L_{EQ} reported is the A-weighted L_{EQ}. Unless noted otherwise, all sound levels within this document refer to A-weighted L_{EQ}.

L_{MAX}: The maximum A-weighted sound level measured during a time interval.

NFS: North Flare Station

Pure tone component. "Pure tone component" means sound having the following qualities: a one-third octave band sound pressure level in the band with the tone that exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 dB for center frequencies of 500 Hz and above, by 8 dB for center frequencies between 160 and 400 Hz, and by 15 dB for center frequencies less than or equal to 125 Hz. (KCC 12.86.030)

Sound Power Level(L_W or PWL): Sound power level is the amount of sound that is created by a noise source and is expressed in decibels. A-weighted sound power level is often denoted using L_WA.

SEPA: State Environmental Policy Act

Sound Pressure Level (SPL or L_P): Sound pressure level is the noise level that is observed at any point and is a function of the Sound Power Level of the source, distance from the source and any extra noise attenuation between the source and receiver position. Throughout this report, any reference to SPL indicates the A-weighted sound pressure level. The Sound Pressure Level is defined as $10 \cdot \log(P(t)/P_{REF})^2$, where P(t) is the instantaneous sound pressure (in Pascals) and P_{REF} is the reference sound pressure, defined to be 20μPa.

1/3 OBSPL: One-Third Octave Band Sound Pressure Level.

Use Factor: The percentage of time that a piece of equipment is in use.

3.0 NOISE CONCEPTS

Sound waves are received by the human ear as variations in pressure over time. The typical threshold of hearing for a person is about 20 micro-Pascal (20 μPa). The loudest sounds that humans typically encounter are on the order of 20 million μPa. Because of this large scale, Sound Pressure Levels (SPLs) are commonly specified in decibels which use a log scale to compress the range of pressure fluctuations to a more meaningful and usable noise metric.

$$SPL = 10 \cdot \log\left(\frac{p_{rms}^2}{p_{ref}^2}\right) = 20 \cdot \log\left(\frac{p_{rms}}{p_{ref}}\right)$$

In the above equation, p_{ref} is 20 μPa. Thus, 0 dB (10×log(1)) is the approximate minimum sound level that humans hear.

Many people are familiar with the concept of the Richter Scale for earthquakes where a magnitude 5 earthquake has a shaking amplitude 10 times stronger than a magnitude 4, and a magnitude 6 has a shaking amplitude 10 times more powerful than a magnitude 5. The same principal applies to noise except that 50 decibels has 10 times more sound energy than 40 decibels. 60 decibels has 10 times the energy as 50 decibels.

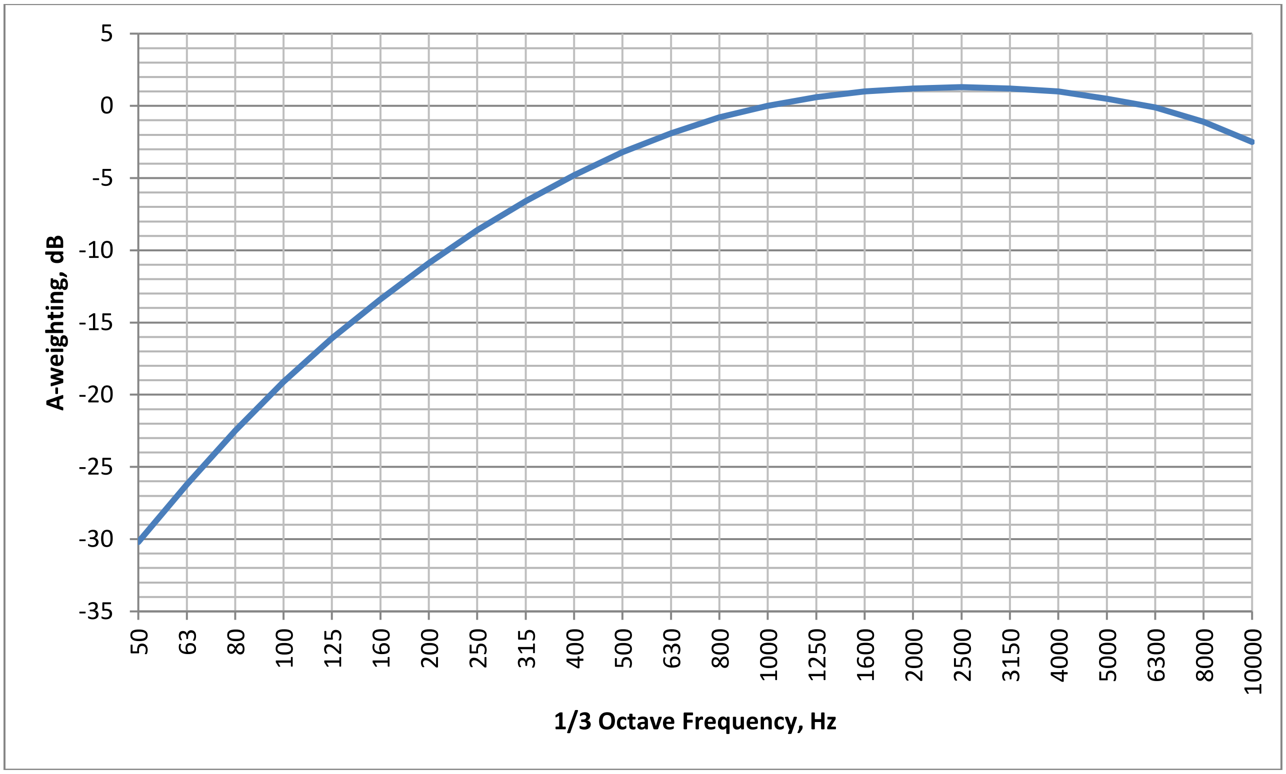
Because of their logarithmic nature, decibels do not arithmetically add. To calculate the sum of two sound levels it is necessary to convert the decibel level back to sound energy (p_{rms}^2), add energy levels, and then take the log of the sum and multiply by 10.

If two sound levels are of equal strength, the sum of the two sound levels is 3 dB greater than the individual SPL. If two sound levels are added with one sound level being 10 dB louder than the other, the combined sound level is only 0.4 dB more than the louder sound level.

Humans are more sensitive to certain frequencies than others. For example a 70 dB tone at 2000 Hz. will seem louder to most people than a 70 dB tone at 80 Hz. The A-weighting scale is an attempt to compensate for this human perception of sound intensity. The A-scale deemphasizes low frequency noise, slightly emphasizes mid-high frequency noise and slightly de-emphasizes high frequency noise.

Figure 3.1 shows the A-weighting as a function of 1/3 octave band frequency.

FIGURE 3.1: A-WEIGHTING SCALE



For comparative purposes, a list of common A-weighted noise levels is shown in Figure 3.2. Decibel levels and common subjective responses to that sound level are also presented in the table. The table also depicts how persons commonly describe sound level differences of 10 dB as being twice as loud or half as loud.

FIGURE 3.2: TYPICAL SOUND LEVELS

Example	dBA	Qualitative Evaluations		
	140	Deafening		
Threshold of Pain	135			
	130			
Jet Engine 200 feet	125			
	120		32	Times as Loud (re 70 dBA)
Rock Band	115			
Accelerating Motorcycle a few ft. away.	110		16	
	105			
Noisy Urban Street/Heavy City Traffic	100	Very Loud	8	
Jack Hammer at 50 feet	95			
	90		4	
Heavy Truck at 50 feet	85			
	80	Moderately Loud	2	
Vacuum Cleaner at 10 feet	75			
Near freeway auto traffic	70		1	
	65			
Business Office	60	Quiet	½	
	55			
	50		¼	
	45			
Quiet urban nighttime	40	Faint	⅛	
	35			
Soft whisper at 5 ft.	30			
	25			
Motion picture studio	20	Very Faint		
	15			
Human breathing	10			
	5			
Threshold of human hearing	0			

L_{EQ} and L_{MAX} are the noise metrics specified in the King County noise limits, KCC 12.86. L_{MAX} is simply the loudest A-weighted sound level observed during a measurement/evaluation period. L_{EQ} is the Energy Equivalent Sound Level, meaning that over a measurement period it is the sound level that would have the same sound energy as a fluctuating sound level over the same time period. In this sense, L_{EQ} is similar to an average sound level but with more weighting being given to louder sound levels due to the logarithmic nature of the decibel.

Sound originates at the source and decreases in intensity with increasing distance from the source. The sound generated by the noise source is the sound power level (Lw) and is expressed in terms of decibels (re: 10^{-12} Watts). The sound that is observed by a receiver is the Sound Pressure Level (SPL or L_P), also expressed in decibels (re: 20μPa). In addition to distance, other features along the sound propagation path, such as barriers and vegetation can further decrease the intensity of sound observed at a particular location. Other factors, such as thermal gradients and wind, could cause the observed sound to increase or decrease. The basic propagation equation is:

$$SPL = L_W + A_{dist} + A_{air} + A_{ground} + A_{barrier} + A_{trees} + A_{directivity}$$

Where SPL is sound pressure level, L_W is the sound power level and A_X is the attenuation due distance, air absorption, soft ground attenuation, trees, directivity of the noise source (how sound varies with direction from the source), and attenuation due to a barrier or terrain shielding.

When the temperature remains relatively constant with changes in altitude, the atmosphere is considered neutral from an acoustics perspective. The lack of temperature gradient results in sound waves travelling in a generally straight line from a source to a receiver. During a temperature inversion (cooler temperatures nearer the earth rather than aloft), sound waves tend to bend downward towards the cooler, denser air. The opposite is true when temperatures near the earth are warmer than aloft causing sound waves to bend upwards.

Wind has a similar effect on sound propagation. Being downwind of a noise source, the sound waves tend to bend downward. When a receiver is upwind of a noise source, the sound waves tend to bend upward.

The neutral atmosphere may be used for typical noise propagation calculations. Downward bending noise waves (caused by an inversion and/or wind conditions) are used for the worst-case noise analysis since the sound waves tend to bend over the top of barriers or natural topographical features resulting in less noise attenuation.

4.0 REGULATORY BASIS

4.1 King County Noise Code

The King County noise ordinance is set in KCC 12.86. Maximum levels are defined in 12.86.110 and 12.86.120. These sections of the code are reproduced below.

12.86.110 Environmental sound levels – maximum permissible sound levels.

A. For purposes of this subsection, sound levels shall be measured by a Type 1 or Type 2 sound level meter. Sound level measurements shall be based on the L_{EQ} during the measurement interval, using a minimum measurement interval of one minute for a constant sound source or a thirty-minute measurement for a noncontinuous sound source. For sound sources located within unincorporated King County, the maximum permissible sound levels are as follows:

District of Sound Source	District of Receiving Property			
	Rural, dB(A)	Residential, dB(A)	Commercial, dB(A)	Industrial, dB(A)
Rural	49	52	55	57
Residential	52	55	57	60
Commercial	55	57	60	65
Industrial	57	60	65	70

B. During a measurement interval, Lmax may exceed the sound level limits of this section by no more than 15 db(A). For the purposes of this subsection, "Lmax" means the maximum sound over a measurement interval determined by using a sound level meter set to "fast" response time.

C. Sounds created by auxiliary equipment operated on watercraft for the purposes of operation of a marina and clam and oyster harvesting, shall be governed by this section. (Ord. 3139 § 302, 1977. Formerly K.C.C. 12.88.020).

12.86.120 Environmental sound levels – modifications to maximum permissible sound levels. The maximum permissible sound levels established by this chapter shall be reduced or increased by the sum of the following:

A. Between 10:00 p.m. and 7:00 a.m. during weekdays, and between 10:00 p.m. and 9:00 a.m. on weekends, the levels established by K.C.C. 12.86.050 are reduced by 10 dB(A) where the receiving property lies within a rural or residential district of King County. The following sounds are exempt from this subsection:

1. Sounds created by existing stationary equipment used in the conveyance of water by a utility; and
2. Sounds created by electrical substations;

B. For any source of sound that has a pure tone component, the levels established by this chapter shall be reduced by 5 dB(A), but this reduction shall not be imposed on any electrical substation. For the purposes of this subsection, ["pure tone component" means sound having the following qualities: a one-third octave band sound pressure level in the band with the tone that exceeds the arithmetic average of the sound pressure levels of the two contiguous one-third octave bands by 5 decibels for center frequencies of 500 Hz and above, by 8 decibels for center frequencies between 160 and 400 Hz, and by 15 decibels for center frequencies less than or equal to 125 Hz]*; and

C. For any source of sound that is impulsive and not measured with an impulse sound level meter, the levels established by this chapter are reduced by 5 dB(A).

(Ord. 18000 § 51, 2015: Ord. 14114 § 7, 2001: Ord. 3139 § 303, 1977. Formerly K.C.C. 12.88.030).

12.86.500 Exemptions – sounds exempt at all times. The following sounds are exempt from this chapter:

A. Sounds originating from aircraft in flight and sounds that originate at airports and are directly related to flight operations;

B. Sounds created by the normal operation of commercial, nonrecreational watercraft;

C. Sounds created by normal docking and undocking operations of all watercraft;

D. Sounds created by watercraft picking up or dropping off waterskiers while operating within the temporary speed limit exemption authorized in K.C.C. 12.44.230;

E. Sounds created by safety and protective devices, such as relief valves, if noise suppression would defeat the safety intent of the device;

F. Sounds created by fire alarms;

G. Sounds created by warning devices of not more than fifteen minutes in duration per incident. For the purposes of this subsection, "warning device" means a device that is working as intended to provide public warning of potentially hazardous, emergency or illegal activities, including, but not limited to, a burglar alarm or vehicle backup signal, but not including any fire alarm;

The landfill is zoned RA-10. The noise limit at the RA-5 zoned properties adjacent to the landfill on the north, east, and west sides, will therefore have a 49 dBA L_{EQ} limit during the day and 39 dBA L_{EQ} at night. The limit on maximum levels, L_{MAX}, is 15 dBA higher.

At the composting site to the south and the properties with mining zoning on the southwest corner, the L_{EQ} noise limits are 57 dBA and the LMAX limit is and 72 dBA

4.2 Renton Noise Code

8-7-2 of the Renton municipal code adopts the noise limits specified in WAC-173-060-040. Per emails from Renton planning department staff, the zoning of a property determines the applicable noise limits rather than the use of the property.

Maximum permissible environmental noise levels.

(1) No person shall cause or permit noise to intrude into the property of another person which noise exceeds the maximum permissible noise levels set forth below in this section.

(2)(a) The noise limitations established are as set forth in the following table after any applicable adjustments provided for herein are applied.

EDNA OF NOISE SOURCE	EDNA OF RECEIVING PROPERTY		
	Class A	Class B	Class C
CLASS A	55 dBA	57 dBA	60 dBA
CLASS B	57	60	65
CLASS C	60	65	70

(b) Between the hours of 10:00 p.m. and 7:00 a.m. the noise limitations of the foregoing table shall be reduced by 10 dBA for receiving property within Class A EDNAs.

(c) At any hour of the day or night the applicable noise limitations in (a) and (b) above may be exceeded for any receiving property by no more than:

(i) 5 dBA for a total of 15 minutes in any one-hour period; or

(ii) 10 dBA for a total of 5 minutes in any one-hour period; or

(iii) 15 dBA for a total of 1.5 minutes in any one-hour period.

Without detailed, precise knowledge of how operation of individual noise sources will be sequenced, it is very difficult to predict the time that a certain sound level will be exceeded when evaluating (c)(1-3) above. Thus, the analysis presented demonstrates compliance using L_{EQ} less than the nominal noise limit and L_{MAX} being less than specified above. Experience with moving, non-steady industrial noise sources has shown that the L_{EQ} is usually close to the L_{25} value.

4.3 State Environmental Policy Act (SEPA) Standards

SEPA requires the determination of whether a project will cause a significant impact to the environment. Noise is one of the many aspects of a project that are typically evaluated under SEPA procedures. In similar cases, projects causing noise levels to increase less than 10 dBA above the pre-existing noise level have been regarded as "non-significant impacts". The 10 dBA threshold for a significant noise impact is not mandated by the WAC and the reviewing authority may impose a different threshold at their discretion.

L_{EQ} is the traditional noise metric used for SEPA evaluation and it is used here.

5.0 ALTERNATIVES DESCRIPTIONS

The No Action and the Action Alternatives are described as follows.

5.1 No Action Alternative

King County
Department of
Natural Resources and Parks
Solid Waste Division

Cedar Hills Regional Landfill
2020 Site Development Plan
Environmental Impact Statement Alternatives

No Action Alternative – Revised August 2020

- No additional landfilling in Main Hill, Southeast Pit, Central Pit, and Areas 2/3 and 4
- Landfilling in Areas 5 and 6 up to 788 feet
- No additional landfilling in Area 7 – currently reached 788 feet
- Landfilling in Area 8 up to 788 feet
- Main landfill support facilities remain in current location, including removal, refurbishment or replacement of some facilities at the end of their useful life, and may include use of interim off-site facilities.
- No new or revised land use permits necessary

Estimated Landfill Life under the No Action Alternative
Mid 2028

FIGURE 5.1: NO ACTION ALTERNATIVE TOPOGRAPHY

5.2 Alternative 1

King County
Department of
Natural Resources and Parks
Solid Waste Division

Cedar Hills Regional Landfill
2020 Site Development Plan
Environmental Impact Statement Alternatives

Action Alternative 1 – Revised June 2020

Landfill Development

- No additional landfilling in Main Hill, Southeast Pit, Central Pit, and Areas 2/3 and 4
- Landfilling in Areas 5, 6, and 7 up to 788 feet
- Landfilling in Area 8 up to 800 feet.
- New Area 9 development in southeast area and landfilling up to 800 feet
- Pursue a Special Use Permit to place the new facilities within the existing northern or southern buffer zone. This permit is only needed if an on-site facilities relocation option is chosen.

Landfill Support Facilities Relocation

The following options are the same for all Action Alternatives

Option 1:

- If a Special Use Permit is approved, then relocate and build main landfill support facilities in the south (including, but not limited to the scale/scalehouse, truck wash, heavy equipment maintenance facility (cat shack), some tractor and trailer parking, the truck maintenance building, employee parking, office space, and laboratory space)

Option 2:

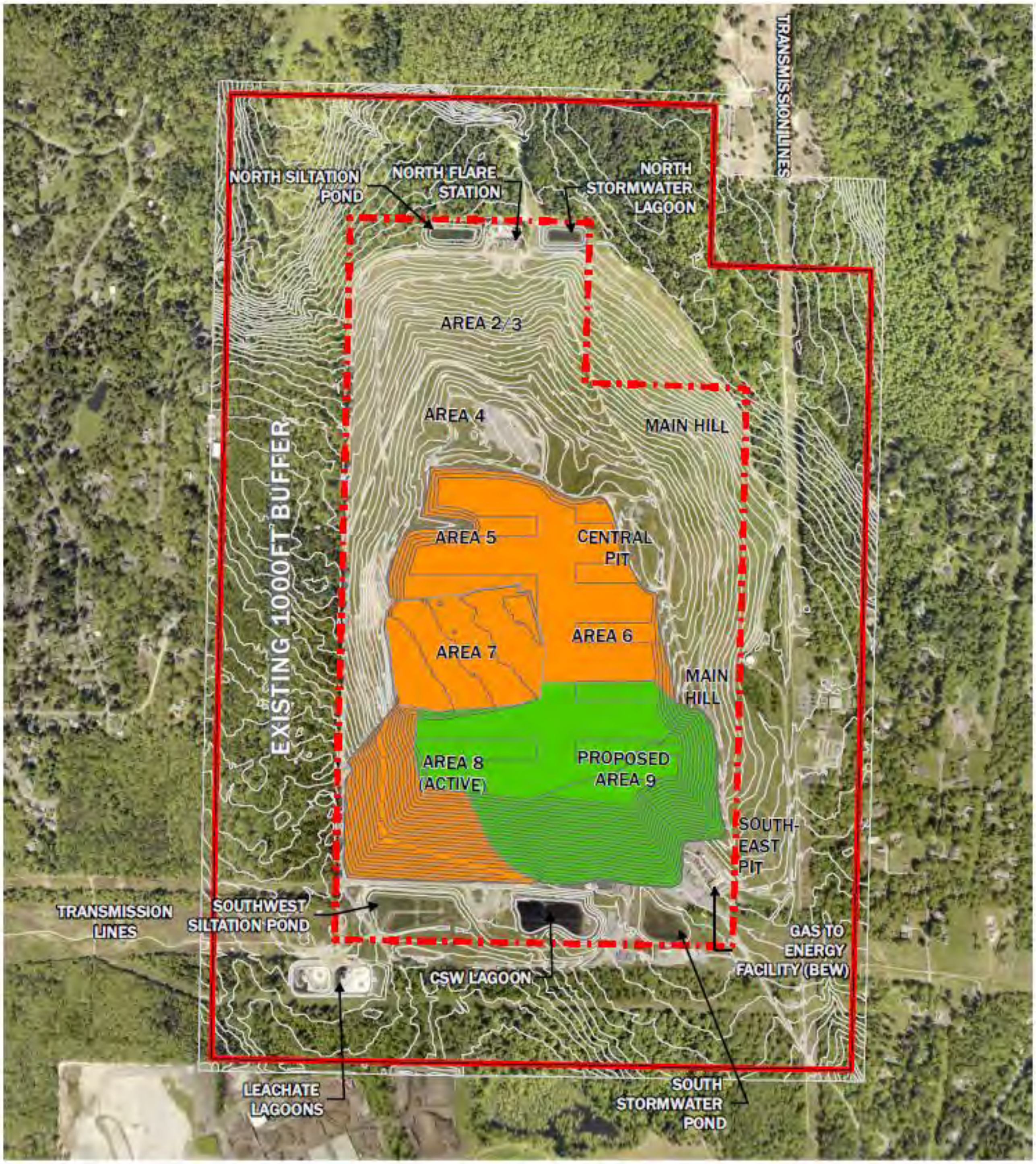
- If a Special Use Permit is approved, then relocate and build main landfill support facilities in the north (including, but not limited to the truck maintenance building, parking, office space, and laboratory space)
- Relocate and build some landfill support facilities in the south, but not within the buffer, including, but not limited to the scale/scalehouse, truck wash, cat shack and some tractor and trailer parking

Option 3:

- Relocate and build landfill support facilities at an off-site location at 3005 NE 4th Street in Renton, adjacent to King County's Renton Transfer Station. The facilities to be relocated include a portion of the vehicle maintenance shop (for repairing tractors, trailers, operations vehicles, and passenger vehicles), employee offices, and parking for employees, tractors, trailers, and operations vehicles.
- Relocate and build some landfill support facilities in the north or south (except the scale/scalehouse, truck wash, cat shack and some tractor and trailer parking relocated in the south), none of which will be located in the buffer.

Estimated Landfill Life under Action Alternative 1
Mid-2037

FIGURE 5.2: ALTERNATIVE 1 TOPOGRAPY



5.3 Alternative 2

King County
Department of
Natural Resources and Parks
Solid Waste Division

Cedar Hills Regional Landfill
2020 Site Development Plan
Environmental Impact Statement Alternatives

Action Alternative 2 – Revised June 2020

Landfill Development

- No additional landfilling in Main Hill and Southeast Pit
- Landfilling in the southern portion of Areas 2/3, 4, and Central Pit up to 788 feet
- Landfilling in Areas 5,6, and 7 up to 788 feet
- Landfilling in Area 8 to no more than 830 feet
- New Area 9 development in southeast area and landfilling to no more than 830 feet
- Pursue a Special Use Permit to place the new facilities within the existing northern or souther buffer zone. This permit is only needed if an on-site facilities relocation option is chosen.

Landfill Support Facilities Relocation

The following options are the same for all Action Alternatives

Option 1:

- If a Special Use Permit is approved, then relocate and build main landfill support facilities in the south (including, but not limited to the scale/scalehouse, truck wash, heavy equipment maintenance facility (cat shack), some tractor and trailer parking, the truck maintenance building, employee parking, office space, and laboratory space)

Option 2:

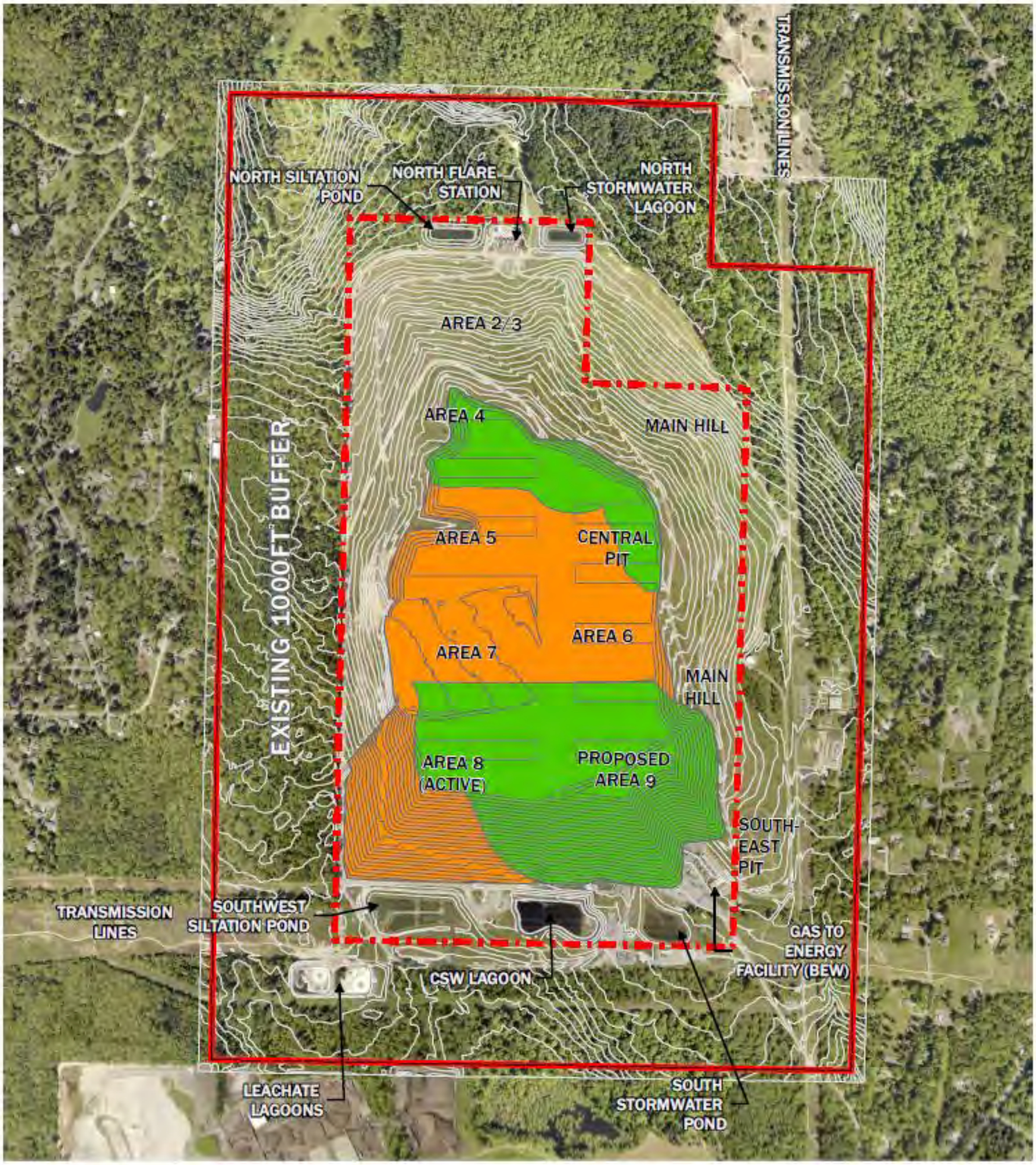
- If a Special Use Permit is approved, then relocate and build main landfill support facilities in the north (including, but not limited to the truck maintenance building, parking, office space, and laboratory space)
- Relocate and build some landfill support facilities in the south, but not within the buffer, including, but not limited to the scale/scalehouse, truck wash, cat shack and some tractor and trailer parking

Option 3:

- Relocate and build landfill support facilities at an off-site location at 3005 NE 4th Street in Renton, adjacent to King County's Renton Transfer Station. The facilities to be relocated include a portion of the vehicle maintenance shop (for repairing tractors, trailers, operation vehicles, and passenger vehicles), employee offices, and parking for employees, tractors, trailers, and operations vehicles.
- Relocate and build some landfill support facilities in the north or south (except the scale/scalehouse, truck wash, cat shack and some tractor and trailer parking relocated in the south), none of which will be located in the buffer.

Estimated Landfill Life under Action Alternative 2
Early 2038

FIGURE 5.3: ALTERNATIVE 2 TOPOGRAPHY



5.4 Alternative 3

King County
Department of
Natural Resources and Parks
Solid Waste Division

Cedar Hills Regional Landfill
2020 Site Development Plan
Environmental Impact Statement Alternatives

Action Alternative 3 – Revised June 2020

Landfill Development

- No additional landfilling in the Southeast Pit
- Landfilling in the northwest Areas 2/3 and 4 to no more than 830 feet
- Landfilling in the northeast portions of the Main Hill and Central Pit to no more than 830 feet
- Landfilling in Areas 5, 6, and 7 up to 788 feet
- Landfilling in Area 8 to no more than 830 feet
- New Area 9 development in southeast area and landfilling to no more than 830 feet
- Incorporation of King County owned property at the northeast corner into the site, thus revising the site boundary, and maintaining 1,000-foot buffer from the revised site boundary.
- Pursue a Special Use Permit to place the new facilities within the existing northern or souther buffer zone. This permit is only needed if an on-site facilities relocation option is chosen.

Landfill Support Facilities Relocation

The following options are the same for all Action Alternatives

Option 1:

- If a Special Use Permit is approved, then relocate and build main landfill support facilities in the south (including, but not limited to the scale/scalehouse, truck wash, heavy equipment maintenance facility (cat shack), some tractor and trailer parking, the truck maintenance building, employee parking, office space, and laboratory space)

Option 2:

- If a Special Use Permit is approved, then relocate and build main landfill support facilities in the north (including, but not limited to the truck maintenance building, parking, office space and laboratory space)
- Relocate and build some landfill support facilities in the south, but not within the buffer, including, but not limited to the scale/scalehouse, truck wash, cat shack and some tractor and trailer parking

Option 3:

- Relocate and build landfill support facilities at an off-site location at 3005 NE 4th Street in Renton, adjacent to King County's Renton Transfer Station. The facilities to be relocated include a portion of the vehicle maintenance shop (for repairing tractors, trailers, operation vehicles, and passenger vehicles), employee offices, and parking for employees, tractors, trailers, and operations vehicles.
- Relocate and build some landfill support facilities in the north or south (except the scale/scalehouse, truck wash, cat shack and some tractor and trailer parking relocated in the south), none of which will be located in the buffer.

Estimated Landfill Life under Action Alternative 3
Late 2046

FIGURE 5.4: ALTERNATIVE 3 TOPOGRAPHY

5.5 Option 1 – South Facilities Location

The Options for landfill support facilities relocation for the noise analysis are based on conceptual site plans prepared for the CHRLF Landfill Support Facilities Evaluation - Phase 2 report when placing potential noise sources at CHRLF or the Renton site. Potential 2-dimensional CHRLF facilities layouts were provided to QSI via CAD files. Building heights and some characteristics (potential pressure washing stations) were taken from the SDA document (Ref 10).

FIGURE 5.5: CHRLF FACILITIES OPTIONS 1 AND 2 OVERVIEW MAP

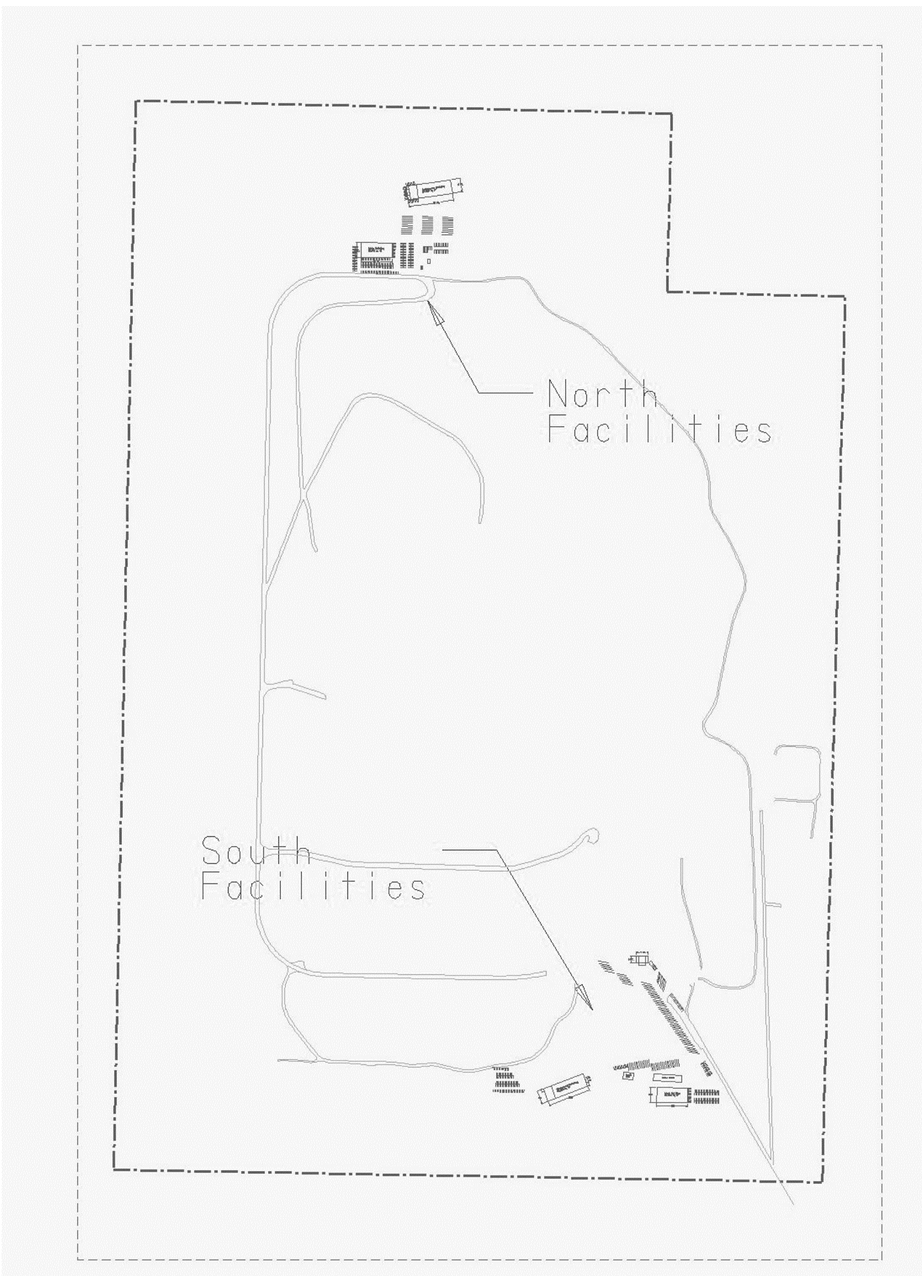


FIGURE 5.6: CHRLF OPTION 1 - SOUTH FACILITIES DETAIL

Figure 5.6 shows the layout used for evaluation of Option 1 - South Facilities. The Maintenance Building is the large building in the southwest corner. The truck wash is the green building in the lower center portion of the image. The green-outlined building in the upper-center portion of the image is the CAT shack. The Administrative Building is the larger of the magenta outlined buildings and the scale house is the smaller of the magenta colored outlines.

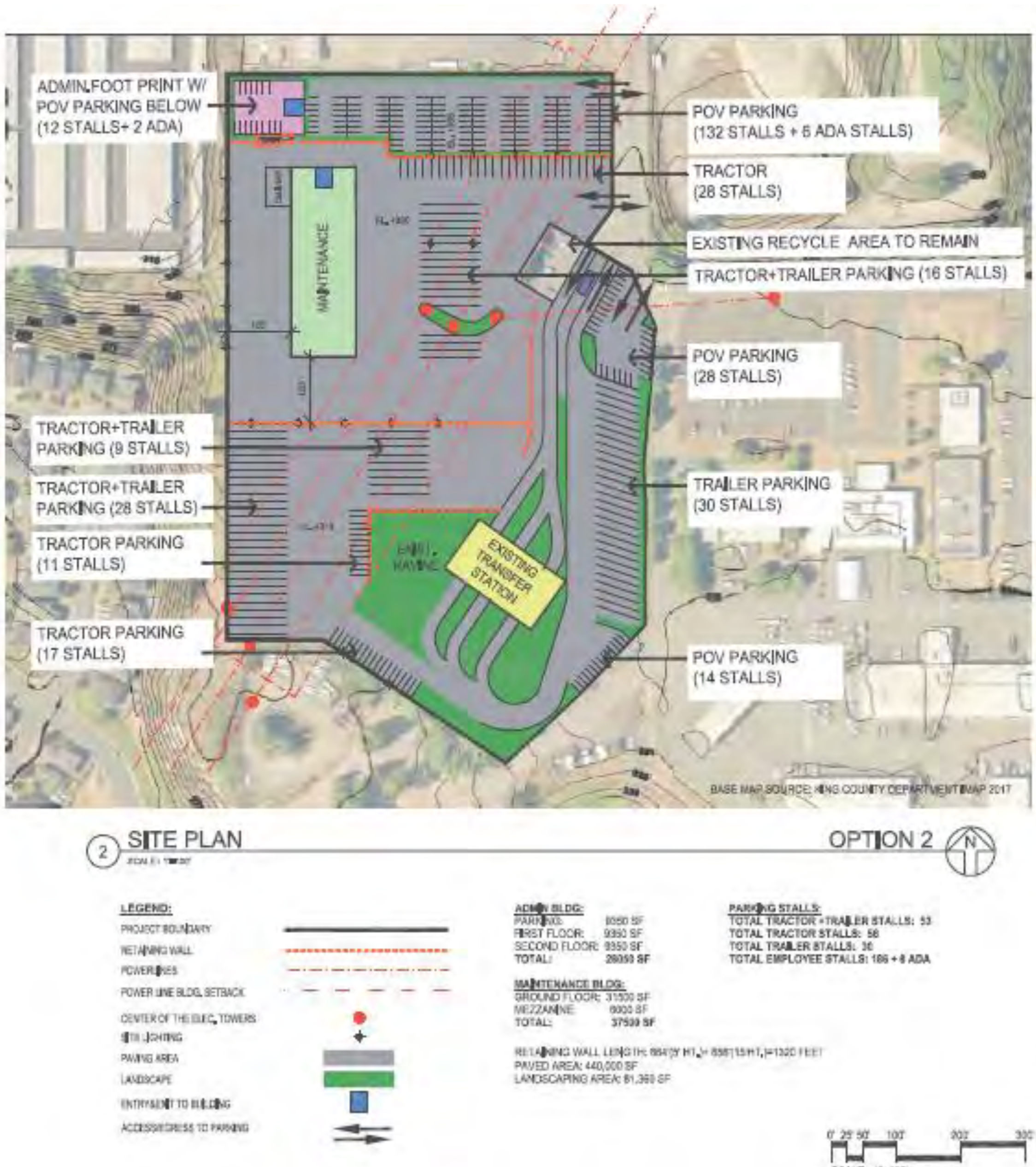
5.6 Option 2 – North Facilities Location

FIGURE 5.7: OPTION 2 - NORTH FACILITIES DETAIL

The Maintenance Building is the large green outlined building in Figure 5.7 while the Administrative Building is the magenta outlined building. The truck wash, scale house, and CAT Shack remain in the southern regions of the property with the North Facilities / Option 2.

5.7 Option 3 – Renton Facilities Location

FIGURE 5.8: OPTION 3 - RENTON SITE PLAN



The nominal layout used for the Renton noise analysis is given in Figure 5.8. Preliminary building layouts for the site follow. These were the current best estimate of potential building design available for the noise assessment. Note that the maintenance building characteristics are also assumed to be generally applicable to facilities locations at CHRLF, with the pressure washing station on one end of the maintenance building.

FIGURE 5.9: FACILITIES ELEVATIONS – RENTON

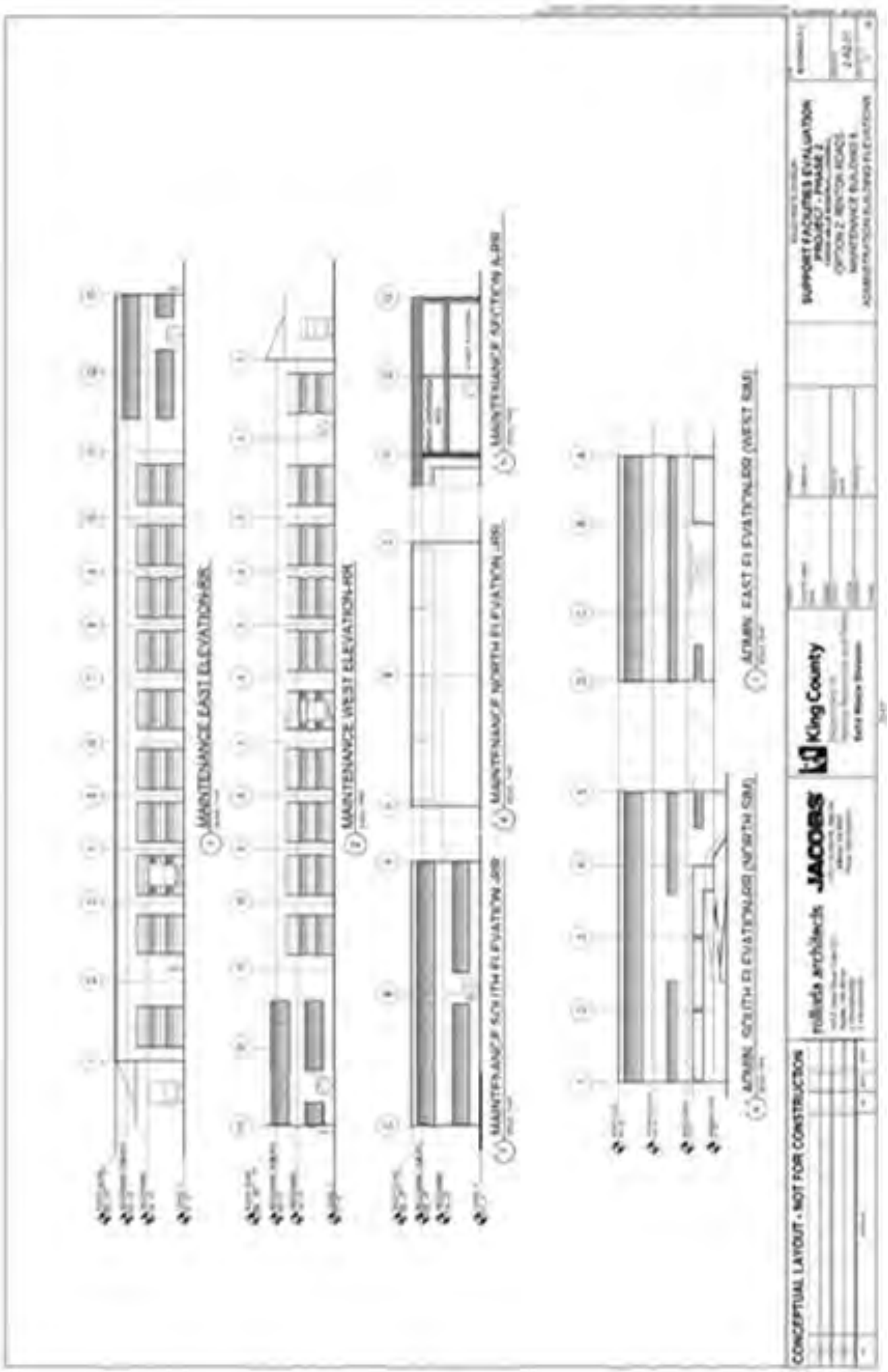
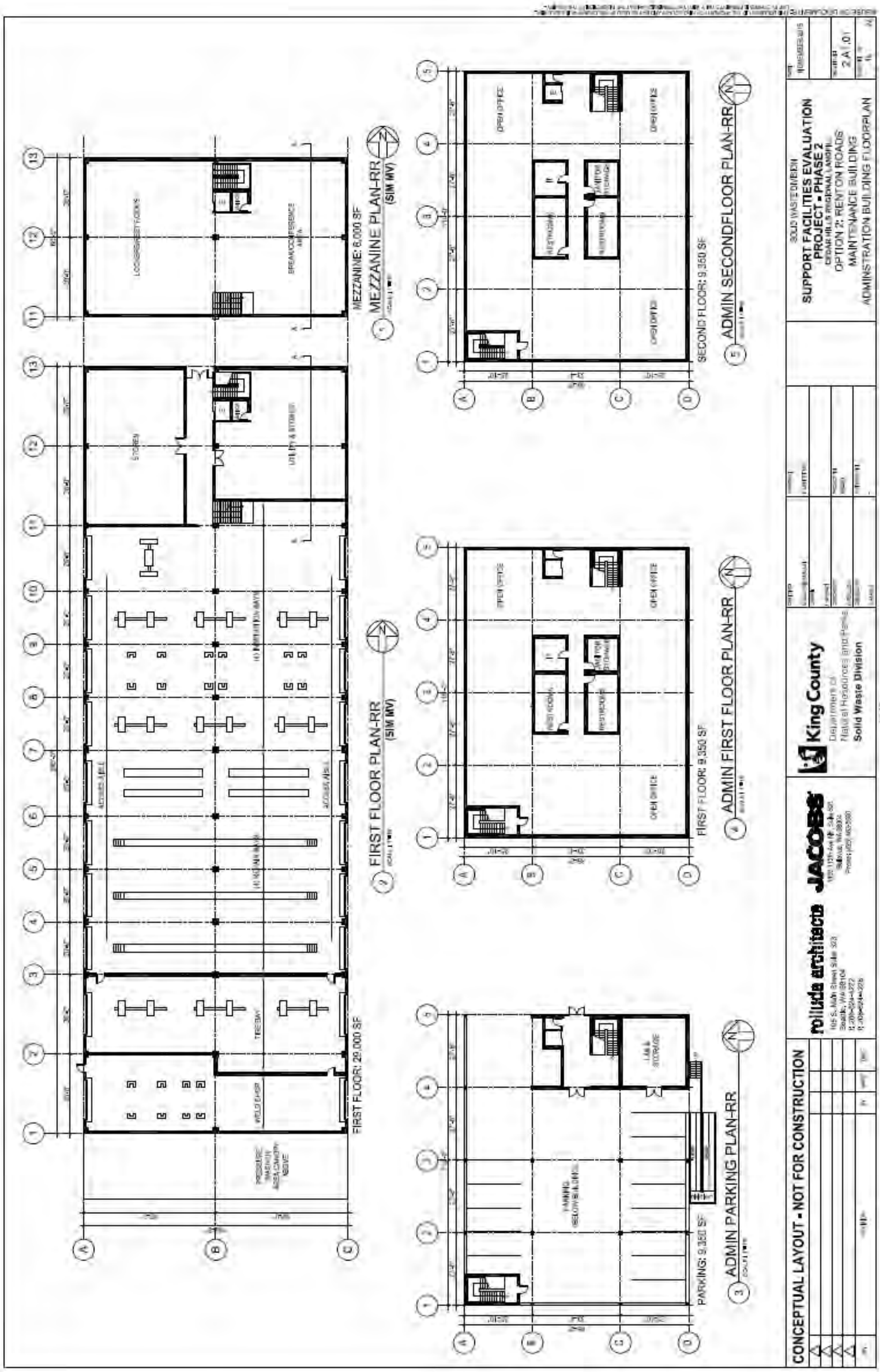


FIGURE 5.10: FACILITIES FLOORPLAN – RENTON



6.0 SITE DESCRIPTIONS

6.1 CHRLF

6.1.1 General

CHRLF is a Rurally zoned (RA-10), approximately 920-acre site that is located east of Renton. The site is bordered on the south by Cedar Grove Composting (industrial zoned) and on the other sides by land that is generally[1] Rural Zoned residential or farmland (RA-5).

228th Avenue SE provides road access to the site. 228th SE runs generally northwesterly from Cedar Grove Road through the southeast corner of the property and up to the gated entrance to the landfill. Once 228th Ave SE crosses the property line, it was considered Solid Waste Division property, so noise generated on that section of road was subject to the county noise code. Noise on public streets caused by street legal vehicles is not subject to the noise code.

The center portion of the landfill is generally grass covered land with exposed earth in the area where refuse is actively being disposed or active construction projects are under way. Dense trees within the landfill property boundaries border the cleared portion of the site along the entire west and north sides. Similar trees are located on the northern half of the eastern property line. Thinner sections of forest are located along the southeast section of the landfill and along the southern border.

[1] The southernmost property on the west property line is also industrially zoned.

FIGURE 6.1: ZONING NEAR CHRLF

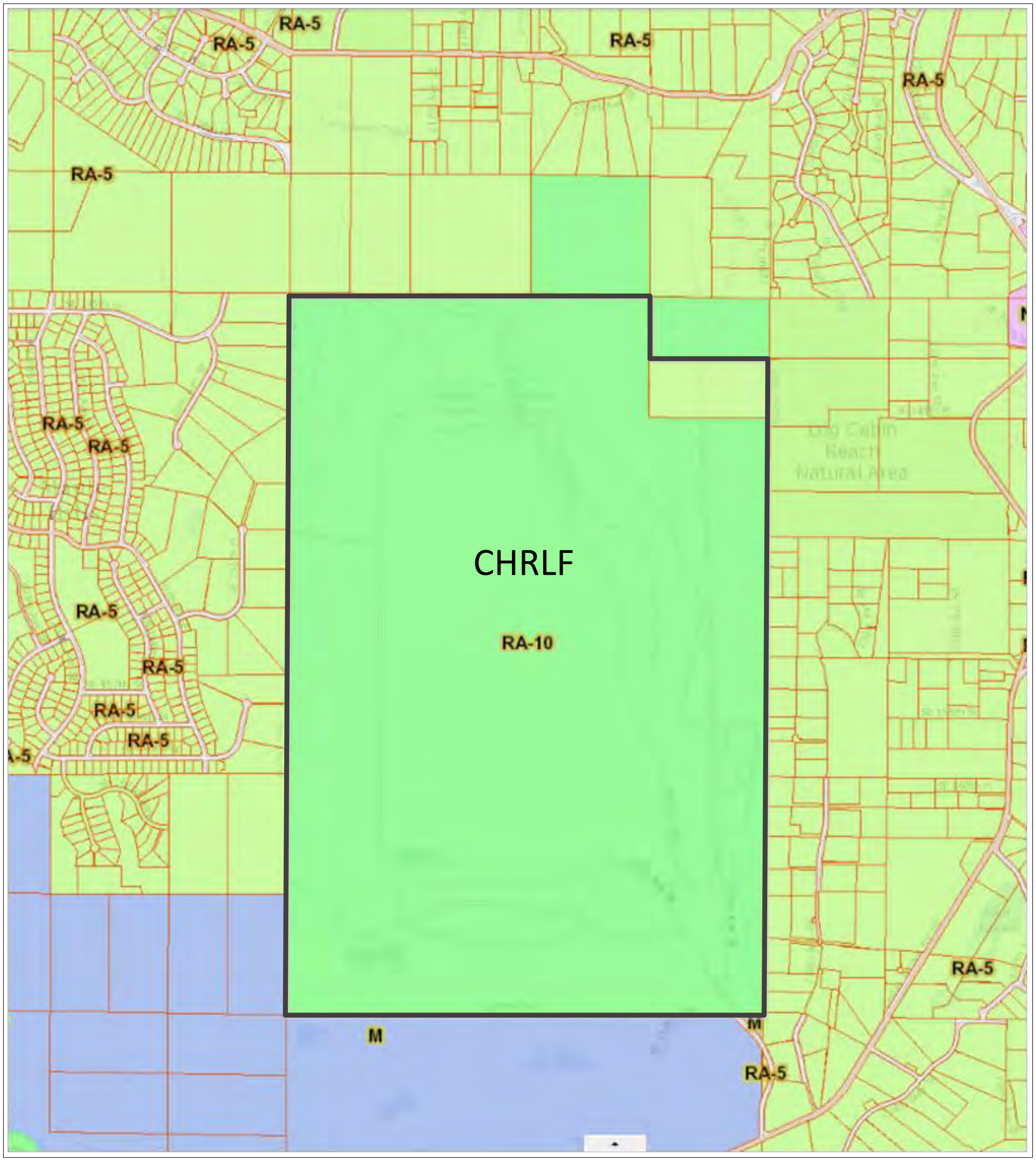


FIGURE 6.2: CHRLF SITE MAP[2]

The parcel shown in the northeast corner of the landfill with the dotted lines around the perimeter is currently owned by King County and would be incorporated into the landfill under Action Alternative 3. The interior dotted lines represent the current 1000-ft. buffer.

[2] From Reference 6

FIGURE 6.3: RECENT LANDFILL AERIAL PHOTO

Figure 6.3 provides an aerial image of the landfill from about 2019. The image depicts filling in Area 7. The excavation for Area 8 can be seen in the lower left portion of the landfill. Area 8 is currently being filled under the existing Special Permit and Solid Waste Landfill Permit.

6.1.2 Landfill Operations

The landfill has been in operation since 1960. The northern section of the landfill was filled first, near the North Flare Station (NFS). The active portion of the landfill has been moving in a generally southern direction, filling the various refuse areas in the process. Figure 6.14 shows an area map depicting the refuse areas.

There are a host of noise sources that are active at the landfill. These range from small to large diesel powered equipment to the industrial operations associated with the NFS and BioEnergy of Washington (BEW). Some of the diesel powered equipment is operated for local, short term construction projects and some is used for handling of the incoming waste.

The equipment for handling the incoming mixed municipal waste used in the noise model include:

- Waste Transfer Trucks (also including commercial direct haulers and some Other-haul vehicles).
- Dual trailer tippers to lift the incoming trailers and dump the waste out the back.
- Bulldozers to perform initial clearing of the area near the tipper and cover waste at the end of the day.
- Compactors to tear apart and compress the solid waste.
- Scrapers or articulated haul trucks with excavator to bring daily cover to the active landfill area.
- A gravel screen and excavator.

Additionally, sounds associated with on-site maintenance personnel and building HVAC equipment were also included in the noise assessment. Facilities noise includes:

- North Flare Station (including the main flares, blowers, and candlestick flare(s))
- BEW
- CAT Shack (heavy equipment maintenance facility)
- Truck Wash
- Estimated Air Conditioning for the administrative and maintenance buildings
- Maintenance facility (including pressure washing station)
- POV (staff) parking
- Truck parking (and associated warm up / idling)

These permanent noise sources were used in this evaluation for compliance with the King County Noise Code. For daytime noise evaluation, BEW is also included in the noise analysis.

Though there are often other temporary construction activities occurring at the CHRLF, these construction activities are exempted from compliance with the noise code by 12.86.520 when the equipment is operated within specified time periods. Such construction activities were not explicitly modeled in the noise assessment, but are discussed in general terms based on anticipated equipment and potential increases to the landfilling noise level based on increased loads imported or extracted.

FIGURE 6.4: CHRLF AREA MAP

6.1.3 Noise Environment

The ambient noise in the vicinity of CHRLF is highly variable. Aircraft and vehicular traffic are the most significant non-natural external noise sources to the community on a wide scale basis. Wind also influences the environmental noise level (for locations near trees, the rustling of leaves due to wind, is an additional noise source). However, there are many smaller scale noise sources that can make significant contributions to the sound level observed locally. These include birds, dogs, insects, and human generated noise such as chainsaws, home repairs, lawn mowers, and leaf blowers.

In addition, the noise from CHRLF may also be heard at some locations in the community, at certain times of the day. Tractor-trailers / semi-trucks and BEW are currently the primary landfill noise sources that can be heard near the southeast and southwest corner of the property. Backup safety alarms may also be heard in these areas. When the active receiving and compacting of waste occurs near the edge of the active landfill area, sounds associated with those activities would likely be audible in the surrounding community. When the active receiving and compacting activities are located away from the edge, they are less noticeable or possibly not noticeable.

During the filling of Area 7 and the currently active filling in Area 8, very little landfill noise is audible in the northeast (NE) and northwest (NW) corners of the property. During the NFS noise study in 2013/2014, the operation of the large flares created low frequency sound that was visible on a spectrum analyzer, but was not readily noticeable to QSI personnel when on-site.

FIGURE 6.5: NORTH FLARE STATION LAYOUT

6.2 Renton

Under Option 3, most landfill support facilities would be moved to a King County owned parcel adjacent to the existing Renton Recycling and Transfer Station. New truck storage, the primary maintenance facility and activities, and primary administrative buildings would be located in Renton.

The CAT Shack and Truck wash, along with some other facilities, would remain at the landfill.

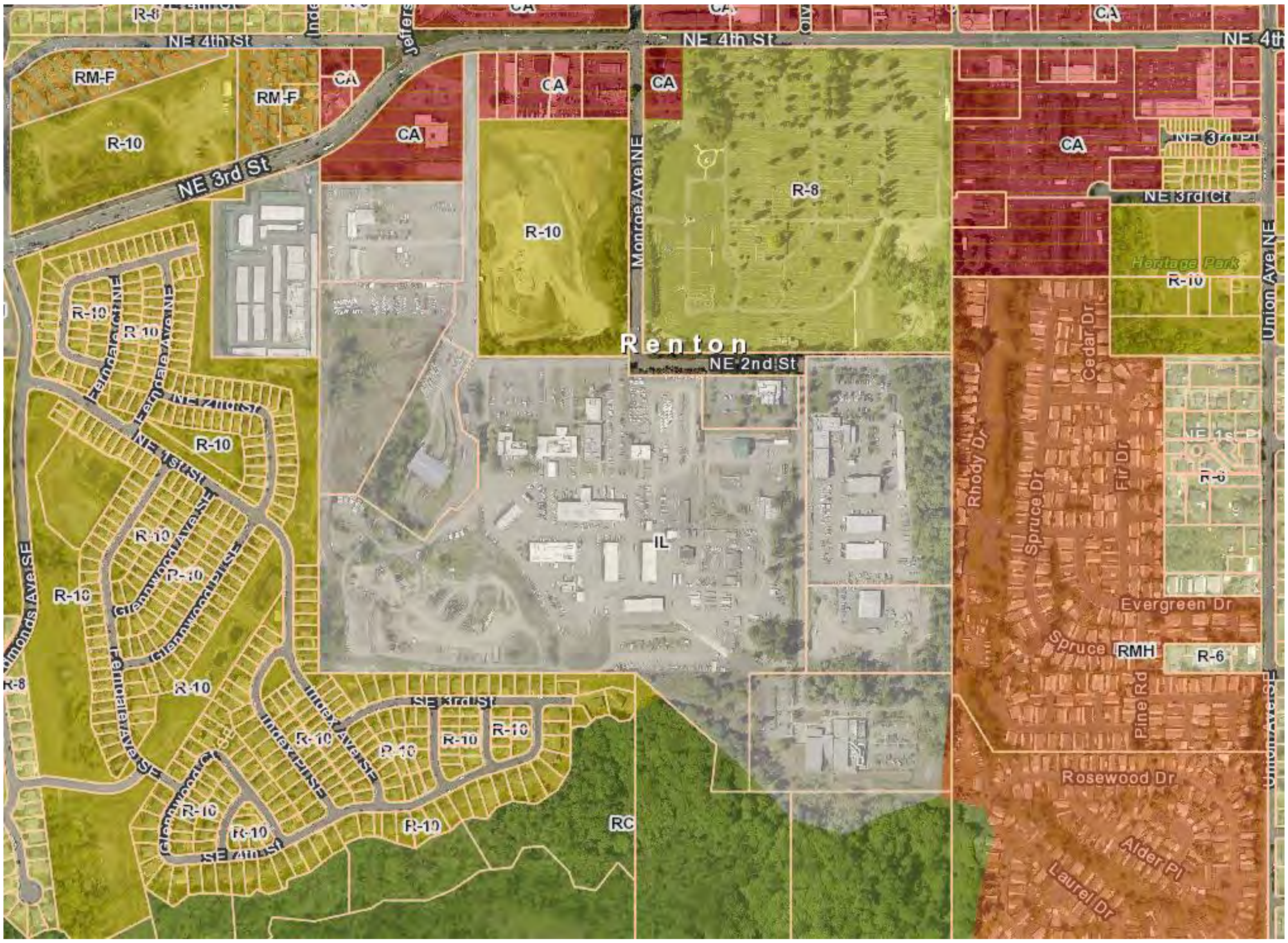
Figure 6.6 provides an overview of the proposed Renton facilities site. The facilities would be located on the triangular-shaped parcel just west of the County operated transfer station. The site is located on top of a bluff overlooking the Liberty Ridge housing development and a self-storage facility. There is an unoccupied parcel owned by the Liberty Ridge Home Owner's Association that is between the proposed facilities location and the actual residences. This parcel is not intended for human use as it is on a steep slope left from past gravel excavation.

To the east and south of the transfer station is the King County Roads Division facility, which wraps around the Solid Waste Division properties. There are a host of activities on the Roads Division site including, material (gravel) storage and loading, sign and culvert storage, heavy equipment maintenance, and sanding operations for winter roads.

FIGURE 6.6: RENTON TRANSFER STATION AERIAL IMAGE

North of the Roads Division property are two residential properties. One is a property that is currently being used for what appears to be gravel extraction; the other is a cemetery, also zoned residential. The Renton planning department indicated that residential noise limits are applicable for those properties despite their current use.

FIGURE 6.7: ZONING NEAR RENTON TRANSFER STATION



7.0 EXISTING CONDITIONS: COMMUNITY NOISE LEVELS NEAR CHRLF

Noise monitoring was performed at several locations around the perimeter of the landfill and at neighborhood residences to determine the exiting ambient conditions in the community. Measurements taken during the NFS study in 2013 supplement the data taken specifically for this assessment.

7.1 Instrumentation

Measurements were made using a high quality digital audio recorder in conjunction with a microphone, preamplifier, adjustable gain power supply, and wind screen. The microphone was mounted on a tripod at a height of 5-6 feet. Power was provided by a 12V battery.

A pistonphone calibrator was used to insert a calibration signal into the recorder. The recorded data was digitized into 1/3 Octave Bands by using a computer based spectrum analyzer. The sensitivity of the analyzer was set using the recorded calibration signal. The field calibrations were performed before and after the measurement set. Drift in system sensitivity, if any was present, was within the allowable tolerance of the system.

This recording and analysis system allowed investigation into any unusually loud noises observed in the measured data. It also provided audio recordings of quiet sounds that would not normally be picked up by sound level meters that only record after a certain threshold sound level is exceeded.

The community and property line noise monitoring was performed for a nominal time period of 48 hours or longer. Some measurement durations were slightly shorter than 48 hours due to batteries running low on power and some data was invalidated by rain. Figure 7.1 shows the noise monitoring positions used for this study.

The recorded data was played back and stored at 0.5 second intervals. Hourly L_{EQ} levels were calculated from the 0.5 second data.

7.2 Measurement Results

Table 7.1 shows the results of the community and property line noise monitoring. L_{EQ} (in dBA) is presented for both daytime and nighttime conditions. The hourly L_{EQ} time histories are plotted in Figures 7.2- 7.24. Notes about the results of the measurements are provided below the 1-hour L_{EQ} graphs.

TABLE 7.1: COMMUNITY AND PROPERTY LINE NOISE MONITORING SUMMARY

Label	Position	Daytime LEQ	Nighttime L_{EQ}	Notes:
NM1	Outside #3	47.1	44.0	
NM2	Near #18	40.3	34.9	
NM3	Under SW Power Lines	44.7	43.8	
NM4	GP#33	43.0	38.2	Excludes the noise caused by mowing/maintenance activities.
NM5	GP#35	42.9	40.0	Excludes the noise caused by mowing/maintenance activities.
NM6	23323 SE 169th	46.6	39.8	
NM7	23327 SE 156th	44.6	37.0	
NM8	16214 230th Ave SE	50.2	37.5	51.3 dBA Daytime L_{EQ} when including final hours on 10/5 with dogs barking/lawnmower. Excludes periods of rain.
NM9	22917 SE 159th	41.4	33.5	Excludes periods of rain.
NM10	20725 SE 162nd Way	48.0	41.9	Excludes periods of rain.
NM11	15809 209th Ave SE	45.5	38.6	Excludes periods of rain.
NM12	Noise Monitor 1	38.7	35.0	Excludes periods of rain.
NM13	Noise Monitor 2	44.7	36.9	
NM14	Noise Monitor 3	39.7	34.1	Excludes periods of rain.
NM15	B2	42.0	41.1	
NM16	C2	40.0	36.6	
NM17	C3	39.0	35.0	Excludes noise caused from shop/sawing activities.
NM18	A1	38.2	34.5	Includes noise generated by NFS.

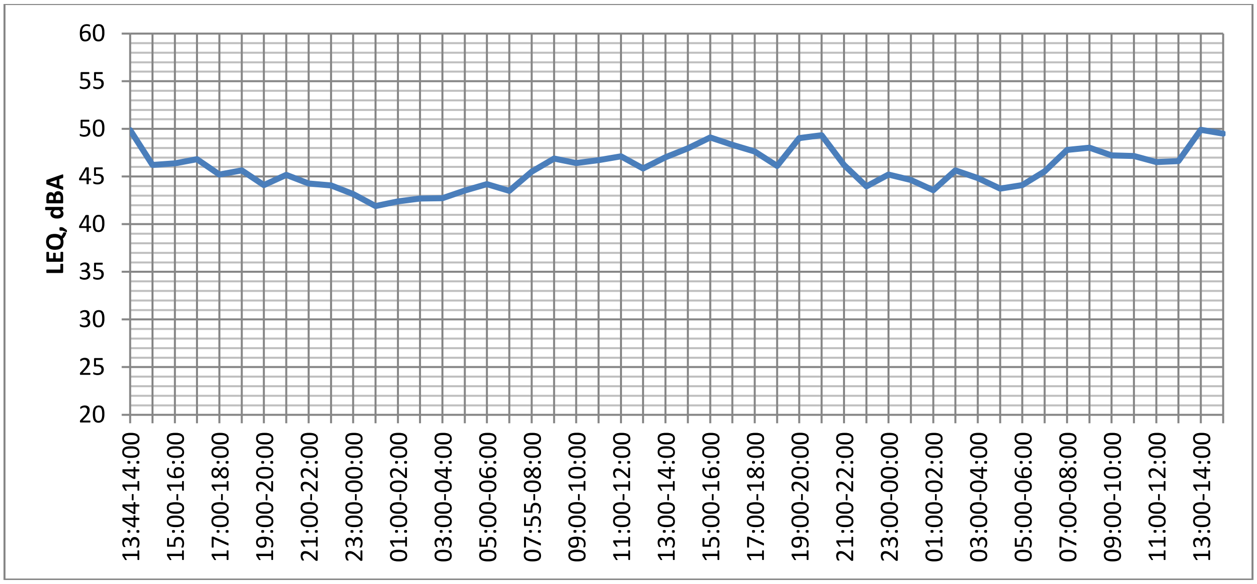
During monitoring periods where rain was a factor, the periods with rain were excluded from the L_{EQ} calculation to avoid unduly influencing the results.

FIGURE 7.1: LONG TERM NOISE MONITORING POSITIONS

Source: Google Earth

Data collected during the NFS noise and vibration study are shown around the northern perimeter of the landfill with red push pins.

FIGURE 7.2:NM1 (OUTSIDE PUMP #3), AUG. 8-10



Notes:

- BEW is currently the most prominent continuous noise source.
- Cars on street to transitional housing adds significantly to noise levels at this location.
- Birds/Insects are intermittently audible.
- This position is about 300 feet inside the property line with fairly dense deciduous trees between the monitoring position and the property line.

FIGURE 7.3: NM2 (NEAR GP#18), AUG 8-10

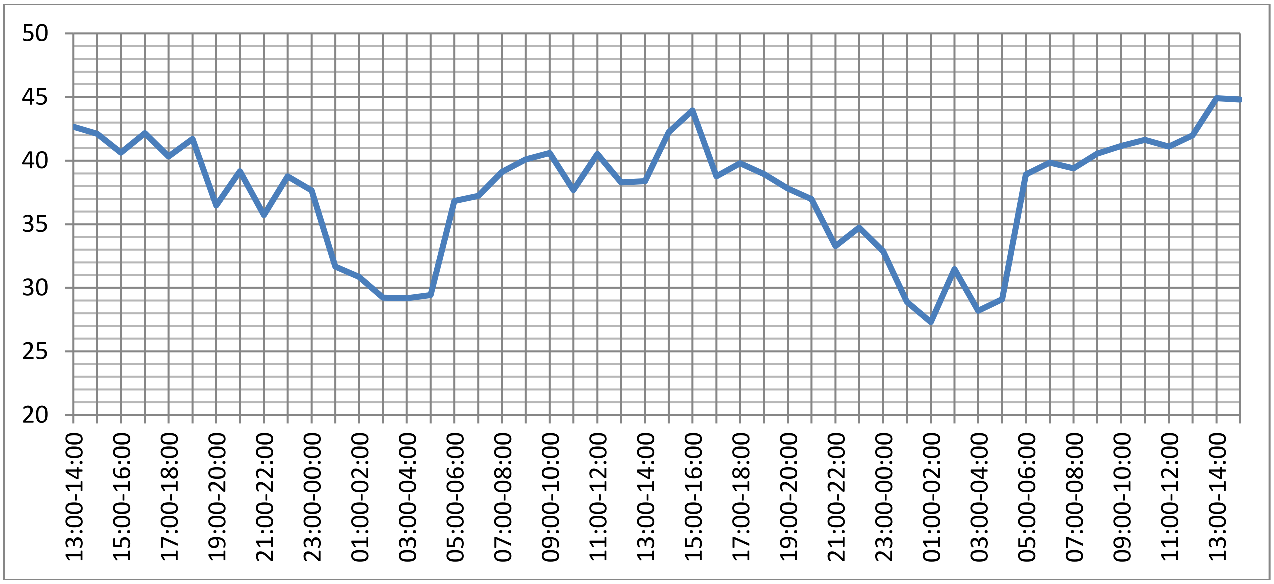


FIGURE 7.4: NM3 (WEST PROPERTY LINE UNDER POWER LINES), AUG 10-12

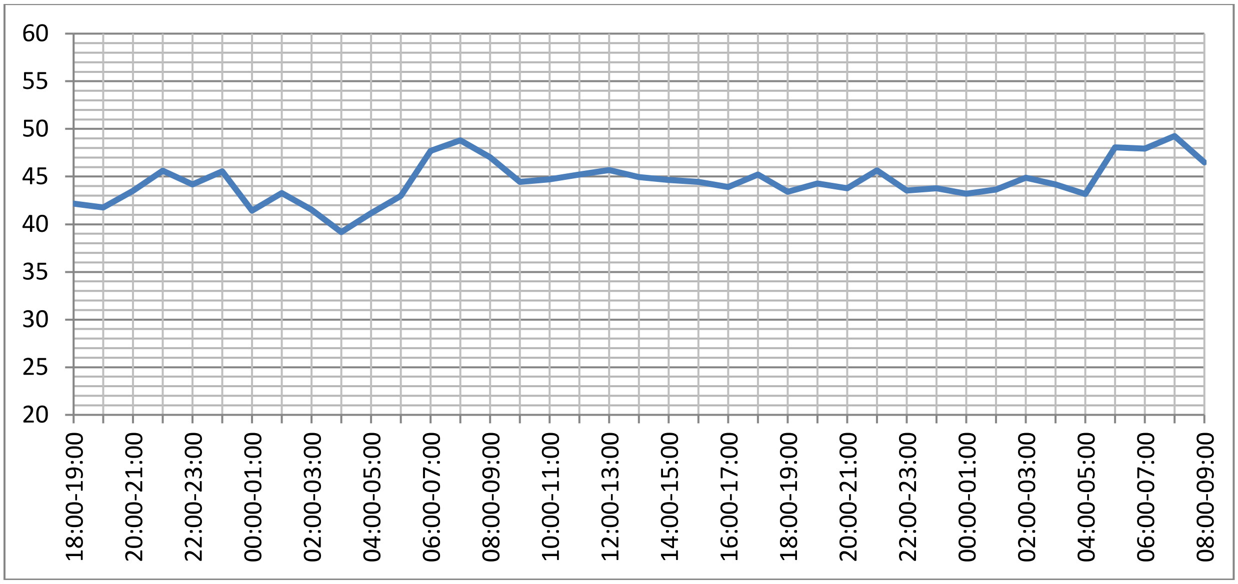


FIGURE 7.5: NM3 (WEST PROPERTY LINE UNDER POWER LINES), AUG 13-15

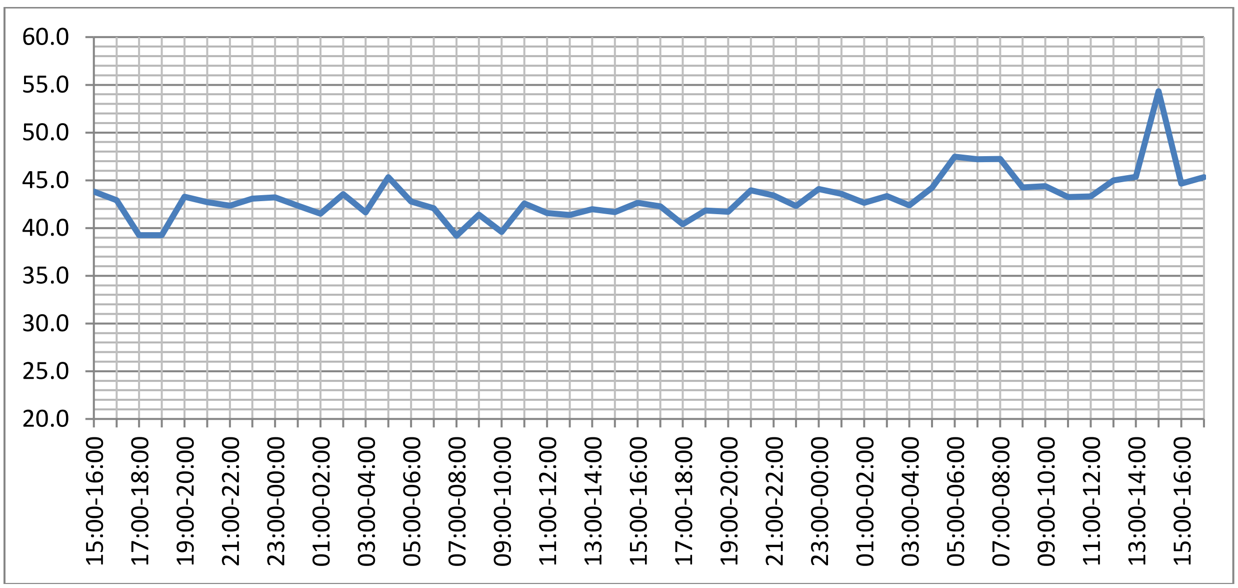
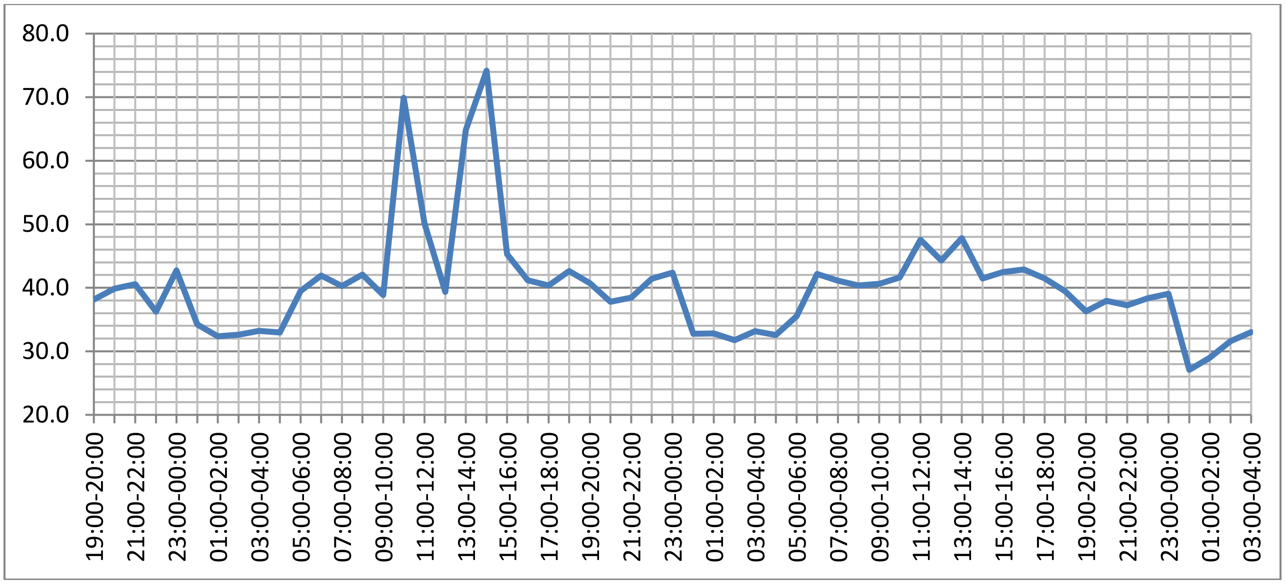


FIGURE 7.6: NM4 (BETWEEN GP#32 & #33), AUG 15-18



Notes:

- The large spikes in the time history were due to some form of maintenance near the microphone station – most likely brush cutting and trimming of grass along the perimeter road around CHRLF. Hours where this was happening were removed from the average daytime L_{EQ} calculations.

FIGURE 7.7:NM5 (NEAR GP#35), AUG 13-15

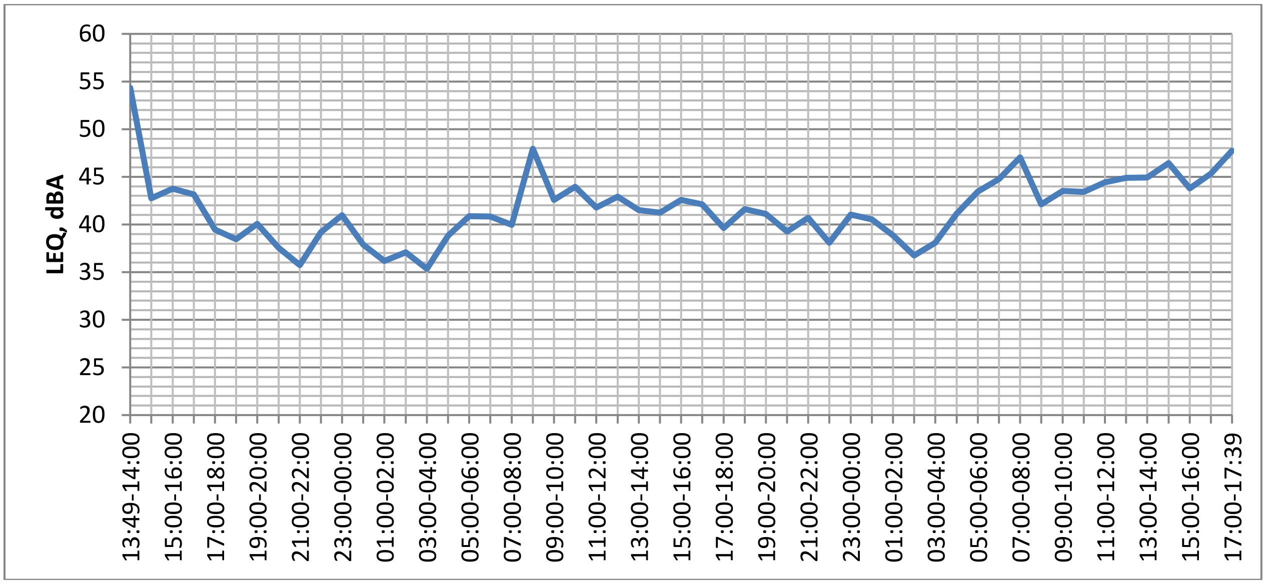
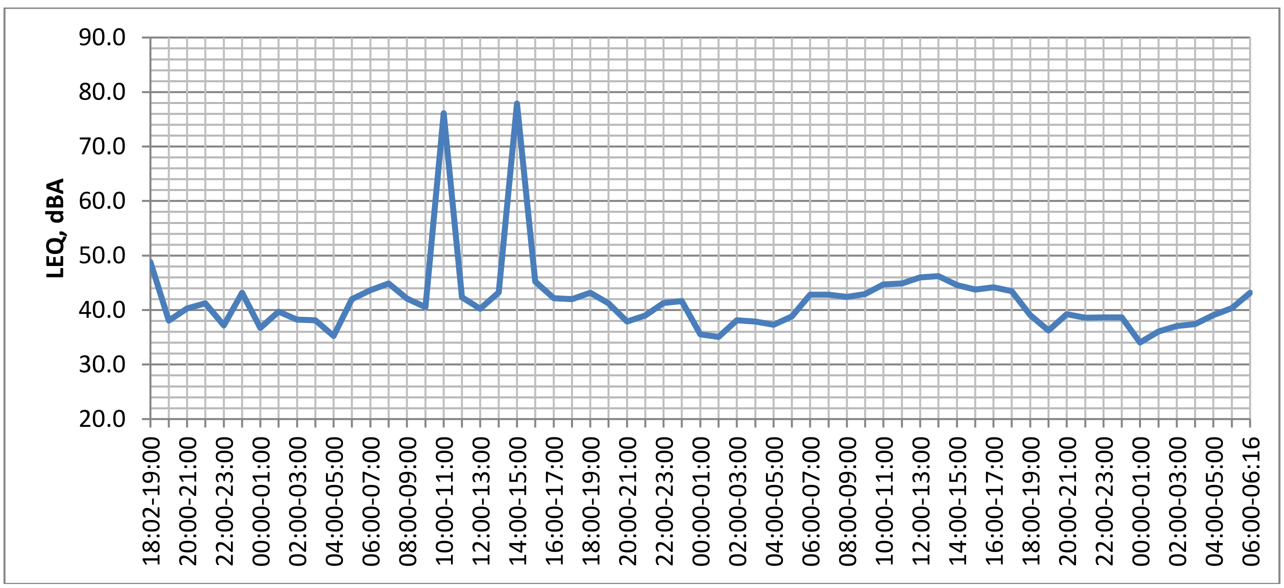


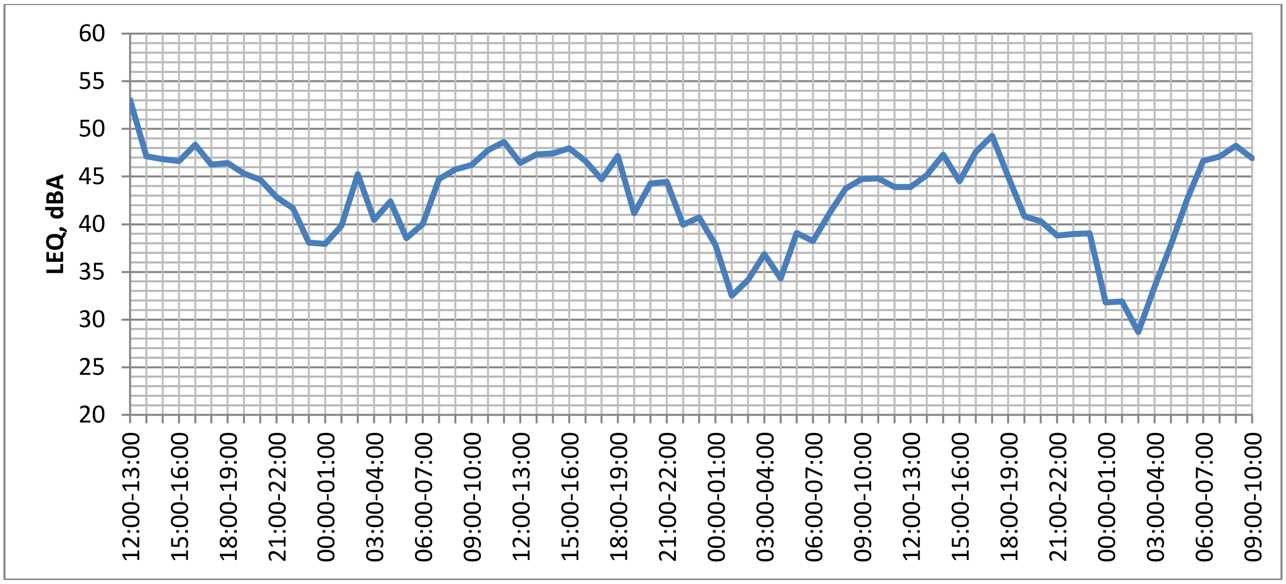
FIGURE 7.8: NM5 (NEAR GP#35), AUG 15-18



Notes:

- The large spikes in the time history were due to some form of maintenance near the microphone station – most likely brush cutting and trimming of grass along the perimeter road around CHRLF. Hours where this was happening were removed from the average daytime L_{EQ} calculations.

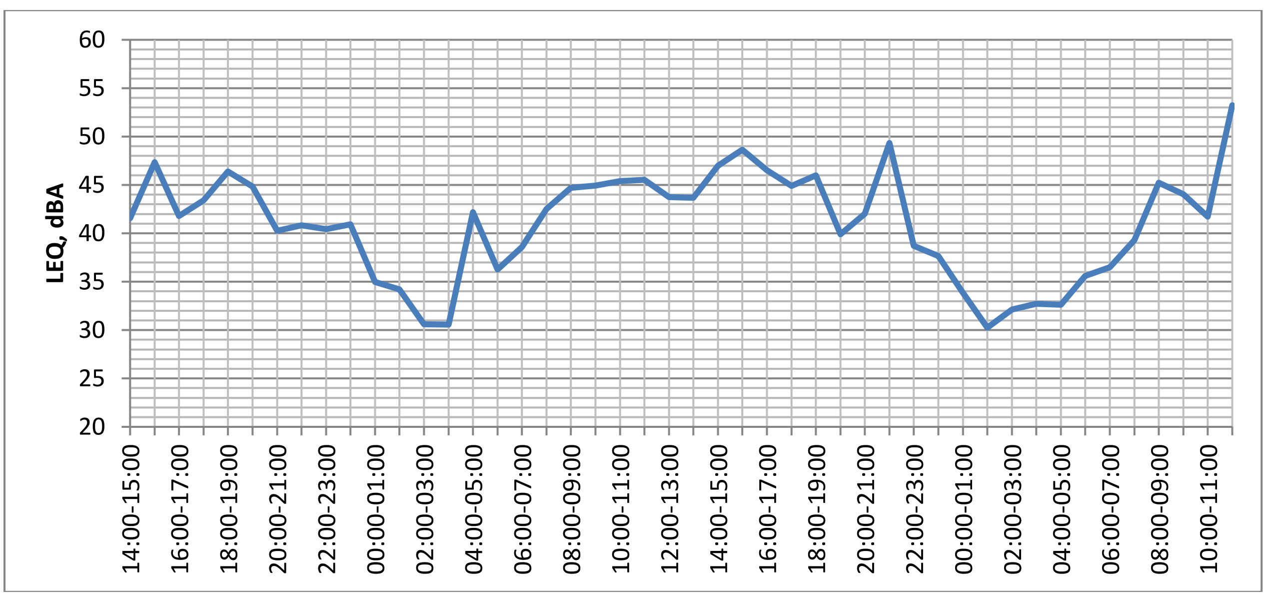
FIGURE 7.9: NM6 (23323 SE 169TH), SEPT 30-OCT 2



Notes:

- Traffic noise is dominant noise source.
- During quiet hours of night, BEW noise is not readily observable. No landfill noise was identified during daytime hours.
- Nighttime sounds included vehicles, owls, raccoons.

FIGURE 7.10: NM7 (23327 SE 156TH) SEPT 30-OCT 2

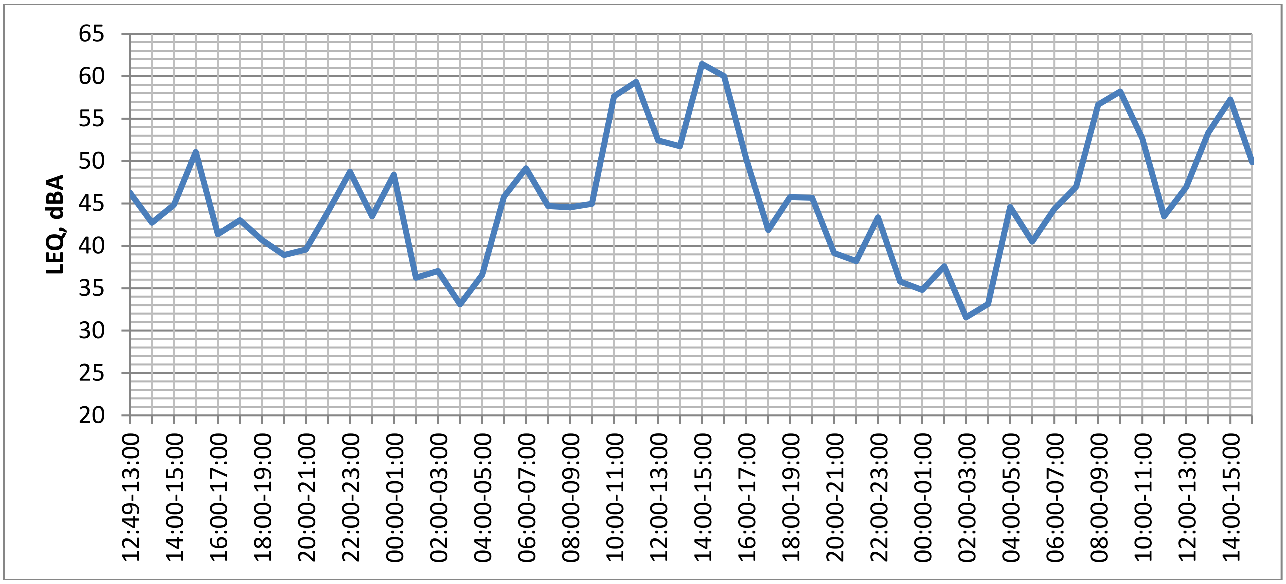


Notes:

- Chainsaw and/or woodworking on 10/2 10:00 – 12:00.

- Planes and automobiles were primary noise sources during morning hours of 10/2.
- Rain/Light Rain evening of 10/1 to morning of 10/2.

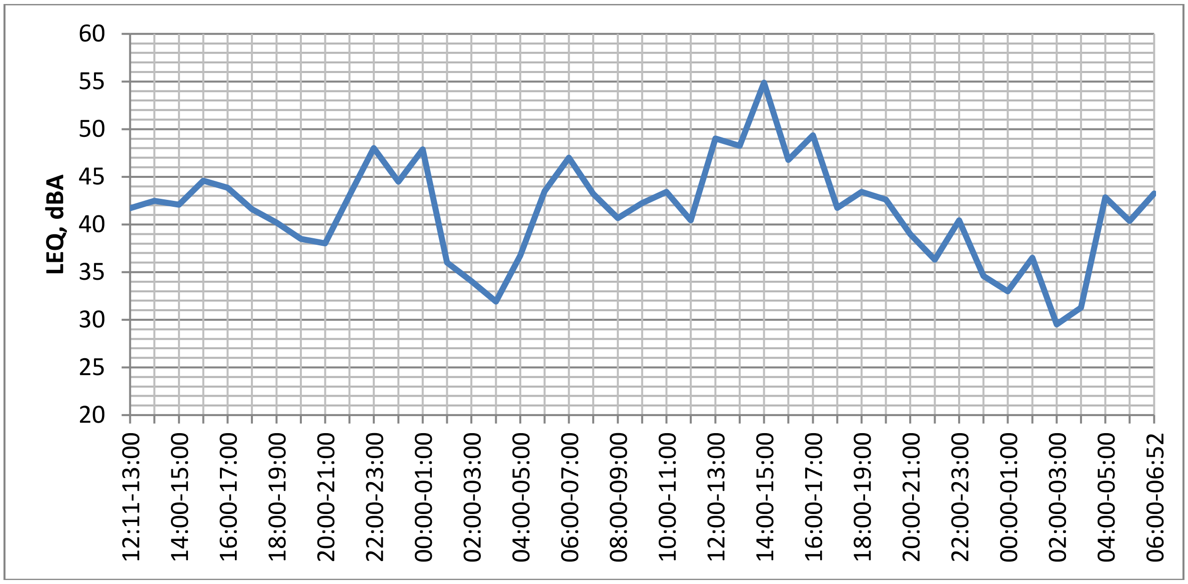
FIGURE 7.11:NM8 (16214 230TH AVE SE), OCTOBER 3-5.



Notes:

- Significant period of rain during this measurement time frame.
- There were dogs in the vicinity that caused occasional high sound levels that influenced the results.
- Data valid as noted below:
    - from start of measurement until 22:00 on October 3.
    - 02:00 to 04:00 OK on October 4.
    - 20:00-22:00 on October 4.
    - 00:00-04:00 on October 5.
    - 09:00 – 15:00 on October 5.

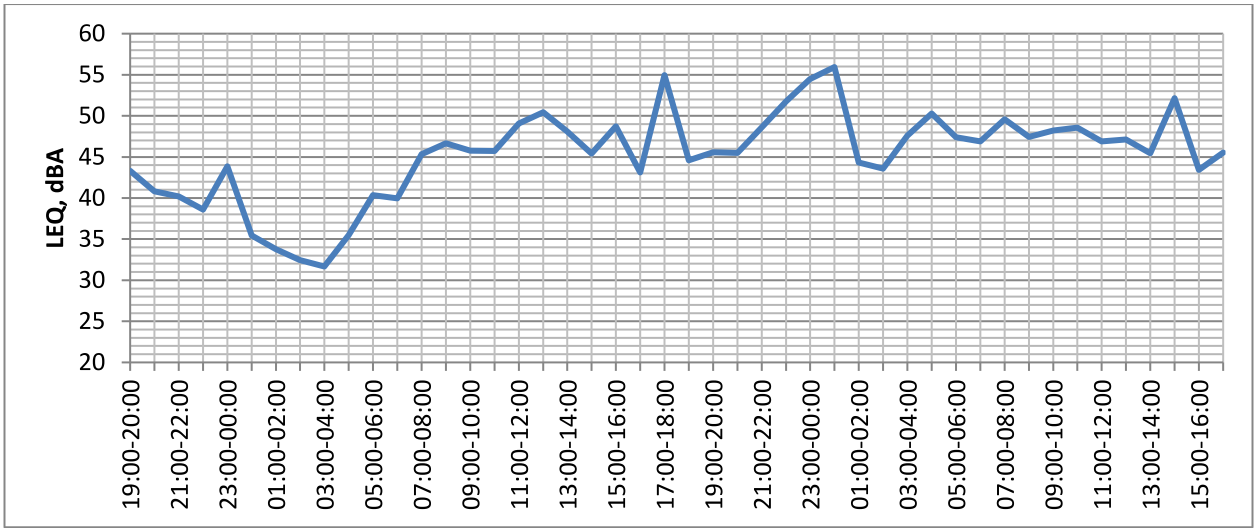
FIGURE 7.12: NM9 (22917 SE 159TH ST), OCT 3-5



Notes:

- Significant period of rain during this measurement time frame
- There were dogs in the vicinity that caused occasional high sound levels that influenced the results.
- Data valid as noted below:
  - until 21:00 on October 3.
  - 02:00 to 04:00 on October 4.
  - 20:00-22:00 on October 4.
  - 23:00 on October 4 to 04:00 October 5.
- Typical daytime hourly L_{EQ} appear to be about 40-50 dBA. During the quietest hours of night L_{EQ} = 30-35 dBA.
- BEW could be heard at some points in the night.

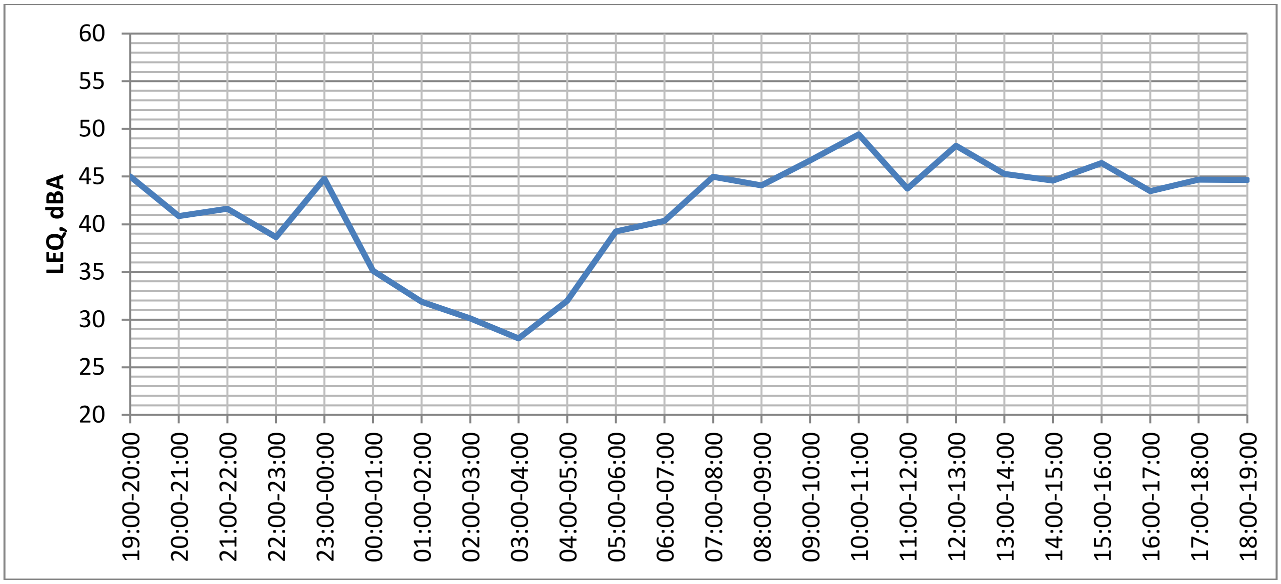
FIGURE 7.13: NM10 (20725 SE 162ND WAY), OCT 5-7



Notes:

- General street traffic was not an issue at this site.
- Most noise was from airplanes, wind, wind chimes, sprinkler systems and other resident activity noises, including dogs barking.
- Rain was a factor from 19:00 on October 6 until 05:00 on October 7. These periods were excluded from average L_{EQ} analyses.
- Some CHRLF heavy equipment noise was heard. It was not readily apparent if it was construction related noise in the southwest corner of the landfill or from activity on top of the landfill associated with the import of new waste.
- The cyclical sounds from the BEW plant could intermittently be heard on the recorded data.

FIGURE 7.14: NM11 (15809 209TH AVE SE), OCT 5-7



Notes:

- Data after 19:00 on October 6 is invalid due to rain and water on microphone surface. The invalid data was not used in the L_{EQ} analysis.
- Cars, aviation, and wind noise were primary noise sources.
- BEW plant was intermittently audible.

7.3 Noise Time Histories from NFS Study

FIGURE 7.15: NM12 NOVEMBER 20 – 23, 2013

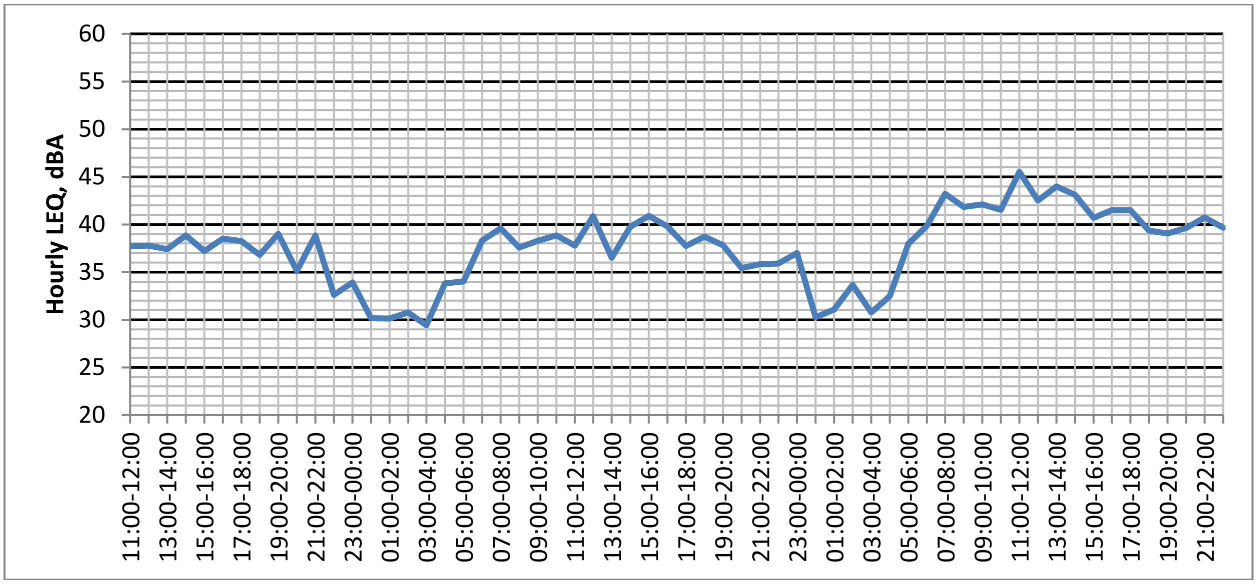


FIGURE 7.16: NM12 DECEMBER 14-16, 2013

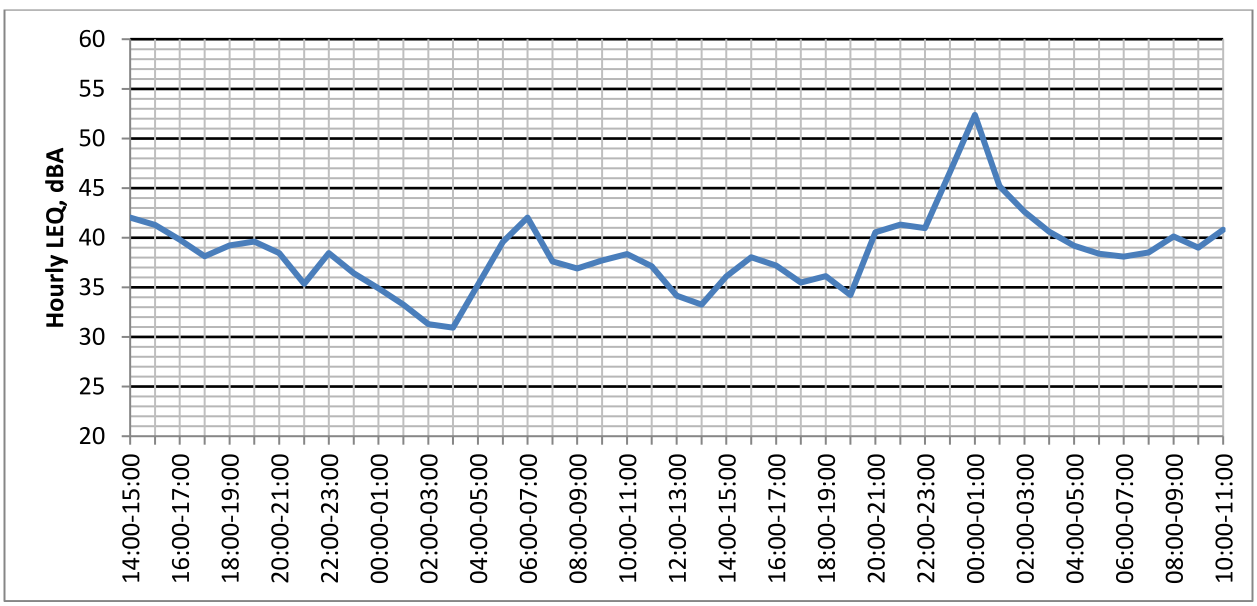
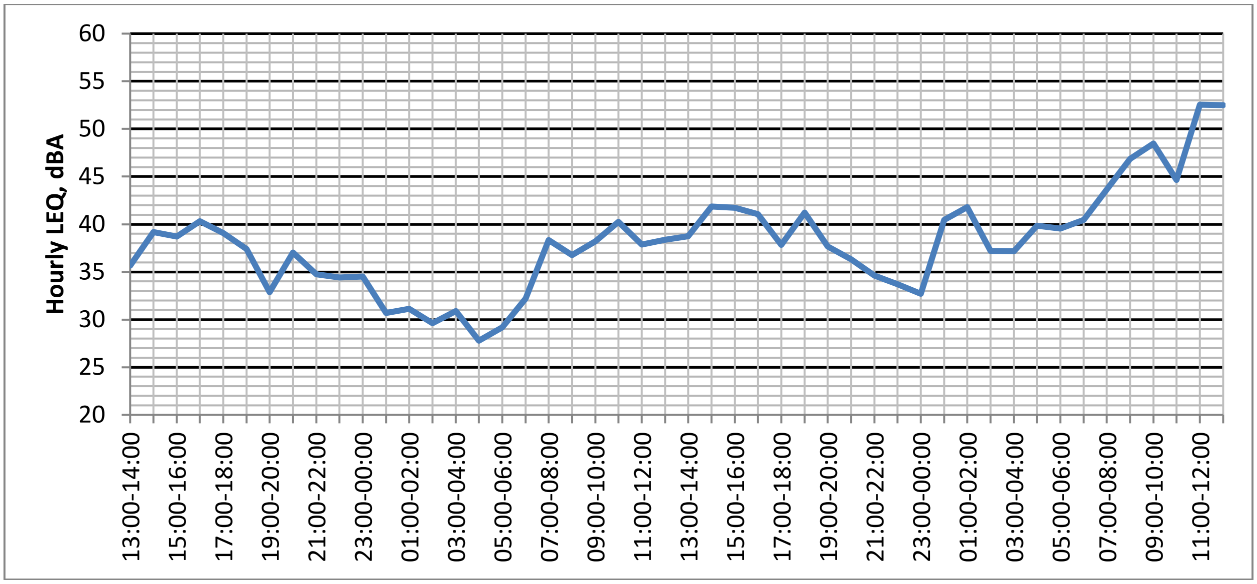


FIGURE 7.17: NM12 DECEMBER 16 – 18, 2013



Notes:

- Rain on December 18 from midnight onward
- Rain on December 15 at 19:00 onward.
- These sections of time were not included in the daytime or nighttime L_{EQ} computations.

FIGURE 7.18: NM13 NOVEMBER 20-23, 2013

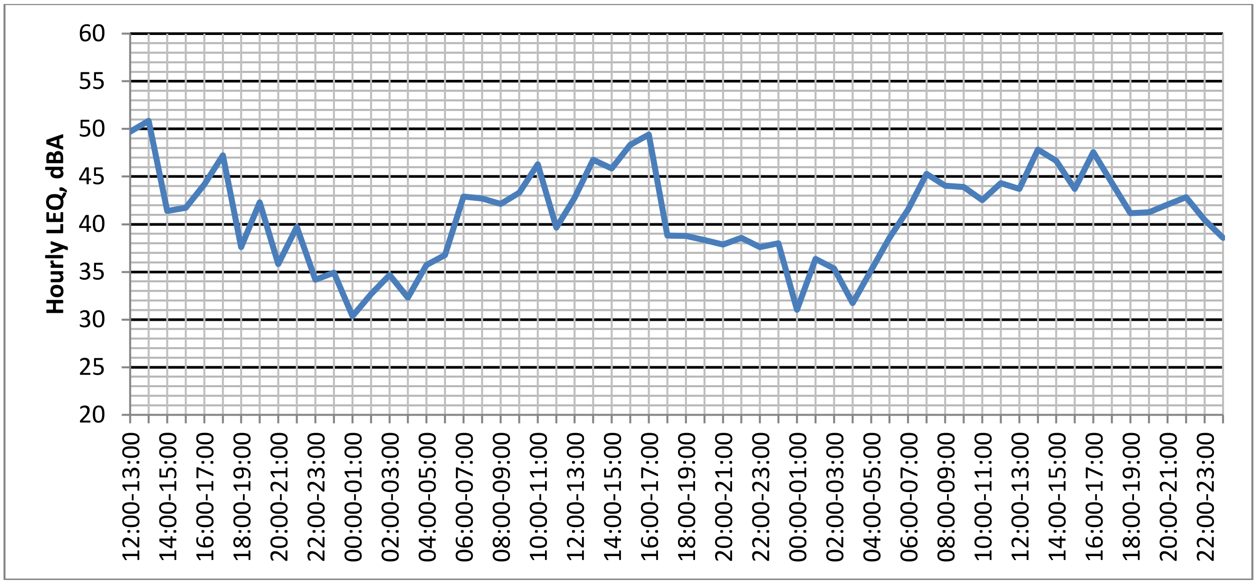
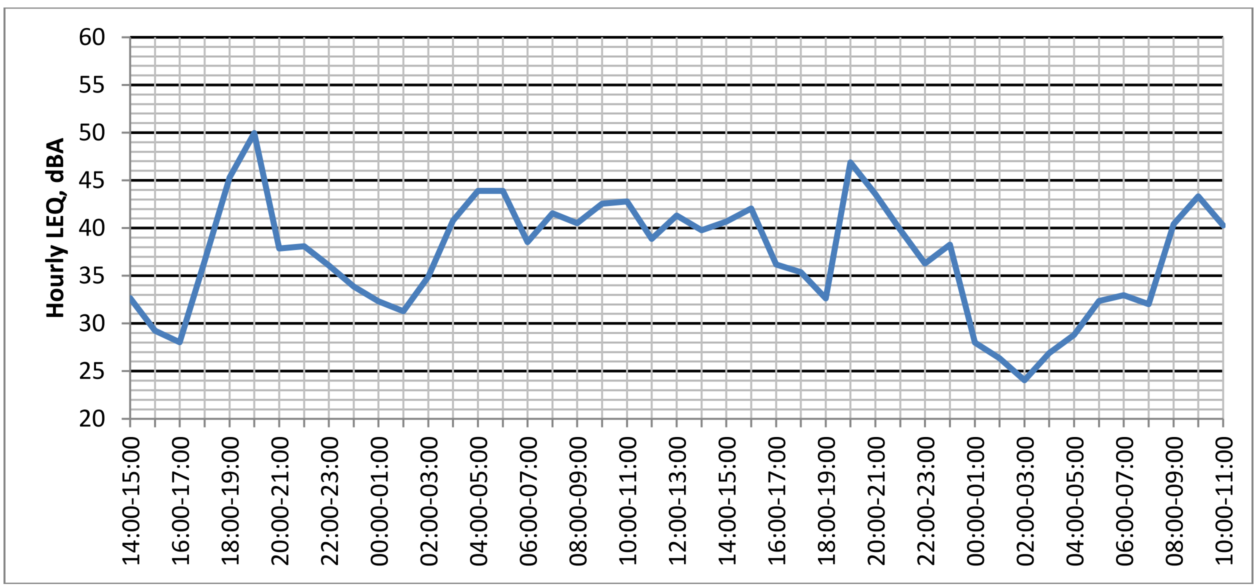


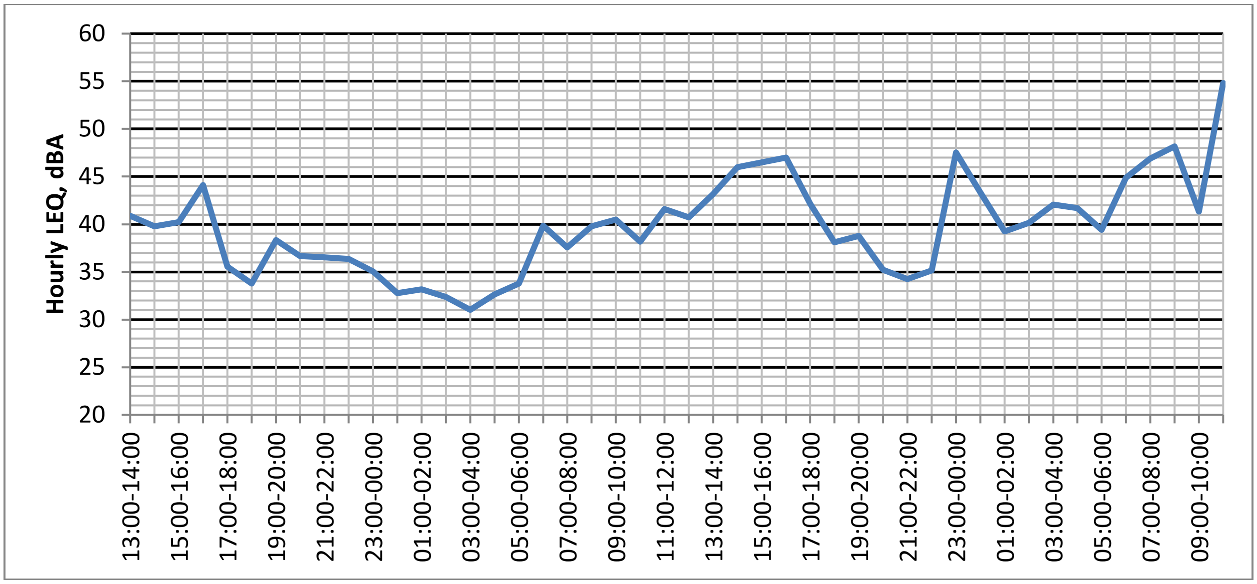
FIGURE 7.19: NM14 DECEMBER 13-15, 2013



Notes:

- Fire trucks on December 13: 18:00-20:00
- Rain from 03:00-06:00 on December 14
- Rain 18:00-23:59 on December 14
- Rain on December 15 07:00 onward.
- These periods excluded from L_{EQ} computations.

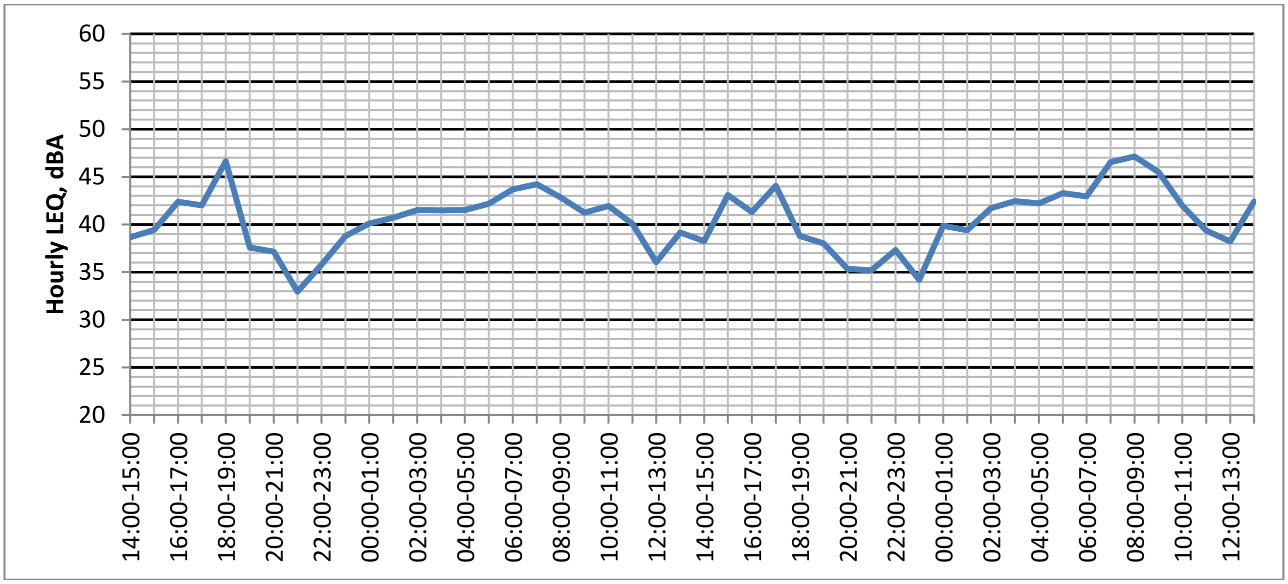
FIGURE 7.20: NM14 DECEMBER 16-18, 2013



Notes:

- Some rain present during measurements – particularly on December 18. Portions influenced by rain were not included in daily L_{EQ} calculations.

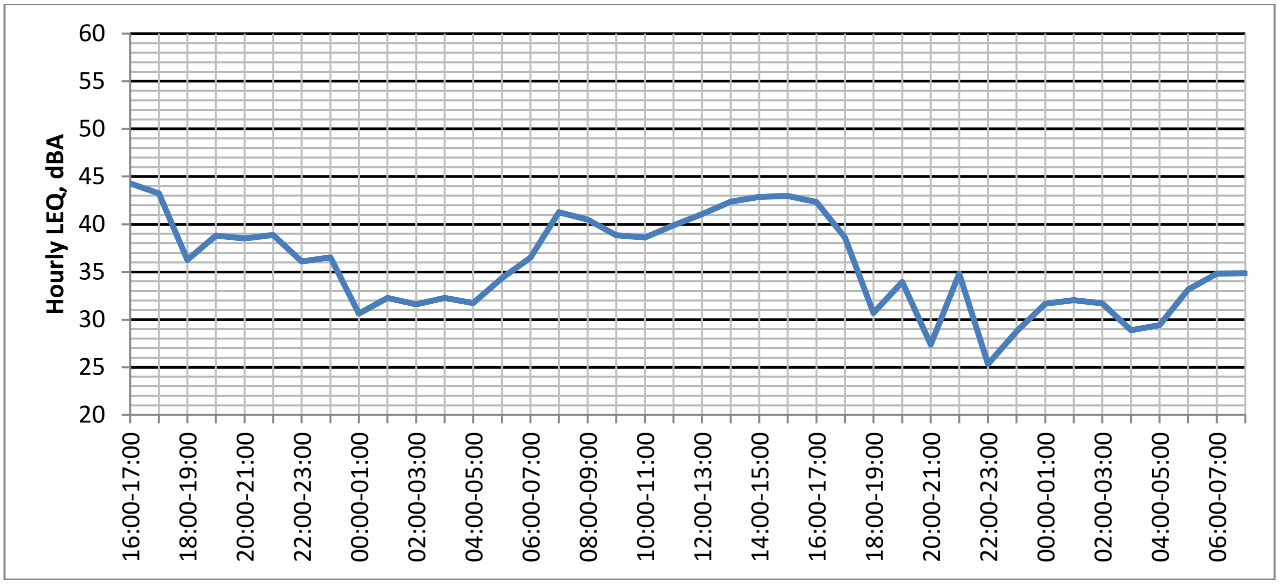
FIGURE 7.21: NM15 OCTOBER 21-23, 2013



Notes:

- Leaves can be heard dropping off tress at some times.

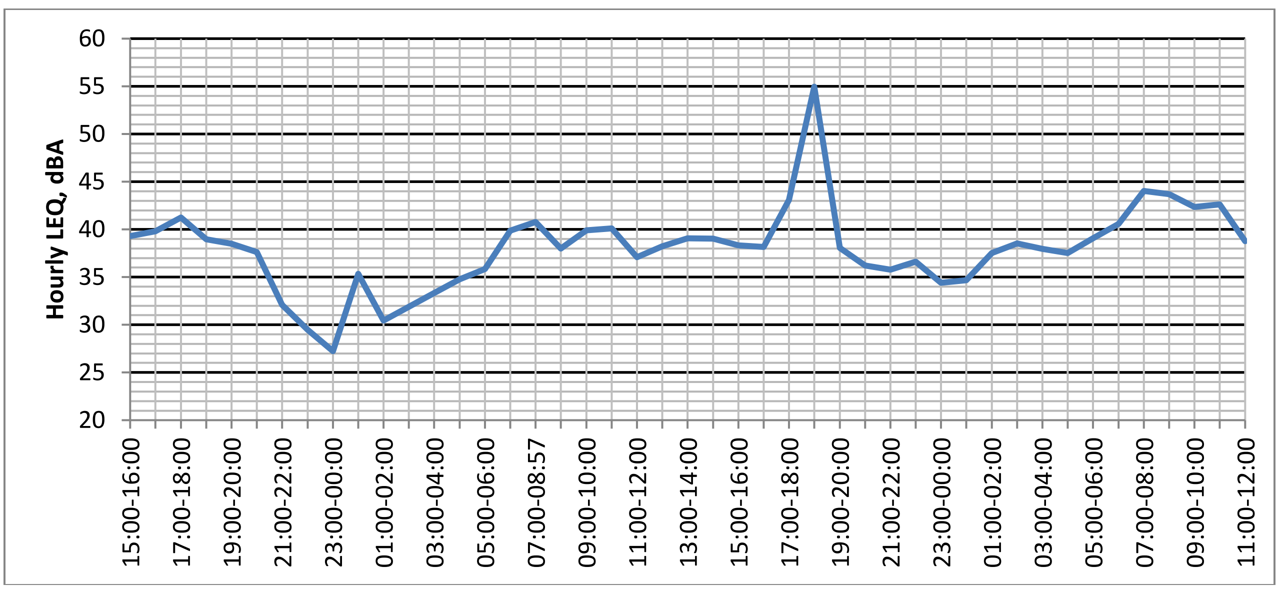
FIGURE 7.22: NM16 OCTOBER 18-20, 2013



Notes:

- Some type of event happening at tree farm. Voices can be heard during the 12:00-17:00 time frame.

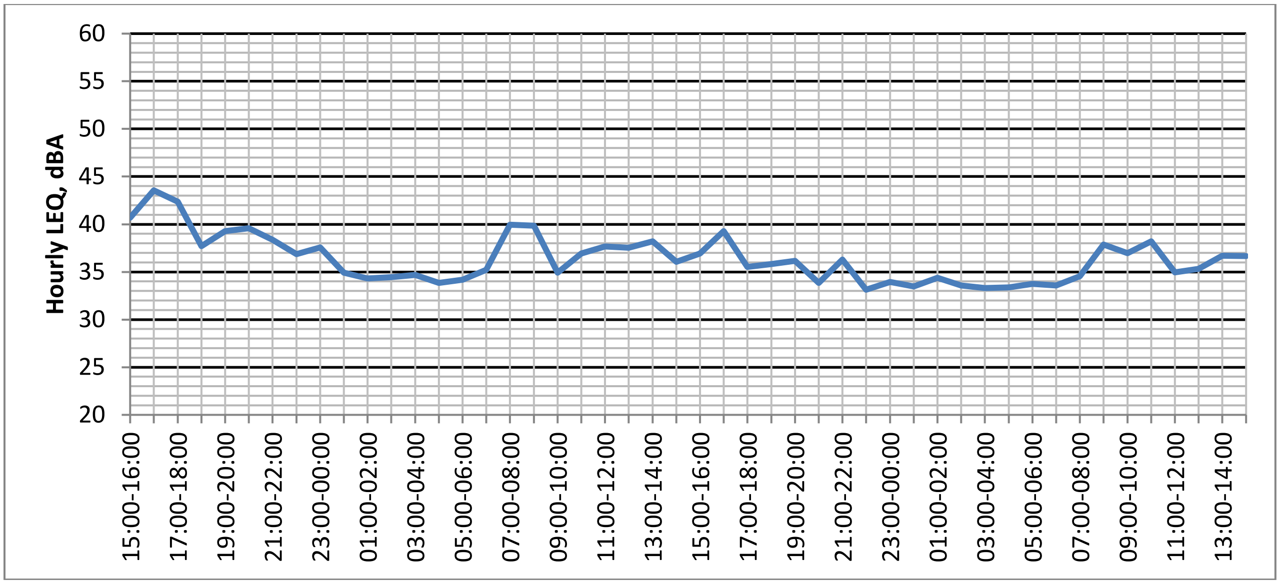
FIGURE 7.23: NM17 OCTOBER 21-23, 2013



Notes:

- The spike in the data from 17:00-19:00 was caused by some form of shop noise (possibly cutting wood) and was excluded from daytime and nighttime average L_{EQ} values for this position.

FIGURE 7.24: NM18 OCTOBER 18-20, 2013



8.0 CHRLF EQUIPMENT SOUND LEVELS

Noise levels of the equipment at CHRLF were measured for the purpose of determining the sound power level (L_W) which would be used in the noise projection model. 1/3 Octave Band Sound Power Levels were calculated for the following equipment.

- Semi-trucks
  - At various angles relative to the truck centerline at idle condition
  - At relatively slow speed (about 20 mph) near the front gate. Including data from both uphill and downhill travel.
  - At higher speeds (about 30 mph). Including data from uphill and downhill travel.
- Active landfill area which included the following:
  - a dual trailer tipper
  - 2-3 large bulldozers
  - 2 compactors
- Scrapers
- Articulated Haul Trucks
- A rock screen and excavator.
- The North Flare Station (NFS).
  - Large flares
  - Pumps and blowers at ground level
  - Candle stick flare.
- BEW. Directivity determined from measurements in 4 directions.
- Automobile / Personally Owned Vehicle (POV) traffic noise
- Truck Wash
- CAT Shack / heavy equipment repair station
- Maintenance Facility Noise
  - Maintenance End
  - Fabrication End
  - Pressure Washing

Truck noise was measured in two settings. One set of measurements was made on the west-northwest side of the landfill as trucks were out of the confines of the office/scales and were travelling at a higher speed. Noise measurements were made with trucks going uphill and downhill.

The second set of truck measurements were made near the PSE pipeline right of way just outside the security fence near the southeast corner of the landfill. These measurements also evaluated trucks going uphill and downhill, but at a generally slower speed than around the back of the landfill.

In both cases, the sound levels from the uphill and the downhill passes were averaged over an equal number of passes in the development of the truck sound power levels used in the noise model.

The active landfill area was evaluated by recording data 135 yards from the acoustical center of the landfill activity. This was where the two compactors were operating and to where the large bulldozers would push material. The noise associated with the tipping of the trailer and waste falling out of the back of the trailer to the ground was minimal in comparison with the continual compactor and bulldozer noise. Additionally, a smaller D6 size bulldozer was working the area below the compactors. The smaller bulldozer and the compactors were deemed to be the primary noise generating sources during these measurements.

During analysis for the proposed Area 9 it was necessary to separate the noise from the tipper(s) and noise from the other components of the active landfilling area. In this case we used the sound power levels calculated in Reference 9 for the tipper and conservatively maintained the sound power levels of the other components.

Scraper noise was evaluated by measuring contractor scrapers as they crested the hill on the access road built during the Area 8 excavation. The contractor's scrapers were in near continuous operation and were of similar make and size compared to the models used by CHRLF (both variants of the Caterpillar 627). Measurements were taken in both the uphill and downhill direction.

Similarly, noise from articulated haul trucks was taken from contractor trucks during the Area 8 excavation. An average of uphill and downhill measurements was used in the determination of the sound power level. Late in the analysis process, the Caterpillar representative did provide manufacturer rated sound level for the articulated trucks that the county has previously rented. The manufacturer's stated sound level was slightly less than the value measured from the contractor's trucks, but did not warrant revisiting the noise computations since the articulated truck noise was not the principal cause of any mitigation.

A rock screen is also used in the general vicinity of the active landfill area to sort material for cover and for road material.

North Flare Station noise levels were evaluated in 2013/2014 and the results were presented in Reference 2. Individual sound power levels were calculated for the flares, the primary candlestick, and the pumps and blowers area. The sound power levels are included with the results from the measurements taken for this analysis in Tables 8.1 - 8.4.

The NFS blowers had significant noise treatment applied to them in 2012/2013. The NFS large flares are run only occasionally when BEW is not taking all of the available gas. The noise analysis presented conservatively assumes there are three flares operating continuously. One candlestick is in continuous operation. The other only runs very infrequently and was not included in the noise analysis.

BEW sound power was evaluated by long term measurements in three locations; additionally, a fourth location was used for a short term monitoring period. The multiple locations were deemed necessary because the emitted sound appeared to vary significantly from one side of the facility to another. Forty-eight-hour monitoring was performed at the positions marked BEW North, BEW East, and BEW West in Figure 8.1. Measurements were also taken at the BEW South positions over the course of about 30 minutes when no truck or other extraneous sources were audible.

CAT shack noise was monitored while there was a scraper being worked on. For the vast majority of the time, there was no sound from the CAT shack. For about 15 minutes out of an hour, the scraper engine was running either a high or low power setting. The levels for the CAT shack reflect these conditions. Further, the repair station is really just 3 sided building, so noise data was taken that accounts for the reduction in sound level as one moves around the building.

The truck wash was not a prominent noise source. The wash cycle lasted about 2 minutes. The noise model reflects the slight directivity due to differences in entrance-side and exit-side sound levels.

Not all data collected during the BEW monitoring was used in the analysis, since there are other variable noise sources around the site during the day that contaminate the data. Instead, the noise levels from quiet portions of the nighttime noise monitoring were used.

Manufacturer data was used when estimating noise level of the large excavator on site and the potential HVAC noise for the administrative and maintenance buildings.

Measurements made during the BEW South monitoring were marked to identify when trucks or other sources were audible. Only times where BEW was the sole significant noise source were analyzed.[3]

[3] There were birds present in the vicinity during BEW South monitoring. The birds' chirp was effectively continuous due to the large number of birds and was focused in the 6300 and 8000 Hz. 1/3 Octave Bands. These bands are not critical from a county noise code perspective, so the level in those bands was approximated by interpolation between the 5000 and 10000 Hz bands. This produced a high frequency roll-off typical of industrial noises.

FIGURE 8.1: BEW NOISE MONITORING POSITIONS

There is a door near the southeast corner of the BEW plant that is sometimes open for hours at a time. The noise emitted to the east is significantly louder when that door is open. The door was open when the noise monitoring at BEW East was started, but was closed approximately two hours later and generally remained closed for the duration of the measurement period. Sound power levels on the east side of BEW are presented for both the door open and closed conditions. However, noise modeling presented in Section 9.0 was carried out for the door closed condition since that appears to be the most common operational configuration (BEW has indicated that the door is usually open only during shipping or receiving of goods into BEW, but may also be open during unusually hot weather). Community noise levels to the east of BEW are nominally expected to be about 9 dBA louder than the levels presented herein, when that door is open.

At the time of the noise measurements, BEW was unable to provide any type of noise data for the flare at their facility and the flare was not operational during our site visits nor was it scheduled to be operational for any maintenance operations anytime soon. Thus, data does not exist for its operation in its current configuration and its impact on the community noise level was not modeled. In any case, it is not a noise source that is normally operational.

The calculated sound power levels resulting from these measurements are presented in Tables 8.1 - 8.4. Measurements were taken over several visits to the site between September 9 and October 20, 2016.

TABLE 8.1: EQUIPMENT SOUND POWER LEVELS (L_{EQ})

Frequency	Active Area Lw	Excavator Lw	Screen + Excavator Lw	Scraper Lw	Articulated Truck Lw	Tipper	Truck Sound Power (fast)	Truck Sound Power (slow typ))	Truck Sound Power (slow DH)
	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ
12.5	109.5		100.1	106.0	105.1		103.7	101.4	100.7
16	107.9		101.2	102.1	100.7		108.3	108.1	110.6
20	106.9	99.4	100.6	100.6	100.3		108.9	107.7	110.1
25	108.8	99.4	102.1	100.8	96.3	101.9	110.0	105.7	107.9
31.5	111.3	99.4	104.4	101.4	101.2	101.9	108.5	105.7	107.7
40	110.6	99.4	103.1	103.1	107.7	100.5	107.9	104.8	106.7
50.0	109.0	99.4	106.6	103.1	103.8	99.1	105.6	103.5	104.3
63.0	107.4	99.4	113.8	103.6	103.0	97.7	108.6	104.5	99.8
80.0	108.9	100.4	112.3	106.0	106.2	99.6	108.0	104.6	99.6
100	107.3	101.4	110.0	108.5	105.6	101.5	103.3	103.2	100.0
125	103.8	102.4	103.4	104.2	107.0	103.4	102.6	104.3	99.5
160	102.5	101.7	105.4	108.2	102.3	104.8	104.1	104.9	100.9
200	100.0	101.0	110.7	104.8	100.3	106.2	103.5	103.9	103.0
250	98.8	100.4	108.8	104.5	100.5	107.5	95.9	101.9	98.8
315	102.3	99.7	108.7	105.8	102.9	105.2	98.1	101.6	97.2
400	106.4	99.0	107.8	109.2	102.3	102.9	101.9	100.3	96.5
500	107.8	98.4	110.5	107.1	102.6	100.5	103.8	95.3	91.8
630	106.7	97.7	109.5	105.1	101.6	100.2	104.7	95.1	92.0
800	105.0	97.0	105.4	105.8	102.7	99.9	105.4	95.9	91.8
1000	103.8	96.4	107.5	105.3	101.8	99.5	105.0	96.3	93.0
1250	103.8	95.4	106.2	104.5	101.7	99.1	103.3	96.5	92.3
1600	102.9	94.4	105.0	103.8	101.0	98.7	101.1	96.2	91.9
2000	102.3	93.4	104.1	103.5	99.9	98.2	100.4	95.7	90.9
2500	101.3	92.0	103.6	103.2	99.4	97.1	99.7	96.2	89.3
3150	100.8	90.7	102.9	100.5	99.9	96.0	97.1	95.0	88.2
4000	102.2	89.4	101.6	98.1	97.7	94.8	94.4	92.5	85.9
5000	101.0	85.7	99.0	95.8	96.1	93.4	92.3	90.9	84.5
6300	95.7	82.0	95.5	93.4	93.7	91.9	89.4	89.3	83.5
8000	93.8	78.4	93.0	91.7	91.1	90.4	86.1	87.8	81.2
10000	89.9	74.7	90.8	91.9	89.0	90.4	85.4	87.4	79.1
LwA	114.5	106.0	116.7	114.9	111.8	110.2	112.7	107.4	103.0

Note: The Slow Truck sound power is applicable near the entrance gate, around buildings, on top of the landfill or when reduced speeds are specified as mitigation. The Fast Truck sound power levels are applicable in other circumstances.

TABLE 8.2: FACILITIES SOUND POWER (L_{EQ})

Frequency	BEW North	BEW East	BEW South	BEW West	BEW East Door OPEN	Candle stick	NFS Blowers	Flares	
	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	
12.5	126.4	121.3	116.5	119.4	120.0	107.8	82.1	123.4	
16	119.1	115.5	110.0	114.1	115.1	108.5	82.1	122.0	
20	111.3	107.7	102.2	104.6	108.0	109.2	82.1	116.7	
25	109.9	106.9	107.4	104.1	108.1	110.6	85.6	112.2	
31.5	112.4	110.0	105.9	108.8	108.8	112.4	85.6	110.9	
40	113.4	109.0	104.9	112.7	108.4	111.8	87.6	109.9	
50.0	109.6	108.2	104.3	110.3	108.0	109.3	87.6	103.7	
63.0	110.2	111.6	108.0	116.2	110.7	107.4	86.6	98.4	
80.0	105.7	108.7	105.9	112.2	108.2	102.9	86.6	87.0	
100	106.4	108.7	106.0	113.5	107.0	98.6	85.6	83.4	
125	103.7	102.2	110.4	107.8	107.0	95.2	85.6	80.4	
160	102.5	100.2	103.7	107.1	110.3	96.5	85.1	80.8	
200	102.8	101.5	101.5	108.0	103.2	99.2	85.1	79.7	
250	101.8	104.5	96.0	105.4	106.0	93.4	85.1	72.6	
315	99.4	104.1	92.6	102.5	106.3	87.3	85.6	71.6	
400	104.3	105.9	95.0	106.0	111.8	86.9	85.3	69.8	
500	113.8	102.8	93.7	102.7	107.1	90.7	85.2	70.3	
630	103.2	100.2	94.2	107.7	108.4	86.0	87.6	74.3	
800	104.2	102.3	94.9	109.2	110.9	85.3	86.1	70.5	
1000	103.9	99.8	94.2	105.6	109.9	83.6	87.9	70.0	
1250	99.6	95.8	92.0	103.8	106.2	84.6	83.3	68.9	
1600	98.0	95.8	91.3	103.7	108.8	82.6	81.0	67.7	
2000	97.3	93.8	90.7	104.3	106.7	77.6	80.5	66.2	
2500	99.1	93.8	89.9	102.4	105.2	75.3	79.7	63.9	
3150	94.7	89.8	88.6	98.3	103.1	74.9	77.9	61.6	
4000	95.9	89.6	87.0	97.7	99.4	74.3	75.4	58.9	
5000	91.7	85.2	86.0	95.3	96.4	71.9	73.2	55.5	
6300	95.9	83.8	83.0	91.4	95.1	70.4	71.7	55.4	
8000	91.0	80.5	80.5	90.2	102.2	68.9	68.8	53.0	
10000	83.5	71.9	78.4	86.8	89.5	67.4	67.3	52.8	
LwA	113.9	109.3	103.9	115.1	118.2	94.5	93.3	80.4	

TABLE 8.2: FACILITIES SOUND POWER (LEQ)

Frequency	Truck Idle 0	Truck Idle 90	Truck Idle 125	Truck Idle 165	POV Sound Power	CAT Shack High Power 0	CAT Shack High Power 90	CAT Shack High Power 180	
	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	
12.5	95.1	100.3	86.7	95.5	107.3	100.1	101.0	94.8	
16	96.3	91.7	81.8	89.6	103.7	95.6	96.4	92.8	
20	97.8	89.9	79.8	90.3	94.9	92.5	91.5	90.2	
25	94.3	99.7	87.6	88.2	99.8	92.6	93.5	88.2	
31.5	109.6	103.2	110.4	108.3	90.1	104.3	101.8	90.2	
40	90.5	96.9	93.5	100.4	88.9	101.4	99.5	88.6	
50.0	92.5	94.5	89.4	94.8	82.7	98.5	101.6	102.2	
63.0	92.8	93.4	94.0	94.7	80.3	102.1	98.4	95.6	
80.0	90.0	90.5	86.1	91.1	83.9	100.3	101.1	95.4	
100	90.4	91.5	87.7	92.2	86.0	112.5	107.1	104.7	
125	87.7	89.3	93.7	86.1	82.2	114.2	100.8	103.5	
160	95.3	88.6	87.9	85.4	82.6	109.5	98.5	97.6	
200	92.7	88.8	85.9	85.8	86.4	114.9	106.3	106.4	
250	92.2	88.6	89.7	84.6	83.3	105.0	101.8	93.2	
315	95.5	88.8	89.4	85.2	83.4	106.5	102.6	87.4	
400	94.7	91.7	90.8	87.3	85.6	116.1	106.2	96.7	
500	91.5	91.1	88.9	89.1	84.7	108.5	105.3	93.2	
630	89.8	90.7	89.0	88.6	88.6	105.7	105.6	86.6	
800	90.8	89.7	89.3	88.4	92.5	108.0	102.5	90.0	
1000	90.8	90.4	88.9	89.0	92.7	107.4	102.4	90.9	
1250	88.5	91.9	87.4	85.5	90.8	107.5	101.6	88.9	
1600	91.6	90.5	88.3	85.1	90.5	108.3	101.4	90.5	
2000	87.9	89.6	87.2	85.7	87.8	105.4	99.1	87.4	
2500	86.7	86.3	85.2	81.2	82.8	103.4	96.9	85.6	
3150	85.9	86.4	84.9	78.9	79.4	102.8	95.7	83.5	
4000	83.7	82.7	82.4	74.0	77.8	100.8	93.6	78.0	
5000	80.8	81.6	80.7	73.4	75.4	98.2	91.3	77.0	
6300	79.6	81.4	79.6	70.1	71.7	95.6	88.9	75.3	
8000	82.1	82.9	74.9	66.7	70.6	94.8	87.5	74.4	
10000	73.8	85.1	73.8	63.7	67.1	92.3	84.8	72.2	
LwA	100.4	100.2	98.3	96.3	99.2	118.0	112.0	101.5	

Note: Where numbers are present in the header row following the description, this indicates that the source has a direction component. The numbers indicate the angle relative to the centerline of the truck or in the case of the CAT shack, the angle relative to the open side of the building.

TABLE 8.2: FACILITIES SOUND POWER (LEQ)

Frequency	CAT Shack Low Power 0	CAT Shack Low Power 90	CAT Shack Low Power 180	Maintenance East	Maintenance West	Maintenance Pressure Wash	12.5-Ton HVAC	Truck Wash Entrance	Truck Wash Exit
	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ	LEQ
12.5	101.2	101.4	95.9	94.9	93.4	107.4		90.5	95.1
16	93.6	96.0	90.8	93.4	92.8	105.0		87.9	93.9
20	91.0	94.1	88.8	93.2	91.0	102.3	84.8	94.1	92.9
25	91.2	91.6	86.8	93.3	89.9	102.4	87.8	89.6	92.8
31.5	117.4	112.0	103.3	106.6	99.5	109.6	87.8	95.8	100.1
40	113.0	111.1	100.1	100.8	90.8	106.1	87.8	92.3	97.6
50.0	92.2	97.3	95.9	104.5	92.0	120.3	87.4	93.0	96.7
63.0	102.4	99.7	95.9	95.2	95.4	108.4	87.4	95.4	96.6
80.0	96.4	98.3	91.5	94.1	88.3	104.6	87.4	94.1	93.6
100	94.1	91.3	86.3	97.8	89.2	113.4	79.1	90.0	94.2
125	97.6	86.2	86.9	96.7	87.7	111.4	79.1	87.7	93.4
160	95.2	83.2	83.3	94.5	84.2	107.5	79.1	88.5	94.6
200	91.7	87.6	83.2	90.8	84.3	104.0	75.6	88.5	93.1
250	92.1	88.5	80.2	88.3	83.0	101.3	75.6	87.0	92.9
315	96.9	88.3	77.7	88.4	81.8	99.3	75.6	88.1	92.9
400	97.0	89.5	77.6	88.0	82.4	98.0	77.0	89.2	92.8
500	94.5	92.4	79.1	87.2	83.1	98.0	77.0	90.9	92.9
630	97.5	93.9	78.5	86.5	81.6	97.7	77.0	90.8	93.2
800	97.6	93.3	79.6	87.2	81.3	95.9	73.9	92.1	93.6
1000	99.0	96.0	82.6	85.6	80.4	95.6	73.9	93.0	94.9
1250	96.5	92.2	77.9	86.0	80.6	96.3	73.9	93.5	95.4
1600	95.8	89.7	78.0	86.3	81.0	94.7	71.7	94.0	95.9
2000	95.6	88.6	77.6	84.1	83.8	94.7	71.7	93.3	95.0
2500	90.8	84.9	72.9	83.8	85.0	93.9	71.7	93.0	94.8
3150	89.7	83.7	70.4	83.4	83.2	91.8	67.4	93.4	94.6
4000	89.0	81.9	66.2	80.0	84.9	90.5	67.4	93.8	94.8
5000	83.8	77.1	62.6	76.8	82.9	87.6	67.4	94.3	95.2
6300	78.7	71.7	58.4	74.7	84.6	85.0	60.6	94.5	95.3
8000	74.8	66.8	54.4	73.3	80.6	86.5	60.6	94.2	95.1
10000	70.9	63.1	50.8	68.4	77.0	83.1	60.6	93.3	94.1
LwA	106.1	101.4	88.6	96.5	94.7	107.2	84.1	105.0	106.5

Note: Where numbers are present in the header row following the description, this indicates that the source has a direction component. The numbers indicate the angle relative to the centerline of the truck or in the case of the CAT shack, the angle relative to the open side of the building.

TABLE 8.3: EQUIPMENT SOUND POWER (L_{MAX})

Frequency	Active Area Lw	Excavator Lw	Screen + Excavator Lw	Scraper Lw	Articulated Truck Lw	Tipper	Truck Sound Power (fast)	Truck Sound Power (slow typ))	Truck Sound Power (slow DH)
	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max
12.5	114.6		94.0	104.3	102.0		98.0	94.2	95.5
16	128.9		93.4	97.3	99.0		107.8	97.9	115.0
20	131.6	99.4	98.8	103.4	94.3		106.9	107.2	112.8
25	139.0	99.4	106.6	97.8	97.7	101.9	105.9	107.7	112.8
31.5	138.4	99.4	105.5	103.6	94.8	101.9	104.1	102.2	110.9
40	137.6	99.4	100.0	103.1	102.5	100.5	106.6	107.3	100.9
50.0	131.5	99.4	109.8	100.7	102.9	99.1	107.1	108.8	102.3
63.0	119.6	99.4	113.5	103.3	100.5	97.7	99.4	102.3	98.5
80.0	123.5	100.4	113.5	105.4	105.8	99.6	104.5	106.8	99.5
100	124.6	101.4	107.1	107.4	106.9	101.5	102.9	109.6	99.4
125	116.8	102.4	108.2	105.5	104.8	103.4	103.7	104.3	105.5
160	114.9	101.7	109.2	106.7	107.1	104.8	108.2	109.1	102.7
200	113.3	101.0	108.7	109.4	103.4	106.2	105.7	107.3	104.8
250	117.1	100.4	111.0	107.4	101.4	107.5	97.1	108.1	104.0
315	120.3	99.7	108.6	108.9	104.5	105.2	100.5	99.7	103.5
400	116.8	99.0	116.3	114.5	105.0	102.9	103.8	108.1	108.0
500	115.5	98.4	118.7	111.0	102.5	100.5	106.0	104.4	96.6
630	118.6	97.7	113.7	108.3	105.6	100.2	105.7	101.2	98.9
800	116.3	97.0	111.5	109.8	107.3	99.9	104.2	102.3	98.3
1000	115.8	96.4	115.7	108.9	105.1	99.5	102.8	103.0	99.1
1250	116.1	95.4	114.3	109.7	108.8	99.1	100.6	106.0	99.6
1600	113.1	94.4	113.6	107.8	108.7	98.7	103.4	104.9	96.9
2000	111.5	93.4	111.6	105.8	106.0	98.2	103.3	104.8	96.1
2500	112.4	92.0	109.9	107.9	105.6	97.1	118.0	104.7	94.2
3150	109.3	90.7	110.5	103.0	107.4	96.0	102.0	102.3	94.4
4000	107.4	89.4	109.0	100.5	104.8	94.8	99.2	98.1	91.9
5000	104.7	85.7	106.8	98.6	103.6	93.4	107.5	94.7	90.6
6300	102.5	82.0	101.8	97.8	101.5	91.9	94.9	92.5	88.1
8000	99.6	78.4	98.8	96.4	99.4	90.4	92.9	89.6	86.4
10000	94.3	74.7	95.6	95.0	96.1	90.4	89.1	87.9	83.9
LwA	125.3	106.0	123.9	118.8	117.6	110.2	120.5	114.8	109.5

Note: The Slow Truck sound power is applicable near the entrance gate, around buildings, on top of the landfill or when reduced speeds are specified as mitigation. The Fast Truck sound power levels are applicable in other circumstances.

TABLE 8.4: FACILITIES SOUND POWER (L_{MAX})

Frequency	BEW North	BEW East	BEW South	BEW West	BEW E Door OPEN	Candle stick	NFS Blowers	Flares	
	LMAX	LMAX	LMAX	LMAX	LMAX				
12.5	124.5	118.4	109.6	123.5	125.4				
16	115.1	105.6	101.7	113.5	117.7				
20	103.0	109.8	107.3	103.1	106.9				
25	104.8	103.5	104.3	103.0	112.3				
31.5	112.2	109.5	107.2	106.0	113.1				
40	111.3	106.8	103.9	118.2	111.6				
50.0	109.9	105.8	106.3	107.4	108.8				
63.0	110.3	112.0	111.7	111.6	111.7				
80.0	103.8	103.0	102.4	110.8	108.1				
100	105.6	107.6	104.6	113.2	106.0				
125	101.1	100.5	109.4	105.7	107.2				
160	105.4	99.3	103.1	107.9	110.7				
200	102.0	99.1	99.2	108.0	102.8				
250	102.7	104.8	91.7	103.9	108.4				
315	100.1	104.9	93.6	101.3	106.1				
400	105.0	105.4	93.9	103.4	113.7				
500	118.3	108.5	92.4	103.5	108.3				
630	107.1	101.0	93.5	112.8	108.9				
800	103.6	116.2	93.3	130.0	113.5				
1000	104.2	101.6	93.1	106.6	113.9				
1250	99.8	99.8	107.3	109.9	110.3				
1600	98.4	98.0	90.7	110.5	115.2				
2000	97.5	95.7	90.8	105.0	112.3				
2500	99.9	95.7	91.0	102.2	110.9				
3150	95.0	91.5	89.4	99.8	108.3				
4000	94.3	90.5	86.6	98.7	104.6				
5000	90.9	86.1	85.6	96.0	102.2				
6300	91.8	83.8	83.6	91.6	101.0				
8000	88.9	80.1	81.6	89.4	109.8				
10000	81.5	71.8	79.5	86.9	95.6				
LwA	116.7	116.7	109.1	129.5	122.5				

TABLE 8.4: FACILITIES SOUND POWER (LMAX)

Frequency	Truck Idle 0	Truck Idle 90	Truck Idle 125	Truck Idle 165	POV Sound Power	CAT Shack High Power 0	CAT Shack High Power 90	CAT Shack High Power 180	
	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max	
12.5	95.9	99.5	90.4	90.4	102.0	93.0	100.9	88.7	
16	95.3	91.6	78.3	87.4	97.9	95.6	97.2	93.1	
20	95.9	93.8	78.1	94.1	95.6	91.0	87.2	84.5	
25	97.0	102.6	89.4	92.9	93.7	95.4	92.9	91.4	
31.5	110.2	103.0	110.2	109.4	92.1	106.4	100.7	82.0	
40	88.2	97.3	92.7	97.9	90.2	101.2	98.5	95.1	
50.0	89.4	96.5	88.8	101.7	89.4	96.0	98.0	113.7	
63.0	94.1	94.1	93.7	93.3	95.1	103.6	99.9	105.7	
80.0	90.9	92.9	84.1	90.8	87.8	101.4	95.8	96.2	
100	92.4	91.4	89.0	93.9	96.2	108.3	106.9	101.0	
125	88.1	91.5	93.4	87.3	92.7	114.5	100.6	104.1	
160	94.8	91.2	96.9	88.0	82.5	106.9	96.9	98.2	
200	94.4	90.5	91.8	86.4	86.1	119.3	109.9	115.7	
250	94.1	89.7	91.6	84.6	85.6	102.3	101.8	92.4	
315	95.4	91.2	94.0	86.1	81.1	108.8	100.7	91.9	
400	97.1	93.1	95.3	88.2	82.5	117.7	108.2	99.8	
500	95.8	93.2	91.9	90.7	81.6	107.7	108.6	93.3	
630	91.2	92.4	91.2	90.3	83.6	107.2	106.0	92.6	
800	92.3	92.7	88.8	91.1	86.9	109.1	104.1	92.6	
1000	92.1	93.4	89.4	91.2	87.5	108.8	103.9	90.9	
1250	90.5	94.5	89.0	88.2	86.0	108.7	102.4	91.7	
1600	91.4	92.0	89.2	87.0	85.0	109.1	101.7	93.9	
2000	89.6	92.4	88.1	87.1	82.2	107.0	99.8	92.0	
2500	87.1	89.3	86.0	81.9	78.2	104.5	97.8	88.6	
3150	86.7	90.4	85.5	79.9	75.6	103.7	96.0	86.4	
4000	84.4	90.3	83.4	75.2	73.7	102.3	93.5	82.3	
5000	81.7	89.7	80.3	74.8	71.3	99.1	91.8	80.1	
6300	80.0	89.3	81.4	71.2	68.6	96.8	88.9	79.1	
8000	79.3	91.5	75.5	68.5	67.3	95.8	87.5	78.6	
10000	75.4	92.0	73.9	63.9	65.7	93.4	84.8	74.6	
LwA	101.8	103.5	99.9	98.2	94.4	119.4	113.3	106.9	

TABLE 8.4: FACILITIES SOUND POWER (LMAX)

Frequency	CAT Shack Low Power 0	CAT Shack Low Power 90	CAT Shack Low Power 180	Maintenance East	Maintenance West	Maintenance Pressure Wash	12.5-Ton HVAC	Truck Wash Entrance	Truck Wash Exit
	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max	LA Max
12.5	97.3	97.2	93.0	96.4	91.6	103.9		90.64	94.05
16	91.9	93.9	89.4	91.2	89.4	104.2		87.54	90.08
20	94.2	95.5	87.7	92.5	88.9	95.4	84.83	79.16	84.52
25	92.0	93.6	88.0	94.3	84.0	96.8	87.83	87.86	87.75
31.5	118.3	116.0	93.9	102.1	89.1	109.4	87.83	102.21	100.83
40	114.1	109.2	108.0	101.8	88.0	104.8	87.83	101.73	102.13
50.0	94.2	89.9	111.9	108.8	84.9	119.6	87.43	92.28	92.65
63.0	103.3	103.4	105.4	100.0	93.7	108.1	87.43	100.48	96.04
80.0	96.8	97.6	91.6	104.9	90.5	112.6	87.43	103.10	96.22
100	94.8	92.4	87.5	105.1	85.8	117.2	79.13	89.33	92.45
125	100.5	87.5	90.1	92.9	81.0	113.9	79.13	86.20	95.89
160	96.1	84.7	87.4	99.3	79.4	109.4	79.13	88.15	99.27
200	90.4	88.5	86.9	97.0	88.4	103.1	75.63	89.55	104.57
250	91.8	88.0	81.9	97.0	83.1	101.1	75.63	87.59	98.92
315	98.2	89.1	81.4	101.1	85.6	100.7	75.63	91.76	99.03
400	98.4	89.8	80.5	99.3	88.5	102.1	77.03	92.05	101.44
500	96.2	93.1	81.8	98.7	89.9	101.4	77.03	94.39	98.45
630	97.3	94.6	82.8	100.1	92.0	101.5	77.03	93.98	97.98
800	99.6	94.3	83.1	95.8	89.8	101.1	73.93	92.31	96.82
1000	100.6	99.0	82.6	95.3	91.0	101.3	73.93	94.52	100.22
1250	98.1	93.6	81.1	91.2	90.8	98.5	73.93	95.39	98.96
1600	97.2	91.0	82.1	91.3	94.0	98.5	71.73	95.68	98.26
2000	96.4	90.5	81.4	88.5	96.7	97.8	71.73	94.99	96.32
2500	91.7	85.7	75.7	99.9	99.8	95.5	71.73	94.92	94.69
3150	90.8	84.3	73.5	87.5	96.0	93.5	67.43	95.49	94.85
4000	91.9	82.4	71.9	84.0	96.0	91.8	67.43	95.53	94.39
5000	84.9	77.9	65.8	86.6	93.6	88.4	67.43	96.20	94.49
6300	80.1	72.5	62.3	78.4	89.9	85.5	60.63	95.95	94.07
8000	76.2	67.3	58.9	79.6	85.1	84.2	60.63	95.73	94.01
10000	71.7	63.4	52.8	70.2	75.9	81.4	60.63	94.59	92.79
LwA	107.4	103.2	92.1	106.4	106.2	110.2	84.1	106.8	108.8

9.0 CHRLF CONDITIONS

9.1 Daytime Noise Conditions

Noise was evaluated for day and night operations. Daytime noise was evaluated for the following conditions for the No Action and Action Alternatives.

Landfilling Operations

- Two compactors operating continuously.
- Two large bulldozers operating as necessary to handle incoming loads.
- One small bulldozer operating continuously.
- Dual tippers operating as loads arrive.
- Screen and Loader operating as necessary (50% use factor consistent with FTA construction guidelines screens)
- Typical BEW operations during (daytime hours).
- Articulated Haul Trucks with an Excavator to bring cover fill to active area[4].
- Truck activity as described in Table 9.8 (Commercial direct haul and other haul trips were as KC waste transfer trucks for noise purposes).

Facilities Operations

- North Flare Station noise (including normal blower and candle stick operation and three large flares burning).
- Maintenance building HVAC.
- Administrative building HVAC noise.
- Some maintenance or fabrication occurring in the maintenance building, pressure washing, some truck idling related to maintenance.
- CAT (heavy equipment repair).
- Truck wash.
- Employees coming to site.
- BEW noise.
- KC waste transfer trucks idling.

[4] KC staff indicated that, if possible, the trucks bringing cover material to the site would place it near the active area and that the articulated trucks would only be used if physical constrains made it necessary. For a worst-case noise scenario, they would be used towards the end of the day. Conservatively, they are included in the 10 a.m. hour, which is busiest hour for loads. In any case, as modeled, their use has an insignificant impact on overall noise levels.

9.2 Nighttime Operations

The early morning conditions used for evaluation of each Action Alternative and No Action Alternative were as follows.

Landfilling Operations

- A few incoming loads (generally attributable to commercial direct haul trucks), but no tipping or compacting until after 7 a.m.
- Four Scraper passes in the 0600-0700 hours.

Facilities Operations

- North Flare Station noise (including normal blower and candle stick operation and three large flares burning).
- Maintenance building HVAC.
- Administrative building HVAC noise.
- Some maintenance or fabrication occurring in the maintenance building. No pressure washing, or maintenance related truck idling until after 7 a.m.
- Employees coming to site.
- KC waste transfer trucks idling.
- Each KC waste transfer truck is assumed to have an approximate 10 minute warm-up cycle before exiting the site.

BEW operates under its own CUP and EIS and is responsible for its nighttime noise emissions; as such it was not included as part of the nighttime noise assessment (per previous KCSWD guidance on BEW noise).

9.3 Trip and Model Data

The average annual incoming waste patterns were analyzed to determine the month with the highest average daily waste. Although July has a higher total volume on a monthly basis, when corrected for the number of days, June turned out to have slightly higher average daily volumes. The average daily incoming waste calculated for June is about 5% more than the annualized average waste.

Preliminary data for the traffic analysis indicated that the maximum hour for waste volume occurs in the 10-11 a.m. time period. This was used for the daytime noise analysis. Similarly, the 6-7 a.m. period had the most trips in the early morning period where the nighttime noise code is applicable.

TABLE 9.1: MONTHLY WASTE DISTRIBUTION

Monthly Waste Distribution					
Month	Monthly Percent of Annual	Work Day/Mo	% of Annual per day	Percent Adjusted for # of days	Monthly Multiplier re 12 month avg.
January	7.78%	30	0.0026	7.82%	0.939
February	7.23%	28	0.0026	7.79%	0.935
March	8.29%	31	0.0027	8.07%	0.968
April	8.30%	30	0.0028	8.35%	1.001
May	8.73%	31	0.0028	8.50%	1.020
June	8.70%	30	0.0029	8.75%	1.050
July	8.92%	31	0.0029	8.68%	1.042
August	8.86%	31	0.0029	8.63%	1.036
September	8.62%	30	0.0029	8.67%	1.040
October	8.54%	31	0.0028	8.31%	0.998
November	8.05%	29	0.0028	8.38%	1.006
December	7.99%	30	0.0027	8.04%	0.965

From 2013-2017 historical waste analysis

TABLE 9.2: CHRLF HOURLY TRIP DISTRIBUTION

Weekday Hourly Load Distribution					
Time	KC Waste Transfer Trucks	Commercial Direct Haul	Other Haul	Employees, BEW,	Operational
5:00	0.00%	0.00%	0.00%	0.00%	0.00%
6:00	7.87%	12.91%	1.00%	1.00%	0.00%
7:00	6.87%	7.91%	4.00%	4.00%	0.00%
8:00	9.87%	5.91%	14.00%	14.00%	12.50%
9:00	9.87%	10.91%	13.00%	13.00%	12.50%
10:00	10.87%	12.91%	16.00%	16.00%	12.50%
11:00	9.87%	17.91%	14.00%	14.00%	12.50%
12:00	7.87%	15.91%	14.00%	14.00%	12.50%
13:00	9.87%	7.91%	13.00%	13.00%	12.50%
14:00	8.87%	4.91%	10.00%	10.00%	12.50%
15:00	7.87%	1.91%	1.00%	1.00%	12.50%
16:00	3.87%	0.91%	0.00%	0.00%	0.00%
17:00	1.87%	0.00%	0.00%	0.00%	0.00%
18:00	1.87%	0.00%	0.00%	0.00%	0.00%
19:00	0.87%	0.00%	0.00%	0.00%	0.00%
20:00	1.87%	0.00%	0.00%	0.00%	0.00%
Total	100%	100%	100%	100%	100%

From Cedar Hills Methods and Assumptions Memo, Transpo. - Opening Year Weekday Net Trips by Time of Day (some percentages adjusted by a fraction of a percent to account for rounding errors in the source data resulting in some operations having slightly over 100%).

TABLE 9.3: CHRLF CAPACITY YEAR TRIPS[5]

Estimated Year CHRLF Reaches Capacity - CHRLF Trip Generation

Daily Trip Forecasts

	Existing	Future 2028 *No Action*		Future 2037 *Alternative 1*			Future 2038 *Alternative 2*			Future 2046 *Alternative 3*		
Time Period	*Total Trips*	% Increase[4]	Daily Trips	% Increase	Daily Trips	Net New Trips	% Increase	Daily Trips	Net New Trips	% Increase	Daily Trips	Net New Trips
Weekday												
KC Haul Trucks	*252*	9.91%	276	28.23%	324	324	30.38%	328	328	48.94%	376	376
Commercial Haul	*28*	9.91%	30	28.23%	36	36	30.38%	36	36	48.94%	42	42
Self Haul	*10*	9.91%	10	28.23%	12	12	30.38%	14	14	48.94%	14	14
Employees/Visitors[2]	*522*	9.69%	572	9.69%	572	572	9.69%	572	572	9.69%	572	572
Operating Trips	-	-	48	-	56	56	-	44	44	-	54	54
Contruction Trips[3]	-	-	-	-	-	-	-	-	-	-	-	-
Total	**812**		**936**		**1,000**	**1,000**		**994**	**994**		**1,058**	**1,058**
Existing Weekday Traffic Count	***800***											
Saturday												
KC Haul Trucks	*142*	9.91%	156	28.23%	182	182	30.38%	186	186	48.94%	212	212
Commercial Haul	*0*	9.91%	0	28.23%	0	0	30.38%	0	0	48.94%	0	0
Self Haul	*0*	9.91%	0	28.23%	0	0	30.38%	0	0	48.94%	0	0
Employees	*98*	13.9%	112	13.9%	112	112	13.9%	112	112	13.9%	112	112
Operating Trips	-	-	48	-	56	56	-	44	44	-	54	54
Contruction Trips	-	-	-	-	-	-	-	-	-	-	-	-
Total	**240**		**316**		**350**	**350**		**342**	**342**		**378**	**378**
Existing Saturday Traffic Count	***312***											
Sunday												
KC Haul Trucks	*108*	9.91%	118	28.23%	138	138	30.38%	140	140	48.94%	160	160
Commercial Haul	*0*	9.91%	0	28.23%	0	0	30.38%	0	0	48.94%	0	0
Self Haul	*0*	9.91%	0	28.23%	0	0	30.38%	0	0	48.94%	0	0
Employees	*98*	13.9%	112	13.9%	112	112	13.9%	112	112	13.9%	112	112
Operating Trips	-	-	48	-	56	56	-	44	44	-	54	54
Contruction Trips	-	-	-	-	-	-	-	-	-	-	-	-
Total	**206**		**278**		**306**	**306**		**296**	**296**		**326**	**326**
Existing Sunday Traffic Counts	***204***											
Weekly Total	**4,506**		**5,274**		**5,656**	**5,656**		**5,608**	**5,608**		**5,994**	**5,994**
Weekly Existing Traffic Counts	***4,388***											

1. Daily Transactions based on 2017-2019 scale data for the Cedar Hills site.

2. Employee/Visitor Trips based on data provided by KC.

3. Construction Trips do not occur at the same time as the operations haul trips. The construction trips were assumed for the analysis as they are greater. Construction trips are estimated to be limited to 4 month durations during the summer.

4. KC Haul Trucks, Commercial, and Self Haul increase percentages based on forecasts provided by King County. Staffing/Visitor percentage increases provided by King County.

5. Assumes one holiday on a weekday and two on a weekend for all but construction trips. Construction trips are assumed to be June-September.

[5] From Reference 8.

TABLE 9.4: CHRLF NO ACTION ALTERNATIVE TRIPS

	No Action Max Daytime Analysis				
Year	2028				
Month	**June**				
Time of Day	**10:00**				
	6/1/2028				
	Weekday Avg Trips	Monthly Adj.	Daily Total	Hr Adj.	1-way Trips
KC Waste Transfer Trucks	**276**	1.050	289.8	0.109	31.49
Commercial Direct Haul	**30**	1.050	31.5	0.129	4.07
Other Haul	**10**	1.050	10.5	0.160	1.68
Employees, BEW, Vendors, Contractors	**572**	1.000	572.0	0.050	28.60
Operating Trips	**48**	1.050	50.4	0.125	6.30
Construction Trips	**-**				
	No Action Max Nighttime Analysis				
Year	2028				
Month	**June**				
Time of Day	**6:00**				
	6/1/2028				
Avg Load (Tons)	22.1				
	Weekday Avg Trips	Monthly Adj.	Daily Total	Hr Adj.	1-way Trips
KC Waste Transfer Trucks	**276**	1.050	289.8	0.0787	22.80
Commercial Direct Haul	**30**	1.050	31.5	0.1291	4.07
Other Haul	**10**	1.050	10.5	0.0100	0.10
Employees, BEW, Vendors, Contractors	**572**	1.000	572.0	0.0700	40.04
Operating Trips	**48**	1.050	50.4	0.0000	0.00
Construction Trips	**-**				
On-Site Operations Cover Trips	**-**				
Avg Annual Waste (ton)	954603				
Daily Avg (ton)	2637				
Monthly Adjustment	1.05				
Daily Waste (ton)	2769				
Density (ton/CY)	0.80				
Daily Volume (CY)	3461				
Cover Volume Req'd (CY)	346				
Cover Loads	12.36				
Cover Trips	**24.72**				
Cover Trips/hr	**8.24**				
% Waste Increase re: 2019	9.91%				

TABLE 9.5: CHRLF ALTERNATIVE 1 TRIPS

	Alternative 1 Max Daytime Analysis				
Year	2037				
Month	**June**				
Time of Day	**10:00**				
	6/1/2037				
	Weekday Avg Trips	Monthly Adj.	Daily Total	Hr Adj.	1-way Trips
KC Waste Transfer Trucks	**324**	1.050	340.2	0.1087	36.96
Commercial Direct Haul	**36**	1.050	37.8	0.1291	4.88
Other Haul	**12**	1.050	12.6	0.1600	2.02
Employees, BEW, Vendors, Contractors	**572**	1.000	572.0	0.0500	28.60
Operating Trips	**56**	1.050	58.8	0.1250	7.35
Construction Trips	-				
	Alternative 1 Max Nighttime Analysis				
Year	2037				
Month	**June**				
Time of Day	**6:00**				
	6/1/2037				
Avg Load (Tons)	23.3				
	Weekday Avg Trips	Monthly Adj.	Daily Total	Hr Adj.	1-way Trips
KC Waste Transfer Trucks	**324**	1.050	340.2	0.0787	26.76
Commercial Direct Haul	**36**	1.050	37.8	0.1291	4.88
Other Haul	**12**	1.050	12.6	0.0100	0.13
Employees, BEW, Vendors, Contractors	**572**	1.000	572.0	0.0700	40.04
Operating Trips	**56**	1.050	58.8	0.0000	0.00
Construction Trips	**-**				
On-Site Operations Cover Trips	**-**				
Avg Annual Waste (ton)	1113704				
Daily Avg (ton)	3077				
Monthly Adjustment	1.05				
Daily Waste (ton)	3230				
Density (ton/CY)	0.80				
Daily Volume (CY)	4038				
Cover Volume Req'd (CY)	404				
Cover Loads	14.42				
Cover Trips	**28.84**				
Cover Trips/hr	**9.61**				
% Waste Increase re: 2019	28.23%				

TABLE 9.6: CHRLF ALTERNATIVE 2 TRIPS

	Alternative 2 Max Daytime Analysis				
Year	2038				
Month	**June**				
Time of Day	**10:00**				
	6/1/2038				
	Weekday Avg Trips	Monthly Adj.	Daily Total	Hr Adj.	1-way Trips
KC Waste Transfer Trucks	**328**	1.050	344.4	0.1087	37.42
Commercial Direct Haul	**36**	1.050	37.8	0.1291	4.88
Other Haul	**14**	1.050	14.7	0.1600	2.35
Employees, BEW, Vendors, Contractors	**572**	1.000	572.0	0.0500	28.60
Operating Trips	**44**	1.050	46.2	0.1250	5.77
Construction Trips	-				
	Alternative 2 Max Nighttime Analysis				
Year	2038				
Month	**June**				
Time of Day	**6:00**				
	6/1/2038				
Avg Load (Tons)	23.3				
	Weekday Avg Trips	Monthly Adj.	Daily Total	Hr Adj.	1-way Trips
KC Waste Transfer Trucks	**328**	1.050	344.4	0.0787	27.09
Commercial Direct Haul	**36**	1.050	37.8	0.1291	4.88
Other Haul	**14**	1.050	14.7	0.0100	0.15
Employees, BEW, Vendors, Contractors	**572**	1.000	572.0	0.0700	40.04
Operating Trips	**44**	1.050	46.2	0.0000	0.00
Construction Trips	-				
On-Site Operations Cover Trips	-				
Avg Annual Waste (ton)	1132382				
Daily Avg (ton)	3128				
Monthly Adjustment	1.05				
Daily Waste (ton)	3284				
Density (ton/CY)	0.80				
Daily Volume (CY)	4105				
Cover Volume Req'd (CY)	411				
Cover Loads	14.66				
Cover Trips	**29.32**				
Cover Trips/hr	**9.77**				
% Waste Increase re: 2019	30.38%				

TABLE 9.7: CHRLF ALTERNATIVE 3 TRIPS

	Alternative 3 Max Daytime Analysis				
Year	2046				
Month	**June**				
Time of Day	**10:00**				
	6/1/2046				
	Weekday Avg Trips	Monthly Adj.	Daily Total	Hr Adj.	1-way Trips
KC Waste Transfer Trucks	**376**	1.050	394.8	0.1087	42.898
Commercial Direct Haul	**42**	1.050	44.1	0.1291	5.692
Other Haul	**14**	1.050	14.7	0.1600	2.352
Employees, BEW, Vendors, Contractors	**572**	1.000	572.0	0.0500	28.600
Operating Trips	**54**	1.050	56.7	0.1250	7.087
Construction Trips	-				
	Alternative 3 Max Nighttime Analysis				
Year	2038				
Month	**June**				
Time of Day	**6:00**				
	6/1/2038				
Avg Load (Tons)	23.3				
	Weekday Avg Trips	Monthly Adj.	Daily Total	Hr Adj.	1-way Trips
KC Waste Transfer Trucks	**376**	1.050	394.8	0.0787	31.055
Commercial Direct Haul	**42**	1.050	44.1	0.1291	5.692
Other Haul	**14**	1.050	14.7	0.0100	0.147
Employees, BEW, Vendors, Contractors	**572**	1.000	572.0	0.0700	40.040
Operating Trips	**54**	1.050	56.7	0.0000	0.000
Construction Trips	-				
On-Site Operations Cover Trips	-				
Avg Annual Waste (ton)	1293607				
Daily Avg (ton)	3574				
Monthly Adjustment	1.05				
Daily Waste (ton)	3752				
Density (ton/CY)	0.80				
Daily Volume (CY)	4690				
Cover Volume Req'd (CY)	469				
Cover Loads	16.75				
Cover Trips	**33.50**				
Cover Trips/hr	**11.17**				
% Waste Increase re: 2019	48.94%				

TABLE 9.8: CHRLF NOISE MODEL OPERATIONS INPUTS OPTIONS 1-2

	No Action		Alt 1		Alt 2		Alt 3	
	6-7 am	10-11 am	6-7 am	10-11 am	6-7 am	10-11 am	6-7 am	10-11 am
	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor
Description								
North Flare Station Main Flare(s)	3	3	3	3	3	3	3	3
NFS Blowers	1	1	1	1	1	1	1	1
NFS Alt Candlestick	--	--	--	--	--	--	--	--
NFS Existing Candlestick	1	1	1	1	1	1	1	1
BEW	--	1	0	1	--	1	--	1
CAT Shack	--	0.25	0	0.25	--	0.25	--	0.25
Truck Wash	--	0.5	0	0.5	--	0.5	--	0.5
Maintenance Building AC	6	6	6	6	6	6	6	6
Maintenance Activities								
Maintenance	1	1	1	1	1	1	1	1
Fabrication	1	1	1	1	1	1	1	1
Pressure Wash	--	1	0	1	--	1	--	1
Admin Building AC	4	4	4	4	4	4	4	4
Truck Parking/Idling	22.80	5.50	26.76	6.41	27.09	6.52	31.05	7.45
POV trips	40.04	28.6	40.04	28.60	40.04	28.60	40.04	28.60
Waste Transfer Truck trips(Exiting @ 6am).	22.80	--	26.76	--	27.09		31.05	
Waste Transfer Trucks (includes Commercial direct haul and Other Haul)	4.17	43.53	5.01	51.21	5.03	50.43	5.84	58.03
Scaper	4	--	4		4		4	
Landfill Active Area (Tippers, Dozers, Compactors)		1		1		1		1
Articulated Haul Trucks		8.2		9.61		9.77		11.17
Excavator		0.5		0.5		0.5		0.5
Screen+Excavator		0.5		0.5		0.5		0.5

TABLE 9.9: CHRLF NOISE MODEL OPERATIONS INPUTS OPTION 3

	Alt 1		**Alt 2**		Alt 3	
	6am	10am	**6am**	**10am**	6am	10am
	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor	Trips / # / Use Factor
Description						
North Flare Station Main Flare(s)	3	3	3	**3**	3	3
NFS Blowers	1	1	1	**1**	1	1
NFS Alt Candlestick	--	--	--	**--**	--	--
NFS Existing Candlestick	1	1	1	**1**	1	1
BEW	0	1	--	**1**	--	1
CAT Shack	0	0.25	--	**0.25**	--	0.25
Truck Wash	0	0.5	--	**0.5**	--	0.5
Maintenance Building AC	--	--	--	**--**	--	--
Maintenance Activities	--	--	--	**--**	--	--
West	--	--	--	**--**	--	--
East	--	--	--	**--**	--	--
Pressure Wash	--	--	--	**--**	--	--
Admin Building AC	--	--	--	--	--	--
Truck Parking/Idling		6.41		6.52		7.45
POV noise	13.86	9.90	13.86	9.90	13.86	9.90
Waste Transfer Trucks (Exiting @ 6am).						
Waste Transfer Trucks (includes Commercial direct haul and Other Haul)	6.94	51.20925	6.98	50.43	8.08	58.03
Scaper	4 passes		4 passes		4 passes	
Landfill Active Area (Tippers, Dozers, Compactors)		1		1		1
Articulated Haul Trucks		9.61		9.77		11.17
Excavator		0.5		0.5		0.5
Screen		.5		**.5**		.5

The number of trucks idling per hour in the 6 a.m. hour is assumed to be equal to the number trucks leaving the site during that hour. During the daytime hours the number of idling trucks is based on landfill personnel observations for the number of trucks idling, and then adjusted for the number of trucks in the solid waste fleet (about 50 currently). Per the traffic model, the quantity of fleet waste transfer trucks is assumed to rise in proportion to the amount of waste coming in.

TABLE 9.10: RENTON NOISE MODEL OPERATIONS INPUTS OPTION 3

	No Action		Alt 1		**Alt 2**		Alt 3	
	6am	10am	6am	10am	**6am**	**10am**	6am	10am
Description	# / Use Factor	# / Use Factor	# / Use Factor	# / Use Factor	# / Use Factor	**# / Use Factor**	# / Use Factor	# / Use Factor
Administrative Bldg AC			6	6	6	**6**	6	6
Maintenance Building AC			4	4	4	**4**	4	4
Maintenance Building Operations East			1	1	1	**1**	1	1
Maintenance Building Operations West			1	1	1	**1**	1	1
Pressure Wash			0	1	0	**1**	0	1
POV Lot			27	19	27	**19**	27	19
Truck Parking/Idling			25.65		26		30	
Truck Upper Lot Loop			25.65		26.1		29.8	
Truck Lower Lot Loop			38.47		39.1		44.7	
Transfer Station: With Commercial Trucks		0.27		0.32		**0.32**		0.37
Transfer Station: No Garbage Trucks present		0.73		0.68		**0.68**		0.63
Commercial Trucks Driving on Access Rd		3.27		3.82		**3.88**		4.44
Other Haul Vehicles on Access Rd		26.48		30.90		**31.41**		35.89
Roads Division Heavy Trucks		3.25		3.25		**3.25**		3.25
Roads Division Light Trucks		4.5		4.50		**4.5**		4.5
Roads Loading Activity		1		1		**1**		1
Roads Dump Truck Unloading		1		1		**1**		1
Roads Division Sweeper		0.059		0.059		**0.059**		0.059
Yard Truck		1.12		1.31		**1.33**		1.52

10.0 PROJECTED CHRLF NOISE LEVELS

10.1 Description of Evaluated Topographic Conditions

Figure 10.1 shows the closed out terrain contours that would be expected if the landfill were to continue operating under the No Action Alternative until the landfill reaches its capacity. To remove potential acoustic shielding created by ridges proposed on the upper-most level of the landfill (the "top deck"), noise levels for the No Action Alternative were conservatively evaluated using the terrain contours shown in Figure 10.2, which removes the elevation gained building the sloped top deck of each fill area. The terrain elevation used for noise evaluation in Areas 4, 5, and 6 was 770 ft MSL.

These methods were applied to all action alternatives. Figures 10.3 to 10.6 compare the terrain model used for noise prediction versus the final landfill contours upon completion of the top deck.

FIGURE 10.1: NO ACTION ALTERNATIVE (FINAL CONTOURS)

FIGURE 10.2: NO ACTION ALTERNATIVE (AS EVALUATED FOR NOISE)

FIGURE 10.3: ALTERNATIVE 2 COMPLETED (FINAL CONTOURS)

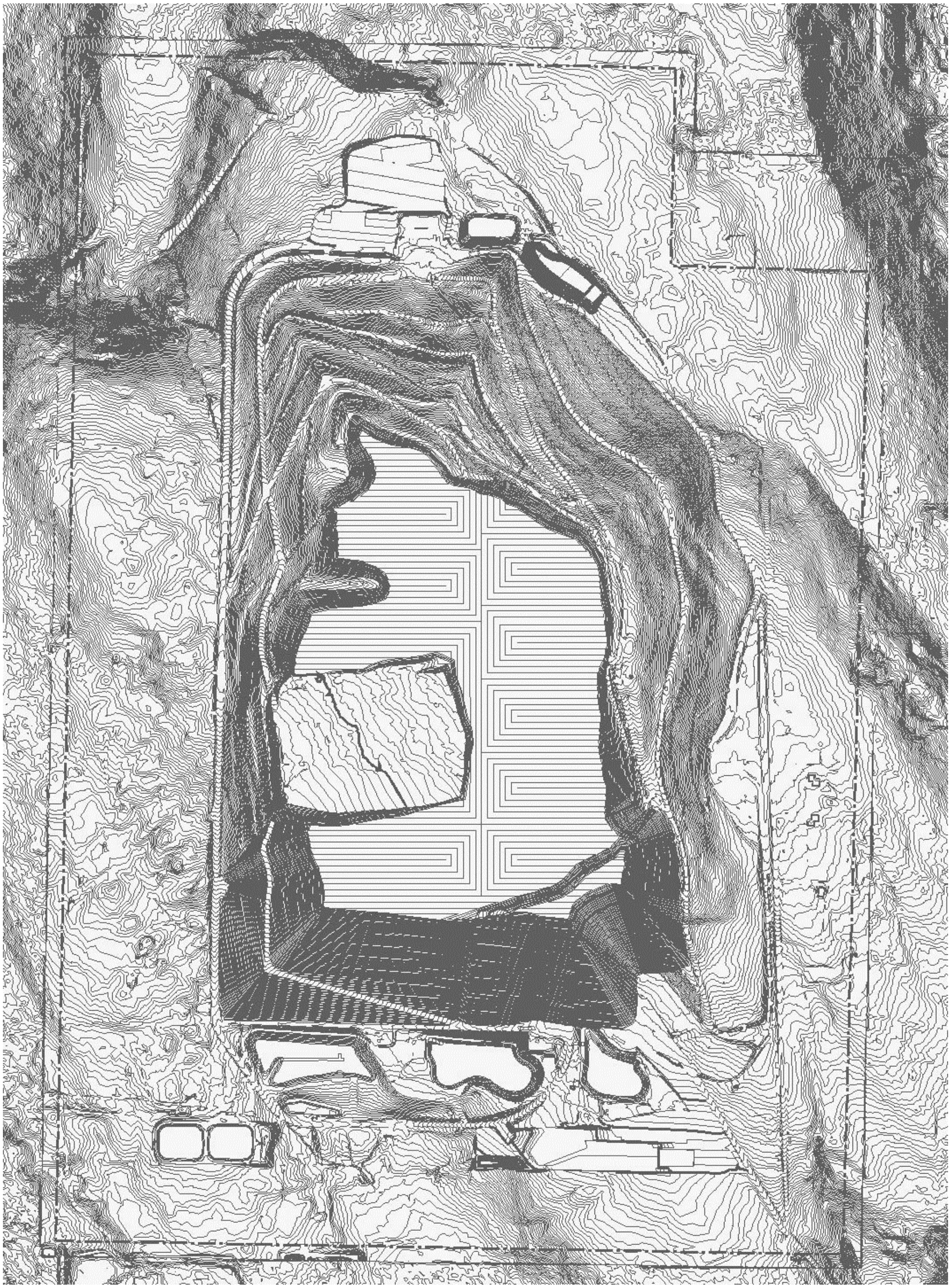


FIGURE 10.4: ALTERNATIVE 2 (AS EVALUATED)

FIGURE 10.5: ALTERNATIVE 3 (FINAL CONTOURS)

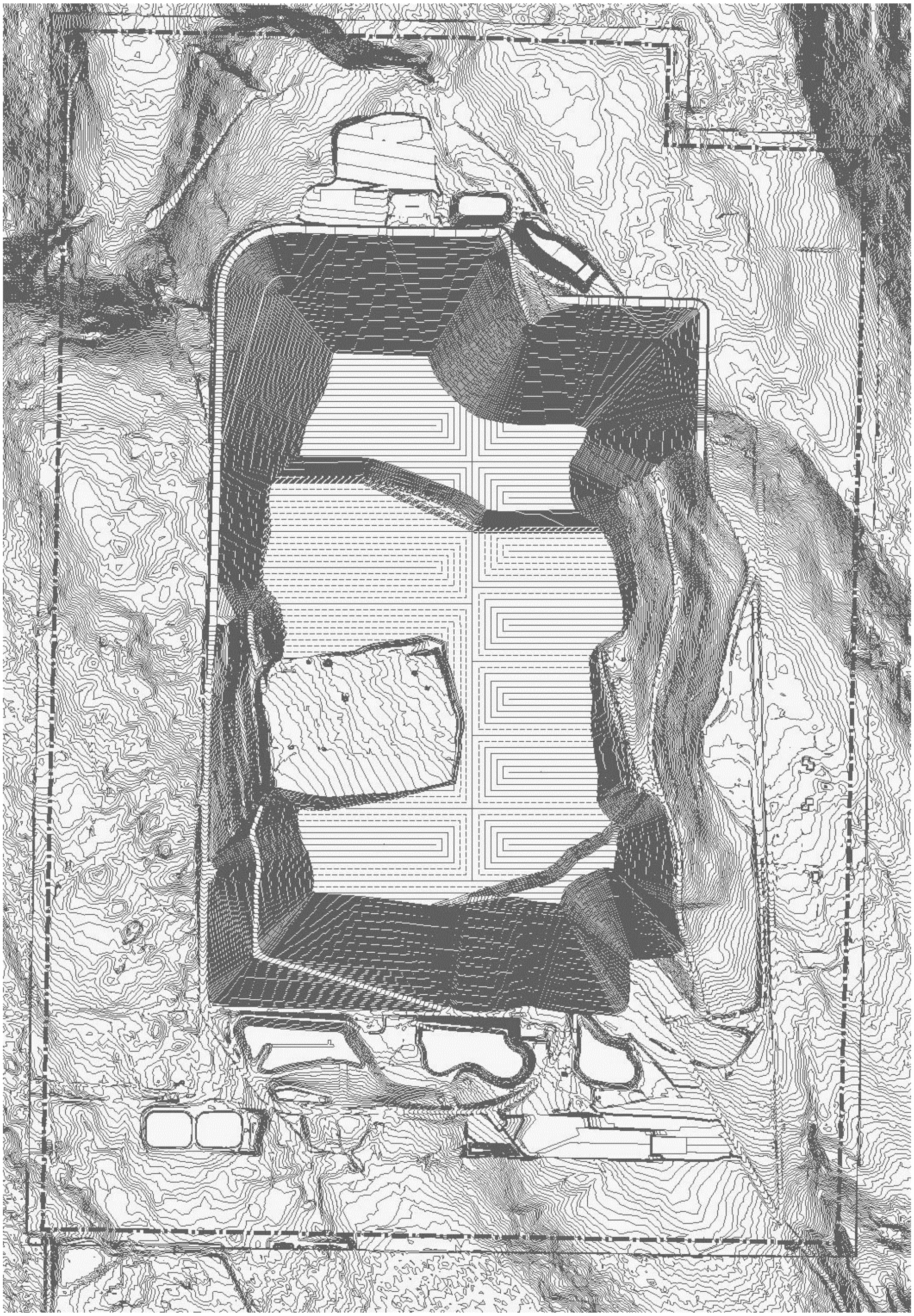
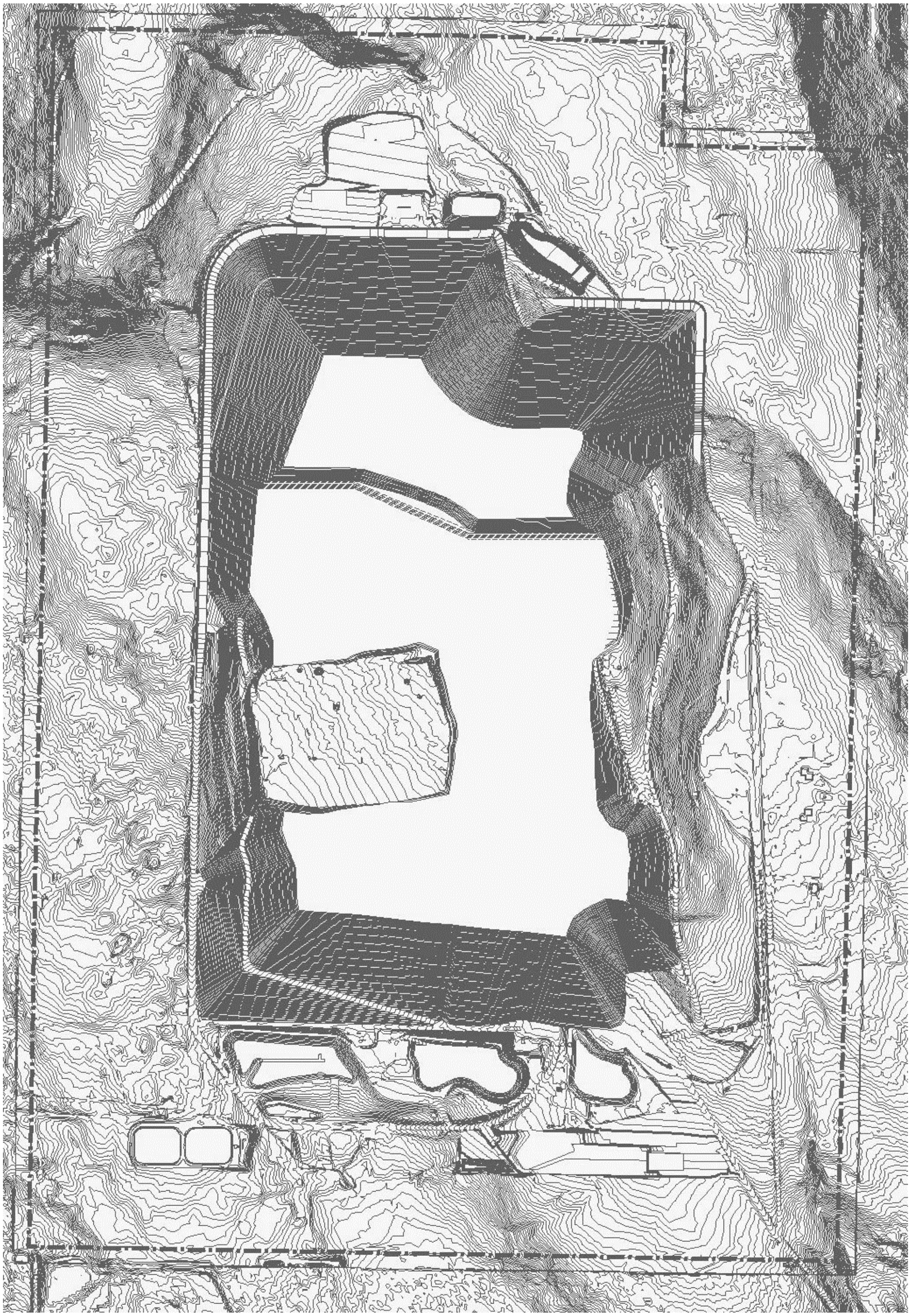


FIGURE 10.6: ALTERNATIVE 3 (AS EVALUATED)



The areas where landfilling noise was evaluated are displayed in Figure 10.7. The areas that were specific to a particular Action Alternative are labeled with a hyphen and the Alternative number. Noise was evaluated at the 770 ft. MSL level. The 770-ft contour for Alternative 2 is shown in Figure 10.7. The dotted line represents the northern limit of the 770-ft contour for Alternative 1.

Noise Areas 5N and 6N are near the northern edges of Areas 5 and 6. Noise Areas 5N-3 and 6N-3 may extend into Area 4 or the Central Pit Area for Action Alternatives 2 and 3. Area 9-Low represents conditions when landfilling is occurring in Area 9 near the existing facilities location. Area 9 represents conditions when the landfilling occurs closer to the completion of Area 9.

Note that the Area designations shown are based on the numbering and approximate area boundaries shown in Figure 6.4. They do not represent any official designations and are intended for` use only within the context of the noise assessment.

FIGURE 10.7: NOISE AREAS

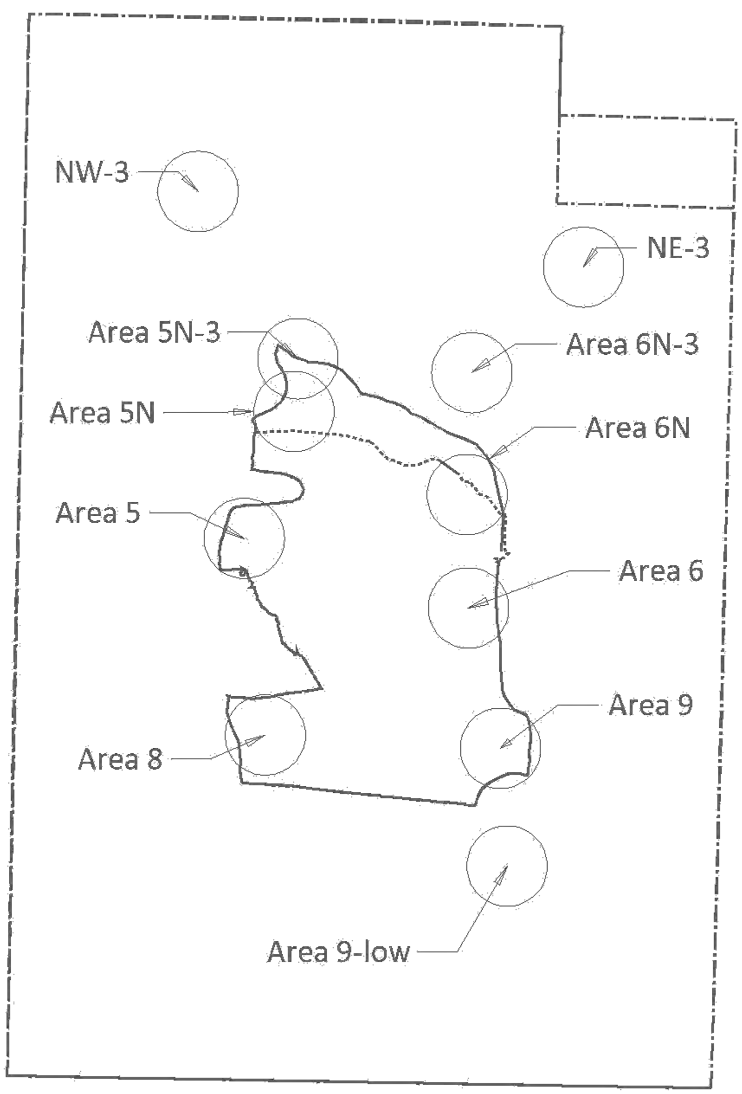
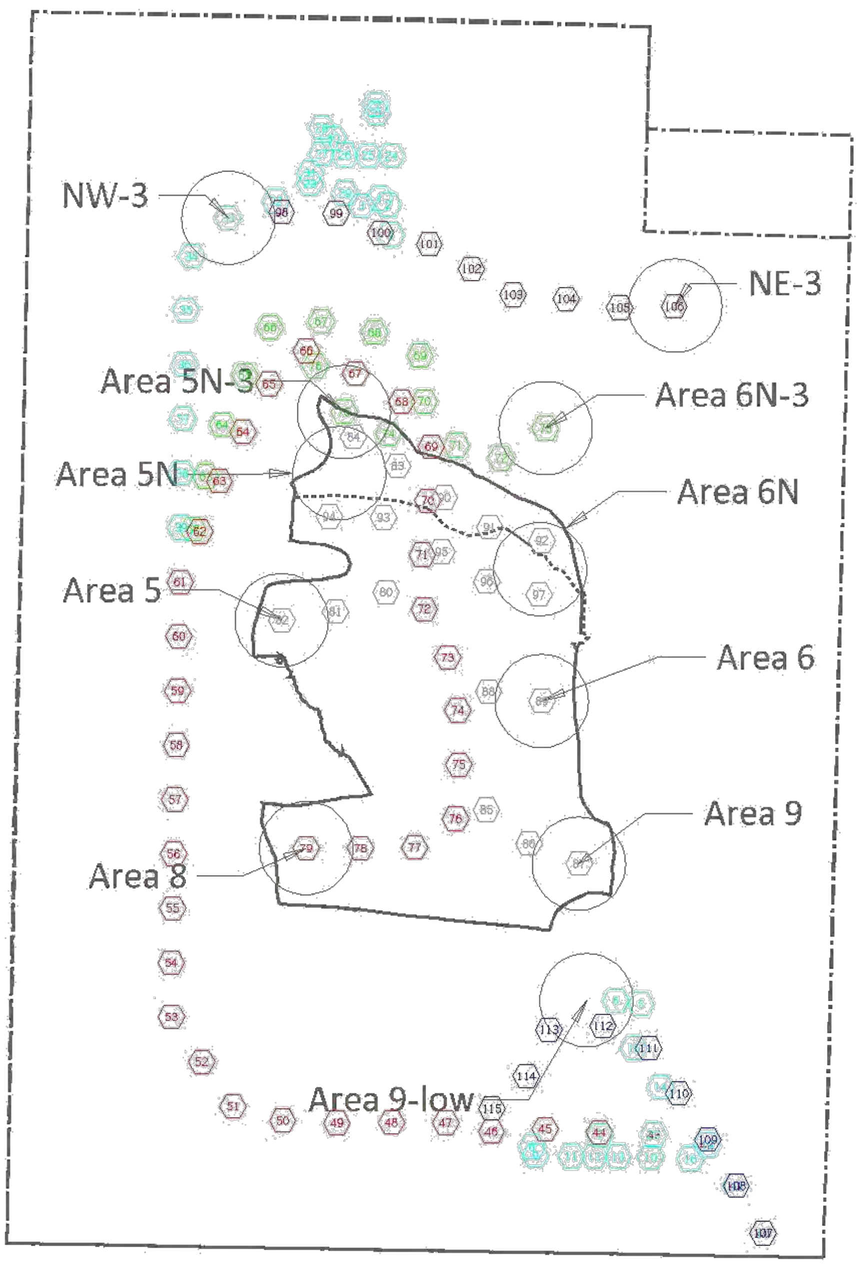


FIGURE 10.8: NOISE SOURCE POSITIONS



The basic truck route is apparent with the red hexagon shapes defining the nominal road to the hill. The various branches off the main route once on the landfill represent the nominal paths to the active area.

The green hexagons show an estimated road to the top of the Alternative 3 final elevations. This was developed because the current road will be covered at some point before Alternative 3 is completed. The extended route length is apparent compared to the current road shown by the red hexagons.

10.2 Noise Model

The positions near the edge of the plateau of the landfill were used for evaluation of the "active area" equipment. The screen and excavator, when active, were assumed to be near the centerline of the landfill relative to the active area. Scraper operation was assumed to be limited to the active area.

Truck noise was evaluated by treating trucks (or other mobile sources) as point sources spread along the applicable route. Time at a particular location was based on the segment length and vehicle speed.

For noise modeling purposes, commercial direct haul trucks and other-haul loads were treated as having the same noise level as the county's waste transfer trucks. Based on weight and vehicle axels the commercial direct haul trucks would be assigned the same noise level as a traditional tractor-trailer combo by the FHWA traffic noise model. The other-haul loads could come in any size vehicle, so the more conservative modeling approach was used where they were assigned a higher noise level. In any case, the other-haul trip numbers are very small compared to the KC waste transfer trucks, so the impact of treating the other haul as a large semi instead of a personal vehicle was trivial.

Figure 10.7 shows the outline of the 770 ft. terrain contour for Alternatives 1 and 2 and the noise source areas that were used in the noise assessment. The top deck boundary for Alternative 2 is shown with the solid line. The nominal northern limit of Alternative 1 is shown with the dotted line.

The 100+ noise source positions used in the analysis are shown in Figure 10.8.

The noise analysis was performed in modules. The output of the appropriate modules was combined to generate the overall Alternative noise levels. This allowed for easier handling of the different facilities locations and kept data files to somewhat reasonable sizes. In general

- Each facilities location had its own module
- The traffic from the front gate to the north end of the main landfill area had its own module
- Truck traffic and equipment on the main landfill area had a module
- Alternative 3 specific situations had separate modules (for example the NE corner or the NE/NW hill portions that are at higher elevation than 770 ft and require grading of a new road, since the old would be buried).
- Option 3 and Area 9 had their own modules.

The CAT shack, truck wash, and some other facilities will remain the southern portion of CHRLF regardless of whether the main facilities are located in Renton or are located in the northern reaches of the landfill. For the noise assessment, the location of the CAT shack is assumed to remain at the position shown in Figure 5.6 for each Alternative since it is out of the buffer, as shown. The location of truck wash and other remaining facilities is not provided in the Alternatives description other than it would not be located within the 1000-ft buffer. The Alternatives also do not describe the road pattern that would be used to get from the main gate to the main road on the west side of the landfill.

When evaluating the North / Option 2 Facilities location, it was assumed that trucks would have a road pattern that closely follows the road shown for the South Facilities development. Such a road breaks off to the west from the existing main access road south of the 1000-ft buffer line and stays south of the existing collection/retention ponds while traversing the southern portion of the landfill property. The truck wash position for the North Facilities was assumed to be located out of the buffer and slightly between the east and central collection ponds, but sufficiently close to the location used for the South Facilities evaluation that the data from the south was still applicable.

When evaluating the Renton / Option 3 facilities, the assumed truck route for the noise model more closely followed the existing truck route to the west side in that it passes the existing scale house and truck wash and then makes a turn back to the south, between collection ponds. This route would likely require some filling or modification of the easternmost collection pond, but appeared to be the most likely way to keep any additional facilities out of the buffer. For this scenario, the truck wash was located close to BEW.

Because the north facilities have no impact on the noise levels in the south, this method allowed for comparison that the differing truck haul route has on the southern community noise levels. Ultimately, the results did not show a significant difference between the two truck routes and truck wash locations. The truck routes used for Option 2 (yellow line) and Option 3 (white line) can be seen in Figure 10.9.

FIGURE 10.9: SOUTHERN TRUCK ROUTE OPTIONS

10.3 Noise Propagation Conditions

Projected noise levels were calculated using atmospheric conditions that are favorable to noise propagation and thus lead to higher than typical noise levels. Temperature inversions and downwind noise propagation paths lead to downward bending noise paths leading to higher noise levels. A five kilometer (about three mile) arc, typical of adverse conditions was used to project noise under these conditions.

The International Standard Atmosphere day, 59 °F (15 °C) with 70% relative humidity, was used to calculate the atmospheric sound absorption properties in each 1/3 octave band.

Noise attenuation provided by trees/vegetation was calculated per ISO-9613-2 [Ref. 5]. Maintaining the existing or better vegetation in the buffers, aside from the facilities relocation proposed herein, is a requirement.

11.0 NO ACTION ALTERNATIVE NOISE CONTOURS

The No Action Alternative noise contours are presented in Figures 11.1 – 11.12. Noise levels were calculated when the active portion of the landfill in areas identified in Figure 10.7. Conditions for the analysis were as outlined in Sections 10.1, 9.1, and 10.3. The 49 and 39 dBA L_{EQ} noise limit contours are shown for the daytime and nighttime evaluations for sample landfilling operations locations.

During daytime operations, the projected worst-case sound levels for the No Action Alternative exceed the King County limit (49 dBA) by about 1 dB outside the SE property line. For early morning operations where the nighttime noise limit is still in effect, the projected noise from landfill activities is about 5 dB above the noise limit, also in the southeast corner. The nighttime Lmax is also more than the 59 dBA nighttime limit and the daytime Lmax is also above the 64 dBA limit in the far SE corner.

The morning exceedances are primarily due to County Waste Transfer Trucks idling and then leaving the site and, to a lesser degree, from commercial waste operators bringing material onto the site.

11.1.1 No Action Alternative Early Morning Noise Levels

FIGURE 11.1: NO ACTION ALTERNATIVE 39 DBA CONTOUR – AREA 6 LANDFILLING

FIGURE 11.2: NO ACTION ALTERNATIVE 39 DBA CONTOUR –AREA 5N LANDFILLING

FIGURE 11.3: NO ACTION ALTERNATIVE 49 DBA CONTOUR –AREA 8 LANDFILLING

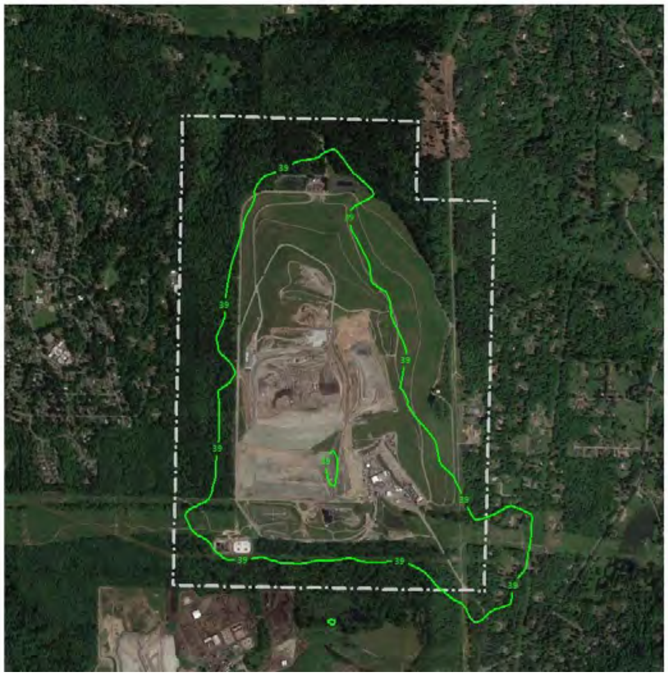


FIGURE 11.4: NO ACTION ALTERNATIVE 39 DBA CONTOUR –AREA 5 LANDFILLING

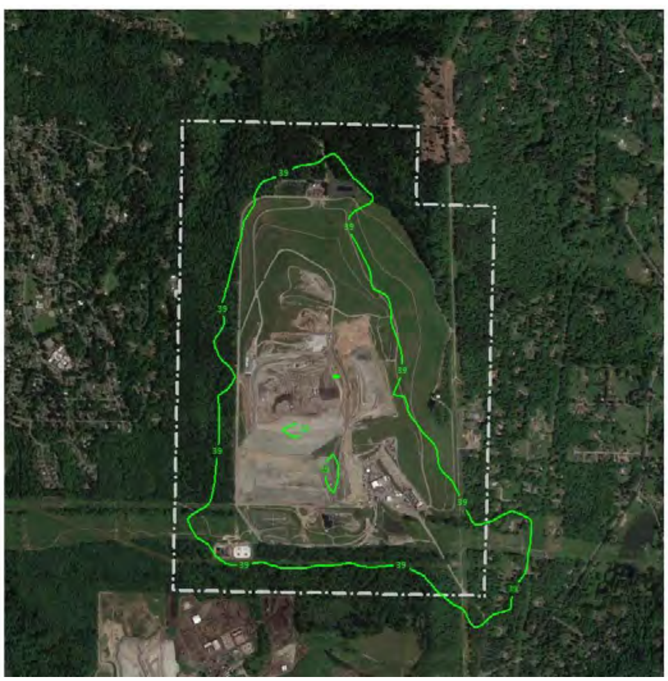


FIGURE 11.5: NO ACTION ALTERNATIVE 39 DBA CONTOUR – AREA 6N LANDFILLING

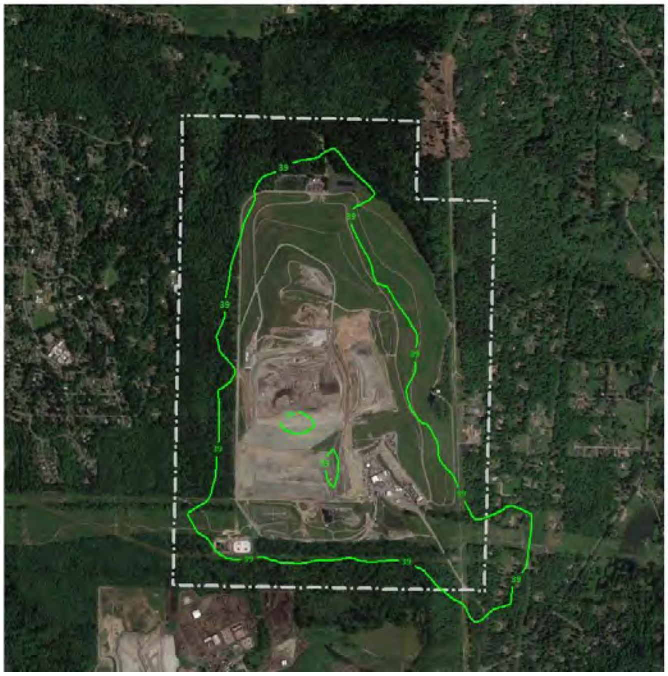


FIGURE 11.6: NO ACTION ALTERNATIVE 54 DBA NIGHTTIME L_{MAX} CONTOUR – AREA 6 LANDFILLING

11.1.2 No Action Alternative Daytime Noise Levels

FIGURE 11.7: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR – AREA 6 LANDFILLING

FIGURE 11.8: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR AREA 5N LANDFILLING

FIGURE 11.9: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR - AREA 5 LANDFILLING

FIGURE 11.10: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR - AREA 8 LANDFILLING

FIGURE 11.11: NO ACTION ALTERNATIVE 49 DBA NOISE CONTOUR - AREA AREA 6N LANDFILLING

FIGURE 11.12: NO ACTION ALTERNATIVE DAYTIME 64 DBA LMAX CONTOUR – AREA 8 LANDFILLING

12.0 UNMITIGATED ALTERNATIVE NOISE LEVELS

This section presents a selection of projected noise contours when the active portion of the landfill is in the areas identified in Figure 10.7. Unmitigated results for landfilling activity in proposed Area 9, Area 5N, and Area NW-3 are shown for Alternatives 2 and 3. With only one trip per hour difference between them, Alternative 1 results are not noticeably different than Alternative 2. These noise contour plots are provided to demonstrate that mitigation is warranted (CHRLF results with mitigation are provided in Section 14.0). These contours were calculated for the worst-case noise propagation conditions (temperature inversion and/or downwind scenario) such that terrain shielding is reduced compared to typical/neutral atmospheric conditions; this leads to higher community noise levels. Noise at residential properties is the focus of the analysis. The daytime noise limit at residential receiver locations is 49 dBA. At night, it is 39 dBA.

The salient results are that for all Alternatives and Options there are sections of land (generally in either the northwest or southeast corners) where the projected noise levels exceed the noise limits. In the southeast corner, the problem areas are generally the same as for the No Action Alternative. Mitigation, discussed in Section 13.0, would reduce community noise levels below the applicable limits.

When the active areas of the landfill are in similar locations, the unmitigated Action Alternative sound levels are comparable in intensity to the No Alternative sound levels discussed in Section 11.0. In areas where waste transfer truck noise is the strongest noise source the upper bounds of the anticipated increase in noise would be about

$$\Delta SPL \approx 10 \cdot \log\left(\frac{\#\, of\ Loads_{Alternative}}{\#\, of\ Loads_{No\ Action\ Alternative}}\right)$$

In areas where the active area noise or facilities noise is more prominent, the increase in sound would be less since those sources tend to operate at about the same capacity, regardless of the number of waste loads coming in.

Initiating new activity in the northern portion of the Main Hill (Alternative 3) and Areas 2/3, and 4 (Alternatives 2 and 3) would increase sounds to the northeast and northwest of the landfill beyond what is currently observed, but would likely be similar in nature to the sound levels observed when those areas of the landfill were originally filled. Sound levels due to landfilling in those areas would not be a significant increase above those under the No Action Alternative.

12.1 South /Option 1 Facilities 6 a.m.

FIGURE 12.1: ALTERNATIVE 2 39 DBA NOISE CONTOUR - AREA 9 LANDFILLING

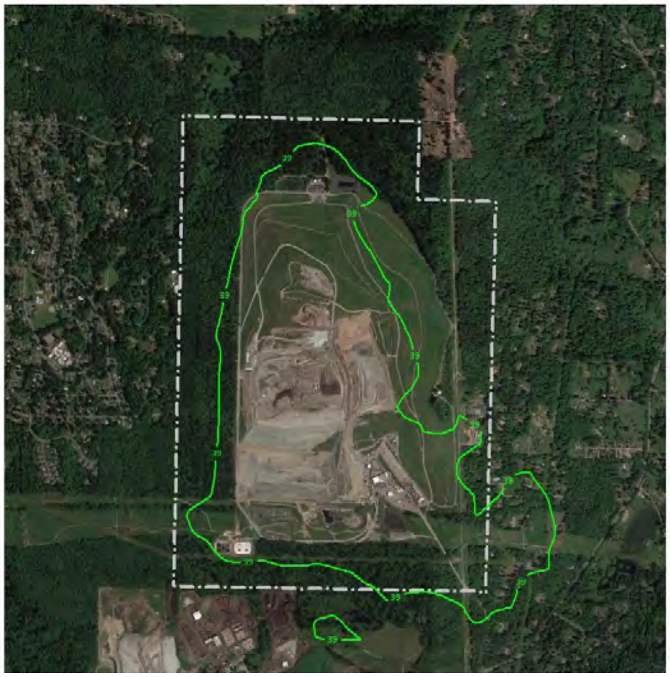


FIGURE 12.2: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 9 LANDFILLING

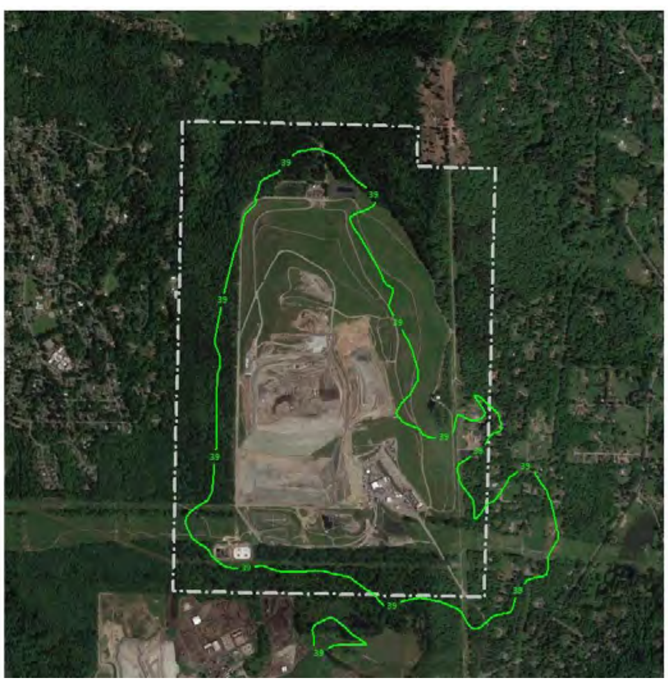


FIGURE 12.3: ALTERNATIVE 2 39 DBA NOISE CONTOUR - AREA 5N LANDFILLING

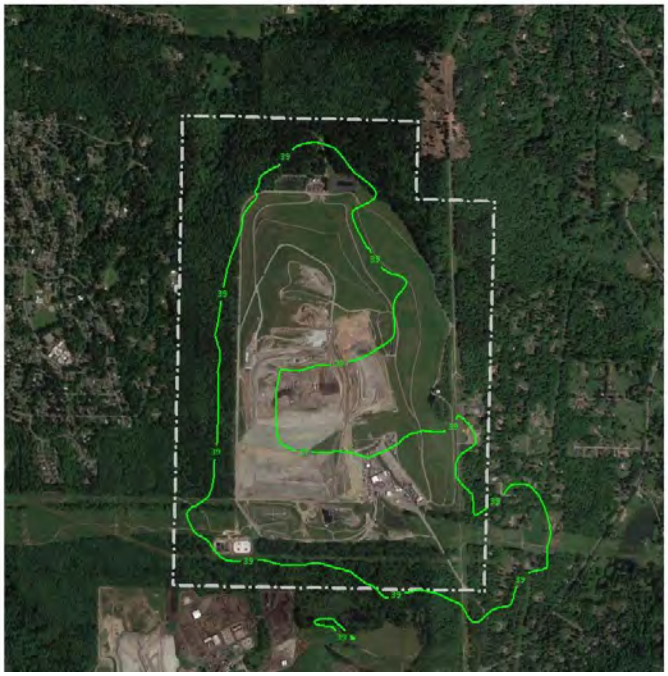


FIGURE 12.4: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 5N LANDFILLING

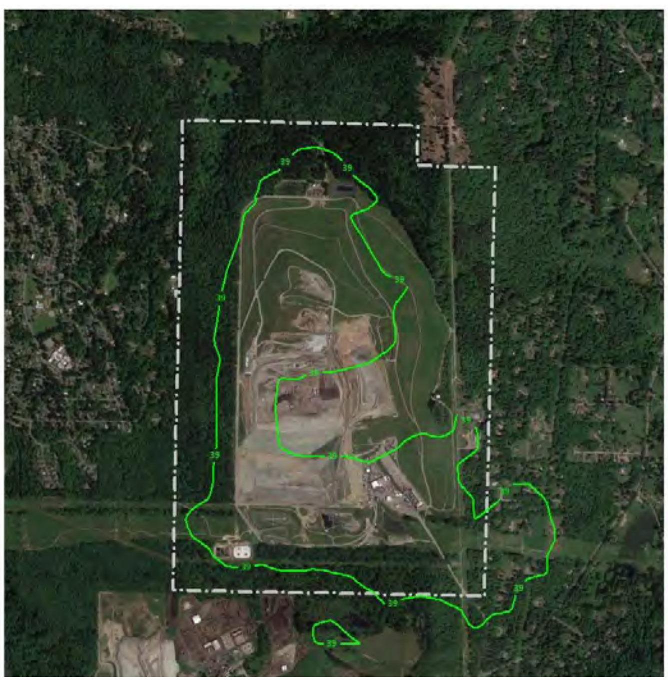


FIGURE 12.5: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA NW-3 LANDFILLING

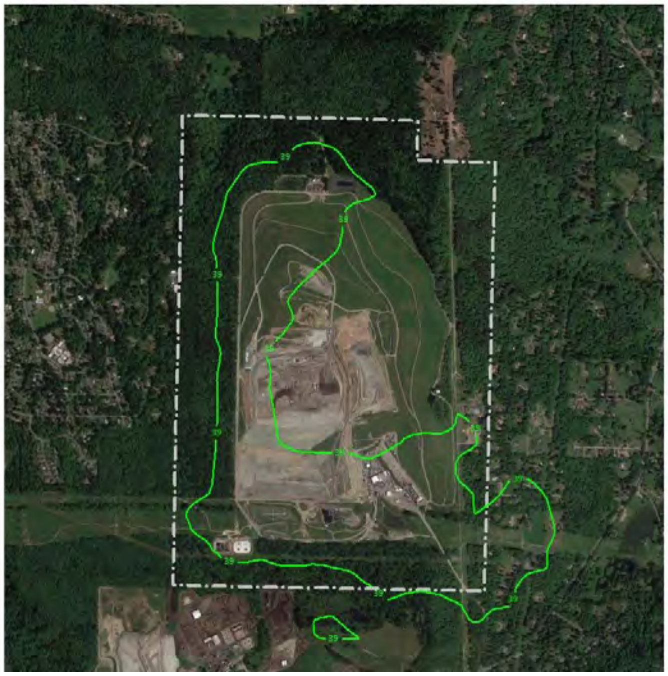
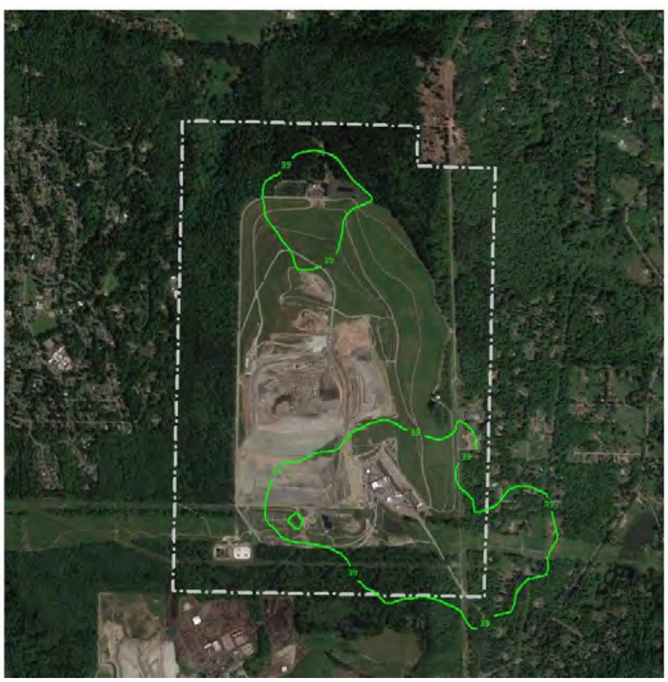


FIGURE 12.6: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 9-LOW LANDFILLING



12.2 South/Option 1 Facilities 10 a.m.

FIGURE 12.7: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING

FIGURE 12.8: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING

FIGURE 12.9: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING

FIGURE 12.10: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING

FIGURE 12.11: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA NW-3 LANDFILLING

FIGURE 12.12: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9-LOW LANDFILLING

12.3 North /Option 2 Facilities 6 a.m.

FIGURE 12.13: ALTERNATIVE 2 39 DB NOISE CONTOUR - AREA 9 LANDFILLING

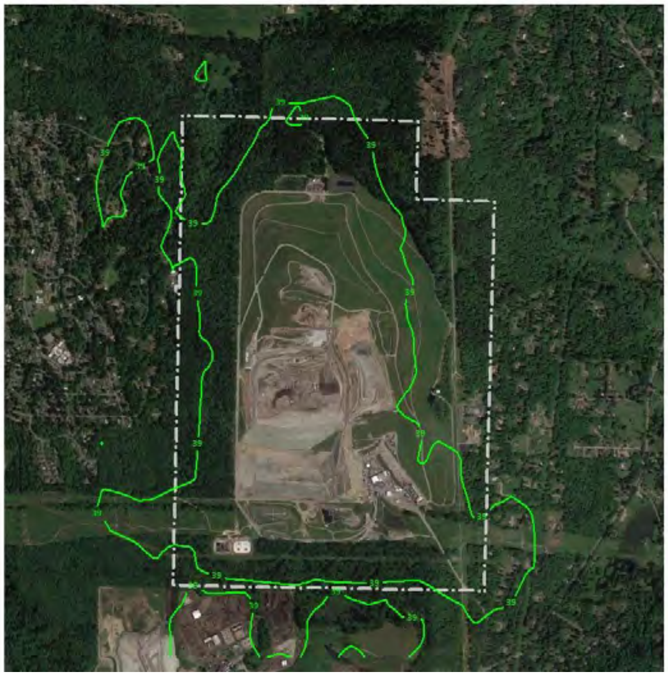


FIGURE 12.14: ALTERNATIVE 3 39 DB NOISE CONTOUR - AREA 9 LANDFILLING

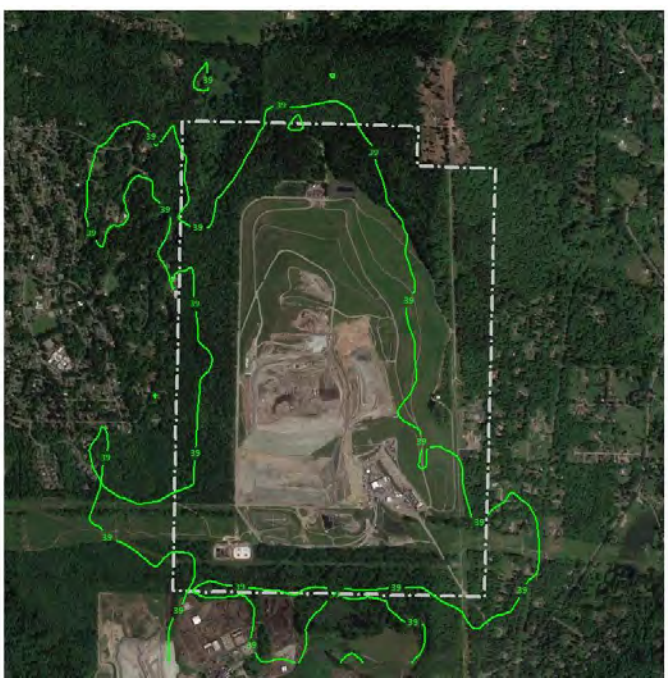


FIGURE 12.15: ALTERNATIVE 2 39 DB NOISE CONTOUR - AREA 5N LANDFILLING

FIGURE 12.16: ALTERNATIVE 3 39 DB NOISE CONTOUR - AREA 5N LANDFILLING

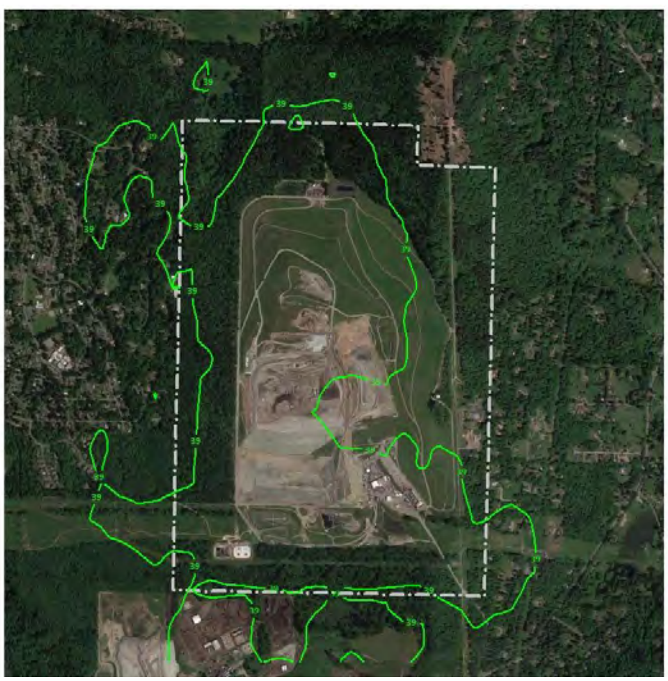


FIGURE 12.17: ALTERNATIVE 3 39 DB NOISE CONTOUR - AREA NW-3 LANDFILLING

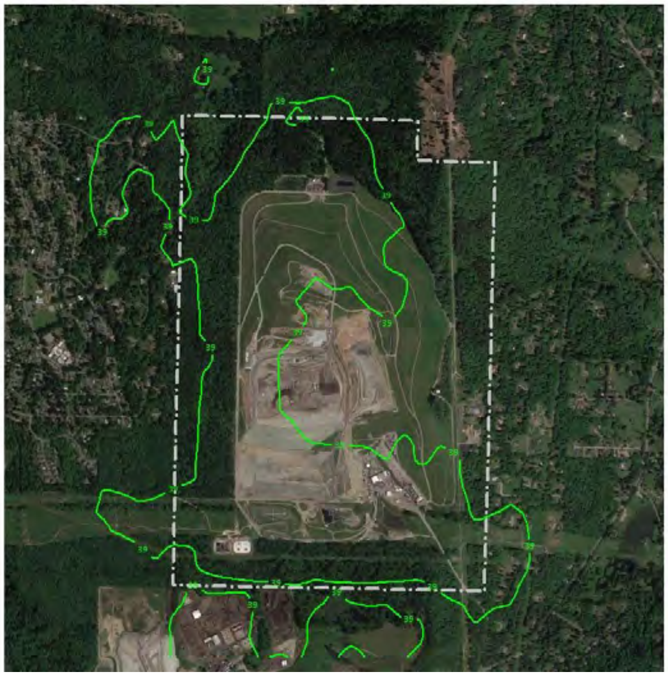
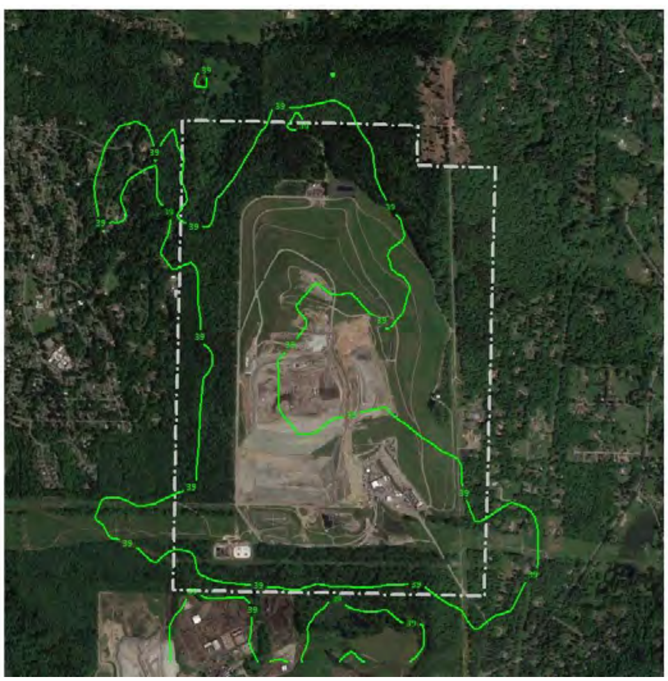


FIGURE 12.18: ALTERNATIVE 3 39 DB NOISE CONTOUR - AREA 9-LOW LANDFILLING



12.4 North / Option 2 Facilities 10 a.m.

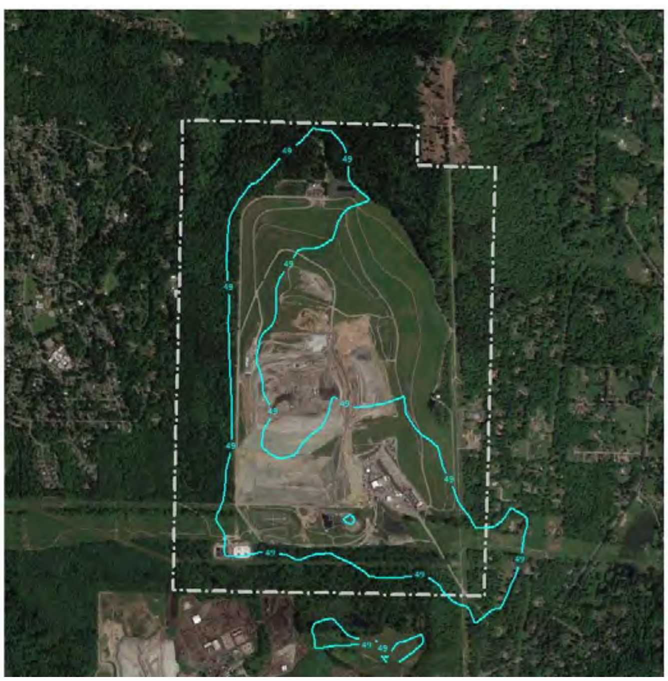
FIGURE 12.19: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING

FIGURE 12.20: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING

FIGURE 12.21: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING

FIGURE 12.22: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING

FIGURE 12.23: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA NW-3



12.5 Option 3 Facilities 6 a.m.

FIGURE 12.24: ALTERNATIVE 2 39 DBA NOISE CONTOUR - AREA 9 LANDFILLING

FIGURE 12.25: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 9 LANDFILLING

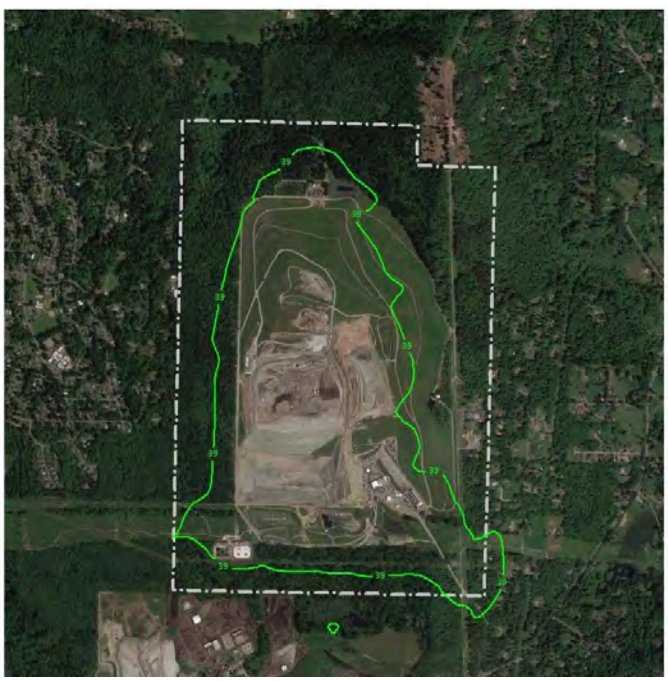


FIGURE 12.26: ALTERNATIVE 2 39 DBA NOISE CONTOUR - AREA 5N LANDFILLING

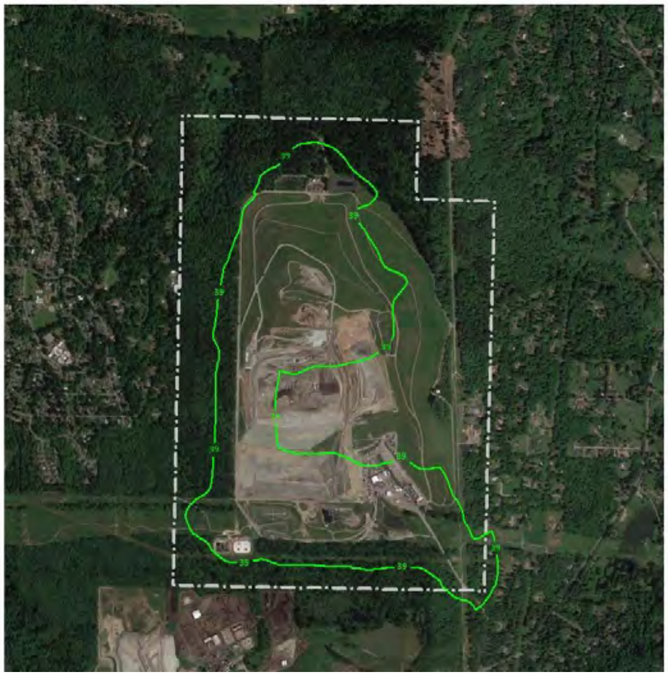


FIGURE 12.27: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 5N LANDFILLING

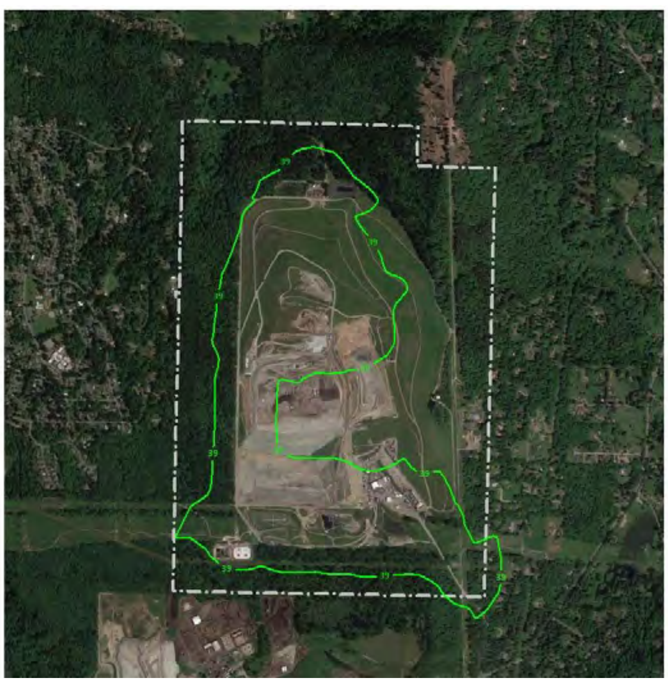


FIGURE 12.28: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA NW-3 LANDFILLING

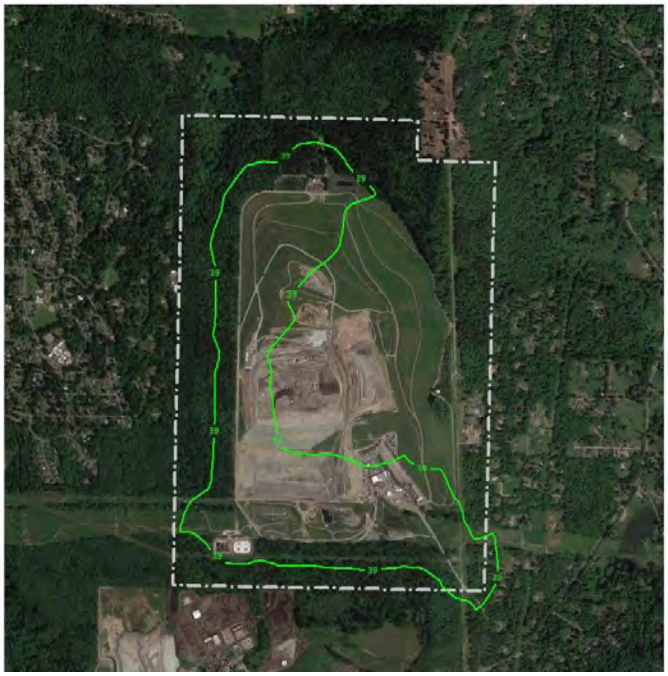
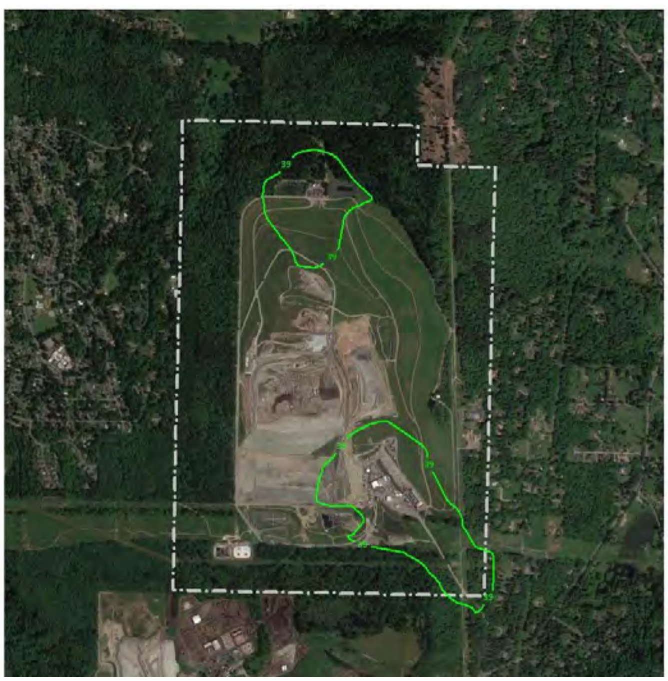


FIGURE 12.29: ALTERNATIVE 3 39 DBA NOISE CONTOUR - AREA 9-LOW LANDFILLING



12.6 Option 3 Facilities 10 a.m.

FIGURE 12.30: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING

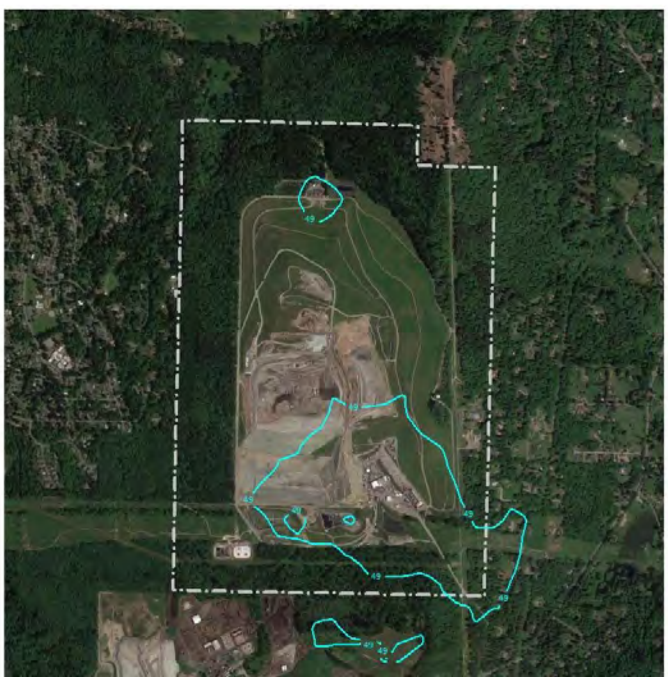
FIGURE 12.31: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9 LANDFILLING

FIGURE 12.32: ALTERNATIVE 2 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING

FIGURE 12.33: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 5N LANDFILLING

FIGURE 12.34: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA NW-3 LANDFILLING

FIGURE 12.35: ALTERNATIVE 3 49 DBA NOISE CONTOUR - AREA 9-LOW LANDFILLING



13.0 POTENTIAL CHRLF MITIGATION

Analysis in the previous section demonstrates the need for noise mitigation to comply with the King County noise code for each of the Action Alternatives and Options under consideration. Mitigation is described in the following sections for each facilities location in order to demonstrate that the noise code can be complied with using traditional mitigation. However, it is anticipated that there will be some changes in the final layout(s) to those that were used for the noise assessment. In that case, the mitigation should be reviewed to determine if any adjustments to the recommendations are necessary.

The mitigation described may not be the only satisfactory solution for compliance with the noise code. Other mitigation, equivalent to that described in this section, could be used.

Also, many of the mitigation measures are aimed at reducing truck noise, either while moving or stationary. For the noise assessment, the acoustic center of the truck was assumed to be at the top of the exhaust stack, about 12 feet above ground level for a typical semi-tractor. The actual noise distribution from the trucks in use should be determined before finalizing mitigation measures. It is possible that the noise source height could be lower, resulting in altered mitigation approaches. Because some of the potential mitigation measures are long walls, this could result in substantial reductions in cost.

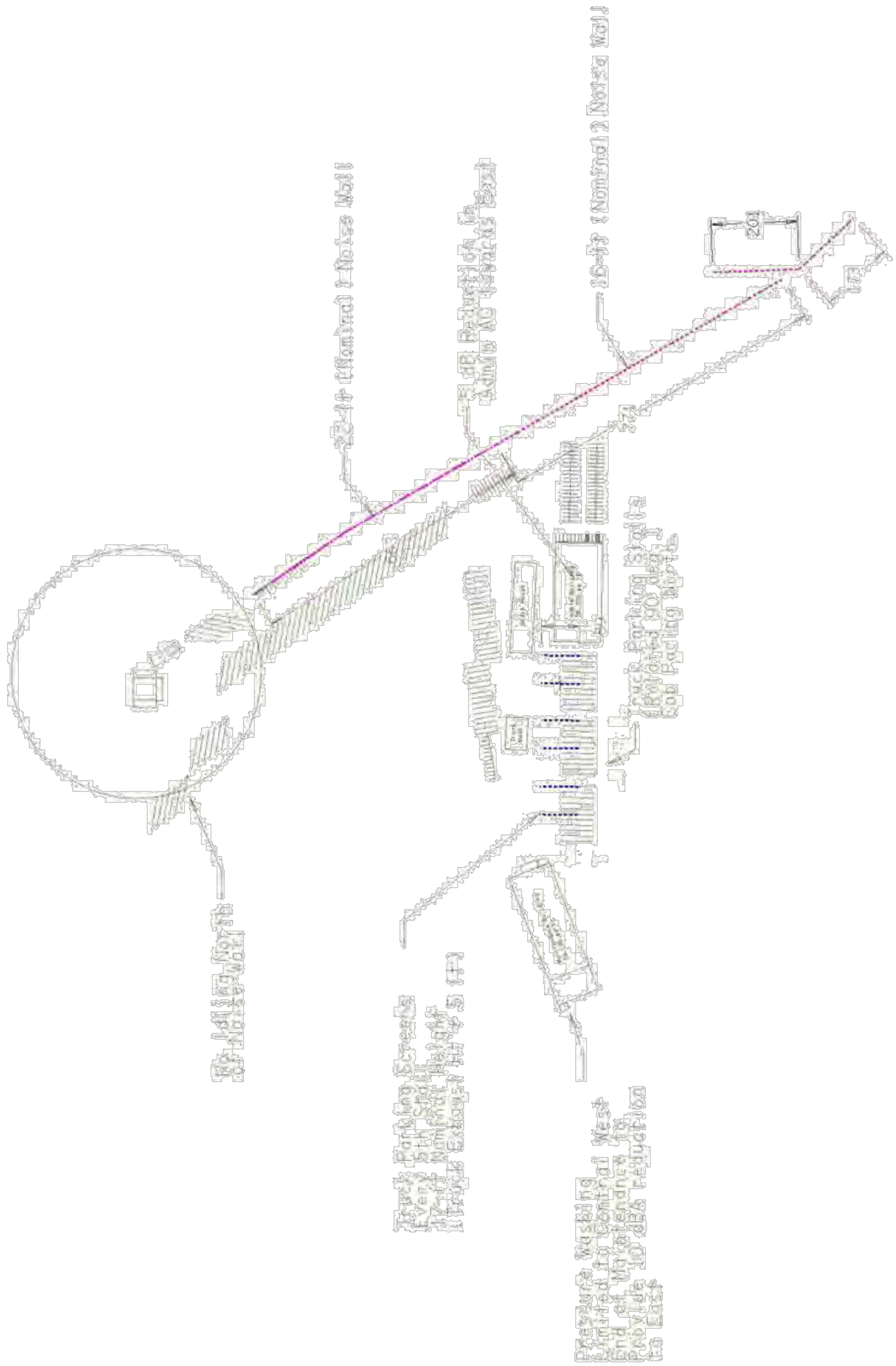
13.1 Mitigation Common to All Options

A barrier along the entrance road, shown in Figure 13.1 is a mitigation approach that is applicable to all Options/facilities locations. The barrier would be nominally 16 feet tall (top of trucks exhaust + 4 feet), but the necessary height may vary according to its actual placement relative to the roadway and the topography adjacent to the roadway. The northern end of the barrier would be 22 feet tall. This higher barrier height is necessary to adequately shield properties in the southeast during truck idle conditions in the early morning hours. Since the ground slopes downward towards the southeast, a taller barrier height would be needed to intersect sound waves in that direction.

Because of the split off of 227th Ave SE, a wing of the barrier would need to extend up 227th to reduce the impact of the gap in the wall for the roadway.

Investigation of a wall that did not extend as far north as the barrier shown in Figure 13.1 was done while researching Area 9 operations. It was found that using the shorter length wall was risky/marginal. It is recommended that the full-length wall be used for comparison of the Alternatives. Research into the semi-tractor noise source height or potentially changed site plans may provide some opportunity to reduce the barrier length, by a couple hundred feet, but probably no more than that.

FIGURE 13.1: POTENTIAL SOUTH MITIGATION



13.2 South Facilities / Option 1 Mitigation

Potential mitigation that is specific to the South Facilities layout are:

- Rotate the CAT shack orientation such that the open end of the building faces towards the NW and away from the closest homes. The analysis used a rotation angle of -57 degrees relative to true north. CAT shack operations should be limited to daytime hours.
- Total HVAC noise on the Administrative Building could have combined sound power of 90.1 or less and could have screens that provide at least 5 dB of extra attenuation to residences towards the east. Systems with higher sound power would be acceptable if offset by increased attenuation from screens.
- Pressure washing could be located on the east end of the maintenance building and could be located on the approximate centerline of the building such that the noise levels to the east are attenuated by 10 dBA or more. Pressure washing could be limited to daytime hours only.
- Noise Screens could be implemented to attenuate noise from idling trucks at the residences to the east. To accomplish this, it is recommended that the truck stalls be rotated 90 degrees from the layout shown provided via CAD file so that the truck stalls run north-south instead of east-west. The noise analysis was performed with the truck cabs facing northwards. An example solution has sound absorptive barriers (absorptive on each facing) should be placed between every 5th truck parking stall. The height would be about 17 feet (exhaust stack height + 5 ft.) and the length is nominally 90 feet and centered on the cab or approximate acoustic center of the tractor. Some rework may be necessary to accommodate the rotated stalls. Placement of stalls near either the Administrative or Maintenance building may reduce the number of stalls that need the barrier/baffle. The walls would be absorptive on both sides and have NRC ratings of 0.9 or higher in the 125 Hz third-octave band.
- Idling trucks could not be located north of the end of the barrier per Figure 13.1.

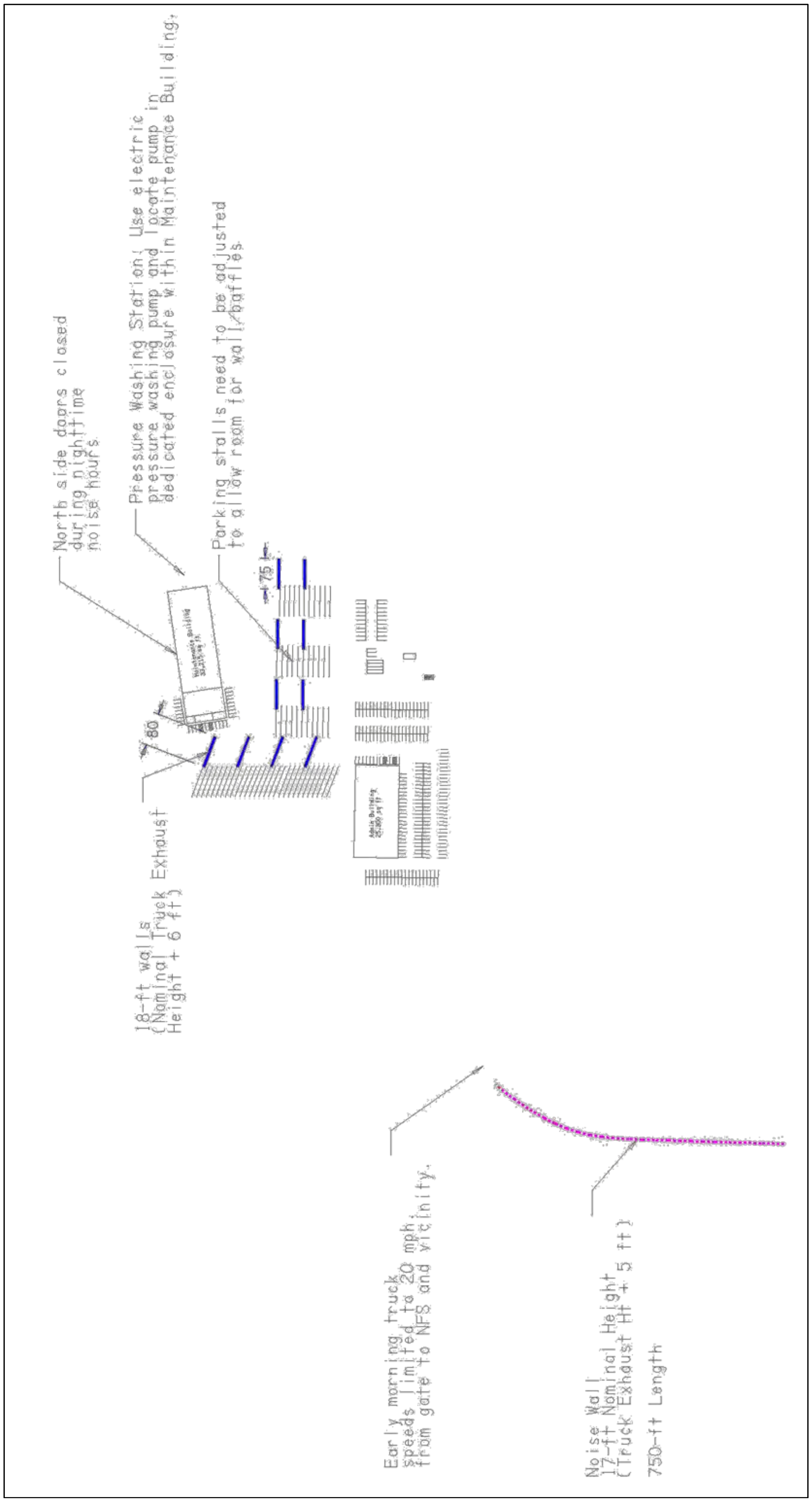
13.3 North Facilities / Option 2 Mitigation

- With the North Facilities location, the maximum speed along the main haul route could be limited to 20 mph until the daytime noise limits start.
- The doors on the maintenance building could be shut on the north side until daytime noise limits start. This would result in about a 10 dB reduction in noise to the north.
- Pressure washing is limited to daytime hours and could be located on the east end of the maintenance building. We recommend that the pressure washer pump be electrically powered and be located in a dedicated enclosure within maintenance building (or a fully enclosed addition on the exterior) with appropriate hose length on the exterior of the building. The pressure washer could be located outside but would need to have a barrier or partial enclosure that results in a 10 dBA noise reduction to the north, east, and west sides.
- A noise wall would be necessary along the NE corner of the main haul route per Figure 13.2.
- Barriers / baffles between truck parking stalls as indicated in Figure 13.2. Nominal height is 18 feet (truck height + 6 ft.) The barriers are intended to shield some currently uninhabited areas to the north / northeast. The analysis demonstrated that this was a feasible approach, however the length of the barriers will necessitate some re-evaluation of the location of the parking stalls to allow clearance around the parking stall walls. Use of the maintenance building as a shield could possibly reduce the

number of parking stalls requiring the noise wall. The walls should be absorptive on both sides and have NRC ratings of 0.9 or higher in the 125 Hz third-octave band.

- The orientation of the vertical column of truck parking stalls could be flipped so that the homes to the west would receive slightly lower noise levels with engine fans pointing away from residences.

FIGURE 13.2: NORTH FACILITIES NOISE MITIGATION



13.4 Area 9 Mitigation

Although mitigating roads and facilities noise would be the preferred method of noise reduction (since it has less operational impact), it was found that when the Area 9 landfilling is in its lower stages, noise mitigation for the active landfilling area would be necessary.

A method of filling, in conjunction with portable noise screens, could be used so that the projected noise levels in the southeast quadrant are within the applicable limits.

The mitigation proposed would be to landfill in about 200-foot wide strips (or whatever KCSWD feels is appropriate) in a southeast to northwest direction so that the waste acts as a partial barrier between the landfilling equipment and the homes to the east/southeast of the site. The portable noise screens would be effective when compacting operations are near or at the final fill grade. In general, the compactors and bulldozers would operate below the level of the tippers and would have some level of noise reduction from being below grade. However, when the compacted waste level is near the elevation of the tipper, the proposed screens would provide line of sight blockage to the affected residences.

When one area of the strip is filled to the top grade, the tippers could be moved laterally to a spot further along the noise wall and the process repeated until the width of the strip is finished and the tipper and entire wall could be moved forward. Figure 13.3 - Figure 13.5 show a proposed scheme.

When the Area 9 filling is at the grade of the current facilities location, the primary concern would be residences towards the southeast. As the landfilling continues upwards, the base of the active area would exceed the height of the existing ridge between the current facilities/BEW and the eastern property line. At that point, the direction of the landfilling strips may need to be adjusted to provide more protection to residents directly east of Area 9.

The initial placing of waste at the perimeter of the Area 9 cell is a short term process and may be considered construction noise since it is the equivalent of construction of berms for noise mitigation. During this time the noise levels at the property lines would exceed the county noise limits by a reasonable amount, about 1-4 dBA, which is not significant.

FIGURE 13.3: AREA 9 FILL SEQUENCE 1

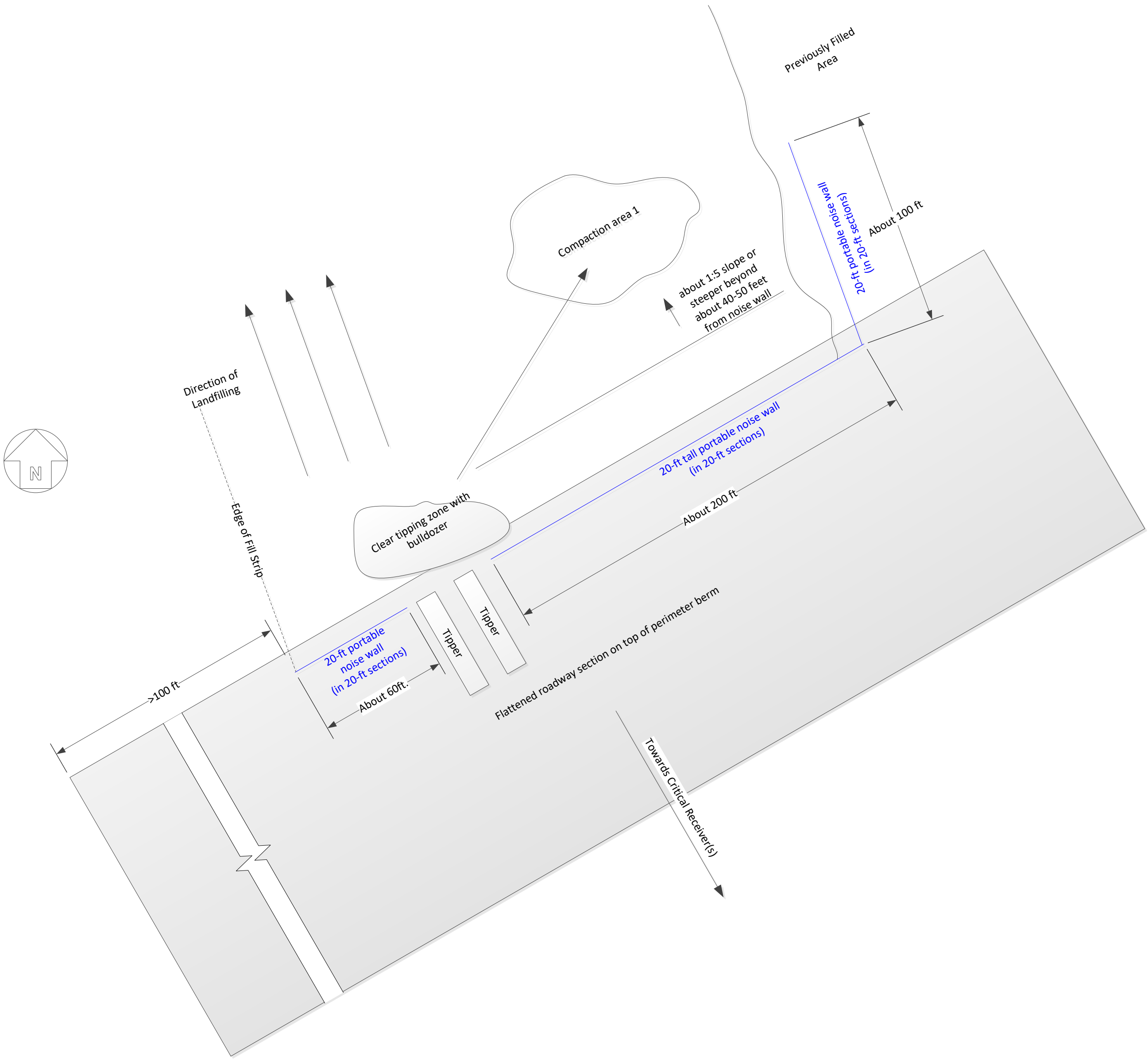


FIGURE 13.4: AREA 9 FILL SEQUENCE 2

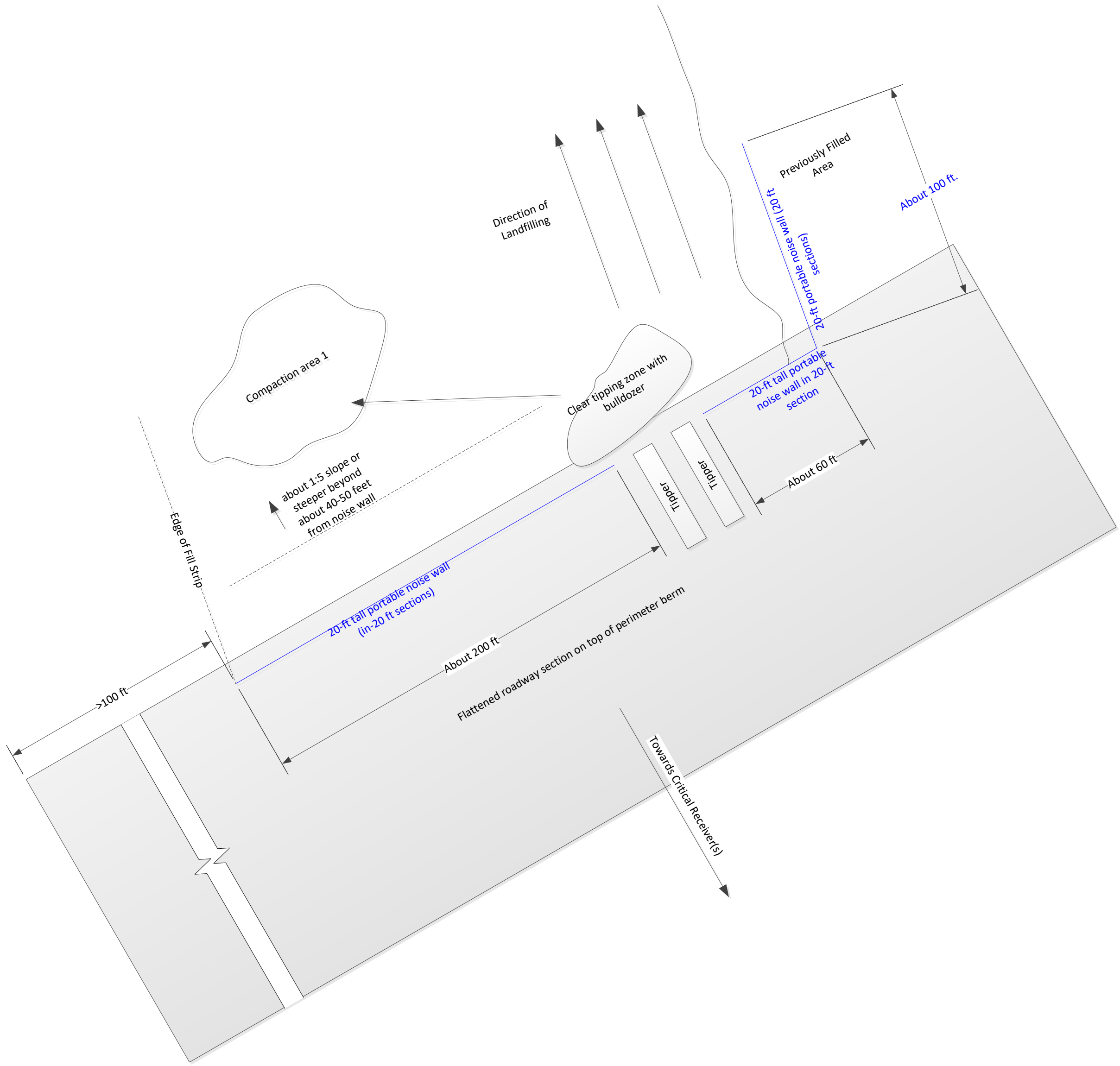
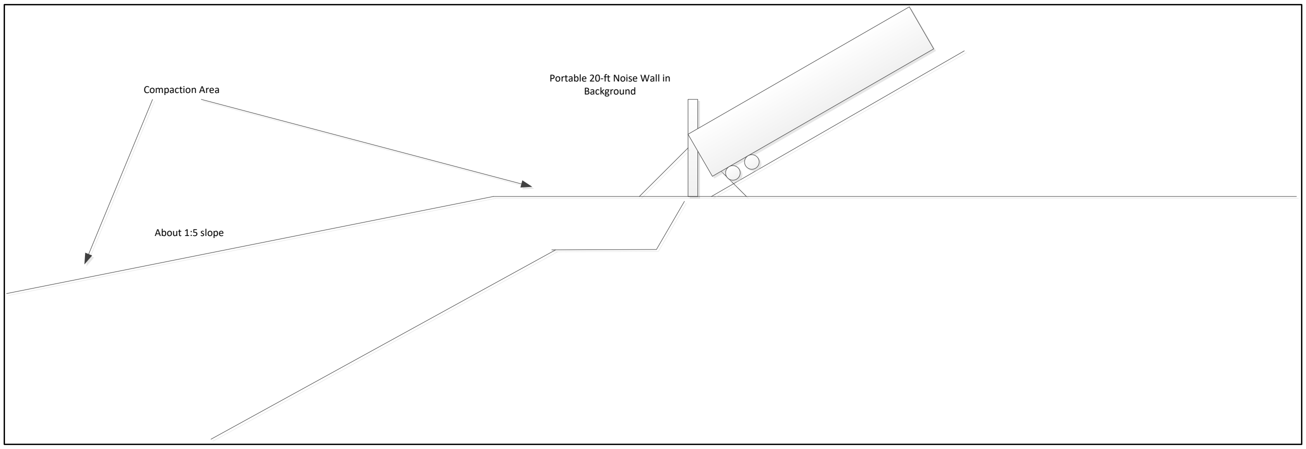


FIGURE 13.5: CROSS SECTION OF AREA 9 FILLING



13.5 Other Mitigation Comments

13.5.1 Screen Operation

The gravel screen used on the landfill can be noisy. The noise model placed the screen near the central portion of the main landfill area and used a use factor of 50% for the screen, which was the recommended value in federally published guidelines for construction noise for vibrating screens. This produced satisfactory noise results. If the screen needs to be run more than half the time and if measured noise levels at the property line confirm that the noise limit is being exceeded, the screen noise could be attenuated by either portable noise screens or by berms made from cover material or even refuse.

The diesel engines are often noisy on screens and the need to have access to stockpiles of material around the screen make them problematic to mitigate since loaders, trucks, or other equipment need access to the stockpiles. If a problem is identified, a potential solution would be to use an electrically powered screen in conjunction with a diesel powered generator. The generator could be located away from the screen and would be easier to put a noise wall around than would the entire screening operation.

13.5.2 Backup Alarms

The two most common noise complaints about industrial sites and sites similar to CHRLF are the sounds made by backup alarms and by banging tailgates after dump trucks have tipped out their loads.

Although the backup alarms are generally exempt from the noise code, they can be included in the impact on community noise levels. This noise assessment for CHRLF and Renton did not make any specific attempt to filter out backup alarms on any equipment measurements or in the noise model computations – whatever alarm noise that was present during measurements for sound power determination are reflected in the noise model results.

It is our understanding that OSHA requires that material handling vehicles and vehicles with blind spots to have backup alarms that are audible at a distance of 15 feet or more from the truck or they must use a dedicated signaler to assist the driver when backing up. It is also our understanding that backup alarms are typically available with one of two common output levels. Often manufacturers will install the noisiest alarm regardless of the sound environment that the device will be used in to protect themselves from legal action in the event of an accident. For minimum community response, however, the quietest alarm that still meets OSHA requirements could be used.

Some backup alarms currently on the market have the capacity to automatically adjust for the ambient noise conditions that the vehicle is operating in and would appear to be a viable option to reduce community noise levels.

Further, use of a broadband or white noise type backup alarm may be less obtrusive to those in the community than the traditional tonal beeper. The tonal alarms have a tone in the 1600-2500 Hz range where humans are traditionally most sensitive to noise. It has been reported that with the broadband type backup alarms, it is easier for a person to detect where the potentially dangerous vehicle is located, but additional data is required.

Use of a dedicated person to signal to truck drivers when it is safe to backup is the quietest option, but there are some considerations that would need to be addressed before reliance upon a signaler. Among them are:

- The tolerance to have an operator controlled switch that deactivates the backup alarm at one property and utilizes the alarm at another. Operational loads will have operations from at least 2 sites and the 2nd site may not have signaling capabilities.
- The ability to legally remove a backup alarm installed on a vehicle.

13.5.3 Tailgate Noise

Banging of tail gates was not readily observed at the landfill during site visits, but any time dump trucks are involved in operations, there is the potential for impact noise caused when the tail gate swings shut after dumping out a load. This is more likely to be a problem when offsite fill loads are being brought to the landfill than when excavated loads are being taken offsite. The banging can be minimized, but operators (both contractors and employees) need to be reminded that such noise must be avoided.

Mitigation recommended by FHWA to reduce tailgate noise includes:

- Establish truck cleanout staging areas
- Use rubber gaskets
- Decrease speed of closure
- Use bottom dump trucks

14.0 CHRLF MITIGATED NOISE LEVELS

The results of the noise analysis with the potential mitigation discussed in Section 13.0 is described here in Section 14.0. The results focus on Alternative 3 for a few reasons:

1. It has the largest number of hourly loads
2. It has the largest noise footprint
3. Alternative 3 has some unique areas in the northeast and northwest corner that Alternatives 1 and 2 do not.
4. The landfill fill sequencing is Area 8 – Area(s) 2/3/4/5/6, Area 9 – northeast, northwest. So, in large part, it follows the same sequencing that would be used for completion of Alternatives 1 & 2, but then extends further into the northern regions of the landfill. Thus, the noise levels that would be generated during Alternatives 1 & 2 as well as the topography will be similar. Loads for Alternatives 1 and 2 would be slightly less, but in both cases the maximum difference (based on hourly loads) would be on the order of 0.3-0.5 dBA – not a significant difference.
5. Thus, demonstration that Alternative 3 complies with the KCC noise code and SEPA non-significance criteria also inherently shows that Alternatives 1 and 2 would also comply with the noise code and would not cause significant noise impacts.

Area 9 operations dictate that the noise wall along the main entrance road be maintained.

The early morning hours operations and trucks leaving the site, continue to be the principal factor in determining the amount of mitigation necessary. Once the mitigation necessary for nighttime compliance are met, the projected daytime levels had slightly more margin to the limit.

14.1 Alternative 3 Option 1 /South Facilities Mitigated Noise Levels 6 a.m.

At all positions, the projected noise levels are within the limits specified by KCC 12.86.

A small segment of the 39 dBA nighttime noise limit contour briefly crosses the property line in the southwest and southeast corners. Both properties where this occurs have industrial zonings, so the limit is 57 dBA and the noise code would be met.

FIGURE 14.1: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6 LANDFILLING

FIGURE 14.2: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N LANDFILLING

FIGURE 14.3: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N LANDFILLING

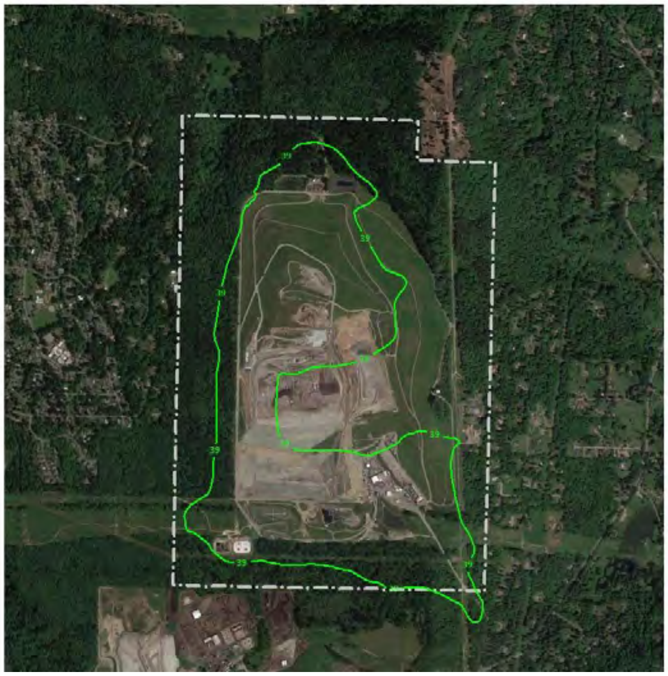


FIGURE 14.4: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 9 LANDFILLING

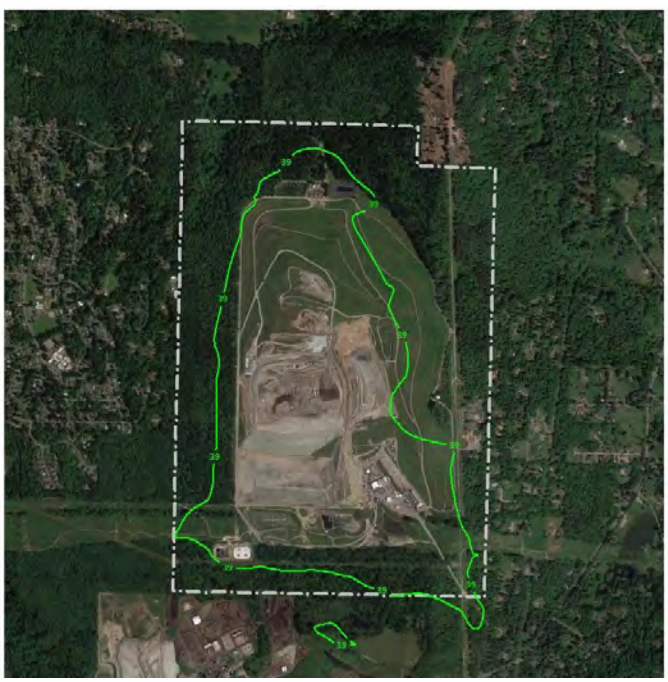


FIGURE 14.5: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 8

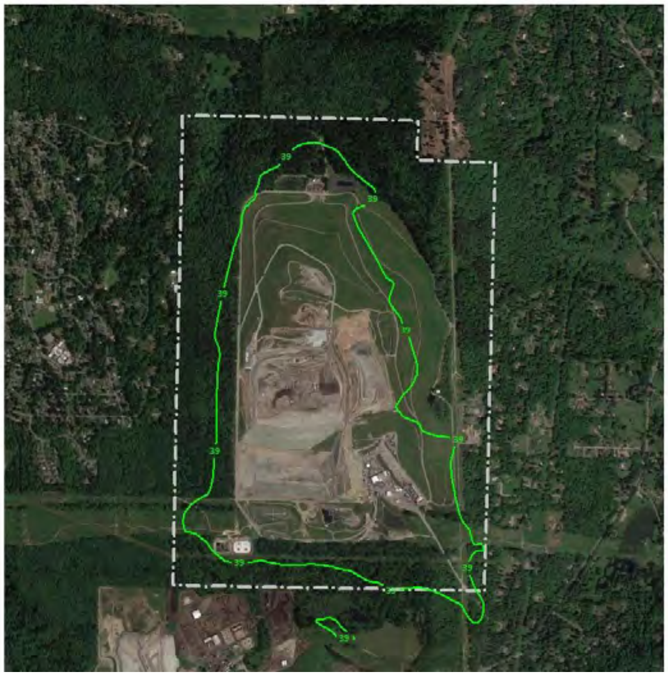


FIGURE 14.6: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5 LANDFILLING

FIGURE 14.7: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. NE-3 LANDFILLING

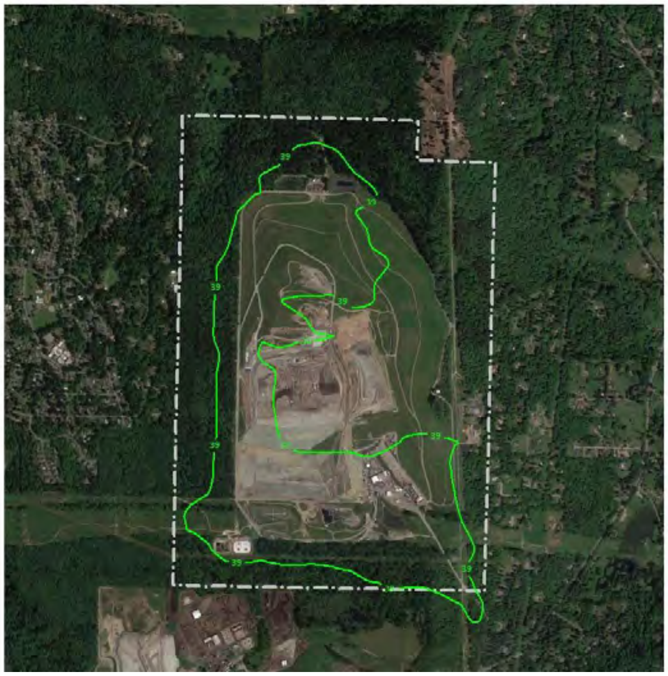


FIGURE 14.8: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. NW-3 LANDFILLING

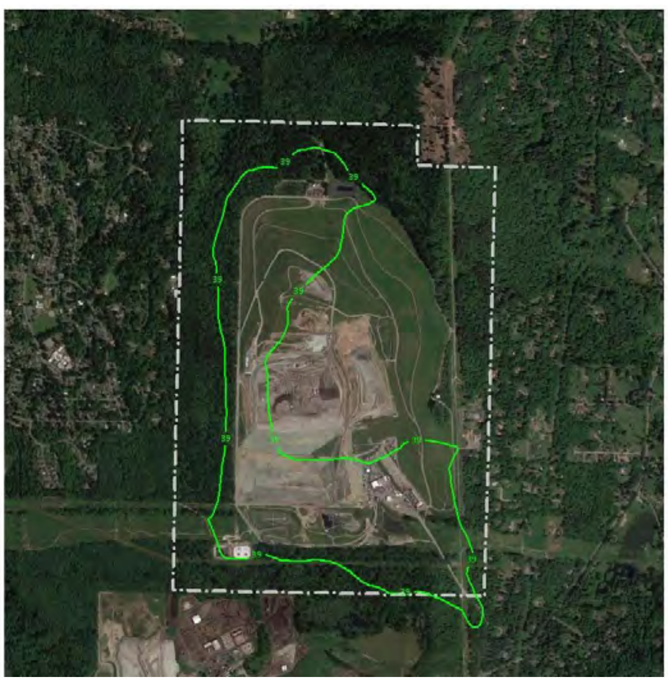


FIGURE 14.9: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N-3 LANDFILLING

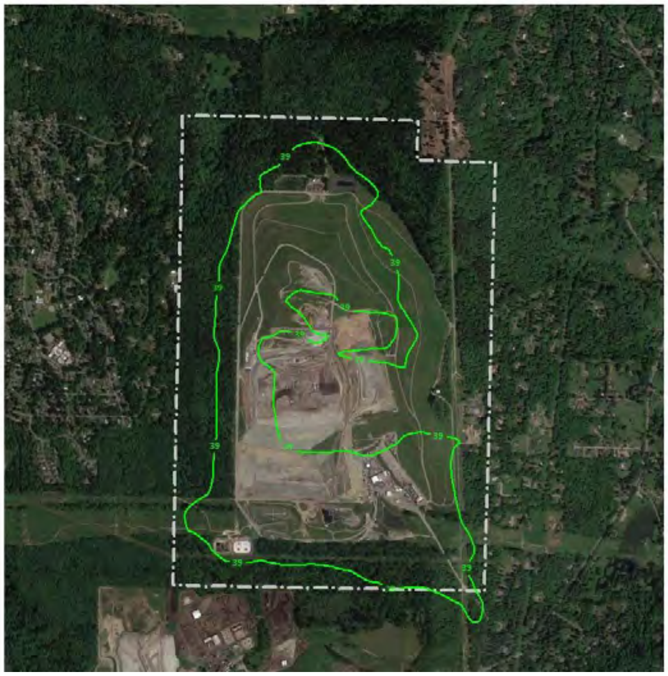


FIGURE 14.10: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N-3 LANDFILLING

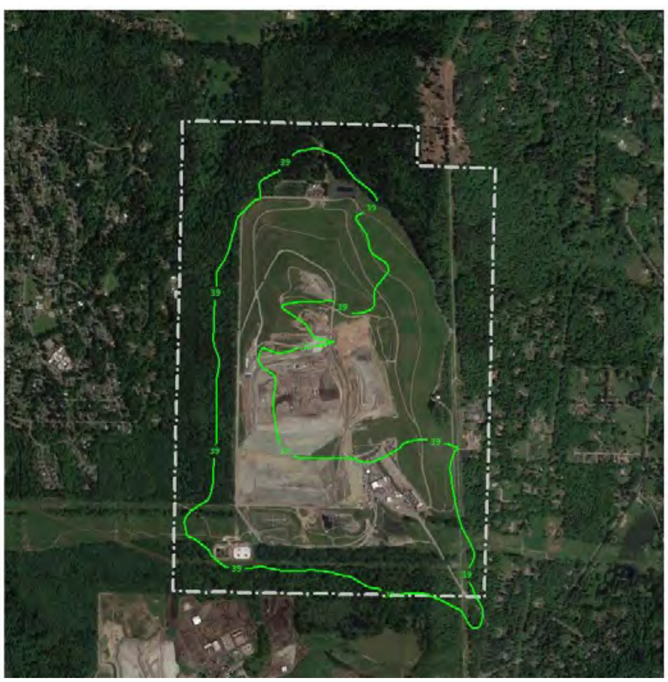


FIGURE 14.11: SOUTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 9-LOW LANDFILLING

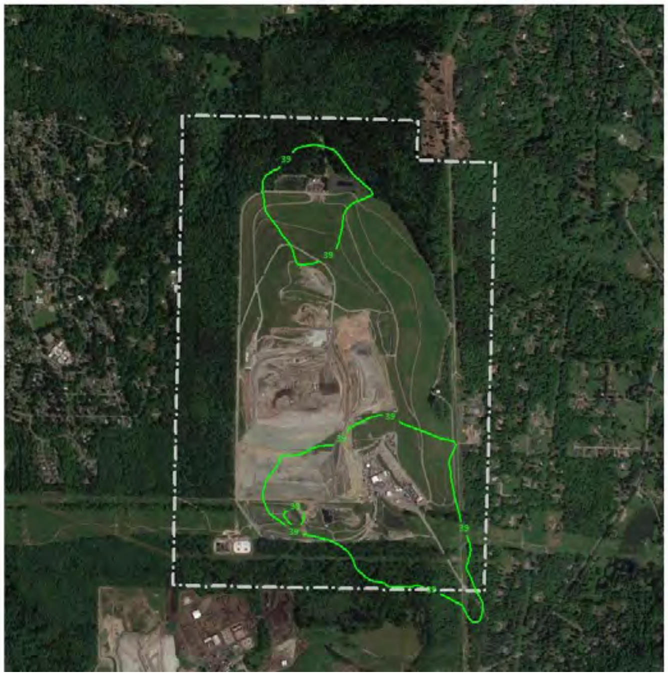


FIGURE 14.12: ALTERNATIVE 3 SOUTH FACILITIES NW-3 LANDFILLING LMAX

14.2 Alternative 3 Option 1 / South Facilities Mitigated Noise Levels 10 a.m.

FIGURE 14.13: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6 LANDFILLING

FIGURE 14.14: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N LANDFILLING

FIGURE 14.15: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N LANDFILLING

FIGURE 14.16: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9 LANDFILLING

FIGURE 14.17: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 8

FIGURE 14.18: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5 LANDFILLING

FIGURE 14.19: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. NE-3 LANDFILLING

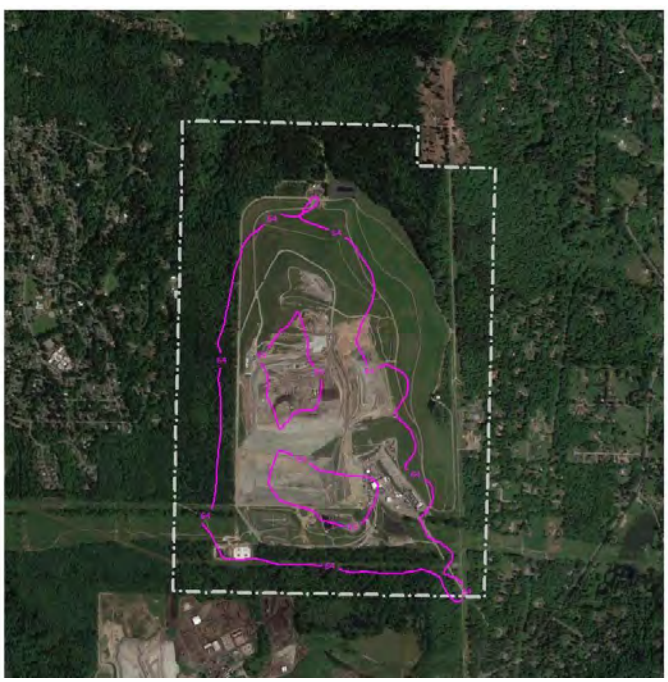
FIGURE 14.20: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. NW-3 LANDFILLING

FIGURE 14.21: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N-3 LANDFILLING

FIGURE 14.22: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N-3 LANDFILLING

FIGURE 14.23: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9-LOW LANDFILLING

FIGURE 14.24: SOUTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9 LANDFILLING LMAX



14.3 Alternative 3 Option 2 / North Facilities Mitigated Noise Levels 6 a.m.

FIGURE 14.25: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6 LANDFILLING

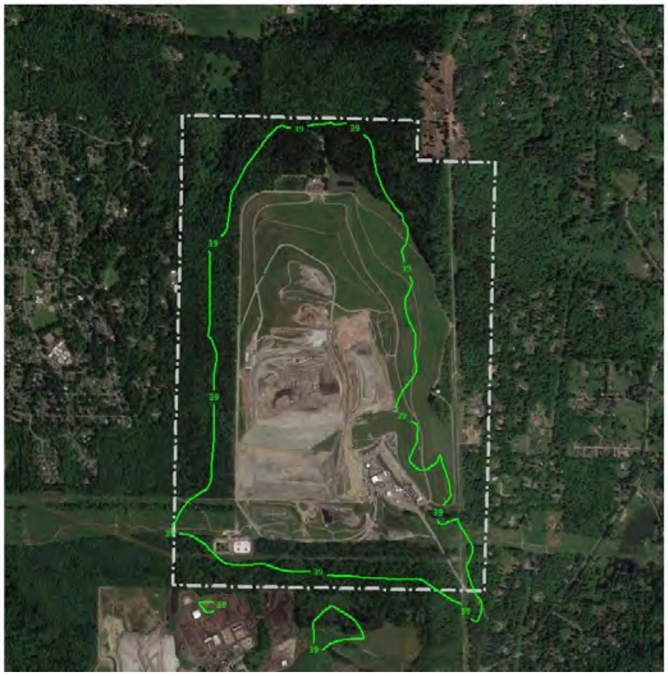


FIGURE 14.26: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N LANDFILLING

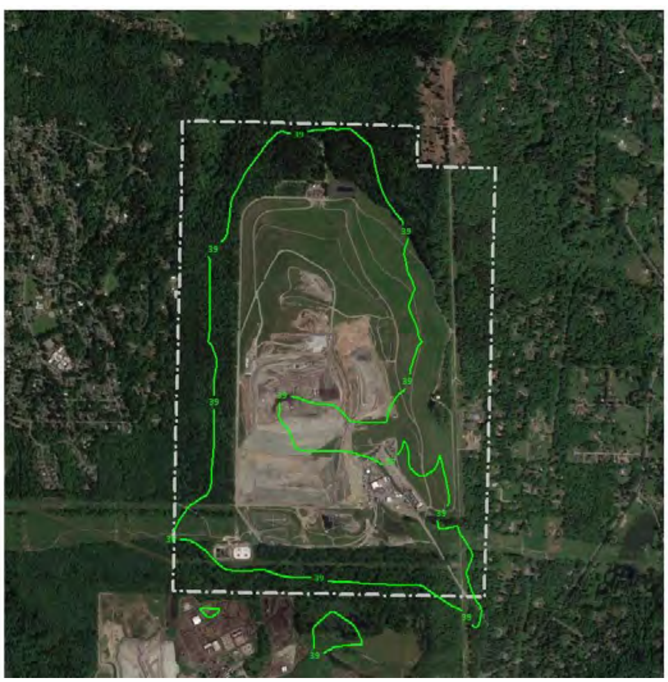


FIGURE 14.27: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N LANDFILLING

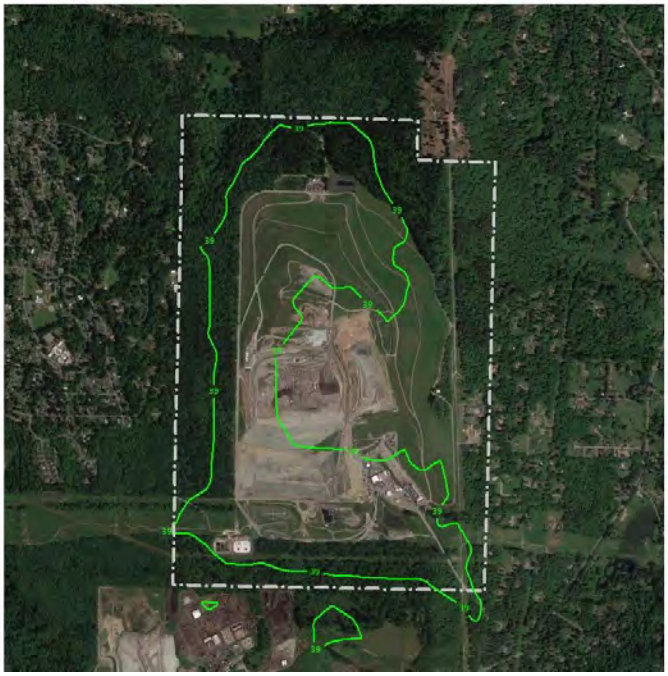


FIGURE 14.28: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 9 LANDFILLING

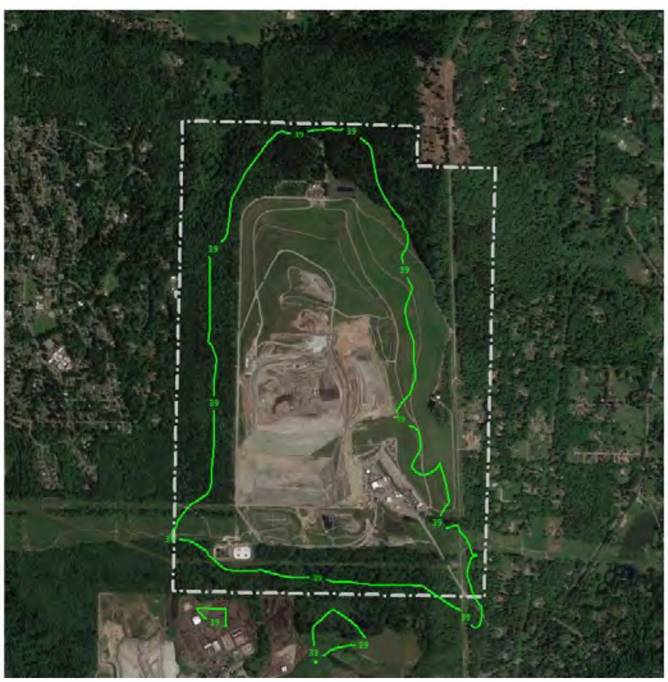


FIGURE 14.29: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 8

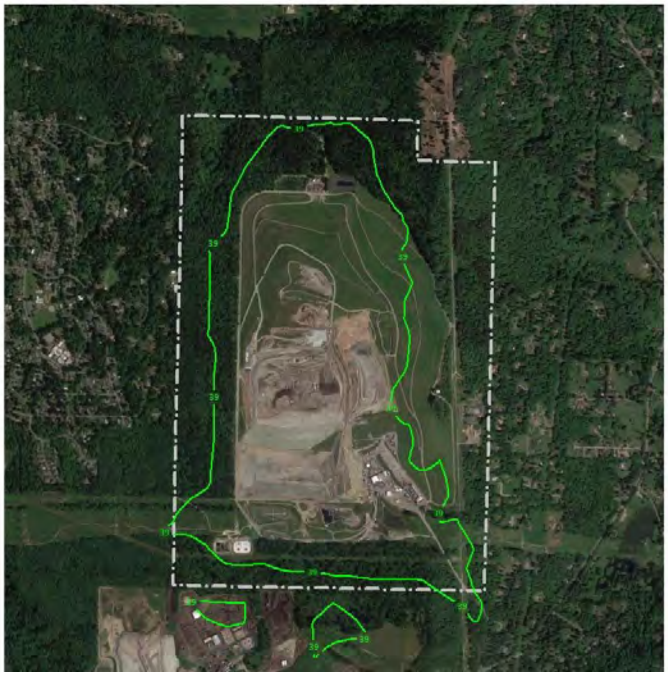


FIGURE 14.30: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5 LANDFILLING

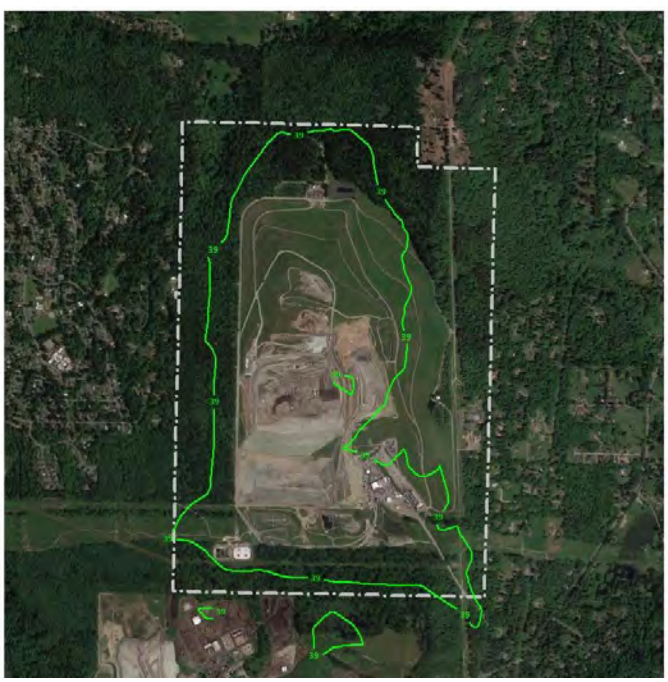


FIGURE 14.31: NORTH FACILITIES ALTERNATIVE 3 6 A.M. NE-3 LANDFILLING

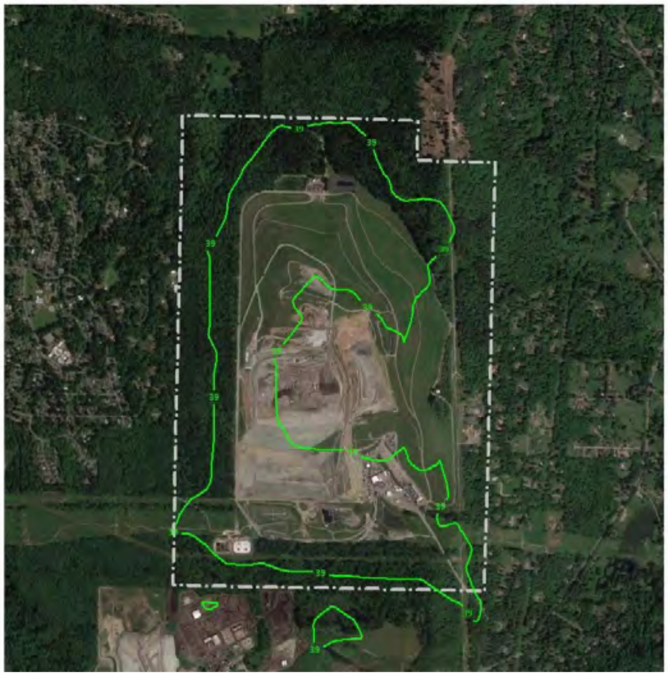


FIGURE 14.32: NORTH FACILITIES ALTERNATIVE 3 6 A.M. NW-3 LANDFILLING

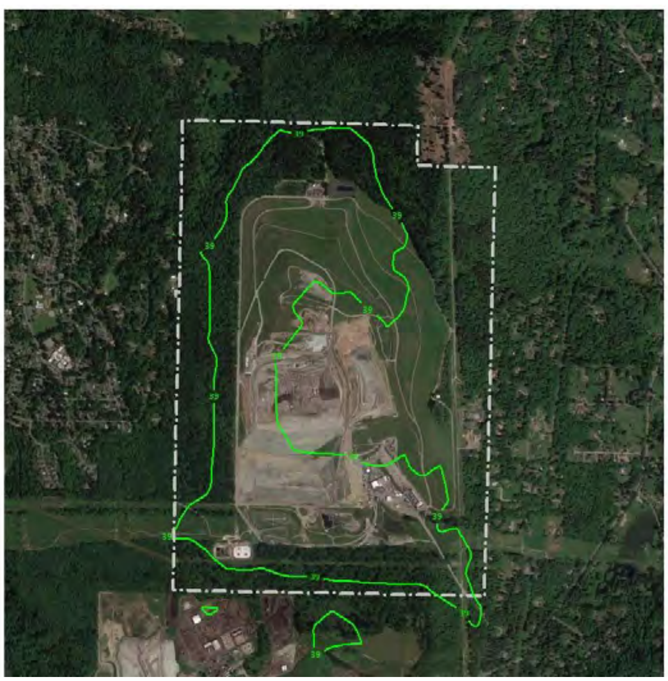


FIGURE 14.33: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N-3 LANDFILLING

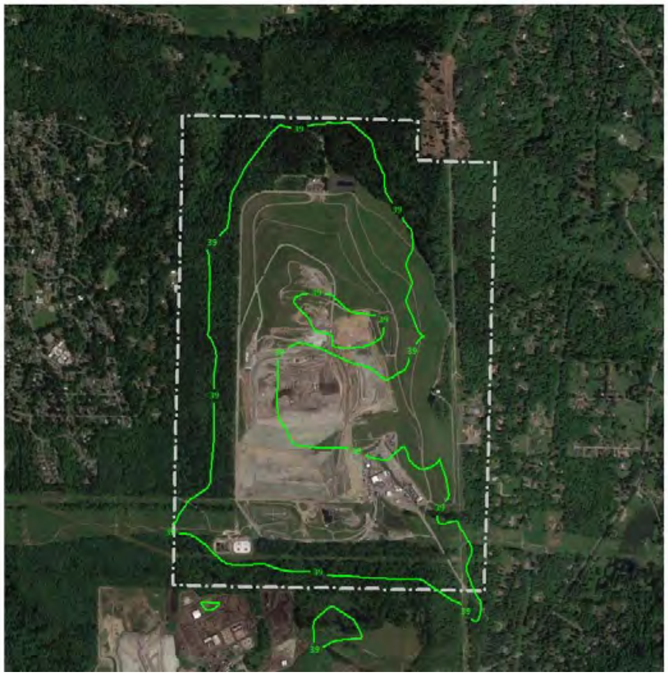


FIGURE 14.34: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N-3 LANDFILLING

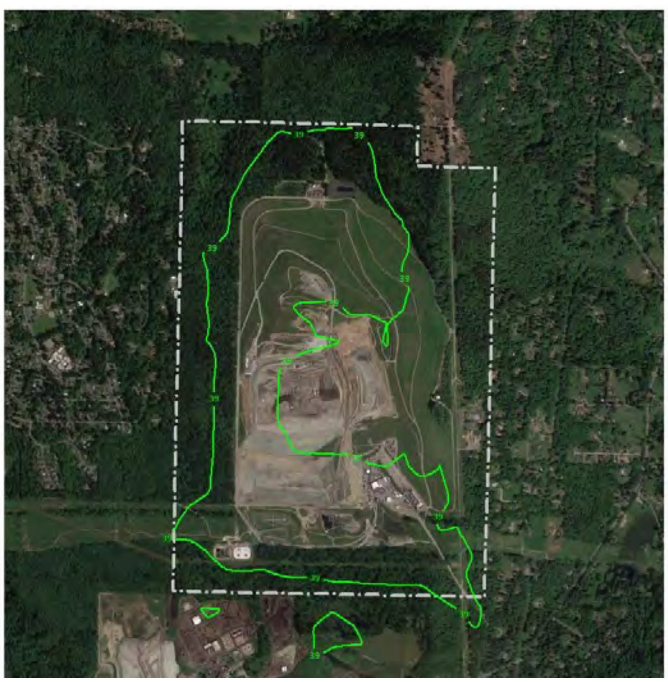


FIGURE 14.35: NORTH FACILITIES ALTERNATIVE 3 6 A.M. AREA 9-LOW LANDFILLING

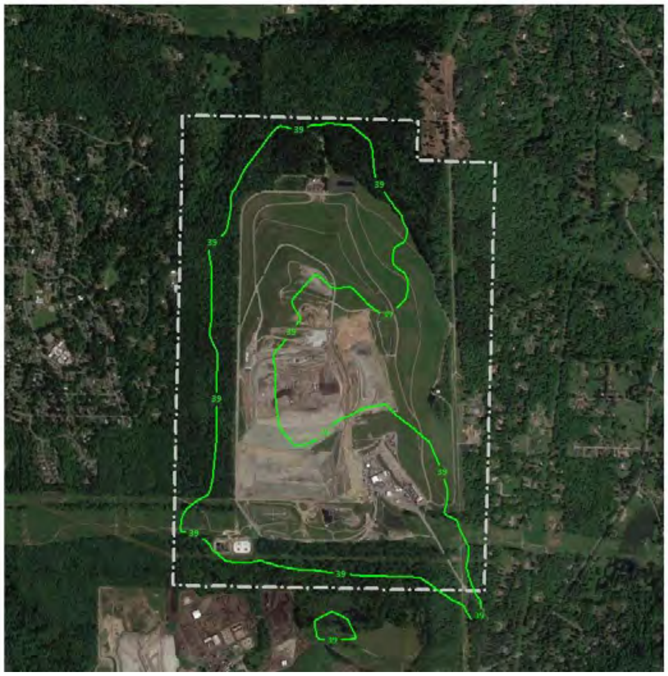


FIGURE 14.36: NORTH FACILITIES ALTERNATIVE 3 6 A.M. NW-3 LANDFILLING LMAX

14.4 Alternative 3 Option 2 / North Facilities Mitigated Noise Levels 10 a.m.

FIGURE 14.37: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6 LANDFILLING

FIGURE 14.38: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N LANDFILLING

FIGURE 14.39: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N LANDFILLING

FIGURE 14.40: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9 LANDFILLING

FIGURE 14.41: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 8

FIGURE 14.42: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5 LANDFILLING

FIGURE 14.43: NORTH FACILITIES ALTERNATIVE 3 10 A.M. NE-3 LANDFILLING

FIGURE 14.44: NORTH FACILITIES ALTERNATIVE 3 10 A.M. NW-3 LANDFILLING

FIGURE 14.45: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N-3 LANDFILLING

FIGURE 14.46: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N-3 LANDFILLING

FIGURE 14.47: NORTH FACILITIES ALTERNATIVE 3 10 A.M. AREA 9-LOW LANDFILLING

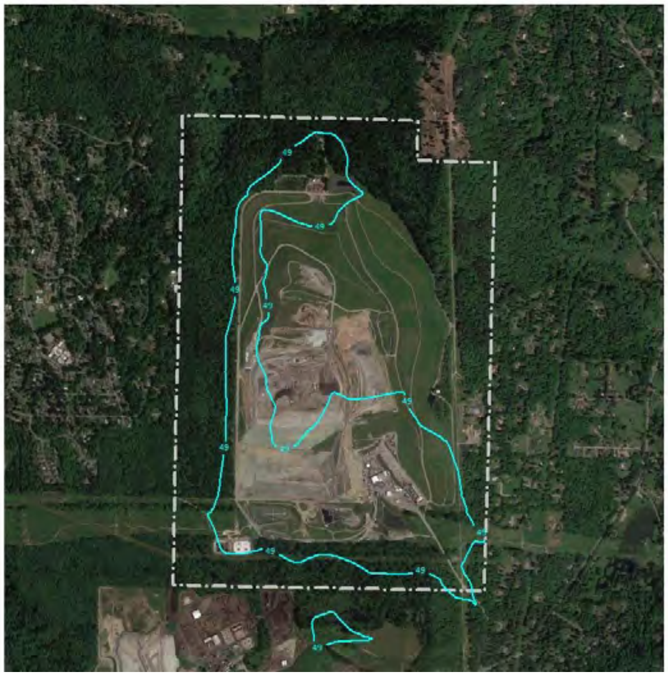


FIGURE 14.48: ALTERNATIVE 3 NORTH FACILITIES NW-3 LANDFILLING LMAX

14.5 Alternative 3 Option 3 / Renton Facilities Mitigated Noise Levels 6 a.m.

FIGURE 14.49: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 6 LANDFILLING

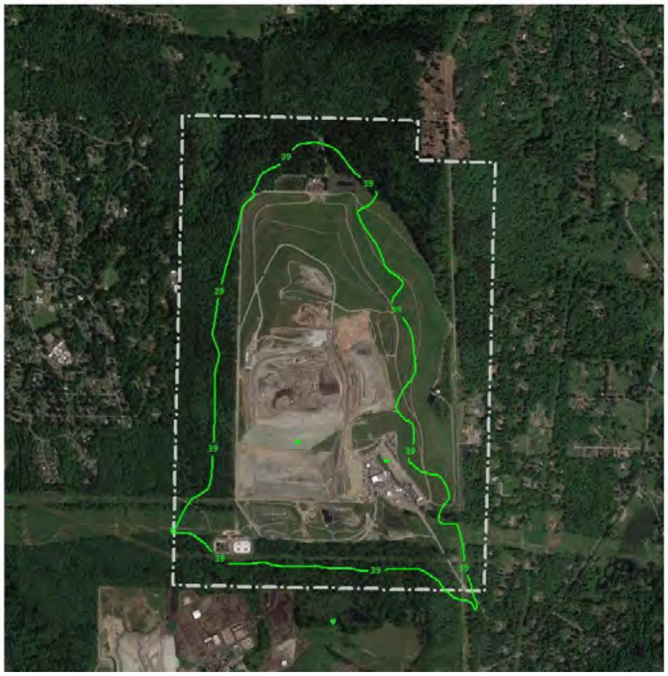


FIGURE 14.50: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N LANDFILLING

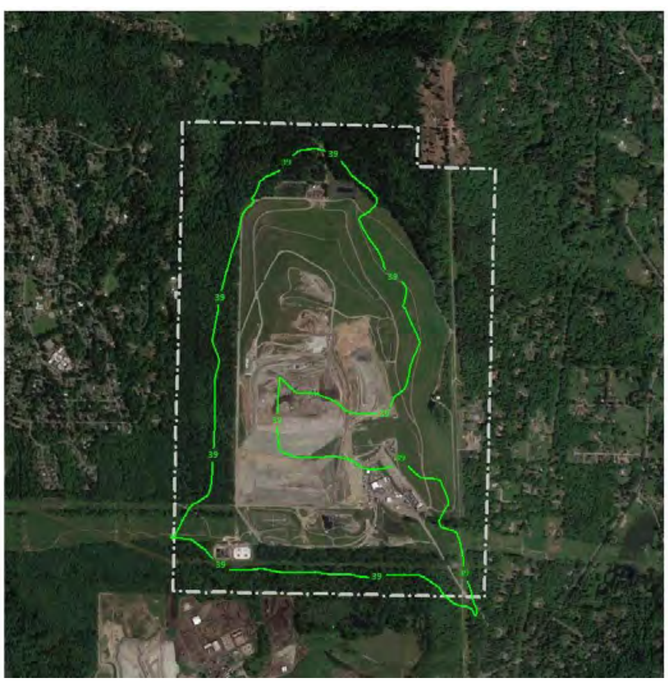


FIGURE 14.51: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N LANDFILLING

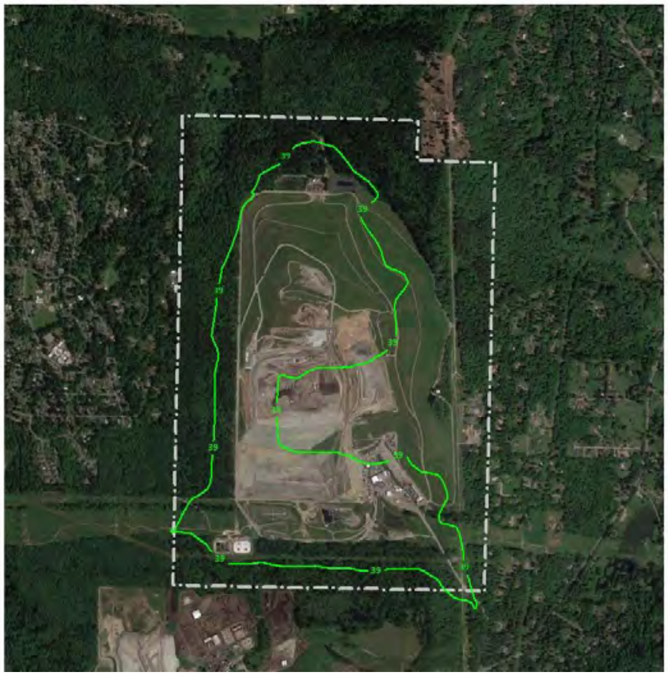


FIGURE 14.52: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 9 LANDFILLING

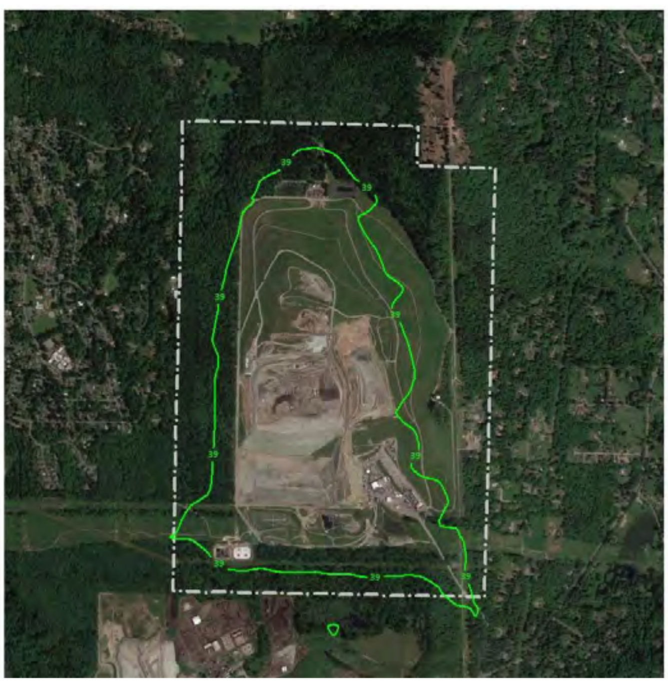


FIGURE 14.53: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 8

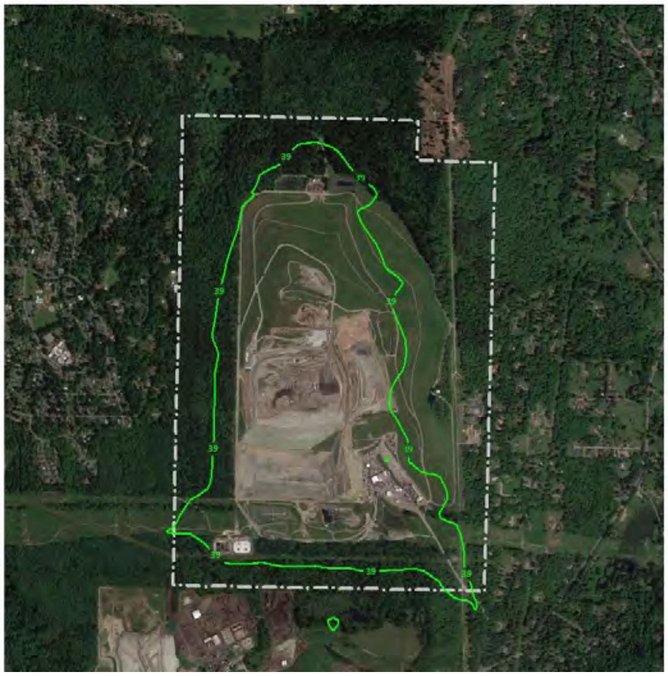


FIGURE 14.54: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 5 LANDFILLING

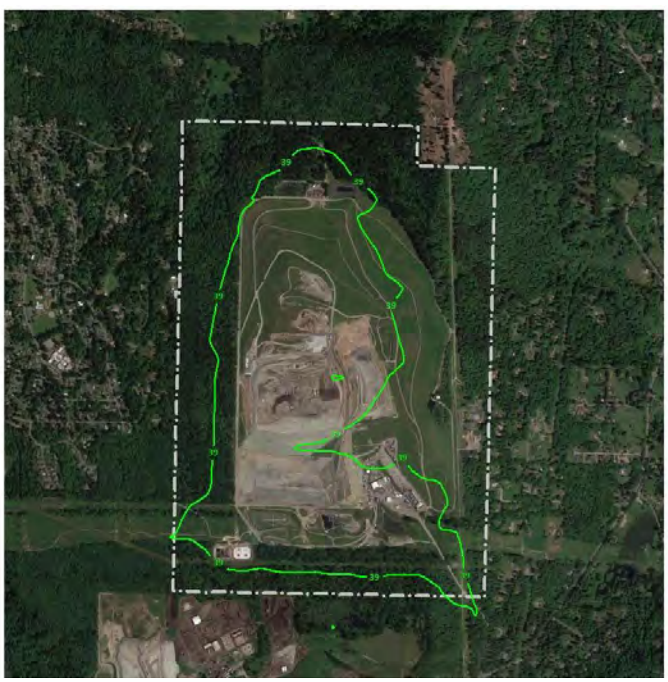


FIGURE 14.55: RENTON FACILITIES ALTERNATIVE 3 6 A.M. NE-3 LANDFILLING

FIGURE 14.56: RENTON FACILITIES ALTERNATIVE 3 6 A.M. NW-3 LANDFILLING

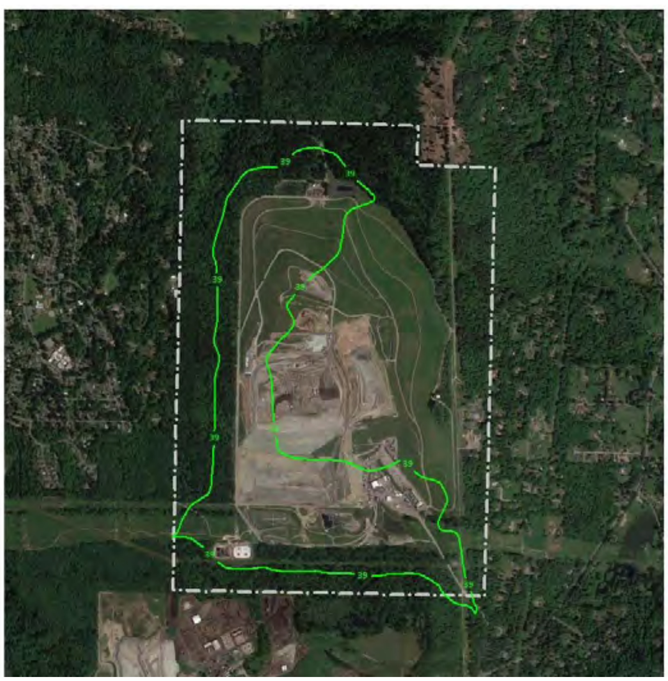


FIGURE 14.57: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 6N-3 LANDFILLING

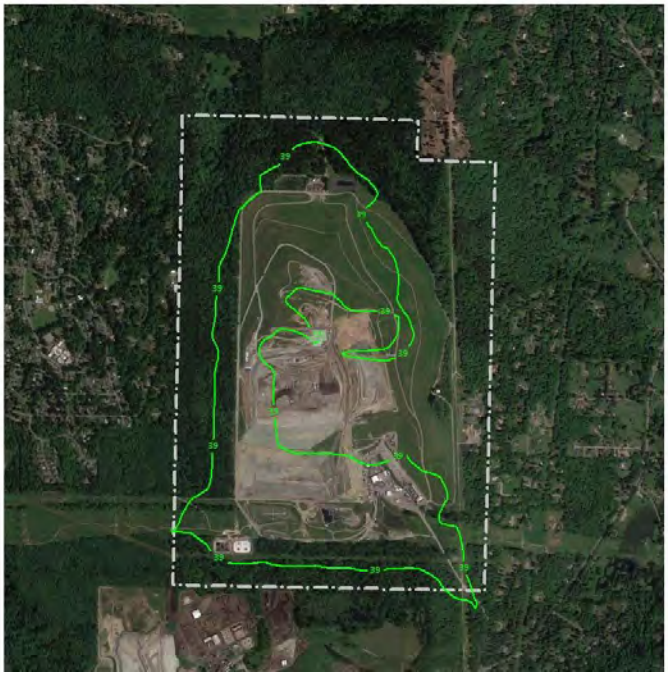


FIGURE 14.58: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 5N-3 LANDFILLING

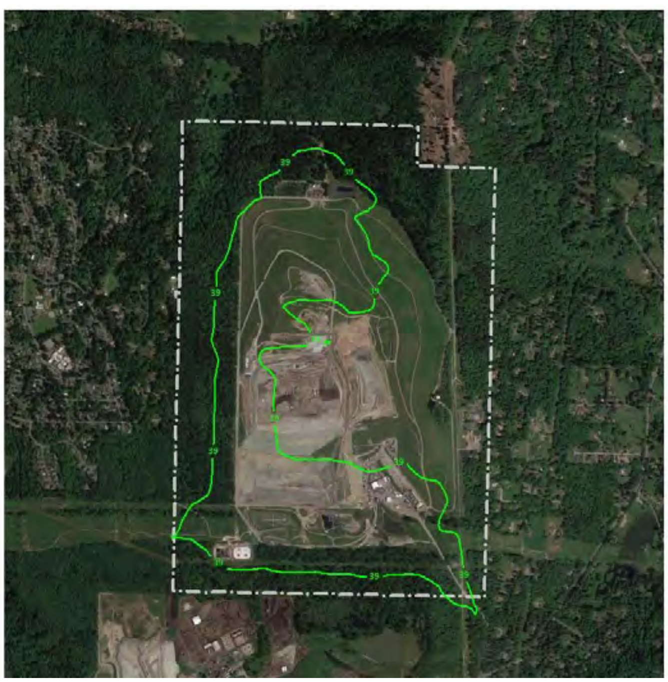


FIGURE 14.59: RENTON FACILITIES ALTERNATIVE 3 6 A.M. AREA 9-LOW LANDFILLING

FIGURE 14.60: ALTERNATIVE 3 RENTON FACILITIES NW-3 LANDFILLING LMAX

14.6 Alternative 3 Option 3 / Renton Facilities Mitigated Noise Levels 10 a.m.

FIGURE 14.61: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 6 LANDFILLING

FIGURE 14.62: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N LANDFILLING

FIGURE 14.63: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N LANDFILLING

FIGURE 14.64: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 9 LANDFILLING

FIGURE 14.65: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 8 LANDFILLING

FIGURE 14.66: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 5 LANDFILLING

FIGURE 14.67: RENTON FACILITIES ALTERNATIVE 3 10 A.M. NE-3 LANDFILLING

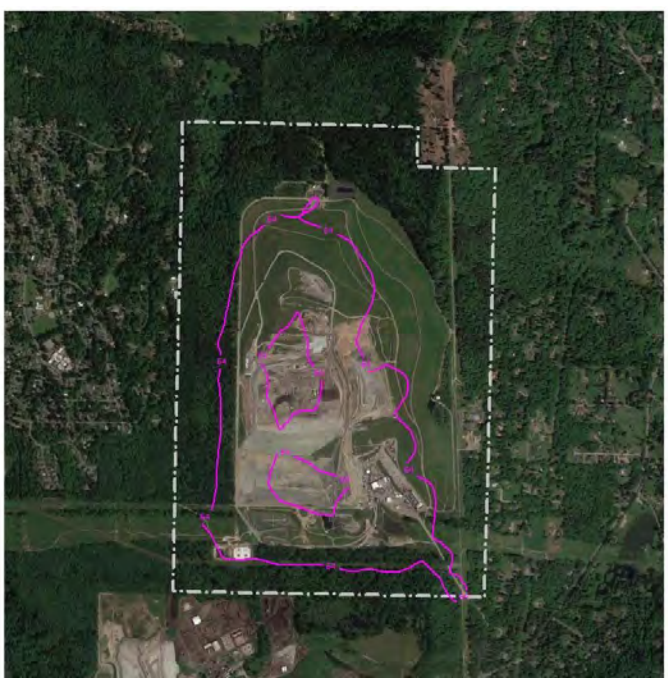
FIGURE 14.68: RENTON FACILITIES ALTERNATIVE 3 10 A.M. NW-3 LANDFILLING

FIGURE 14.69: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 6N-3 LANDFILLING

FIGURE 14.70: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 5N-3 LANDFILLING

FIGURE 14.71: RENTON FACILITIES ALTERNATIVE 3 10 A.M. AREA 9-LOW LANDFILLING

FIGURE 14.72: ALTERNATIVE 3 RENTON FACILITIES SE CORNER LMAX



15.0 CHRLF SEPA NOISE COMPARISON

Tables 15.1 - 15.6 compare the daytime and early morning (nighttime noise limit) for the No Action Alternative and Action Alternative 3 with Options 1-3. The results are conservatively applicable to Alternatives 1 and 2 since the noise levels for those conditions will be marginally less than the Alternative 3 results for the same noise source area.

Projected CHRLF noise levels are compared at the community noise monitoring locations discussed in Section 7.2 for the landfilling locations identified in Figure 10.7 and Figure 10.8.

Overall, the projected increase in noise levels for early morning operations (6 a.m. to 7 a.m.) is generally less than 3 dBA for each position for which long term monitoring was performed. One exception is along the northern property line for the North Facilities (Option 2) condition where the projected increase is about 6.6 dBA. This is currently a heavily forested area not occupied by people.

Comparison of projected noise levels at 10 a.m. yielded similar results with maximum projected increases of about 5.4 dBA occurring along the north property line with a North Facilities location. At other locations the increase was about 3 dBA or less. Northern positions tended to have slightly larger increases than southern positions, but are not enough to be considered significant.

Since the projected increase in community noise is less than 10 dBA, the increases for day or night would not be considered a significant impact.

15.1 SEPA Analysis 6 a.m.

TABLE 15.1: COMPARISON OF SOUTH FACILITIES 6 A.M. ACTION / NO ACTION NOISE LEVELS

		No Action Alt Data							Alternative Data												
Position (4)	Measured Nighttime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Max Projected Increase
NM1	44.0	38.8	38.8	38.7	38.9	38.7	38.7 - 38.9	(1), (2)	34.8	34.0	34.3	34.6	33.8	34.2	34.3	36.1	35.0	34.4	33.3	33.3 - 36.1	-2.8
NM2	34.9	28.5	29.8	28.1	28.2	28.2	35.7 - 36.1		31.1	30.1	31.0	31.4	29.8	30.1	30.5	31.6	30.8	30.5	29.4	36.0 - 36.6	0.5
NM3	43.8	38.0	38.0	38.0	38.7	38.1	44.8 - 45.0		39.2	35.2	39.0	39.1	35.2	39.1	39.1	39.2	39.4	39.2	32.2	44.1 - 45.2	0.2
NM4	38.2	28.7	28.6	29.2	30.9	31.0	38.7 - 39.0		30.1	26.5	29.9	29.5	26.5	29.8	29.3	30.1	31.6	31.5	25.9	38.4 - 39.1	0.1
NM5	40.0	28.5	28.5	29.1	31.6	30.7	40.3 - 40.6		30.4	26.7	30.2	30.2	26.8	30.5	30.4	30.5	32.3	31.8	24.2	40.1 - 40.7	0.1
NM6	39.8	32.3	32.3	32.3	32.4	32.3	40.5 - 40.5		31.2	30.8	31.0	31.1	30.6	31.0	31.0	31.5	31.3	31.1	30.1	40.2 - 40.4	-0.1
NM7	37.0	26.0	26.7	24.9	25.8	25.1	37.3 - 37.4		27.0	25.2	25.9	26.5	22.4	24.2	24.8	27.4	26.2	25.0	20.7	37.1 - 37.5	0.1
NM8	37.5	36.1	36.1	35.9	36.1	35.9	39.8 - 39.9		36.4	35.8	36.0	36.2	35.6	35.9	36.0	36.9	36.3	36.1	35.2	39.5 - 40.2	0.3
NM9	33.5	34.3	34.5	33.5	34.0	33.6	36.5 - 37.1		36.6	35.6	35.8	36.2	35.1	35.5	35.6	37.0	36.1	35.7	34.7	37.1 - 38.6	1.5
NM10	41.9	32.2	32.3	32.4	33.2	32.7	42.3 - 42.5		32.8	29.8	32.6	32.6	29.8	32.7	32.7	32.8	33.6	33.1	27.8	42.1 - 42.5	0.0
NM11	38.6	32.0	32.1	32.5	33.4	33.1	39.5 - 39.7		32.7	29.0	32.8	32.5	28.7	33.1	32.8	32.8	33.8	33.6	27.4	38.9 - 39.8	0.1
NM12	35.0	30.3	30.4	30.7	30.4	30.6	36.3 - 36.4		31.2	32.6	31.8	31.2	33.2	32.3	31.6	31.1	31.3	31.3	28.2	35.8 - 37.2	0.8
NM13	36.9	30.8	30.9	31.6	31.4	31.9	37.8 - 38.1		31.3	28.9	31.4	31.2	28.8	32.2	31.7	31.2	31.8	32.1	27.0	37.3 - 38.2	0.1
NM14	34.1	31.3	31.4	31.9	31.6	32.0	35.9 - 36.2		32.0	32.0	32.3	31.9	32.9	33.0	32.4	31.9	32.2	32.5	26.9	34.9 - 36.6	0.4
NM15	41.1	30.1	30.2	31.4	30.2	31.0	41.4 - 41.5		30.9	29.6	33.4	30.9	29.6	34.3	31.8	30.8	31.0	31.6	25.1	41.2 - 41.9	0.4
NM16	36.6	27.8	28.3	28.1	27.9	27.9	37.1 - 37.2		28.2	28.3	29.7	28.7	27.1	29.1	28.6	28.2	28.2	28.1	26.0	37.0 - 37.4	0.2
NM17	35.0	23.4	23.5	23.4	23.3	23.3	35.3 - 35.3		24.1	26.2	23.7	24.8	22.5	21.1	25.9	24.6	24.1	24.1	20.9	35.2 - 35.5	0.2
NM18	34.5	31.8	31.9	32.1	31.8	31.9	31.8 - 32.1	(1), (2)	32.5	33.8	33.1	32.6	32.8	33.5	32.9	32.4	32.5	32.6	30.8	30.8 - 33.8	1.7

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

TABLE 15.2: NORTH FACILITIES 6 A.M. NOISE IMPACTS VS. NO ACTION

		No Action Alt Data							Alternative Data												
Position (4)	Measured Nighttime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Max Increase
NM1	44.0	38.8	38.8	38.7	38.9	38.7	38.7 - 38.9	(1), (2)	33.9	33.3	33.4	33.6	33.1	33.3	33.4	35.4	34.1	33.5	32.6	32.6 - 35.4	-3.5
NM2	34.9	28.5	29.8	28.1	28.2	28.2	35.7 - 36.1		29.5	28.1	29.5	29.8	27.9	28.3	28.6	30.1	29.0	28.6	27.3	35.6 - 36.2	0.1
NM3	43.8	38.0	38.0	38.0	38.7	38.1	44.8 - 45.0		40.6	40.4	40.6	40.6	40.4	40.6	40.6	40.7	40.8	40.7	39.5	45.2 - 45.6	0.6
NM4	38.2	28.7	28.6	29.2	30.9	31.0	38.7 - 39.0		31.2	30.1	31.0	30.7	30.1	30.9	30.6	31.1	32.4	32.3	29.5	38.8 - 39.2	0.2
NM5	40.0	28.5	28.5	29.1	31.6	30.7	40.3 - 40.6		32.0	31.4	31.8	31.9	31.4	32.0	32.0	32.0	33.4	33.0	30.5	40.5 - 40.9	0.3
NM6	39.8	32.3	32.3	32.3	32.4	32.3	40.5 - 40.5		30.1	29.8	29.8	29.9	29.7	29.8	29.8	30.4	30.2	29.9	29.0	40.1 - 40.3	-0.2
NM7	37.0	26.0	26.7	24.9	25.8	25.1	37.3 - 37.4		29.5	28.6	29.0	29.2	27.8	28.2	28.3	29.7	29.0	28.5	27.4	37.5 - 37.7	0.3
NM8	37.5	36.1	36.1	35.9	36.1	35.9	39.8 - 39.9		34.8	34.1	34.2	34.4	33.9	34.0	34.1	35.5	34.6	34.2	33.3	38.9 - 39.6	-0.3
NM9	33.5	34.3	34.5	33.5	34.0	33.6	36.5 - 37.1		35.1	33.8	34.1	34.5	33.3	33.5	33.6	35.7	34.4	33.8	32.6	36.1 - 37.8	0.7
NM10	41.9	32.2	32.3	32.4	33.2	32.7	42.3 - 42.5		34.2	34.0	34.1	34.1	34.0	34.2	34.2	34.3	34.8	34.5	33.2	42.4 - 42.7	0.2
NM11	38.6	32.0	32.1	32.5	33.4	33.1	39.5 - 39.7		34.3	33.8	34.2	34.2	33.7	34.4	34.3	34.3	35.1	34.9	33.1	39.7 - 40.2	0.5
NM12	35.0	30.3	30.4	30.7	30.4	30.6	36.3 - 36.4		37.1	37.3	37.2	37.1	37.6	37.3	37.2	37.0	37.1	37.1	36.8	39.0 - 39.5	3.1
NM13	36.9	30.8	30.9	31.6	31.4	31.9	37.8 - 38.1		33.6	33.2	33.6	33.6	33.3	34.1	33.9	33.6	33.9	34.1	32.7	38.3 - 38.7	0.6
NM14	34.1	31.3	31.4	31.9	31.6	32.0	35.9 - 36.2		35.3	35.4	35.4	35.3	35.9	35.7	35.5	35.3	35.4	35.5	34.6	37.4 - 38.1	1.9
NM15	41.1	30.1	30.2	31.4	30.2	31.0	41.4 - 41.5		33.9	33.7	34.6	33.9	33.8	35.3	34.4	33.8	34.0	34.3	33.1	41.7 - 42.1	0.6
NM16	36.6	27.8	28.3	28.1	27.9	27.9	37.1 - 37.2		30.7	30.9	31.5	30.9	30.4	31.1	30.9	30.6	30.6	30.6	30.1	37.5 - 37.8	0.6
NM17	35.0	23.4	23.5	23.4	23.3	23.3	35.3 - 35.3		29.5	30.3	29.8	29.7	29.5	29.3	30.1	29.6	29.5	29.5	29.2	36.0 - 36.3	1.0
NM18	34.5	31.8	31.9	32.1	31.8	31.9	31.8 - 32.1	(1), (2)	38.4	38.6	38.5	38.4	38.5	38.7	38.5	38.4	38.4	38.4	38.2	38.2 - 38.7	6.6

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

TABLE 15.3: OPTION 3 FACILITIES 6 A.M. NOISE IMPACTS VS. NO ACTION

		No Action Alt Data							Alternative Data													
Position (4)	Measured Nighttime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range		Increase (3)
NM1	44.0	38.8	38.8	38.7	38.9	38.7	38.7 - 38.9	(1), (2)	32.7	31.8	31.8	32.3	31.5	31.6	31.9	34.6	32.9	32.1	24.0	24.0 - 34.6		-4.3
NM2	34.9	28.5	29.8	28.1	28.2	28.2	35.7 - 36.1		27.7	24.1	27.0	28.1	23.1	24.3	26.0	28.6	26.5	26.2	20.5	35.1 - 35.8		-0.3
NM3	43.8	38.0	38.0	38.0	38.7	38.1	44.8 - 45.0		39.9	39.7	39.8	39.9	39.7	39.8	39.8	40.0	40.2	40.0	26.0	43.9 - 45.4		0.4
NM4	38.2	28.7	28.6	29.2	30.9	31.0	38.7 - 39.0		29.9	28.0	29.5	29.2	28.0	29.4	29.0	29.9	31.3	31.3	21.5	38.3 - 39.0		0.0
NM5	40.0	28.5	28.5	29.1	31.6	30.7	40.3 - 40.6		30.6	29.3	30.2	30.4	29.3	30.5	30.6	30.6	32.4	32.0	15.9	40.0 - 40.7		0.1
NM6	39.8	32.3	32.3	32.3	32.4	32.3	40.5 - 40.5		28.0	27.5	27.4	27.7	27.2	27.3	27.5	28.5	28.0	27.6	19.5	39.8 - 40.1		-0.4
NM7	37.0	26.0	26.7	24.9	25.8	25.1	37.3 - 37.4		27.3	25.2	25.8	26.8	22.5	24.1	25.1	27.7	26.3	25.4	20.0	37.1 - 37.5		0.1
NM8	37.5	36.1	36.1	35.9	36.1	35.9	39.8 - 39.9		33.0	31.9	31.9	32.4	31.5	31.6	31.9	34.1	32.6	32.1	24.2	37.7 - 39.1		-0.8
NM9	33.5	34.3	34.5	33.5	34.0	33.6	36.5 - 37.1		33.6	31.2	31.4	32.5	29.9	30.3	31.1	34.4	32.2	31.4	23.5	33.9 - 37.0		-0.1
NM10	41.9	32.2	32.3	32.4	33.2	32.7	42.3 - 42.5		33.2	32.5	32.8	33.0	32.5	32.9	33.1	33.3	33.9	33.5	23.3	42.0 - 42.5		0.0
NM11	38.6	32.0	32.1	32.5	33.4	33.1	39.5 - 39.7		33.1	31.6	32.9	33.0	31.4	33.2	33.2	33.2	34.1	33.9	22.5	38.7 - 39.9		0.2
NM12	35.0	30.3	30.4	30.7	30.4	30.6	36.3 - 36.4		31.6	32.7	31.7	31.7	33.3	32.2	32.0	31.6	31.7	31.8	27.5	35.7 - 37.2		0.8
NM13	36.9	30.8	30.9	31.6	31.4	31.9	37.8 - 38.1		31.7	29.8	31.3	31.6	29.7	32.1	32.1	31.6	32.1	32.5	25.0	37.2 - 38.2		0.1
NM14	34.1	31.3	31.4	31.9	31.6	32.0	35.9 - 36.2		32.6	32.4	32.2	32.6	33.1	32.9	33.0	32.6	32.8	33.1	25.5	34.7 - 36.7		0.5
NM15	41.1	30.1	30.2	31.4	30.2	31.0	41.4 - 41.5		31.6	29.9	33.4	31.6	29.9	34.3	32.5	31.6	31.7	32.3	24.0	41.2 - 41.9		0.4
NM16	36.6	27.8	28.3	28.1	27.9	27.9	37.1 - 37.2		28.0	27.7	29.2	28.5	26.2	28.5	28.4	28.0	27.9	27.9	24.6	36.9 - 37.3		0.1
NM17	35.0	23.4	23.5	23.4	23.3	23.3	35.3 - 35.3		24.8	26.1	23.5	25.3	22.3	20.8	26.3	25.2	24.7	24.7	20.4	35.1 - 35.6		0.3
NM18	34.5	31.8	31.9	32.1	31.8	31.9	31.8 - 32.1	(1), (2), (5)	32.8	33.8	33.0	32.9	32.8	33.5	33.2	32.8	32.8	32.9	30.6	30.6 - 33.8		1.7

Comments

1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

15.2 SEPA Analysis 10 a.m.

TABLE 15.4: SOUTH FACILITIES 10 A.M. NOISE IMPACTS VS. NO ACTION

		No Action Alt Data							Alternative Data												
Position (4)	Measured Daytime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	47.1	46.2	45.8	45.3	46.6	45.4	45.3 - 46.6	(1), (2)	43.5	42.1	42.4	43.4	41.6	42.1	42.4	47.1	44.8	42.9	43.4	41.6 - 47.1	0.5
NM2	40.3	41.0	42.4	40.0	40.3	39.7	43.0 - 44.5		40.2	37.5	41.0	42.0	36.9	39.2	39.5	41.5	39.1	39.7	36.2	41.7 - 44.3	-0.2
NM3	44.7	48.4	48.1	48.2	49.8	48.5	49.7 - 51.0		49.2	48.7	49.0	49.1	48.8	49.0	49.1	49.2	49.8	49.5	43.1	47.0 - 51.0	0.0
NM4	43.0	40.4	40.9	41.9	43.6	44.3	44.9 - 46.7		40.3	36.7	41.1	40.7	36.7	40.9	40.7	42.4	43.8	44.1	35.4	43.7 - 46.6	-0.1
NM5	42.9	39.8	41.0	41.9	44.2	43.9	44.6 - 46.6		40.5	38.3	41.0	41.5	38.5	41.5	41.9	40.7	43.9	44.3	32.6	43.3 - 46.7	0.1
NM6	46.6	39.6	39.1	38.8	40.1	38.9	47.3 - 47.5		38.0	37.4	37.4	37.9	36.8	37.2	37.4	39.6	38.8	37.7	38.3	47.0 - 47.4	-0.1
NM7	44.6	40.5	40.0	38.0	40.4	37.8	45.4 - 46.0		39.3	38.7	39.1	39.9	36.3	37.7	37.6	40.4	38.6	37.9	34.0	45.0 - 46.0	0.0
NM8	50.2	45.7	45.0	44.2	45.8	44.3	51.2 - 51.5		44.7	43.4	43.6	44.3	42.8	43.2	43.4	46.6	44.8	43.7	44.7	50.9 - 51.8	0.3
NM9	41.4	46.8	45.8	43.8	46.2	43.7	45.7 - 47.9		46.0	43.6	44.0	45.4	42.0	43.0	43.3	47.3	44.7	43.7	41.7	44.5 - 48.3	0.4
NM10	48.0	42.9	42.6	43.0	44.9	43.6	49.1 - 49.7		42.9	41.9	42.9	43.1	42.1	43.1	43.3	44.1	45.0	44.1	38.5	48.5 - 49.8	0.1
NM11	45.5	42.4	43.1	44.0	45.8	45.1	47.2 - 48.7		43.0	41.3	43.9	43.7	41.0	44.2	44.3	44.5	45.7	45.6	38.6	46.3 - 48.6	-0.1
NM12	38.7	39.7	40.2	41.0	40.1	40.5	42.3 - 43.0		39.5	42.7	42.1	40.7	45.1	43.1	41.8	39.6	39.7	40.9	32.1	39.6 - 46.0	3.0
NM13	44.7	41.7	41.8	43.2	43.0	43.6	46.5 - 47.2		41.0	38.5	42.6	41.9	39.6	43.6	43.3	41.6	42.3	43.8	34.4	45.1 - 47.3	0.1
NM14	39.7	41.7	41.9	43.1	42.4	43.1	43.8 - 44.7		41.5	42.3	43.2	42.4	45.0	44.3	43.6	41.7	42.1	43.4	33.2	40.6 - 46.1	1.4
NM15	42.0	40.6	41.4	43.5	41.2	42.5	44.4 - 45.8		40.5	38.9	43.8	41.8	39.8	45.4	43.9	40.5	40.8	42.9	30.5	42.3 - 47.0	1.2
NM16	40.0	38.1	39.2	38.9	38.0	38.1	42.1 - 42.6		36.9	38.7	41.8	39.5	38.1	41.2	39.4	36.9	36.4	37.9	31.8	40.6 - 44.0	1.4
NM17	39.0	31.1	31.5	31.0	30.7	30.7	39.6 - 39.7		32.1	38.6	34.3	34.1	37.4	26.0	36.7	33.5	32.2	31.8	25.2	39.2 - 41.8	2.1
NM18	38.2	39.3	39.7	40.3	39.6	39.9	39.3 - 40.3	(1), (2)	39.1	42.2	41.6	40.5	43.5	43.7	42.0	39.1	39.2	40.4	32.7	32.7 - 43.7	3.4

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1
5. Projected noise level shown is for siimilar site near property line.

TABLE 15.5: NORTH FACILITIES 10 A.M. NOISE IMPACTS VS. NO ACTION

Position (4)	Measured Daytime LEQ	No Action Alt Data: Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Alternative Data: Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	47.1	46.2	45.8	45.3	46.6	45.4	45.3 - 46.6	(1), (2)	43.4	42.0	42.3	43.3	41.4	41.9	42.3	47.0	44.8	42.8	43.5	41.4 - 47.0	0.4
NM2	40.3	41.0	42.4	40.0	40.3	39.7	43.0 - 44.5		40.1	37.5	41.0	42.0	36.8	39.1	39.5	41.5	39.0	39.6	36.3	41.7 - 44.2	-0.3
NM3	44.7	48.4	48.1	48.2	49.8	48.5	49.7 - 51.0		49.1	48.6	48.9	49.0	48.7	48.9	49.0	49.1	49.7	49.3	45.4	48.1 - 50.9	-0.1
NM4	43.0	40.4	40.9	41.9	43.6	44.3	44.9 - 46.7		40.3	36.7	41.1	40.7	36.7	40.9	40.7	42.4	43.8	44.1	36.6	43.9 - 46.6	-0.1
NM5	42.9	39.8	41.0	41.9	44.2	43.9	44.6 - 46.6		40.4	38.1	40.9	41.5	38.3	41.4	41.8	40.6	43.9	44.2	34.7	43.5 - 46.6	0.0
NM6	46.6	39.6	39.1	38.8	40.1	38.9	47.3 - 47.5		38.0	37.3	37.3	37.8	36.7	37.1	37.3	39.5	38.8	37.6	38.6	47.0 - 47.4	-0.1
NM7	44.6	40.5	40.0	38.0	40.4	37.8	45.4 - 46.0		39.6	39.0	39.4	40.2	36.8	38.1	38.0	40.6	38.9	38.3	34.9	45.0 - 46.1	0.1
NM8	50.2	45.7	45.0	44.2	45.8	44.3	51.2 - 51.5		44.6	43.2	43.4	44.1	42.6	43.0	43.2	46.5	44.6	43.5	44.7	50.9 - 51.7	0.2
NM9	41.4	46.8	45.8	43.8	46.2	43.7	45.7 - 47.9		45.9	43.4	43.9	45.3	41.8	42.9	43.1	47.2	44.6	43.5	41.7	44.6 - 48.2	0.3
NM10	48.0	42.9	42.6	43.0	44.9	43.6	49.1 - 49.7		42.8	41.8	42.8	43.0	42.0	43.0	43.2	44.0	44.9	44.0	39.6	48.6 - 49.7	0.0
NM11	45.5	42.4	43.1	44.0	45.8	45.1	47.2 - 48.7		43.0	41.2	43.8	43.7	40.9	44.2	44.3	44.5	45.6	45.6	39.6	46.5 - 48.6	-0.1
NM12	38.7	39.7	40.2	41.0	40.1	40.5	42.3 - 43.0		40.2	43.0	42.5	41.2	45.3	43.4	42.3	40.2	40.4	41.4	35.5	40.4 - 46.1	3.1
NM13	44.7	41.7	41.8	43.2	43.0	43.6	46.5 - 47.2		41.0	38.6	42.6	42.0	39.7	43.6	43.4	41.7	42.4	43.8	35.8	45.2 - 47.3	0.1
NM14	39.7	41.7	41.9	43.1	42.4	43.1	43.8 - 44.7		41.7	42.5	43.4	42.6	45.1	44.4	43.8	42.0	42.3	43.6	35.5	41.1 - 46.2	1.5
NM15	42.0	40.6	41.4	43.5	41.2	42.5	44.4 - 45.8		40.8	39.4	44.0	42.0	40.1	45.5	44.0	40.8	41.1	43.1	33.5	42.6 - 47.1	1.3
NM16	40.0	38.1	39.2	38.9	38.0	38.1	42.1 - 42.6		37.8	39.4	42.1	40.1	38.9	41.5	39.9	37.8	37.5	38.7	34.5	41.1 - 44.2	1.6
NM17	39.0	31.1	31.5	31.0	30.7	30.7	39.6 - 39.7		34.0	39.1	35.6	35.4	38.1	31.2	37.5	35.0	34.1	33.8	31.0	39.6 - 42.1	2.4
NM18	38.2	39.3	39.7	40.3	39.6	39.9	39.3 - 40.3	(1), (2)	43.4	44.8	44.5	44.0	45.6	45.7	44.7	43.4	43.4	43.9	42.0	42.0 - 45.7	5.4

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

TABLE 15.6: OPTION 3 FACILITIES 10 A.M. NOISE IMPACTS VS. NO ACTION

		No Action Alt Data							Alternative Data												
Position (4)	Measured Daytime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	47.1	46.2	45.8	45.3	46.6	45.4	45.3 - 46.6	(1), (2)	44.0	42.8	43.1	43.9	42.3	42.8	43.0	47.3	45.2	43.5	43.2	42.3 - 47.3	0.7
NM2	40.3	41.0	42.4	40.0	40.3	39.7	43.0 - 44.5		40.1	37.4	41.0	42.0	36.7	39.1	39.4	41.5	39.0	39.6	36.2	41.7 - 44.2	-0.3
NM3	44.7	48.4	48.1	48.2	49.8	48.5	49.7 - 51.0		49.1	48.7	49.0	49.1	48.7	49.0	49.1	49.2	49.8	49.4	42.4	46.7 - 50.9	-0.1
NM4	43.0	40.4	40.9	41.9	43.6	44.3	44.9 - 46.7		40.2	36.5	41.1	40.6	36.5	40.9	40.7	42.3	43.8	44.0	35.2	43.7 - 46.6	-0.1
NM5	42.9	39.8	41.0	41.9	44.2	43.9	44.6 - 46.6		40.3	37.9	40.8	41.3	38.1	41.3	41.7	40.5	43.8	44.2	30.8	43.2 - 46.6	0.0
NM6	46.6	39.6	39.1	38.8	40.1	38.9	47.3 - 47.5		38.5	37.9	37.9	38.3	37.4	37.7	37.9	39.9	39.2	38.2	38.2	47.1 - 47.4	-0.1
NM7	44.6	40.5	40.0	38.0	40.4	37.8	45.4 - 46.0		39.4	38.8	39.2	40.0	36.5	37.8	37.8	40.4	38.7	38.0	34.3	45.0 - 46.0	0.0
NM8	50.2	45.7	45.0	44.2	45.8	44.3	51.2 - 51.5		44.8	43.5	43.8	44.4	43.0	43.4	43.6	46.7	44.9	43.9	44.4	51.0 - 51.8	0.3
NM9	41.4	46.8	45.8	43.8	46.2	43.7	45.7 - 47.9		46.1	43.8	44.2	45.6	42.3	43.3	43.5	47.4	44.8	43.9	41.7	44.6 - 48.3	0.4
NM10	48.0	42.9	42.6	43.0	44.9	43.6	49.1 - 49.7		42.9	41.9	42.9	43.0	42.1	43.0	43.3	44.0	44.9	44.1	37.9	48.4 - 49.7	0.0
NM11	45.5	42.4	43.1	44.0	45.8	45.1	47.2 - 48.7		43.0	41.3	43.8	43.7	41.0	44.2	44.3	44.5	45.6	45.6	38.1	46.2 - 48.6	-0.1
NM12	38.7	39.7	40.2	41.0	40.1	40.5	42.3 - 43.0		39.5	42.7	42.1	40.6	45.1	43.1	41.8	39.5	39.7	40.8	31.6	39.5 - 46.0	3.0
NM13	44.7	41.7	41.8	43.2	43.0	43.6	46.5 - 47.2		40.9	38.3	42.5	41.9	39.5	43.5	43.3	41.5	42.3	43.7	33.7	45.0 - 47.3	0.1
NM14	39.7	41.7	41.9	43.1	42.4	43.1	43.8 - 44.7		41.4	42.3	43.2	42.3	45.0	44.2	43.6	41.7	42.1	43.4	32.6	40.5 - 46.1	1.4
NM15	42.0	40.6	41.4	43.5	41.2	42.5	44.4 - 45.8		40.5	38.8	43.8	41.8	39.7	45.4	43.8	40.4	40.8	42.8	29.8	42.3 - 47.0	1.2
NM16	40.0	38.1	39.2	38.9	38.0	38.1	42.1 - 42.6		36.7	38.6	41.7	39.4	38.0	41.1	39.3	36.7	36.3	37.8	31.4	40.6 - 44.0	1.4
NM17	39.0	31.1	31.5	31.0	30.7	30.7	39.6 - 39.7		32.1	38.6	34.3	34.1	37.4	26.0	36.7	33.5	32.1	31.8	25.1	39.2 - 41.8	2.1
NM18	38.2	39.3	39.7	40.3	39.6	39.9	39.3 - 40.3	(1), (2)	39.1	42.1	41.5	40.5	43.4	43.7	42.0	39.0	39.1	40.3	32.4	32.4 - 43.7	3.4

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

16.0 CHRLF CONSTRUCTION NOISE

Subject to the hourly restrictions specified in 12.86.520 of the King County Code (excerpt follows), construction noise is generally exempt from the noise code.

12.86.520 Exemptions – construction sounds – exceptions.

A. Normal and usual sounds created by construction, including on or by watercraft, are restricted to the following hours unless otherwise specified by the director, and are exempt from this chapter except as provided in subsection C. of this section:

1. For heavy equipment used on construction sites, including crawlers, tractors, bulldozers, rotary drills and augers, loaders, power shovels, cranes, derricks, graders, off-highway trucks, ditchers, trenchers, compactors, compressors and other similar equipment, operating hours are between 7:00 a.m. and 7:00 p.m. weekdays and between 9:00 a.m. and 7:00 p.m. weekends;
2. For impact types of construction equipment, including pavement breakers, pile drivers, jackhammers, sandblasting tools or other types of equipment or devices that create impulse noise or impact noise, operating hours are between 8:00 a.m. and 5:00 p.m. on weekdays and between 9:00 a.m. and 5:00 p.m. on weekends; and
3. For all other construction activities, operating hours are between 7:00 a.m. and 10:00 p.m. on weekdays and between 9:00 a.m. and 8:00 p.m. on weekends.

B. This section does not apply to sound created by mineral extraction or materials processing operations, which are governed by K.C.C. chapter 21A.22.

C. Exterior construction sound levels heard from the interior of buildings within a commercial or industrial district, after efforts including closing windows and doors are taken to reduce the impact of the exterior construction noise, must not be unreasonable. Whether the construction sound levels are within the maximum permissible sound levels of this chapter may be a factor in determining reasonableness. (Ord. 18000 § 78, 2015).

The most intensive construction activity anticipated under the proposed Alternatives will be the excavation associated with Area 9. This will likely occur in the June-September months for three or four consecutive summers. Hours of operation are assumed to be limited to those in 12.86.520 (A)(1).

Based on observations during Area 8 excavation, it is anticipated that 2-3 large excavators will be used in conjunction with typical road-going dump trucks (likely with trailers). During the excavation it is anticipated that up to 83 trips per hour will be made for off-site soil export.

Other equipment may be used on a shorter term basis for certain phases of the excavation, but the excavators and dump trucks would be there throughout.

TABLE 16.1: CONSTRUCTION TRUCK TRIPS

Table 4. Estimated Peak Construction Trips

Year	Alternative 1			Alternative 2			Alternative 3		
	Total Annual Trips[1]	Peak Monthly Trips[2]	Peak Hourly Trips[3]	Total Annual Trips	Peak Monthly Trips	Peak Hourly Trips	Annual Trips	Peak Monthly Trips	Peak Hourly Trips
2025	103,947	28,571	79	0	0	0	0	0	0
2026	77,438	28,758	80	86,456	24,172	67	90,083	25,079	70
2027	16,625	4,156	12	88,572	29,785	83	84,945	26,157	73

Note: Shading indicates the peak hourly trips for each Alternative.
1. Annual construction trips occur for up to 4 months between June-September.
2. The peak monthly trips occur in the 4th month of construction.
3. The peak hourly trips are calculated based on the peak month of construction activity and assuming the construction trips occur for 12 hours a day for 7 days a week.

Under normal excavating conditions excavators are not significant noise sources, considering the distances to the property line, and the primary noise sources that would be readily observable by the surrounding community will be the noise generated by the dump trucks as they enter or exit the site. From a noise perspective, the construction dump trucks are similar in nature to the King County waste transfer trucks that bring daily waste to the site, and the noise model developed for the county's trucks is applicable to the construction trucks.

It is anticipated that the excavated material would be removed from the site using the existing access road. Noise impacts from proposed Area 9 construction would mostly be limited to the residential area to the east and southeast of the existing CHRLF facilities / BEW with the southeast area receiving higher noise levels since there is less topographic shielding in that direction.

Because the construction truck noise is expected to be the loudest component of the construction tasks, the noise increase due to the construction can be approximated based on the ratio of construction trips to the number of daily trips that bring waste to the site.

The maximum number of KC waste transfer truck trips considered in the noise assessment was approximately 43.5 trips per hour for the No Action Alternative. The maximum projected hourly construction trips is 83 trips per hour.

So, the estimated noise increase (L_{EQ}) in noise in the southeast due to the Area 9 excavation is

$$10 \cdot \log[(43.5+83)/43.5] = 4.6 \text{ dBA}$$

This approximate increase is relative to the No Action Alternative condition and would not be considered a significant impact. The increase may be less than this, dependent upon the mitigation, if any, that has been implemented when the excavation takes place.

17.0 EXISTING CONDITIONS: RENTON

The community noise levels near the proposed Renton site tend to be most heavily influenced by traffic noise, either from local traffic in the Liberty Ridge development or from other traffic along NE 3rd / 4th Street, which is a main east-west arterial between downtown Renton / I-5 and the Renton Highlands area. Aircraft, both jet and propeller driven, were also noticed in the area.

In the southeast corner of the Liberty Ridge development, the noise from the Roads Division yard is also a factor and raised the existing community noise above the NE 3rd/4th Street noise levels.

Noise from Renton Recycling and Transfer Station activities was not observed to be a significant daytime factor during site-visits. The transfer station is not open overnight, and does not contribute to the nighttime noise levels.

The Roads Division property is a large area. The focus for this evaluation was the southwest portion of the property where there was wheel-loader and dump truck activity and along the access road down to the southwest corner of the property that had an array of heavy and light vehicles on it.

Evaluation of the existing community noise levels included

- Long term noise monitoring at positions around the perimeter of the proposed facilities location and along the southern boundary of the Roads Division property.
- Short term noise monitoring at several locations in the Liberty Ridge community (including automobile traffic noise).
- Creation of a noise model that reflects the above measurement results.
- Measurement of sound sources prevalent at the transfer station and the Roads Division site[6] that would be expected to influence community noise.

17.1 Long Term Monitoring

Noise levels were monitored over a nominal time period of about 48 hours at 4 location around the perimeter of the proposed facilities location and the existing Roads Division property. The long-term monitoring positions are labeled P1-P4 in Figure 17.1. The actual duration of the measurements varied slightly due to power limitations.

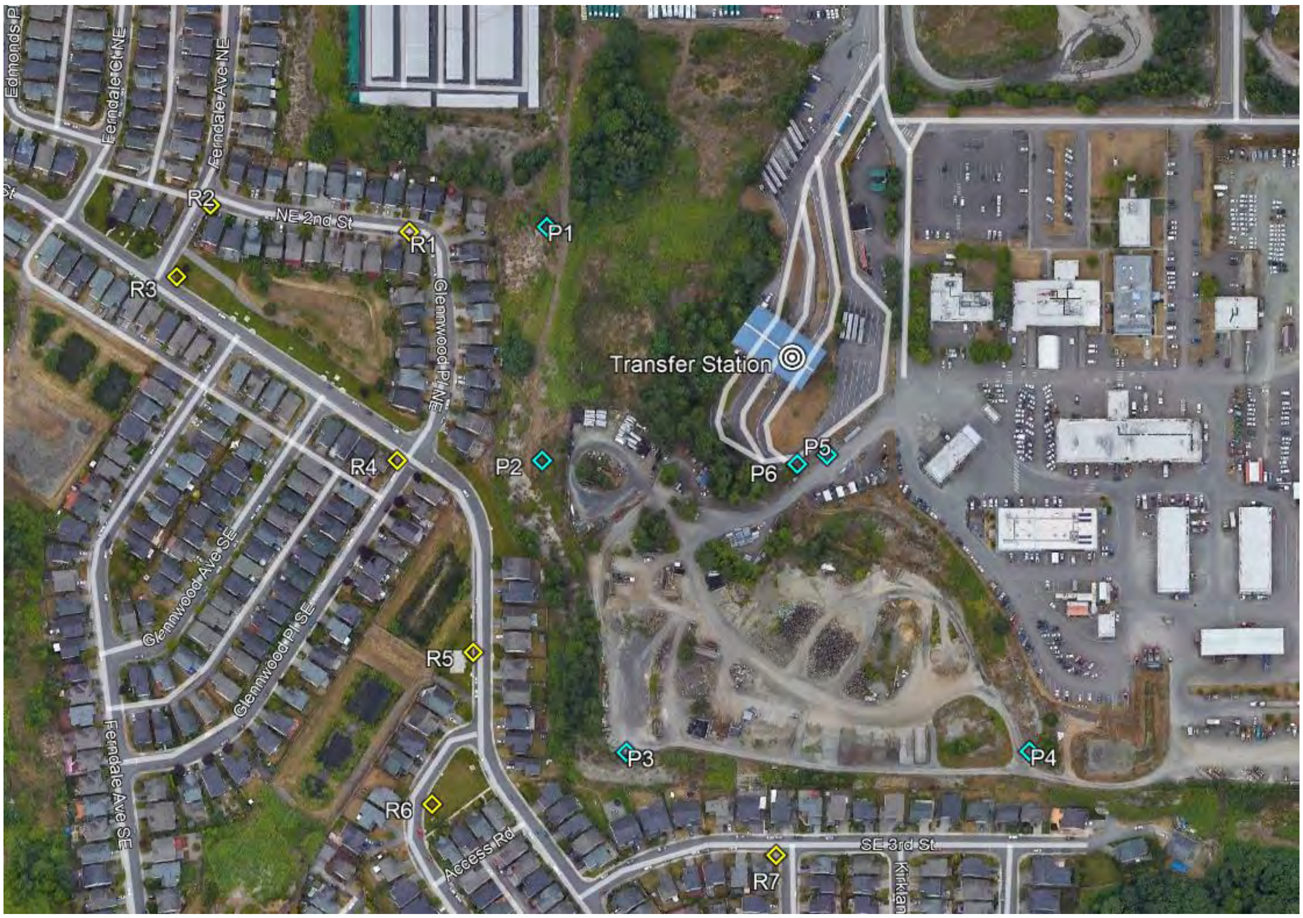
Noise levels were recorded and post processed in 0.5 second increments. The half second increments were analyzed to provide hourly L_{EQ} and L_N data. The

Data was acquired at P5 and P6 to evaluate noise generated from the transfer station for use in the noise prediction model, including vehicular traffic leaving the transfer station. The monitoring position was next to one of the main access points to the lower Roads Division yard area so measurements were also made for vehicles entering and leaving the pit area at the same time.

[6] Although some measurement of the Roads Division noise was performed for this analysis, it should not be considered comprehensive of that site. Only enough Roads Division data was acquired to satisfactorily show that the proposed KCSWD facilities would not pose an impact to the community.

Sound level meter measurements were made at Positions R1-R7. Audio recordings were made at R1, R3, R4, and R6. Ultimately, only the recordings were used in the noise assessment since they provided complete noise time history data while the sound level measurement only provided the time averaged sound level (LEQ). The recordings were used to evaluate the local street traffic noise and were used in conjunction with the data from P1 to validate the traffic noise model used to predict noise from NE 3rd and 4th street.

FIGURE 17.1: RENTON NOISE MONITORING POSITIONS



Results of the hourly measurements at P1 area shown in Figure 17.2. Hourly results from the two days were combined when assessing ambient noise conditions. During quiet portions of all hours of the day, the traffic noise from NE 3rd and 4th streets was clearly audible at P1. Thus, the L90 level calculated from P1 data file (the noise level exceeded for 90% of the time), was used as the benchmark to predict NE 3rd/4th Street noise levels at other points in the community. This predicted the "quiet" times in the Liberty Ridge area when no local auto traffic was audible. The distance from NE 3rd or 4th street was calculated for a grid of points in the community and the projected noise level was calculated based on the observed level at P1 plus a correction to account for differences between NE 3rd/4th Street and the P1 and grid positions.

FIGURE 17.2: POSITION P1 LEQ TIME HISTORY

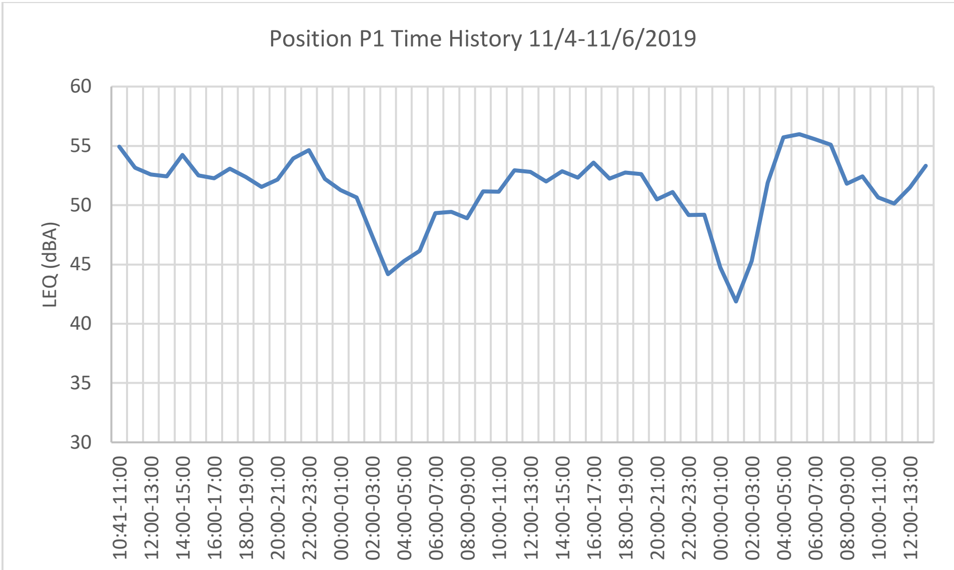


FIGURE 17.3: POSITION P2 LEQ TIME HISTORY

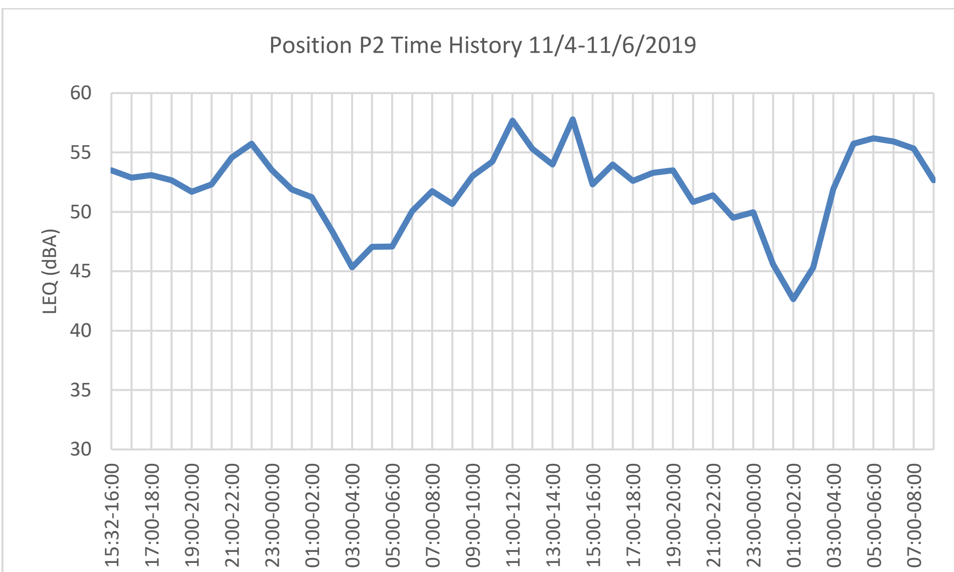


FIGURE 17.4: POSITION P3 LEQ TIME HISTORY

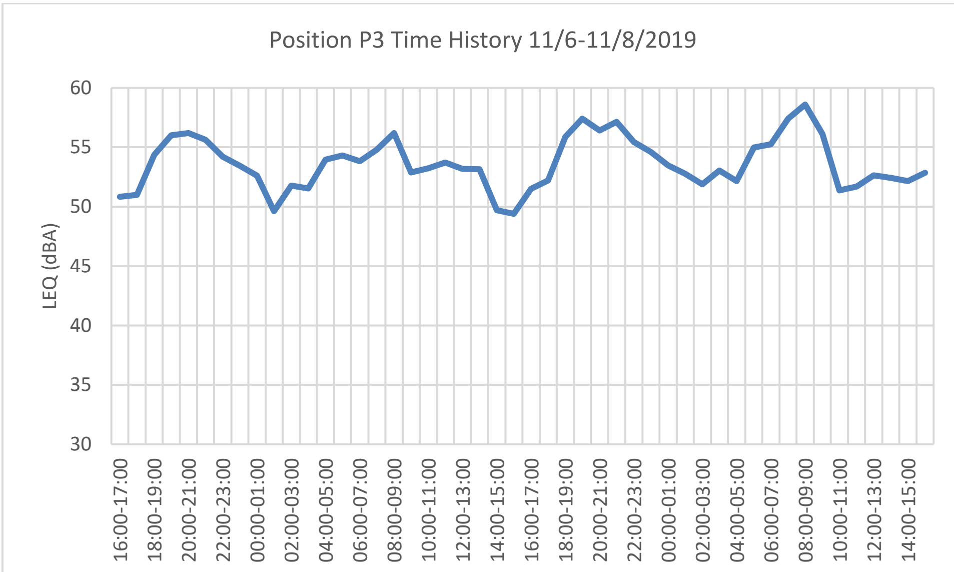
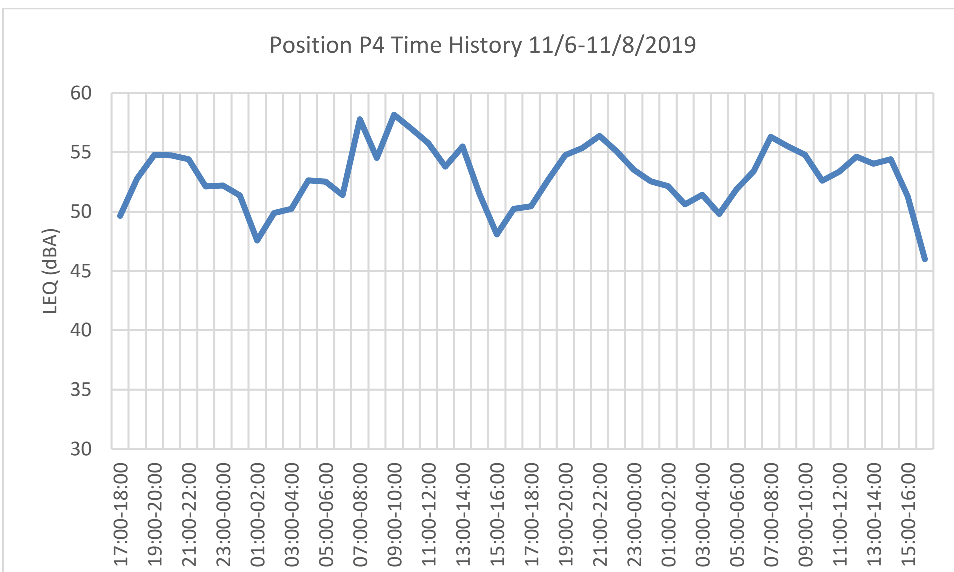


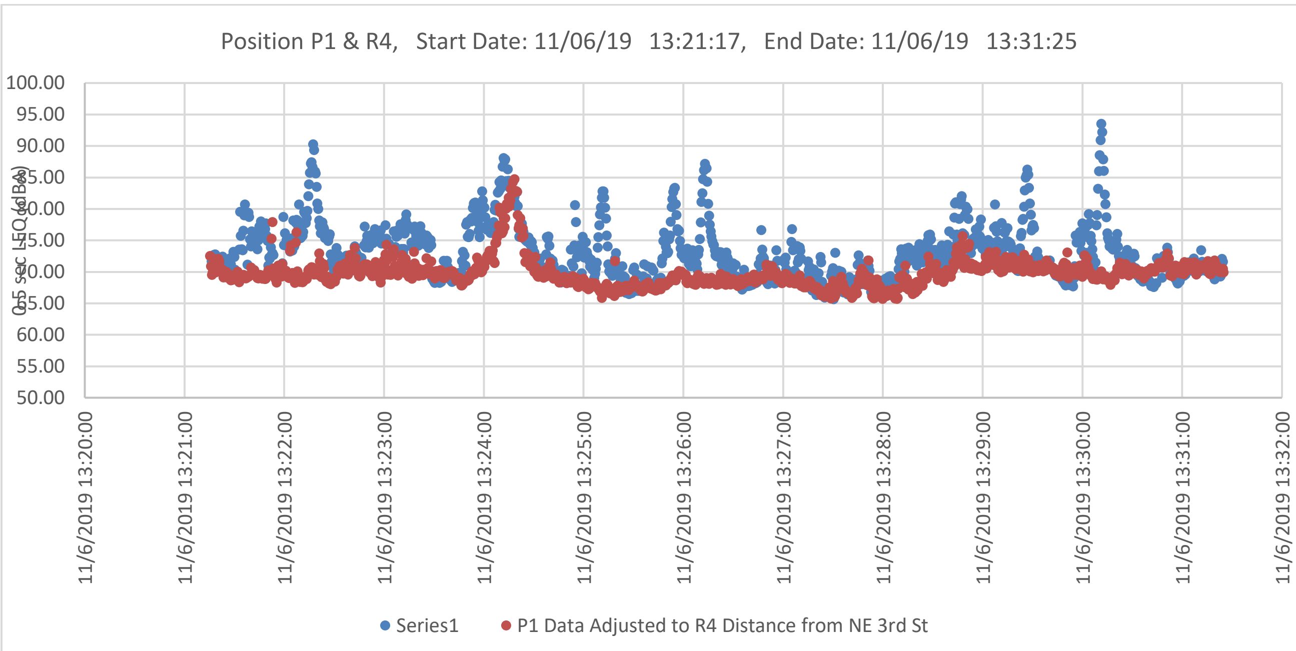
FIGURE 17.5: POSITION P4 LEQ TIME HISTORY



17.2 Renton Ambient Noise Model

Recorded data taken at R1, R3, R4, and R6 were used to evaluate traffic sound power levels in Liberty Ridge and also to confirm the ambient noise prediction methodology. Figure 17.6 shows an example of the analysis at R4 where time-synchronized 0.5-second sound levels from Positions P1 and R4 are plotted. The adjusted level from Position 1 closely matches the quiet time in between vehicles from R4 when NE 3rd St is the most significant noise source.

FIGURE 17.6: POSITION P1 AND R4 SOUND LEVELS



The topography left by apparent gravel excavation results in the homes below the corner between the self storage and the proposed facilities location being shielded from NE 3rd traffic. Expectedly, the A-weighted sound level was about 5 dBA less than was predicted by extrapolation of data from P1. Thus, the homes in that (near the Greenwood Ave and 2nd St corner/intersection) area had a -5 dBA correction applied to the level predicted by the P1 data.

Homes in the southeast corner of Liberty Ridge receive more noise from the KC Roads Division property than the homes further west. Comparison of the P4 time history data, for both the 6 a.m. and 10 a.m. hour, with the projected traffic data indicated that region is about 5-8 dB louder than would be predicted from NE 3rd/4th street traffic. Thus, a +5 dBA correction was made to predicted 3rd/4th street traffic noise in that area.

The resulting projections of NE 3rd/4th Street noise are shown below. The contours show the A-weighted L_{EQ}.

FIGURE 17.7: NE 3RD/4TH ST TRAFFIC NOISE 0600-0700

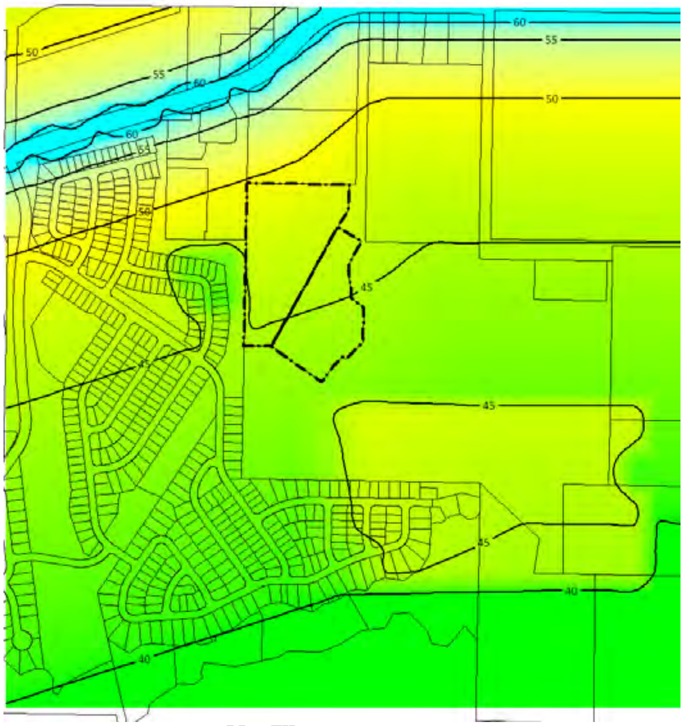
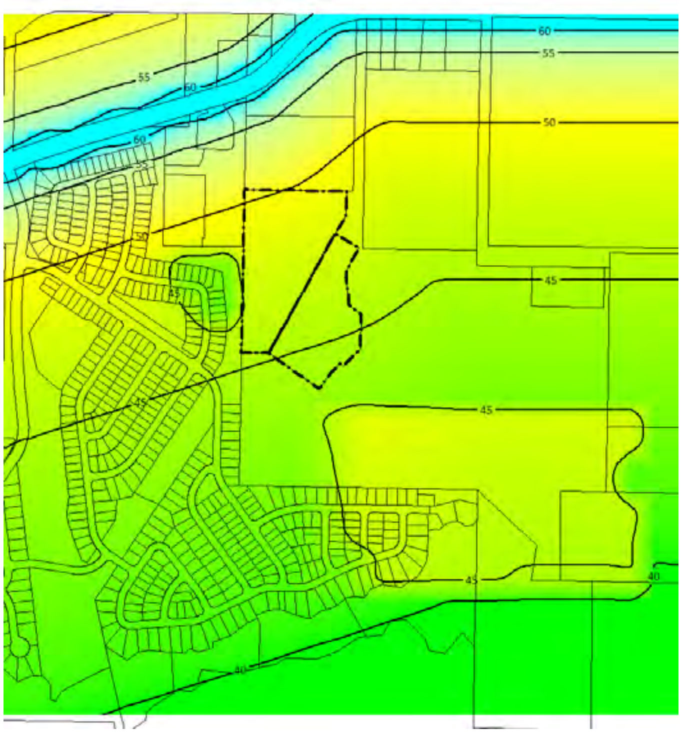


FIGURE 17.8: NE 3RD/4TH ST TRAFFIC NOISE 1000-1100



Noise due to local traffic within Liberty Ridge was assessed by evaluating the approximate number of homes served by segments of roadway within the housing development. An hourly traffic distribution for residential areas published by the Institute of Traffic Engineers (ITE), based on the number of homes and adjusted for traffic counts provided by the City of Renton, were used to predict traffic counts at various points with the housing development. The number of vehicles per hour along with the vehicle sound power levels developed from the data acquired at R1-R6 were used to project traffic noise and create a traffic noise map for Liberty Ridge.

Projected traffic noise from local street traffic ranged from about 35-40 dBA (LEQ) in the furthest corners of the development to about 55 dBA (LEQ) near the intersection of Edmonds Ave. SE and NE 3rd St. The 10 a.m. hour had slightly vehicles, and thus slightly noise than the 6 a.m. hour.

The projected A-weighted LEQ sound levels due to Liberty Ridge local traffic is displayed in Figure 17.9 and Figure 17.10.

FIGURE 17.9: PROJECTED LIBERTY RIDGE LOCAL TRAFFIC NOISE 0600-0700

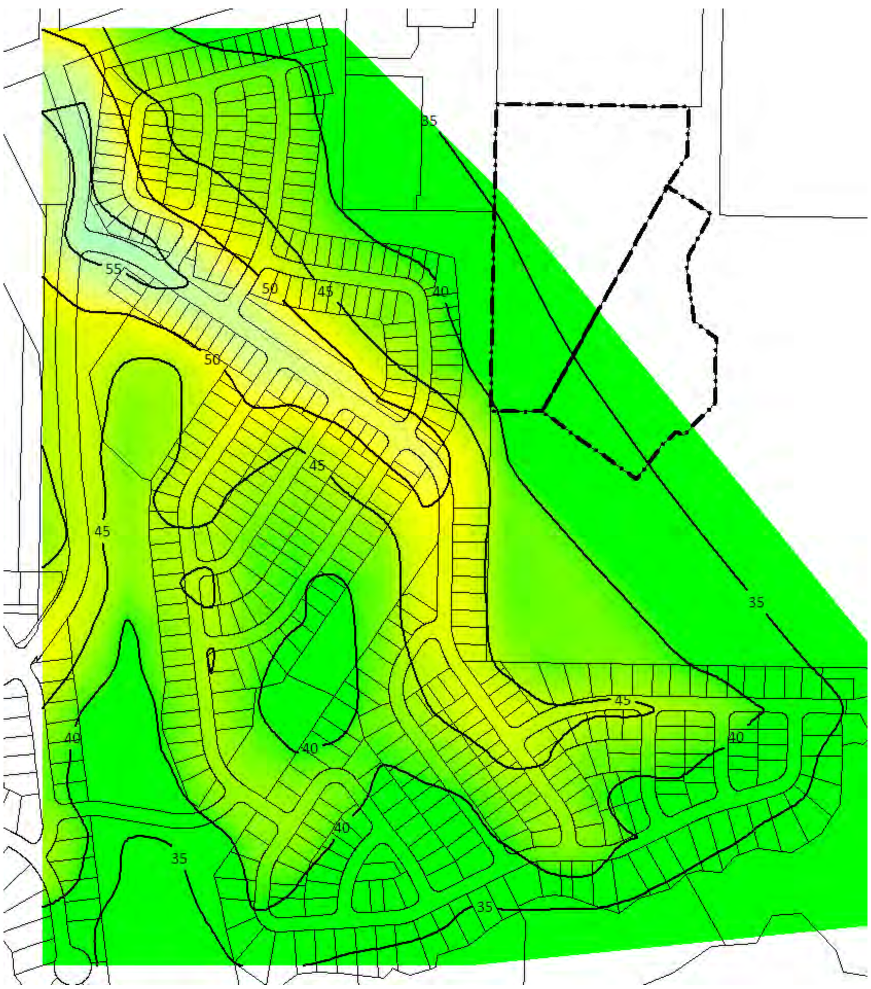
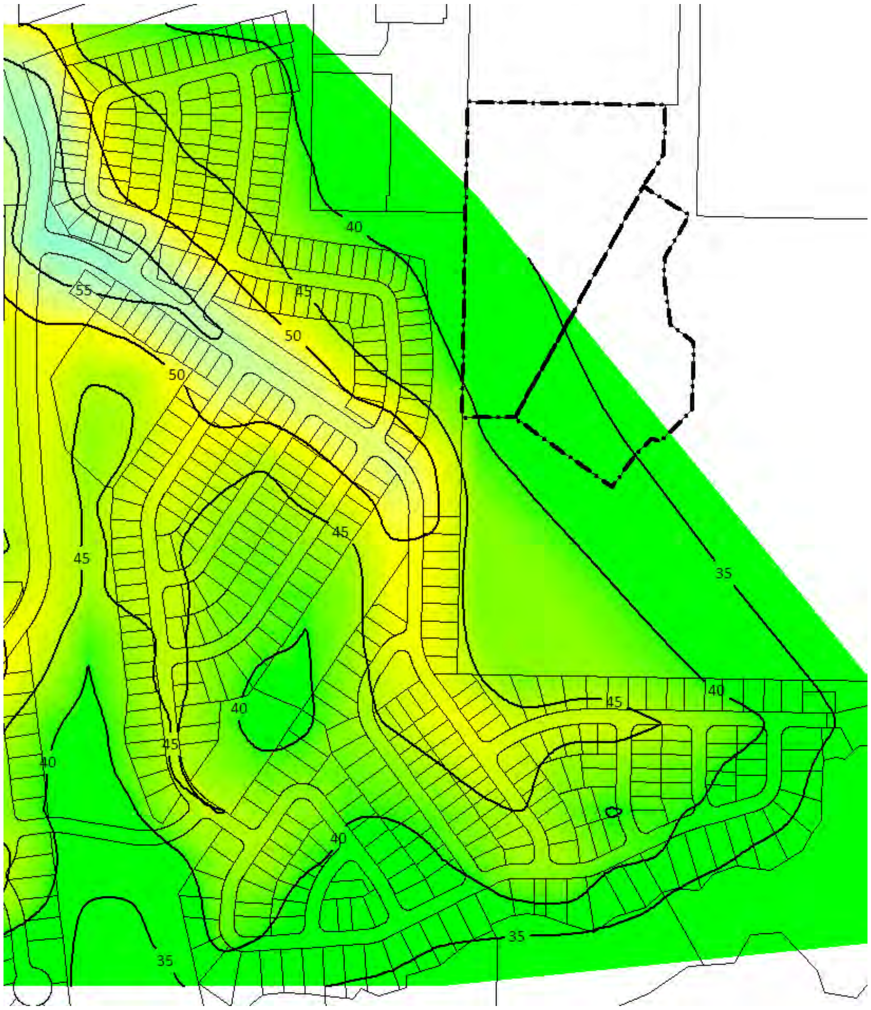


FIGURE 17.10: PROJECTED LIBERTY RIDGE LOCAL TRAFFIC NOISE 1000-1100



Figures 17.7 -17.10 were combined (for similar time segments) to create the full traffic/ambient noise model for the site. These are shown in Figures 17.11 - 17.12 .

.

FIGURE 17.11: COMBINED LIBERTY RIDGE LOCAL TRAFFIC + NE 3RD/4TH ST NOISE 0600-0700

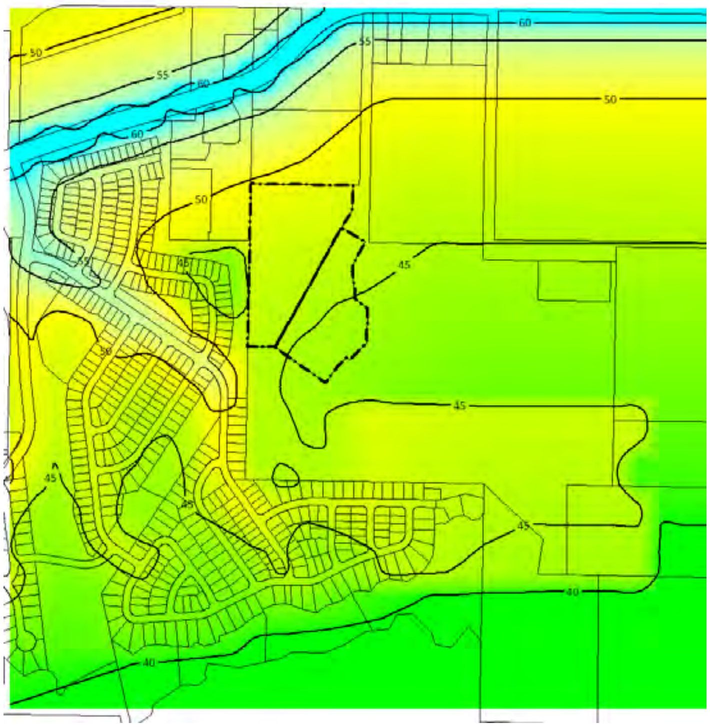
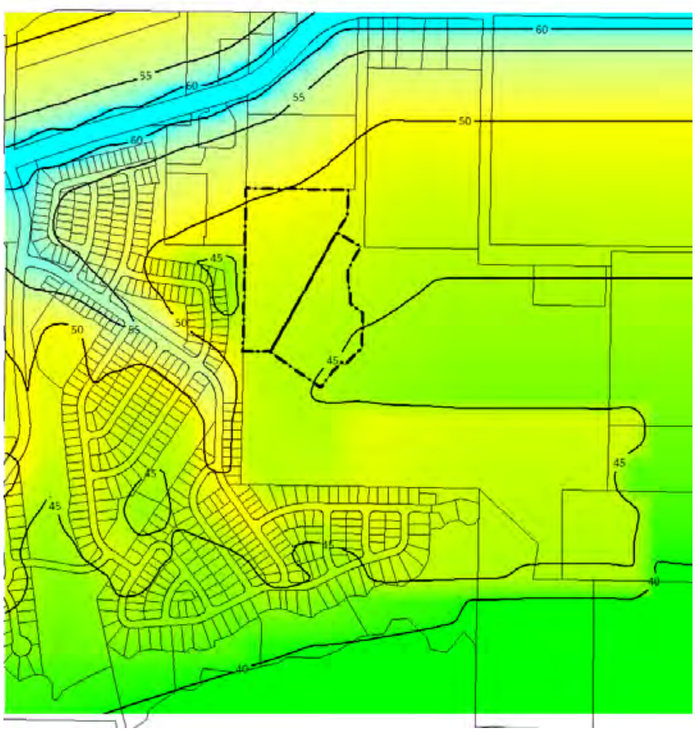


FIGURE 17.12: COMBINED LIBERTY RIDGE LOCAL TRAFFIC + NE 3RD/4TH ST NOISE 1000-1100



18.0 RENTON EQUIPMENT SOUND POWER LEVELS

Sound power levels for equipment used in Renton / Option 3 Facilities analysis were determined from measurements taken on-site, from measurements of similar equipment at CHRLF, or from manufacturer data. The measured noise levels included whatever backup alarms were present during the monitoring. Although backup alarms and similar safety features are exempt from noise ordinance limits, any backup alarm sounds were kept in the data. No post-processing was performed that would filter alarm tones out.

Measured data was corrected for distance to the source, atmospheric absorption, microphone frequency response, and windscreen response, and power supply gain (when applicable) when determining the sound power level of each source.

Sound level monitoring performed at Positions P5 & P6 (reference Figure 17.1) was used to obtain the bulk of the sound power level data necessary for the Renton site analysis. These included:

- The transfer station operations.
- Commercial trucks emptying loads.
- Self-haul waste unloading.
- Self-haul and commercial vehicle noise on the access road.
- Yard truck noise used to move full trailers of waste.
- Roads division light duty trucks / pickups
- Roads division heavy trucks
- Roads division street sweeper

The commercial garbage trucks are the primary source of noise at the transfer station. It was observed that when self-haul vehicles were in the station, the noise levels were not noticeably different than when no vehicles were present. Therefore, noise from the transfer station was broken down into two scenarios: with a commercial truck, and without a commercial garbage truck. It was observed that the commercial trucks were in the transfer station about 5 minutes.

Roads division loader and dump truck sound power were evaluated from on-site measurements in February 2020. The tests were performed in the lower gravel operations area of the Roads Division site and evaluated the loader filling the truck with gravel and also the noise created when the truck emptied the gravel out of the bed. The gravel used in the measurements was medium-small sized (estimated about 1-inch diameter or less).

Local Liberty Ridge traffic sound power levels were calculated from the short term recorded data taken at Positions R3 [Figure 17.1].

Noise data for the HVAC units was taken from manufacturer data. Noise levels of the maintenance shop and trailer pressure washing activities were measured at CHRLF.

Tables 18.1 – 18.2 show the equipment sound power levels used in the Renton analysis.

TABLE 18.1: SOUND POWER LEVELS FOR RENTON ANALYSIS (LEQ)

Frequency	Transfer Stn w/ Commercial Truck	Transfer Stn w/o Commercial Truck	Commercial Truck on Access Rd	Self Haul on Access Rd	Roads Div Heavy Truck	Roads Div Light Truck	Loader with Gravel	Dump Truck Dumping Gravel	Street Sweeper	Terminal Tractor	Liberty Ridge Auto
20	102.8	103.9	99.1	88.3	85.4	84.6	87.2	90.2	98.7	88.9	88.5
25	102.7	103.3	95.2	89.7	87.4	86.2	89.1	93.8	97.8	91.9	88.7
31.5	103.4	103.1	94.7	90.0	86.8	86.2	89.9	100.5	100.2	92.5	93.6
40	104.9	103.3	95.7	90.1	92.0	86.3	94.2	103.6	105.6	93.9	93.5
50	107.1	103.6	93.0	93.7	95.6	91.1	95.1	101.2	112.6	93.9	91.1
63	114.0	106.9	93.1	96.6	95.1	96.5	97.6	100.8	119.8	94.8	92.3
80	106.0	104.9	103.1	100.9	97.9	89.7	103.0	102.5	103.4	94.2	94.5
100	104.3	102.3	96.4	101.2	94.8	93.1	99.4	106.7	108.0	104.8	91.7
125	106.0	100.8	92.7	102.2	96.9	90.7	98.7	103.7	112.4	101.7	90.9
160	99.1	96.7	92.7	95.6	96.5	87.4	97.0	105.9	104.6	98.8	88.1
200	99.1	94.8	97.0	95.5	92.4	84.9	97.1	105.9	102.8	98.7	88.1
250	100.1	94.1	100.3	90.6	93.1	82.3	98.0	107.4	105.7	100.0	88.2
315	94.8	92.0	99.8	87.6	94.0	81.1	97.6	116.7	101.4	100.0	87.9
400	94.6	90.4	94.9	83.8	91.8	81.2	96.6	106.4	101.2	102.1	85.8
500	94.0	89.5	98.9	81.7	92.8	81.0	95.2	105.0	102.9	99.1	86.3
630	93.1	88.7	94.4	81.8	93.1	82.9	95.6	105.9	99.8	100.6	87.6
800	92.8	88.2	96.0	81.9	93.6	83.9	94.0	104.1	98.3	101.4	90.3
1000	93.0	87.4	95.6	81.2	93.4	82.6	94.8	102.1	95.9	98.9	90.5
1250	94.1	87.1	94.6	81.1	93.2	80.8	111.9	101.0	97.4	97.9	88.0
1600	92.9	86.5	92.8	81.2	92.3	79.4	96.4	100.9	96.2	97.5	86.0
2000	93.2	85.9	91.6	79.9	92.0	79.4	92.2	99.2	96.0	96.9	83.4
2500	92.9	85.7	90.4	79.3	92.2	78.6	103.2	97.1	93.9	95.0	81.1
3150	91.3	85.0	88.1	77.9	90.1	76.6	90.3	96.1	92.8	94.4	79.2
4000	90.3	84.1	86.7	76.4	87.0	75.6	90.0	94.8	90.7	94.3	76.7
5000	89.1	82.7	85.2	74.9	84.4	74.0	87.4	93.5	88.4	92.9	75.8
6300	87.2	82.2	82.2	72.7	82.8	72.4	87.8	92.7	84.7	93.3	73.9
8000	85.4	81.2	80.1	71.4	81.1	73.4	85.6	93.5	82.1	91.6	71.0
10000	83.2	76.7	79.4	69.9	79.3	77.3	82.8	91.0	77.2	88.9	69.2
L_WA	104.5	98.9	104.6	94.3	102.9	91.6	113.7	114.3	108.6	109.0	97.0

TABLE 18.2: SOUND POWER LEVELS FOR RENTON ANALYSIS (LMAX)

Frequency	Transfer Stn w/ Commercial Truck	Transfer Stn w/o Commercial Truck	Commercial Truck on Access Rd	Self Haul on Access Rd	Roads Div Heavy Truck	Roads Div Light Truck	Loader with Gravel	Dump Truck Dumping Gravel	Street Sweeper	Terminal Tractor	
20	118.6	102.2	103.3	85.8	84.5	83.5	81.4	105.2	104.7	88.3	
25	114.5	104.1	99.4	89.0	90.4	90.8	89.3	107.6	99.5	91.8	
31.5	112.7	103.0	98.2	87.6	85.1	85.2	87.2	117.5	102.9	91.9	
40	116.9	105.6	99.8	92.9	92.8	92.9	94.0	120.8	103.9	92.7	
50	129.9	107.3	96.2	89.6	104.3	89.3	93.6	114.9	114.0	94.0	
63	126.5	107.1	93.6	93.1	100.3	93.3	93.0	117.9	120.1	95.1	
80	124.0	107.4	104.5	102.0	100.2	92.9	90.1	115.6	105.3	96.9	
100	124.4	106.5	99.3	103.7	97.6	89.4	94.7	120.5	113.8	103.8	
125	121.8	102.2	94.9	116.5	97.7	90.8	92.9	116.3	118.1	102.9	
160	115.7	98.3	92.3	100.5	96.3	90.8	90.9	123.0	106.7	99.6	
200	113.6	98.5	97.6	97.4	92.3	86.9	90.1	119.3	101.9	99.5	
250	112.3	97.2	101.3	95.5	99.0	85.9	92.7	116.0	106.9	100.4	
315	107.2	95.2	103.4	96.7	101.1	87.4	91.3	115.4	101.6	102.1	
400	108.8	94.3	96.5	82.4	95.0	87.5	93.0	118.4	100.7	101.3	
500	107.8	97.4	100.1	82.1	95.6	86.8	91.8	116.7	104.8	99.9	
630	109.0	100.9	95.7	79.5	96.8	88.1	92.8	119.7	99.6	101.2	
800	109.9	101.8	98.0	79.7	97.8	88.7	92.3	114.8	104.0	102.5	
1000	110.7	105.0	98.0	77.3	99.0	90.4	101.6	114.3	99.2	99.6	
1250	111.5	106.6	96.9	80.4	97.8	88.8	124.0	114.3	102.0	99.1	
1600	110.9	109.0	94.9	87.3	97.8	87.2	105.1	113.6	98.6	98.1	
2000	111.4	110.8	93.3	78.3	97.8	87.5	95.9	112.6	99.2	97.5	
2500	110.3	110.6	91.1	76.1	99.6	86.6	104.4	110.2	97.5	95.8	
3150	109.5	111.2	89.3	77.9	97.3	82.6	90.1	105.4	94.5	95.5	
4000	106.0	111.3	88.3	75.3	92.5	81.5	90.6	104.9	90.9	95.3	
5000	103.8	110.7	87.0	71.9	89.8	79.4	86.6	104.5	87.1	93.6	
6300	102.0	107.9	83.9	70.4	88.4	77.2	88.8	102.7	80.3	94.1	
8000	98.3	106.8	81.9	67.4	86.3	74.1	86.0	100.7	73.0	92.6	
10000	94.3	103.0	83.0	64.4	82.2	74.4	79.9	97.2	64.9	89.9	
L_{WA}	121.3	120.4	106.5	101.8	108.4	98.0	124.8	124.8	111.5	109.8	

19.0 RENTON NO ACTION ALTERNATIVE NOISE LEVELS

The No Action condition for the Renton Recycling and Transfer Station is that the landfill support facility would not be built and the transfer station would continue to operate "as is" and the amount of waste handled would increase with time. The operation of the transfer station is independent of CHRLF status, so the incoming waste will continue regardless of the CHRLF closing date.

The noise contours due to transfer station activities from the daytime No Action Alternative case are plotted in Figure 19.1 using the loads that would be observed at the closing of CHRLF in 2046 (Alternative 3). The cumulative No Action Alternative noise contours that include the transfer station, the roads division, and projected traffic/ambient noise are given in Figure 19.2.

FIGURE 19.1: NO ACTION ALTERNATIVE TRANSFERE STATION NOISE CONTOURS 10 A.M.

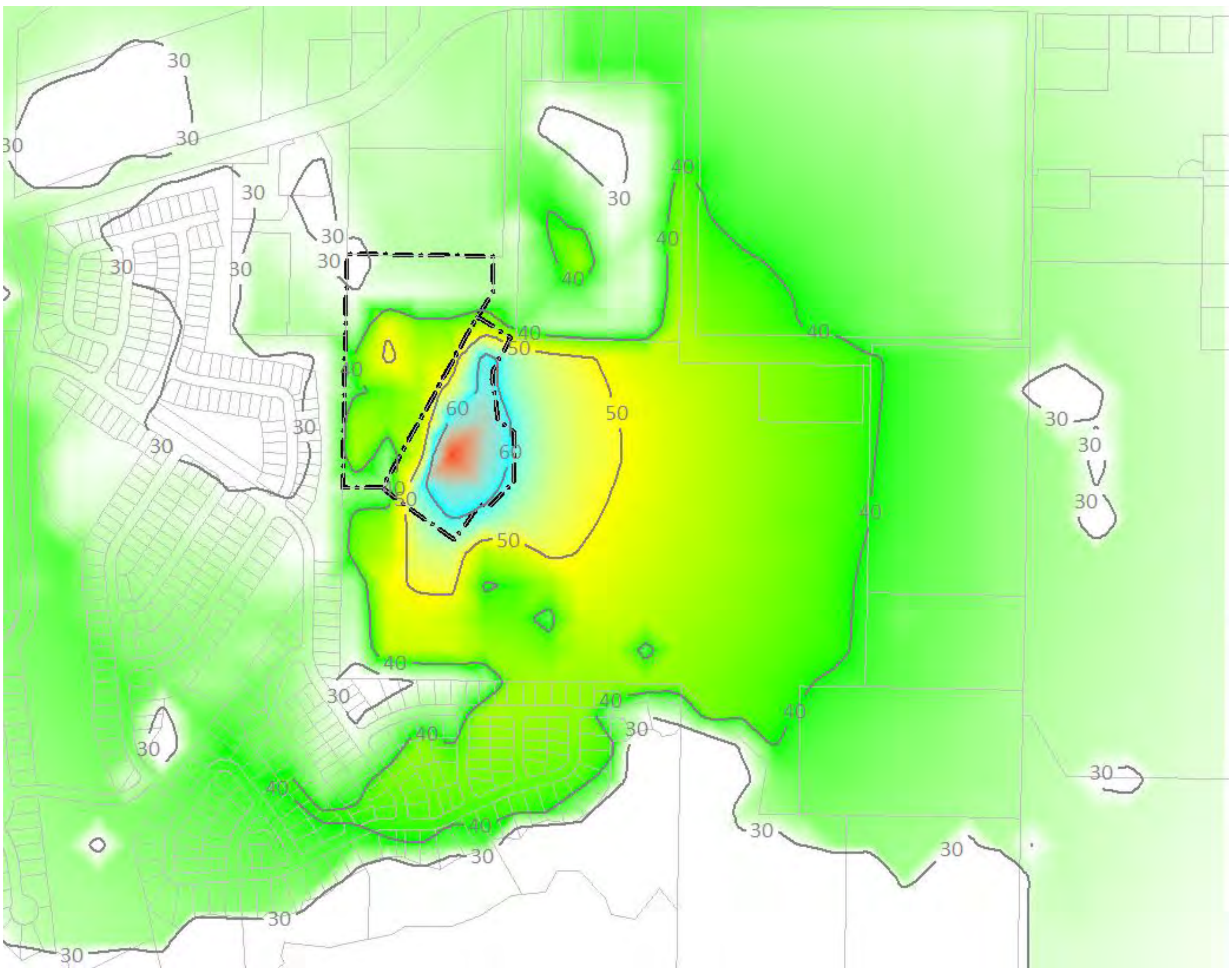
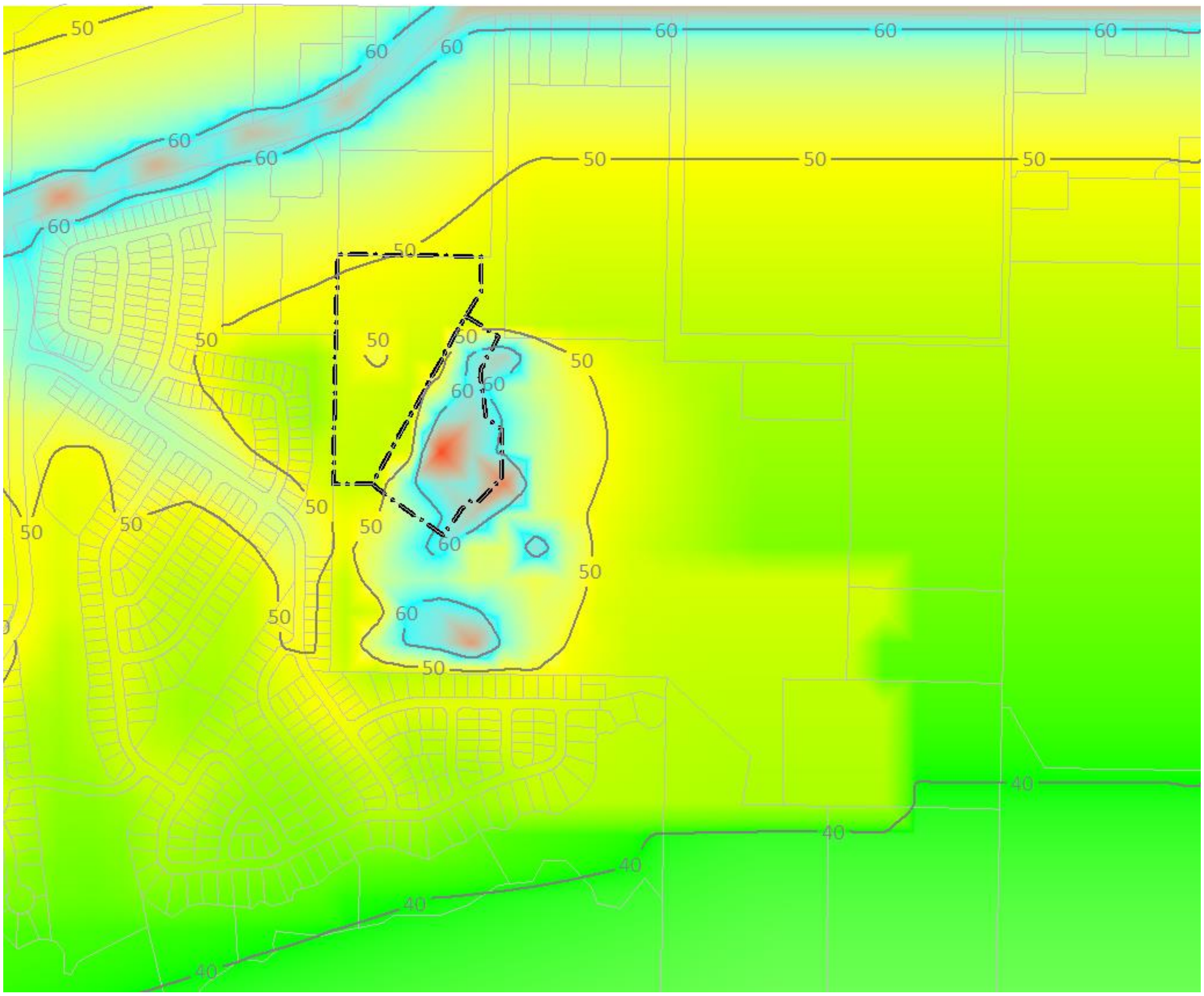


FIGURE 19.2: CUMULATIVE NO ACTION ALTERNATIVE NOSIE LEVELS RENTON 10 A.M.



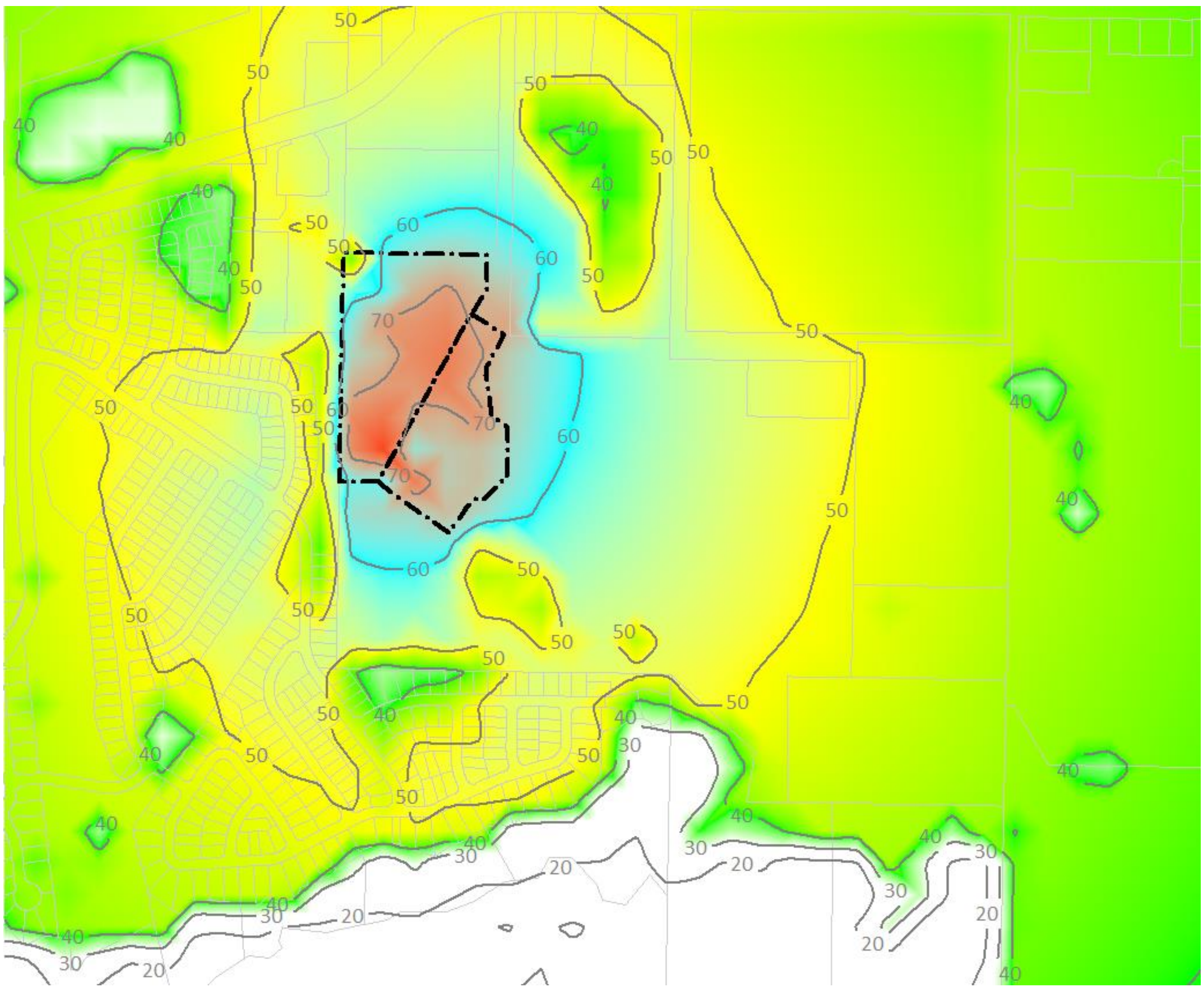
The transfer station does not operate at night, so the nighttime levels previously shown in Figure 17.11 for projected traffic and Roads Division noise are the applicable 6 a.m. hour cumulative No Action noise levels.

The Roads Division may have intermittent early morning loading operations where loaders and trucks are operating near the southern border of that property. However, that activity is not consistent and therefore was not used in determination of impact/no impact (nor was it necessary).

20.0 RENTON UNMITIGATED ALTERNATIVE NOISE LEVELS

The projected Alternative 3 noise levels without any mitigation are presented in Figure 20.1 - Figure 20.2. The applicable Renton nighttime noise limit for industrial to residential properties is 50 dBA. The projected 50 dBA noise contour extends well outside the KCSWD property lines and into the surrounding community. In some cases the projected sound level exceed the limit by over 10 dBA. Areas in all directions from the site would require noise reduction.

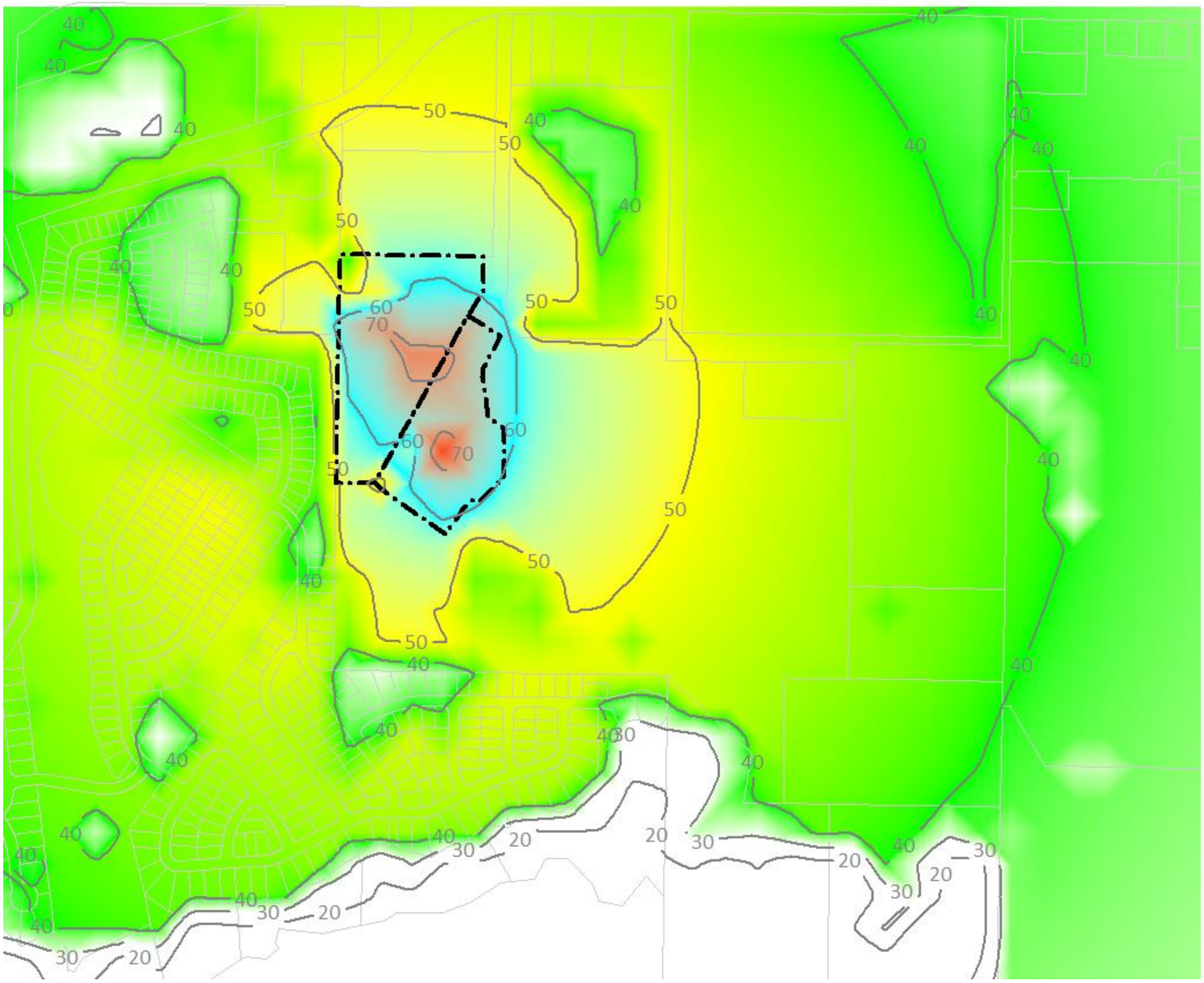
FIGURE 20.1: RENTON ALTERNATIVE 3 UNMITIGATED 6-7 A.M.



The projected daytime noise levels would be within the noise code limits. The LEQ 60 dBA noise contour (daytime noise limit) is right on the border with the Liberty Ridge HOA property to the west and the residentially zoned gravel operations property to the east.

A proposed mitigation plan is outlined in Section 21.0 to demonstrate that compliance with the nighttime noise code is feasible.

FIGURE 20.2: RENTON ALTERNATIVE 3 UNMITIGATED SOUND 10-11 A.M.



21.0 RENTON MITIGATION DESCRIPTION

The mitigation required for the Renton site to comply with the Renton noise ordinance would be extensive. Most of the site would need to have tall, absorptive sound walls around the perimeter, on intermediate walls, and also some along the street. The barrier surface would need to be acoustically absorptive to prevent sound from reflecting off of the noise barriers and back into the community.

Under this potential mitigation plan, the ingress/egress route shown in the site plans would need to move further to the south with a noise wall extending from the northeast corner down to the access point. Leaving the ingress/egress in the northeast corner was not conducive to meeting the 50 dBA nighttime noise limit at the property to the northeast (currently used for gravel extraction).

Figure 21.2 shows the nominal potential locations, heights, and lengths of the noise walls. These nominal dimensions were based on the proposed site layout plans that are not fixed. Thus, the mitigation would need to be revisited once the site plans are finalized. As discussed for other truck noise mitigation in this report, the nominal heights for the walls were calculated for a noise source height of 12 ft, the approximate height of the exhaust stacks on a typical semi-truck. A detailed analysis of the noise generated by the trucks should be performed to determine how much noise is generated by components closer to the ground (engine fan noise for example), which would likely lead to slightly lower barrier heights. However, for cost estimates, use of the higher barriers described herein would be appropriate.

- The walls should nominally have a NRC rating of 0.90 or higher and 125 Hz absorption coefficient of 0.9 or higher.
- The surface of the noise wall facing the trucks must be the absorptive side.
- For some walls that have SWD noise sources on both sides (the dividing wall between the upper and lower lot and the wall between the upper lot and the transfer station access road are examples), each surfaces of the noise wall would need to be absorptive.

The analysis did not indicate that the property line directly west of the proposed Renton maintenance required a noise wall. The maintenance building provides significant shielding for most of the truck parking areas and much of the presumed traffic flow. For safety reasons though, it appears that some form of wall would be required along that segment of property line. For aesthetic purposes, a wall that matches the others described in this section would be acceptable.

Pressure washing activities, would be located in the upper lot and located away from the bluff overlooking the Liberty Ridge development to minimize community noise. This analysis used a point near the drive through parking stalls in the upper lot as the source point. Any point from there east would be acceptable. If the final site plan includes a pressure washing station closer than described above, additional analysis to ensure compliance would be appropriate.

FIGURE 21.1: POTENTIAL RENTON MITIGATION WITH DRAFT SITE PLAN

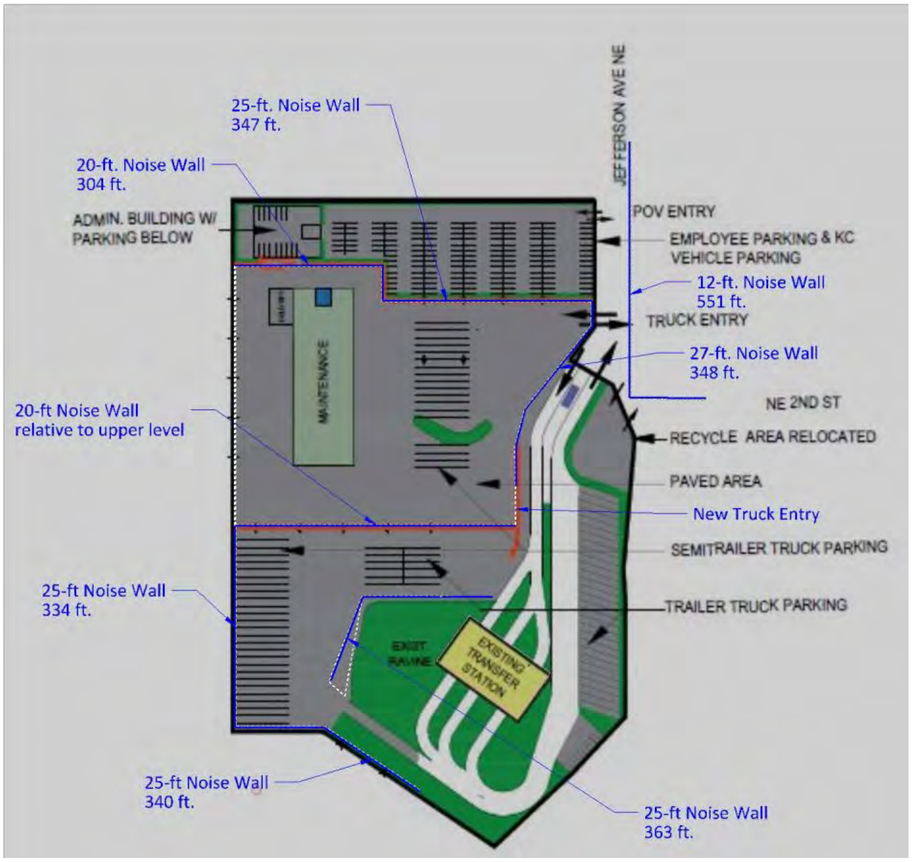
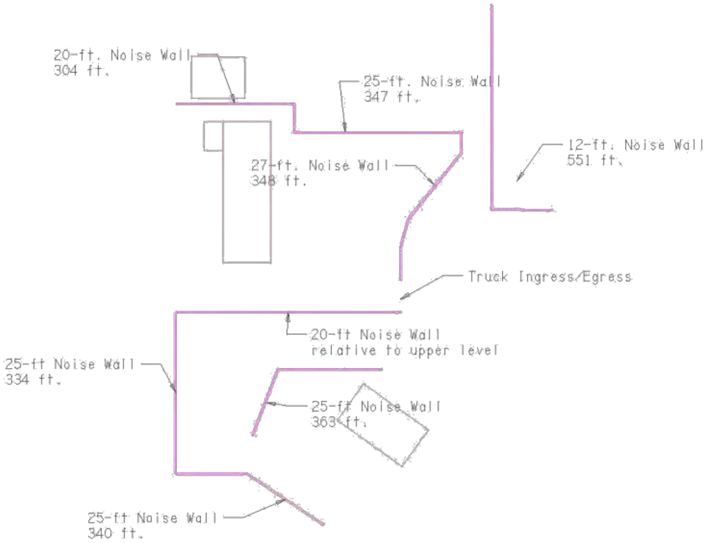


FIGURE 21.2: POTENTIAL RENTON NOISE MITIGATION WITHOUT SITE PLAN



22.0 RENTON MITIGATED NOISE LEVELS

The projected noise level for Alternatives 1-3, when incorporating the significant mitigation measures discussed in Section 21.0 are shown in Figures 22.1-22.3. Nighttime noise levels at surrounding residences are within the LEQ 50 dB noise contour, which is typically equivalent to the WAC limit for $L_{25} \leq 50$ dBA.

The 50 dBA noise contour does extend slightly outside the KC owned properties onto Liberty Ridge Home Owner's Association properties that are not expected to be occupied at any time since those properties are on steep, potentially dangerous slopes left from previous gravel extraction. Along the west side of the proposed facilities location, this occurs because of interpolation between the grid points used to create the noise contours – the actual contours would be much tighter against the proposed barriers and top of the ridge. Along the Roads Division property line, this occurs at the far east end of the Liberty Ridge development where the noise grid is almost right on the property line and the projected noise level is about 51 dBA. The next grid point is 125 feet away and does not reflect the abruptness of the drop off south of the property line. Because of the steep slope, the noise level will drop as soon as a potential observer is off the crest of the hill.

Because there is no significant truck activity, regardless of which Action Alternative is considered, daytime noise levels from the proposed Renton facility would be minimal. Projected daytime contours, depicted in Figure 22.4, are well within the allowable 60 dBA daytime noise limit.

FIGURE 22.1: RENTON ALTERNATIVE 1 LEQ CONTOURS 6 A.M.

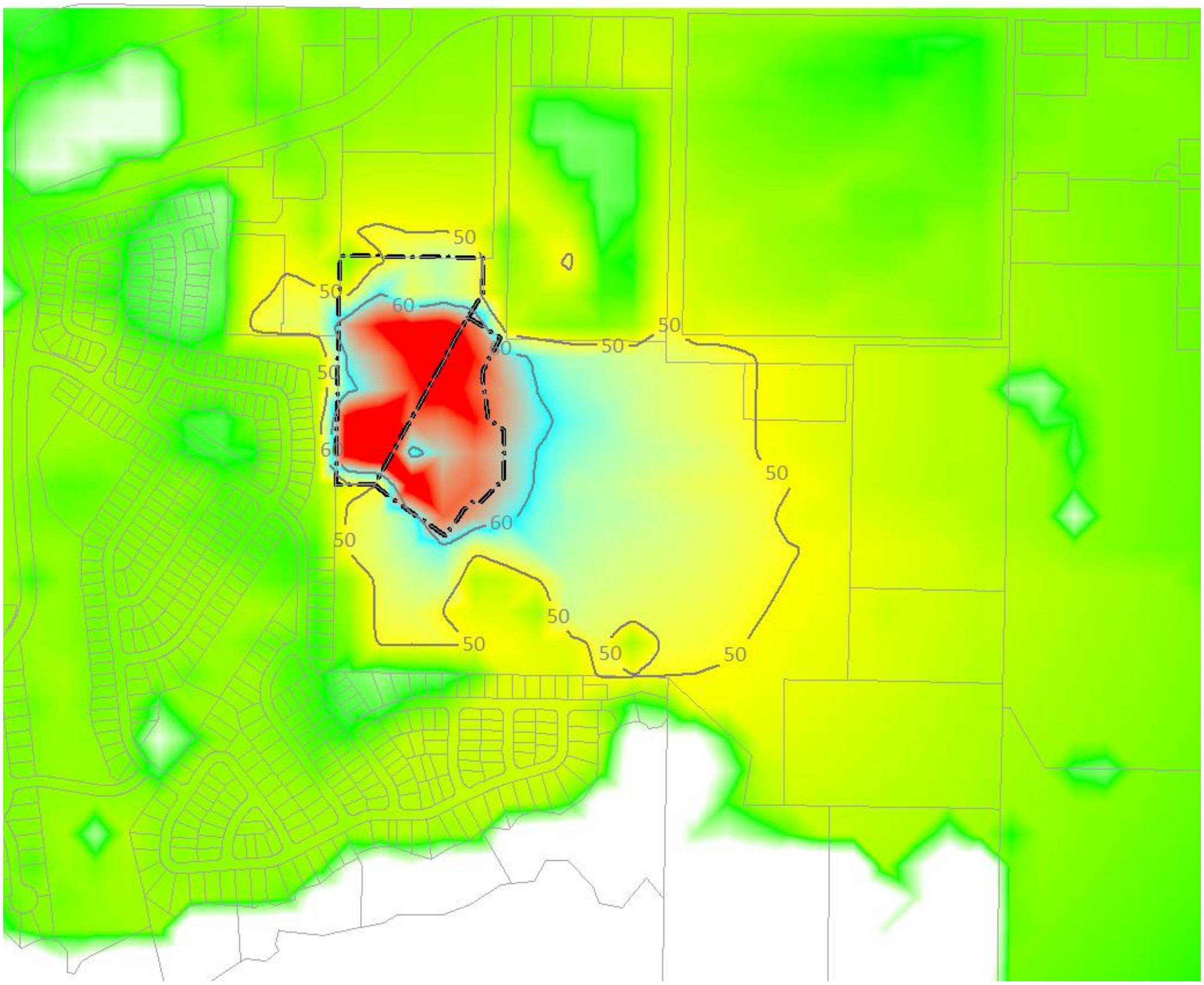


FIGURE 22.2: RENTON ALTERNATIVE 2 LEQ CONTOURS 6 A.M.

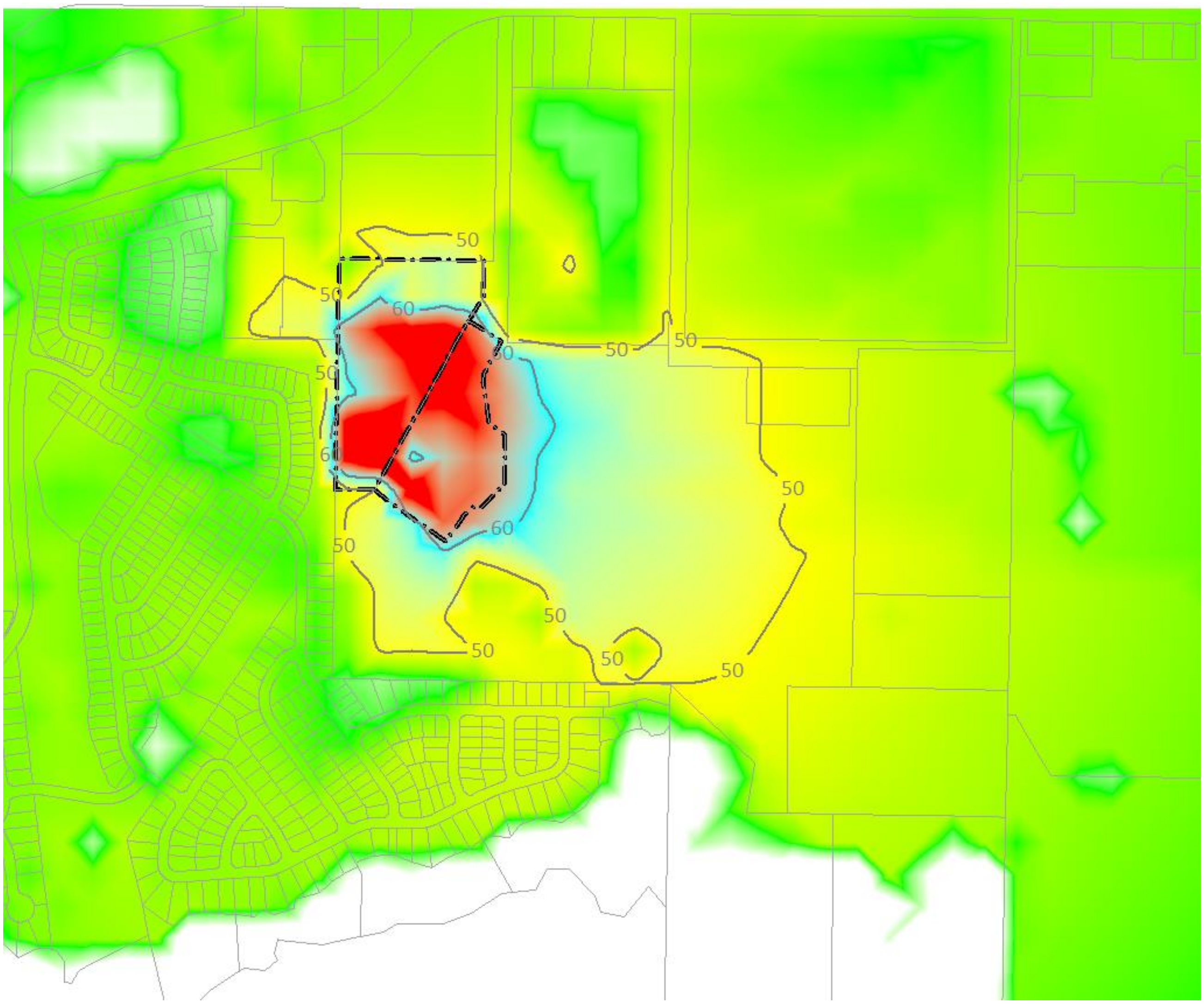


FIGURE 22.3: RENTON ALTERNATIVE 3 LEQ CONTOURS 6 A.M.

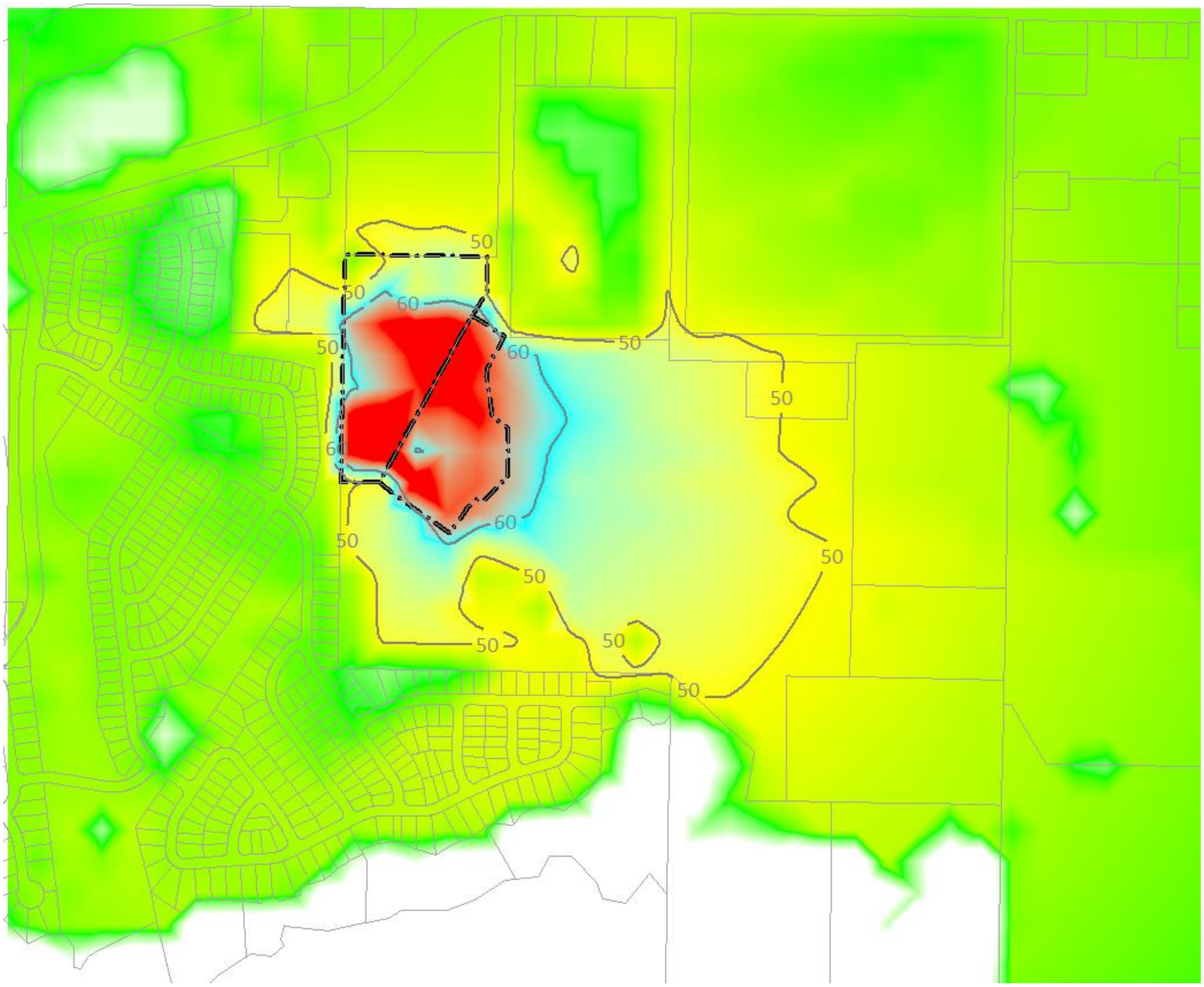
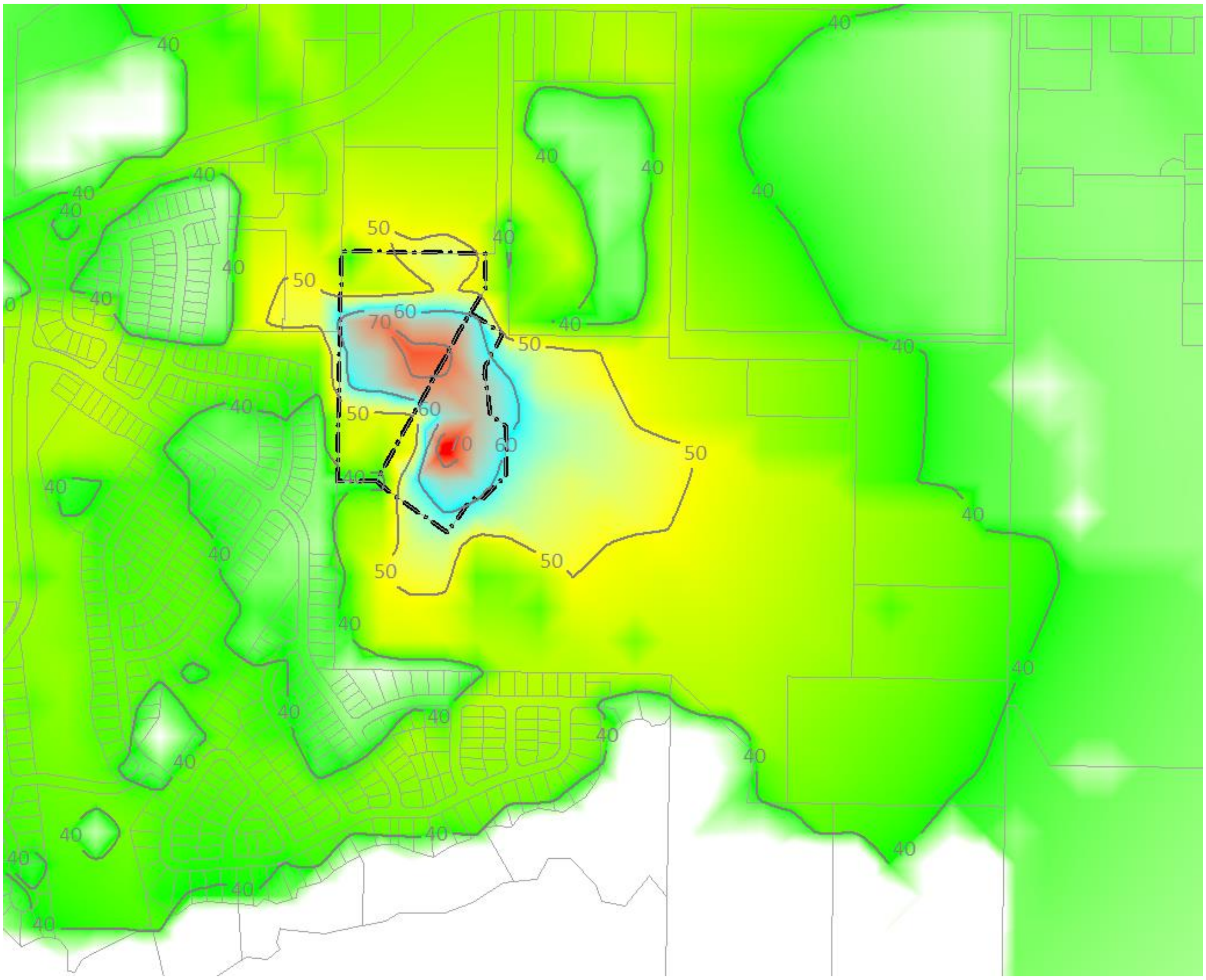


FIGURE 22.4: CUMULATIVE ALTERNATIVE 3 FACILITIES AND TRANSFER STATION LEQ 10 A.M.



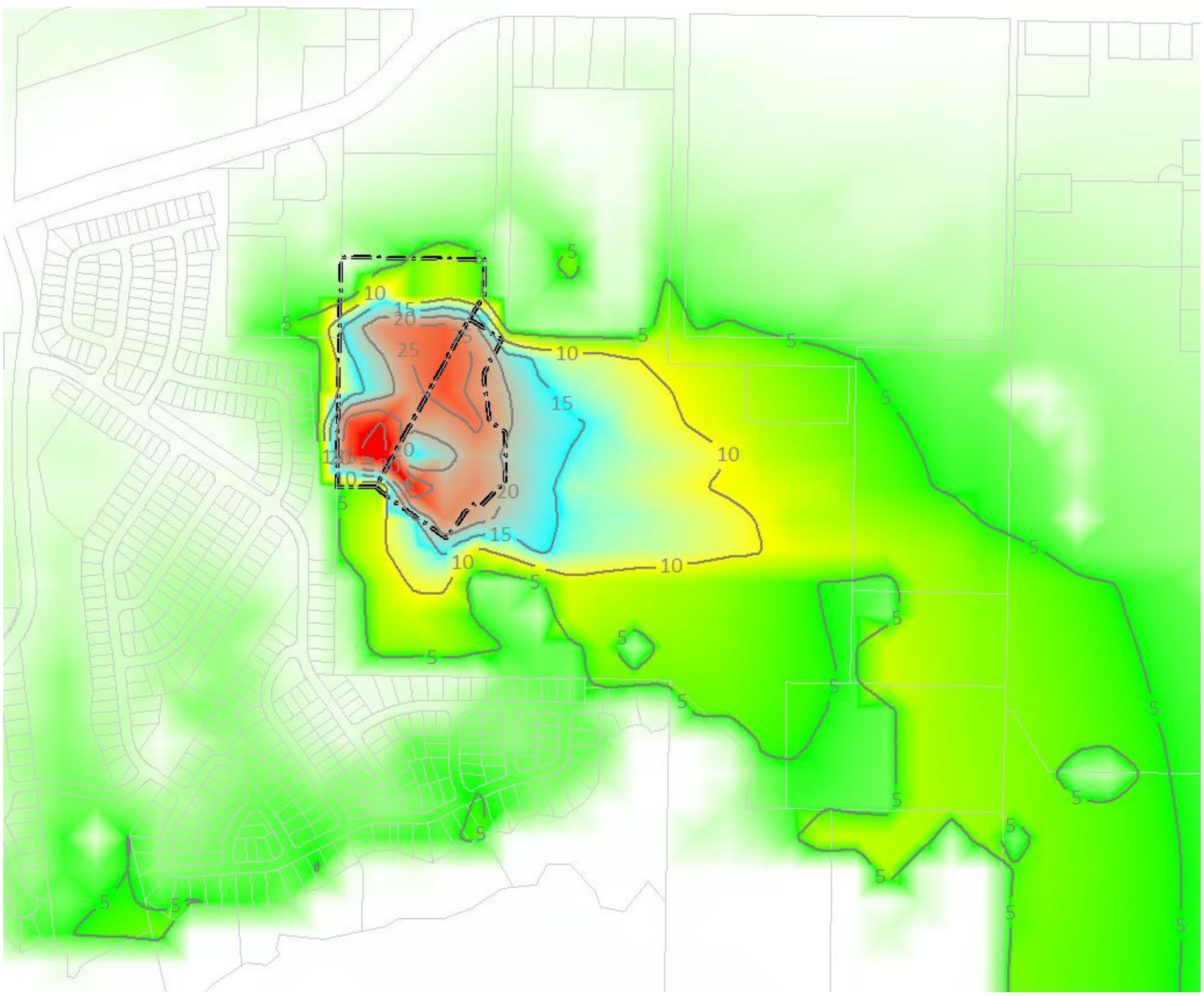
Projected cumulative daytime noise levels from both KCSWD properties (the facilities location and the transfer station) are provided in Figure 22.4. The projected levels are within the 60 dBA daytime limit. These were calculated for Alternative 3 load rates, so the noise levels from Alternatives 1-2 would be marginally less and would also comply with the noise code limits.

23.0 RENTON SEPA NOISE COMPARISON

Figure 23.1 shows the community noise increase caused with implementation of Alternative 3. This is calculated as the Alternative 3 cumulative noise (facilities, transfer station noise, roads division noise, plus projected ambient/traffic noise) minus the cumulative No Action Alternative noise levels (transfer station, roads division, and projected ambient/traffic noise)..

The noise increase is less than 10 dBA at all areas of concern. Noise increases in the surrounding community are generally in the 0-5 dBA range. Because the increase is less than 10 dBA for the noisiest configuration (Alternative 3), none of the Alternatives under consideration would create a significant noise impact when implementing appropriate, feasible mitigation.

<u>FIGURE 23.1: RENTON ALTERNATIVE 3 INCREASE ABOVE EXISTING AMBIENT 6 A.M. (SEPA COMPARISON)</u>



24.0 CONCLUSIONS

A noise assessment was carried out for the No Action Alternative and Action Alternatives 1-3, each having differing facilities locations described as Options 1-3. The Options included placing facilities in the North regions of the landfill, in the southern regions of the landfill, or moving the facilities location off-site to a county owned property in Renton. The facilities options final configuration may be different than the configurations used for this analysis, which may lead to different mitigation needs and strategies than presented herein.

The CHRLF portion of the analysis focused on Alternative 3, because it had the largest landfill geometric footprint, largest incoming waste volumes, and had intermediate filling stages that appeared to closely correspond to the fill sequences of Alternatives 1-2. Thus, the results from the Alternative 3 analysis can be conservatively used to evaluate upper limit of potential impacts caused by Alternatives 1 and 2.

The analysis used the closing year (and highest) average weekday trips as the basis for the determination of truck trips. These were further adjusted for monthly and hourly variations when computing noise levels. Noise levels were computed assuming all equipment currently used at the landfill would be maintained until the closing year of each Alternative. This is the most conservative approach since replacement of old equipment usually results in a quieter new unit. With advances in alternative vehicle power, it is not beyond possibility that KCSWD will be using some form of hybrid semi-truck to haul loads by the time that the Alternative 1-3 closing years occur (2037-2046).

The CHRLF analysis indicated that the No Action Alternative noise levels would exceed the King County noise limits for both daytime and early morning conditions under typical adverse sound propagation conditions at certain positions around the perimeter. The largest No Action exceedance occurs during early morning conditions in the SE corner where the access road crosses the southern property line. Daytime operations also had projected sound levels that exceeded the limit in the southeast corner, although by a smaller margin.

As anticipated, the results of the unmitigated Alternatives with facilities located in the southern portion of the landfill analysis had somewhat similar results to the No Action Alternative with the morning and daytime noise limits being exceeded in some locations – generally in the SE corner.

Having the facilities located in the north or in Renton alleviates some of the exceedances in the SE corner, but not all. The north facilities required significant mitigation in the north in addition to most mitigation for the south facilities. Further, landfilling operations during the initial phases of Area 9 will require the same South Facilities mitigation that could potentially be saved by having the facilities in the north or Renton. Thus, from a pure mitigation cost perspective, there does not appear to be a significant benefit to moving the facilities away from the south as the other facilities location will need to retain virtually all of the south mitigation plus whatever mitigation is required for the other site.

A 10 dBA increase in community noise levels has previously been accepted as the threshold for significant impact under SEPA and is proposed here. For the 16 positions around CHRLF where existing community noise levels were measured, the projected increase in cumulative community noise level due to a change from the No Action Alternative to any of the Action Alternatives under consideration (when including the proposed mitigation) is less than 6.6 dBA.

The Renton facilities site proposed under Option 3 is adjacent to both industrial and residential properties. Because of the residential zoning and the fact that the most significant operations will occur during the 6-7 a.m. period (meaning the nighttime portions of the noise code are applicable), extensive (and expensive) mitigation will be required for compliance with the noise code. Once the noise levels are compliant with the noise code, the projected increase in cumulative community noise at residences is about 5 dB or less during the 6-7 a.m. time frame and even less during normal daytime operations.

Based on the projected increase in community noise levels (including mitigation described herein), the noise associated with each Action Alternative and Option under consideration do not represent an unavoidable significant adverse noise impact compared to the No Action Alternative.

The Action Alternatives and Options proposed by the County will increase the lifespan of the landfill beyond the 2028 closure forecast for the No Action Alternative. Thus, the community will hear landfill noise for an extended duration compared to the No Action Alternative. The duration will depend on the Alternative selected. Nonetheless, based on the relatively small increases in existing noise and continued compliance with the noise code, the noise levels associated with the Action Alternatives under consideration do not represent an unavoidable significant adverse noise impact compared to the No Action Alternative.

Intentionally Blank Page

QSI DOCUMENT: QSI 2020-02 (Addendum)
KING CO. CONTRACT: E00364E15

CEDAR HILLS REGIONAL LANDFILL 2020 SITE DEVELOPMENT PLAN ENVIRONMENTAL IMPACT STATEMENT

ADDENDUM TO NOISE TECHNICAL REPORT

Prepared for:

King County Solid Waste Division
201 S. Jackson Street, Suite 701
Seattle, WA 98104

Submitted by:

Herrera Environmental Consultants, Inc.
2200 6th Ave, Suite #1100
Seattle, WA 98121

February 14, 2022

DOCUMENT DISTRIBUTION

Document: Cedar Hills Regional Landfill 2020 Site Development Plan Environmental Impact Statement

Addendum to Noise Technical Report

QSI Document: QSI 2020-02 (Addendum)

Original Issue Date: February 14, 2022

CERTIFICATION DOCUMENT

JRE DOCUMENT: QSI 2020-02 (Addendum)

CEDAR HILLS REGIONAL LANDFILL 2020 SITE DEVELOPMENT PLAN ENVIRONMENTAL IMPACT STATEMENT

ADDENDUM TO NOISE TECHNICAL REPORT

Prepared for:

King County Solid Waste Division
201 S. Jackson Street, Suite 701
Seattle, WA 98104

Submitted by:

Herrera Environmental Consultants, Inc.
2200 6th Ave, Suite #1100
Seattle, WA 98121

Prepared by:

Quietly Superior, Inc.
415 SE 177th Ave
Unit 345
Vancouver, WA 98683

Greg Price

John Alberti

Issue Date: February 14, 2022

LOG OF REVISIONS

Rev	Date	Affected Pages / Changes	Initial
IR	February 14, 2022		JRA

TABLE OF CONTENTS

SECTION	TITLE	PAGE
1.0	SUPPLEMENTAL ANALYSIS FOR CHRLF	1.1
1.1	Summary	1.1
1.2	Noise Sources Evaluated	1.3
2.0	NO ACTION ALTERNATIVE 7-DAY WORK WEEK	2.1
2.1	No Action Alternative 6am 39 dBA Contours	2.1
2.2	No Action Alternative 10am 49 dBA Contours	2.4
3.0	NO ACTION ALTERNATIVE 5-DAY WORK WEEK	3.1
3.1	No Action Alternative 6am 39 dBA Contours	3.1
3.2	No Action Alternative 10am 49 dBA Contours	3.4
4.0	ALTERNATIVE 3 CONTOURS	4.1
4.1	Alternative 3 Option 1 6am 39 dB Noise Contours	4.1
4.2	Alternative 3 Option 1 10am 49 dB Noise Contours	4.8
4.3	Alternative 3 Option 2 6am 39 dB Noise Contours	4.14
4.4	Alternative 3 Option 2 10am 49 dB Noise Contours	4.20
4.5	Alternative 3 Option 3 6am 39 dB Noise Contours	4.26
4.6	Alternative 3 Option 3 10am 49 dB Noise Contours	4.32
5.0	CHRLF 5-DAY OPERATIONS	5.38
5.1	5-Day Week - Alternative 3 Option 1 6am 39 dB Noise Contours	5.38
5.2	5-Day Week - Alternative 3 Option 1 10am 49 dB Noise Contours	5.44
5.3	5-Day Week - Alternative 3 Option 2 6am 39 dB Noise Contours	5.50
5.4	5-Day Week - Alternative 3 Option 2 10am 49 dB Noise Contours	5.56
5.5	5-Day Week - Alternative 3 Option 3 6am 39 dB Noise Contours	5.61
5.6	5-Day Week - Alternative 3 Option 3 10am 49 dB Noise Contours	5.62
6.0	PROJECTED SEPA NOISE INCREASES	6.1
6.1	Alternative 3 6 a.m. 7-Day Week	6.1
6.2	Alternative 3 10 a.m. 7-Day Week	6.4
6.3	Alternative 3 6 a.m. 5-Day Week	6.7
6.4	Alternative 3 10 a.m. 5-Day Week	6.9
7.0	MITIGATION	7.1
8.0	NOISE MODEL VALIDATION	8.4
9.0	TREE ATTENUATION	9.1
10.0	SUPPLEMENTAL ANALYSIS FOR RENTON (OPTION 3)	10.1
10.1	No Action Alternative 7-Day Week	10.4
10.1.1	Existing Traffic Noise	10.4
10.1.2	6 a.m. Operations	10.5
10.1.3	10 a.m. Operations	10.7
10.2	No Action Alternative 5-Day Week	10.10
10.2.1	6 a.m. Operations	10.11

10.2.2 10 a.m. Operations ... 10.13
10.3 Traffic Noise Along NE 3rd/4th St ... 10.15

11.0 ADDITIONAL NOISE MITIGATION REQUIRED ... 11.1

APPENDIX A: NOISE MODEL VALIDATION ... A-1

APPENDIX B: SOUND ATTENUATION OF TREES IN NOISE MODEL AT CHRLF ... B-1

LIST OF FIGURES

FIGURE TITLE PAGE

Figure 1.1: No Action Alternative Top Deck Source Positions ... 1.4
Figure 1.2: Alternative 3 Top Deck Source Position ... 1.5
Figure 1.3: Top Deck Noise Evaluation Points – No Action Alternative ... 1.6
Figure 1.4: Top Deck Noise Evaluation Points – Alternative 2 ... 1.7
Figure 1.5: Top Deck Noise Evaluation Points – Alternative 3 ... 1.8
Figure 2.1: No Action Alternative 6am Area 6N ... 2.1
Figure 2.2: No Action Alternative 6am Area 5N ... 2.2
Figure 2.3: No Action Alternative 6am Area 6 ... 2.2
Figure 2.4: No Action Alternative 6am Area 8 ... 2.3
Figure 2.5: No Action Alternative 6am Area 5 ... 2.3
Figure 2.6: No Action Alternative 10am Area 6N ... 2.4
Figure 2.7: No Action Alternative 10am Area 5N ... 2.4
Figure 2.8: No Action Alternative 10am Area 6 ... 2.5
Figure 2.9: No Action Alternative 10am Area 8 ... 2.5
Figure 2.10: No Action Alternative 10am Area 5 ... 2.6
Figure 3.1: No Action Alternative (5-day) 6am Area 6N ... 3.1
Figure 3.2: No Action Alternative (5-day) 6am Area 5N ... 3.2
Figure 3.3: No Action Alternative (5-day) 6am Area 6 ... 3.2
Figure 3.4: No Action Alternative (5-day) 6am Area 8 ... 3.3
Figure 3.5: No Action Alternative (5-day) 6am Area 5 ... 3.3
Figure 3.6: No Action Alternative (5-day) 10am Area 6N ... 3.4
Figure 3.7: No Action Alternative (5-day) 10am Area 5N ... 3.4
Figure 3.8: No Action Alternative (5-day) 10am Area 6 ... 3.5
Figure 3.9: No Action Alternative (5-day) 10am Area 8 ... 3.5
Figure 3.10: No Action Alternative (5-day) 10am Area 5 ... 3.6
Figure 4.1: Alternative 3 Option 1 6am Area 5N-3 LEQ ... 4.1
Figure 4.2: Alternative 3 Option 1 6am Area 6N-3 LEQ ... 4.2
Figure 4.3: Alternative 3 Option 1 6am Area 6 LEQ ... 4.2
Figure 4.4: Alternative 3 Option 1 6am Area 6N LEQ ... 4.3
Figure 4.5: Alternative 3 Option 1 6am Area NE-3 LEQ ... 4.3
Figure 4.6: Alternative 3 Option 1 6am Area 5N LEQ ... 4.4
Figure 4.7: Alternative 3 Option 1 6am NW3 LEQ ... 4.4
Figure 4.8: Alternative 3 Option 1 6am Area 9 LEQ ... 4.5

Figure 4.9: Alternative 3 Option 1 6am Area 8 LEQ ... 4.5
Figure 4.10: Alternative 3 Option 1 6am Area 5 LEQ ... 4.6
Figure 4.11: Alternative 3 Option 1 6am Area 9 Low LEQ ... 4.6
Figure 4.12: BEW-6dB with Alternative 3 Option 1 6am Area 9 LEQ ... 4.7
Figure 4.13: Alternative 3 Option 1 10am Area 5N-3 LEQ ... 4.8
Figure 4.14: Alternative 3 Option 1 10am Area 6N-3 LEQ ... 4.8
Figure 4.15: Alternative 3 Option 1 10am Area 6 LEQ ... 4.9
Figure 4.16: Alternative 3 Option 1 10am Area 6N LEQ... 4.9
Figure 4.17: Alternative 3 Option 1 10am Area NE-3 LEQ... 4.10
Figure 4.18: Alternative 3 Option 1 10am Area 5N LEQ... 4.10
Figure 4.19: Alternative 3 Option 1 10am NW3 LEQ... 4.11
Figure 4.20: Alternative 3 Option 1 10am Area 9 LEQ ... 4.11
Figure 4.21: Alternative 3 Option 1 10am Area 8 LEQ ... 4.12
Figure 4.22: Alternative 3 Option 1 10am Area 5 LEQ ... 4.12
Figure 4.23: Alternative 3 Option 1 10am Area 9 Low LEQ ... 4.13
Figure 4.24: Alternative 3 Option 2 6am Area 5N-3 LEQ ... 4.14
Figure 4.25: Alternative 3 Option 2 6am Area 6N-3 LEQ ... 4.14
Figure 4.26: Alternative 3 Option 2 6am Area 6 LEQ ... 4.15
Figure 4.27: Alternative 3 Option 2 6am Area 6N LEQ... 4.15
Figure 4.28: Alternative 3 Option 2 6am Area NE-3 LEQ... 4.16
Figure 4.29: Alternative 3 Option 2 6am Area 5N LEQ... 4.16
Figure 4.30: Alternative 3 Option 2 6am NW3 LEQ... 4.17
Figure 4.31: Alternative 3 Option 2 6am Area 9 LEQ ... 4.17
Figure 4.32: Alternative 3 Option 2 6am Area 8 LEQ ... 4.18
Figure 4.33: Alternative 3 Option 2 6am Area 5 LEQ ... 4.18
Figure 4.34: Alternative 3 Option 2 6am Area 9 Low LEQ ... 4.19
Figure 4.35: Alternative 3 Option 2 10am Area 5N-3 LEQ ... 4.20
Figure 4.36: Alternative 3 Option 2 10am Area 6N-3 LEQ ... 4.20
Figure 4.37: Alternative 3 Option 2 10am Area 6 LEQ ... 4.21
Figure 4.38: Alternative 3 Option 2 10am Area 6N LEQ... 4.21
Figure 4.39: Alternative 3 Option 2 10am Area NE-3 LEQ... 4.22
Figure 4.40: Alternative 3 Option 2 10am Area 5N LEQ... 4.22
Figure 4.41: Alternative 3 Option 2 10am NW3 LEQ... 4.23
Figure 4.42: Alternative 3 Option 2 10am Area 9 LEQ ... 4.23
Figure 4.43: Alternative 3 Option 2 10am Area 8 LEQ ... 4.24
Figure 4.44: Alternative 3 Option 2 10am Area 5 LEQ ... 4.24
Figure 4.45: Alternative 3 Option 2 10am Area 9 Low LEQ ... 4.25
Figure 4.46: Alternative 3 Option 3 6am Area 5N-3 LEQ ... 4.26
Figure 4.47: Alternative 3 Option 3 6am Area 6N-3 LEQ ... 4.26
Figure 4.48: Alternative 3 Option 3 6am Area 6 LEQ ... 4.27
Figure 4.50: Alternative 3 Option 3 6am Area NE-3 LEQ... 4.28
Figure 4.51: Alternative 3 Option 3 6am Area 5N LEQ... 4.28
Figure 4.52: Alternative 3 Option 3 6am NW3 LEQ... 4.29
Figure 4.53: Alternative 3 Option 3 6am Area 9 LEQ ... 4.29
Figure 4.54: Alternative 3 Option 3 6am Area 8 LEQ ... 4.30

Figure 4.55: Alternative 3 Option 3 6am Area 5 LEQ 4.30
Figure 4.56: Alternative 3 Option 3 6am Area 9 Low LEQ 4.31
Figure 4.57: Alternative 3 Option 3 10am Area 5N-3 LEQ 4.32
Figure 4.58: Alternative 3 Option 3 10am Area 6N-3 LEQ 4.32
Figure 4.59: Alternative 3 Option 3 10am Area 6 LEQ 4.33
Figure 4.60: Alternative 3 Option 3 10am Area 6N LEQ.................... 4.33
Figure 4.61: Alternative 3 Option 3 10am Area NE-3 LEQ.................... 4.34
Figure 4.62: Alternative 3 Option 3 10am Area 5N LEQ.................... 4.34
Figure 4.63: Alternative 3 Option 3 10am NW3 LEQ.................... 4.35
Figure 4.64: Alternative 3 Option 3 10am Area 9 LEQ 4.35
Figure 4.65: Alternative 3 Option 3 10am Area 8 LEQ 4.36
Figure 4.66: Alternative 3 Option 3 10am Area 5 LEQ 4.36
Figure 4.67: Alternative 3 Option 3 10am Area 9 Low LEQ 4.37
Figure 5.1: 5-Day Week - Alternative 3 Option 1 6am Area 5N-3 LEQ.................... 5.38
Figure 5.2: 5-Day Week - Alternative 3 Option 1 6am Area 6N-3 LEQ.................... 5.39
Figure 5.3: 5-Day Week - Alternative 3 Option 1 6am Area 6 LEQ.................... 5.39
Figure 5.4: 5-Day Week - Alternative 3 Option 1 6am Area 6N LEQ.................... 5.40
Figure 5.5: 5-Day Week - Alternative 3 Option 1 6am Area NE-3 LEQ 5.40
Figure 5.6: 5-Day Week - Alternative 3 Option 1 6am Area 5N LEQ.................... 5.41
Figure 5.7: 5-Day Week - Alternative 3 Option 1 6am NW3 LEQ.................... 5.41
Figure 5.8: 5-Day Week - Alternative 3 Option 1 6am Area 9 LEQ.................... 5.42
Figure 5.9: 5-Day Week - Alternative 3 Option 1 6am Area 8 LEQ.................... 5.42
Figure 5.10: 5-Day Week - Alternative 3 Option 1 6am Area 5 LEQ.................... 5.43
Figure 5.11: 5-Day Week - Alternative 3 Option 1 6am Area 9 Low LEQ 5.43
Figure 5.12: 5-Day Week - Alternative 3 Option 1 10am Area 5N-3 LEQ.................... 5.44
Figure 5.13: 5-Day Week - Alternative 3 Option 1 10am Area 6N-3 LEQ.................... 5.44
Figure 5.14: 5-Day Week - Alternative 3 Option 1 10am Area 6 LEQ.................... 5.45
Figure 5.15: 5-Day Week - Alternative 3 Option 1 10am Area 6N LEQ.................... 5.45
Figure 5.16: 5-Day Week - Alternative 3 Option 1 10am Area NE-3 LEQ 5.46
Figure 5.17: 5-Day Week - Alternative 3 Option 1 10am Area 5N LEQ.................... 5.46
Figure 5.18: 5-Day Week - Alternative 3 Option 1 10am NW3 LEQ.................... 5.47
Figure 5.19: 5-Day Week - Alternative 3 Option 1 10am Area 9 LEQ.................... 5.47
Figure 5.20: 5-Day Week - Alternative 3 Option 1 10am Area 8 LEQ.................... 5.48
Figure 5.21: 5-Day Week - Alternative 3 Option 1 10am Area 5 LEQ.................... 5.48
Figure 5.22: 5-Day Week - Alternative 3 Option 1 10am Area 9 Low LEQ 5.49
Figure 5.23: 5-Day Week - Alternative 3 Option 2 6am Area 5N-3 LEQ.................... 5.50
Figure 5.24: 5-Day Week - Alternative 3 Option 2 6am Area 6N-3 LEQ.................... 5.50
Figure 5.25: 5-Day Week - Alternative 3 Option 2 6am Area 6 LEQ.................... 5.51
Figure 5.26: 5-Day Week - Alternative 3 Option 2 6am Area 6N LEQ.................... 5.51
Figure 5.27: 5-Day Week - Alternative 3 Option 2 6am Area NE-3 LEQ 5.52
Figure 5.28: 5-Day Week - Alternative 3 Option 2 6am Area 5N LEQ.................... 5.52
Figure 5.29: 5-Day Week - Alternative 3 Option 2 6am NW3 LEQ.................... 5.53
Figure 5.30: 5-Day Week - Alternative 3 Option 2 6am Area 9 LEQ.................... 5.53
Figure 5.31: 5-Day Week - Alternative 3 Option 2 6am Area 8 LEQ.................... 5.54
Figure 5.32: 5-Day Week - Alternative 3 Option 2 6am Area 5 LEQ.................... 5.54

Figure 5.33: 5-Day Week - Alternative 3 Option 2 6am Area 9 Low LEQ 5.55
Figure 5.34: 5-Day Week - Alternative 3 Option 2 10am Area 5N-3 LEQ.................................. 5.56
Figure 5.35: 5-Day Week - Alternative 3 Option 2 10am Area 6N-3 LEQ.................................. 5.56
Figure 5.36: 5-Day Week - Alternative 3 Option 2 10am Area 6 LEQ.. 5.57
Figure 5.37: 5-Day Week - Alternative 3 Option 2 10am Area 6N LEQ..................................... 5.57
Figure 5.38: 5-Day Week - Alternative 3 Option 2 10am Area NE-3 LEQ 5.58
Figure 5.39: 5-Day Week - Alternative 3 Option 2 10am Area 5N LEQ..................................... 5.58
Figure 5.40: 5-Day Week - Alternative 3 Option 2 10am NW3 LEQ.. 5.59
Figure 5.41: 5-Day Week - Alternative 3 Option 2 10am Area 9 LEQ.. 5.59
Figure 5.42: 5-Day Week - Alternative 3 Option 2 10am Area 8 LEQ.. 5.60
Figure 5.43: 5-Day Week - Alternative 3 Option 2 10am Area 5 LEQ.. 5.60
Figure 5.44: 5-Day Week - Alternative 3 Option 2 10am Area 9 Low LEQ 5.61
Figure 5.45: 5-Day Week - Alternative 3 Option 3 10am Area 5N-3 LEQ.................................. 5.62
Figure 5.46: 5-Day Week - Alternative 3 Option 3 10am Area 6N-3 LEQ.................................. 5.62
Figure 5.47: 5-Day Week - Alternative 3 Option 3 10am Area 6 LEQ.. 5.63
Figure 5.48: 5-Day Week - Alternative 3 Option 3 10am Area 6N LEQ..................................... 5.63
Figure 5.49: 5-Day Week - Alternative 3 Option 3 10am Area NE-3 LEQ 5.64
Figure 5.50: 5-Day Week - Alternative 3 Option 3 10am Area 5N LEQ..................................... 5.64
Figure 5.51: 5-Day Week - Alternative 3 Option 3 10am NW3 LEQ.. 5.65
Figure 5.52: 5-Day Week - Alternative 3 Option 3 10am Area 9 LEQ.. 5.65
Figure 5.53: 5-Day Week - Alternative 3 Option 3 10am Area 8 LEQ.. 5.66
Figure 5.54: 5-Day Week - Alternative 3 Option 3 10am Area 5 LEQ.. 5.66
Figure 5.55: 5-Day Week - Alternative 3 Option 3 10am Area 9 Low LEQ 5.67
Figure 7.1: Revised North End Mitigation 7.2
Figure 10.1: Combined Liberty Ridge Local Traffic + NE 3rd/4th St Noise 0600-0700................. 10.4
Figure 10.2: Combined Liberty Ridge Local Traffic + NE 3rd/4th St Noise 1000-1100................. 10.4
Figure 10.3: Alternative 3 Option 3 6 a.m. Facilities Noise 10.5
Figure 10.4: Alt 3 Option 3 6 a.m. Cumulative Facilities + Traffic Noise..................................... 10.6
Figure 10.5; Alt 3 Option 3 Noise Increase Re: No Action Alternative.. 10.6
Figure 10.6: 1000-1100 Existing Cumulative Community Noise Level (Transfer Stn + Roads Division + Traffic).. 10.8
Figure 10.7: 10am Facilities + Transfer Station (KCSWD Property Noise) – shows compliance.. 10.9
Figure 10.8: Cumulative: Facilities + Transfer Station + Roads Division + Traffic Noise............ 10.9
Figure 10.9: Increase. Compliance shown since increase outside of property boundaries is less than 10 dBA 10.10
Figure 10.10: Alt3 Facilities Noise +Transfer Station Noise 10.11
Figure 10.11: Cumulative Facilities + Traffic 10.12
Figure 10.12: Noise Increase Relative to No Action Alternative 10.12
Figure 10.13: 1000-1100 Community Noise Level (transfer stn + roads div + traffic) 10.13
Figure 10.14: 10am Facilities + Transfer Station (KCSWD Property Noise) 10.13
Figure 10.15: Cumulative: Facilities + Transfer Station + Roads Division + Traffic Noise......... 10.14
Figure 10.16: Noise Increase Relative to No Action 10.14
Figure 11.1: 7-Day Operations Mitigation.. 11.1
Figure 11.2: 5-Day Operations Mitigation.. 11.2

LIST OF TABLES

TABLE TITLE PAGE

Table 1.1: 7-Day Landfill Operations Options 1-2 ... 1.9
Table 1.2: 7-Day Landfill Operations Option 3 ... 1.10
Table 1.3: 5-day Landfill Operations Options 1-2 ... 1.11
Table 1.4: 5-day Landfill Operations Option 3 ... 1.12
Table 6.1: Alt3 Opt1 6am (7-Day Work Week) Noise Increase re: No Action ... 6.1
Table 6.2: Alt3 Opt2 6am (7-Day Work Week) Noise Increase re: No Action ... 6.2
Table 6.3: Alt3 Opt3 6am (7-Day Work Week) Noise Increase re: No Action ... 6.3
Table 6.4: Alt3 Opt1 10am (7-Day Work Week) Noise Increase re: No Action ... 6.4
Table 6.5: Alt3 Opt2 10am (7-Day Work Week) Noise Increase RE: No Action ... 6.5
Table 6.6: Alt3 Opt3 10am (7-Day Work Week) Noise Increasee re: No Action ... 6.6
Table 6.7: Alt3 Opt1 6am (5-Day Work Week) Noise Increase re: No Action ... 6.7
Table 6.8: Alt3 Opt2 6am (5-Day Work Week) Noise Increase re: No Action ... 6.8
Table 6.9: Alt3 Opt1 10am (5-Day Work Week) re: No Action Alternative ... 6.9
Table 6.10: Alt3 Opt2 10am (5-Day Work Week) re: No Action Alternative ... 6.10
Table 6.11: Alt3 Opt3 10am (5-Day Work Week) re: No Action Alternative ... 6.11
Table 10.1: Renton 7-Day Noise Model Operations (Unchanged from DEIS) ... 10.2
Table 10.2: Renton 5-Day Noise Model Operations (Unchanged from DEIS) ... 10.3
Table 10.3: Traffic Noise Analysis on NE 3rd/4th St. ... 10.17

REFERENCES

1. Federal Transit Administration Report FTA-VA-90-1003-06, *Transit Noise and Vibration Impact Assessment*, May 2006
2. JR 336, *Noise and Vibration Study of Cedar Hills Regional Landfill North Flare Station,* J R Engineering, May 2014
3. *Revised Site Development Plan for Cedar Hills Regional Landfill,* Herrera, HDR, BHC, June 2016
4. King County*, Preliminary Draft Environmental Impact Statement,* TBR
5. Engineering Coordination Memo, JRE-HECI-20210924, *Noise Model Validation*, September 24, 2021
6. Engineering Coordination Memo, JRE-HECI-220210831, Sound Attenuation of Trees in Noise Model at CHRLF, August 31, 2021

DEFINITIONS AND ACRONYMNS

ALT: Alternative

A-Scale is a frequency weighting designed to emulate human response to noise of various frequencies. A-Scale emphasizes the 1,000 to 5,000 Hz part of the spectrum (maximum emphasis at 2,500 Hz) and de-emphasizes the low frequency end of the spectrum.

BEW: BioEnergy of Washington

CHRLF: Cedar Hills Regional Landfill

CUP: Conditional Use Permit

QSI: Quietly Superior, Inc.

KCC: King County Code

KCSWD: King County Solid Waste Division

L_A (A-Scale Level): Overall Sound Pressure Level (in dB re: 20 microPascal -- also dBA) measured by a system having A-Scale frequency response. Throughout this memo, A-weighted sound levels are noted as dBA.

L_{EQ} (Energy Equivalent Sound Level): The level of a constant sound over a specific time period that has the same sound energy as an unsteady sound over the same period. Throughout this report, the L_{EQ} reported is the A-weighted L_{EQ}. Unless noted otherwise, all sound levels within this document refer to A-weighted L_{EQ}.

L_{MAX}: The maximum A-weighted sound level measured during a time interval.

NFS: North Flare Station

OPT: Option

SEPA: State Environmental Policy Act

Sound Pressure Level (SPL or L_P): Sound pressure level is the noise level that is observed at any point and is a function of the Sound Power Level of the source, distance from the source and any extra noise attenuation between the source and receiver position. Throughout this report, any reference to SPL indicates the A-weighted sound pressure level. The Sound Pressure Level is defined as $10 \cdot \log(P(t)/P_{REF})^2$, where P(t) is the instantaneous sound pressure (in Pascals) and P_{REF} is the reference sound pressure, defined to be 20μPa.

1/3 OBSPL: One-Third Octave Band Sound Pressure Level.

Use Factor: The percentage of time that a piece of equipment is in use.

1.0 SUPPLEMENTAL ANALYSIS FOR CHRLF

1.1 Summary

Sections 2.0 –9.0 address DEIS community comments related to the landfill noise analysis. The topics for which additional analysis was necessary fell into four categories:

1. Compute noise contours with equipment at the closeout elevation of the landfill. The previous analysis evaluated noise and mitigation at near the maximum height, but before the completed top-deck elevations were achieved.
2. Inclusion of noise associated with the cell towers located in the east-central portion of the property. The cell towers themselves make no discernable noise, but the air conditioners on the exterior of the buildings at the base of the towers do create a small amount of noise.
3. Comparisons of the noise model with measured data.
4. Inclusion of BEW in the projection of noise that occurs during the nighttime hours. Previously, BEW was considered to be operating under its own CUP and separate from the landfill during the nighttime hours.

In addition to the above topics, King County is considering switching to a 5-day work week at CHRLF. This topic is also addressed in the supplementary analysis.

This analysis is intended to expand upon the information described in the DEIS Noise Technical Report (Appendix F) and also include changes necessary due to the potential 5-day work week. It is not intended to replace the DEIS Noise Technical Report. Some corrections to the DEIS recommendations are made.

The supplementary analysis focuses on Alternative 3. The basic fill sequence of Alternative 3 is the same as Alternatives 1 and 2, but then expands on them by adding landfilling operations in the north end of the landfill. Alternative 3 also includes a higher plateau over the existing Area 4/Main Hill area. Alternative 3 also has the highest hourly load volume. So, use of Alternative 3 for the purpose of determining impacts, is a conservative approximation for Alternative 1 and 2.

Evaluating noise levels at the slightly higher elevations of the completed top deck had little impact on the noise results. The elevation used for the DEIS submission (770 ft MSL) was chosen since it was high enough that the sound emanating outward was already above the height of the trees in the buffer. Also, the slope of the terrain meant that the noise sources were slightly closer to the property line. At the higher elevation, the noise associated with landfilling activities was still above the tree level and some noise sources were at slightly greater distances from the property line. The ridges and valleys of the completed top deck create some extra shielding for some noise source/receiver position combinations and less shielding for others. However, the overall conclusions are the same in that the proposed Alternatives with equipment either at the highest elevations or using the 770 foot flat top deck model did not significantly increase noise outside the landfill property lines.

The cell towers, located in the east-central portion of the landfill are not significant noise sources. Noise measurements were taken near the units with the air conditioner units operating for maximum cooling. The inclusion of the units had an insignificant impact on the overall results.

Noise measurements were conducted along the eastern and western property lines to validate the results of the noise model. In general, the predicted level was slightly higher than the measured noise level. Further, the tree model used in the analysis was verified and the results predicted by the model for the "leaf off tree" condition matched the measured data.

New analysis was also performed in relation to a potential 5-day workweek for CHRLF operations under consideration by King County. This included analysis of a No Action Alternative with a 5-day week as well as the noise levels with the Alternatives. It was found that only minor changes to the mitigation described in the main portion of the report was necessary for compliance with the noise code. These modifications affected the noise wall along the NE corner of the perimeter road and also the allowable truck idle time for warmups if Option 2 is chosen (support facilities are located in the north).

When including BEW in the nighttime noise analysis, the projected noise level for "worst case conditions" along the southeast property line corner of the landfill exceeds the 39 dBA nighttime noise limit specified in King County Code (KCC 12.86). Mitigation is warranted. Reasonable, practical steps have been taken to mitigate noise from King County operated noise sources to minimize community noise in the early morning hours as much as possible based on existing operations. With additional mitigation, the anticipated noise levels with the increased operational loads considered under the EIS, would be about the same.

Noise levels due to BEW will remain as they have been for the past several years, possibly exceeding the nighttime noise limit under certain conditions. To the extent that the noise from BEW has been an impact in the past, it will continue to be an impact going forward or until mitigation is changed or new equipment is installed.

Analysis indicated that after the proposed landfill noise mitigation was installed, a further reduction of approximately 6 dBA in BEW noise (cumulative from all components) would be required to have the projected noise levels be less than 39 dBA nighttime noise limit. Due to the logarithmic nature of decibels, this represents a significant reduction, about 75%, in noise emitted compared to the existing configuration. Whether or not this is achievable is unknown.

To the best of our knowledge, no noise measurements have been taken that confirm that the noise levels in the SE corner do exceed the nighttime noise limit. The worst case conditions used in this analysis, may not develop. Review of other independent noise analysis done for the landfill had similar measured sound power levels for BEW compared to those used in the EIS and that model also predicted noise levels that were of about the same magnitude as reported herein.

It was also found that the noise berm/wall along the NE corner of the perimeter road would not be sufficient to mitigate noise from the Alternative 3 activities in the far NW corner. Use of barriers, similar to that described for Area 9 activity, or other mitigation measures, would be necessary once the landfill topography reaches an elevation such that sound to the east would travel over the top of the traffic barrier (or retaining wall which would be about the same height). The noise wall would need to be extended for the 5-day workweek due to increased truck traffic. The nominal wall height is 19 ft above ground level (AGL). The wall height for the original analysis was listed as 17 feet, but 19 feet was the height actually used in the prior analysis.

1.2 Noise Sources Evaluated

Section 10 of the main body of the DEIS Noise Technical Report shows the completed top deck contours for the No Action Alternative, Alternative 2, and Alternative 3 that were used for this supplemental analysis.

Noise evaluation positions were adjusted so that the equipment, specifically the active area, was nominally on the ridges of the top deck when computing noise. This would be the highest expected elevation. Other components may or may not be on the ridgeline since the landfill has some flexibility to position those as necessary. These are shown for the No Action Alternative and Alternative 3 in Figure 1.1 to Figure 1.5.

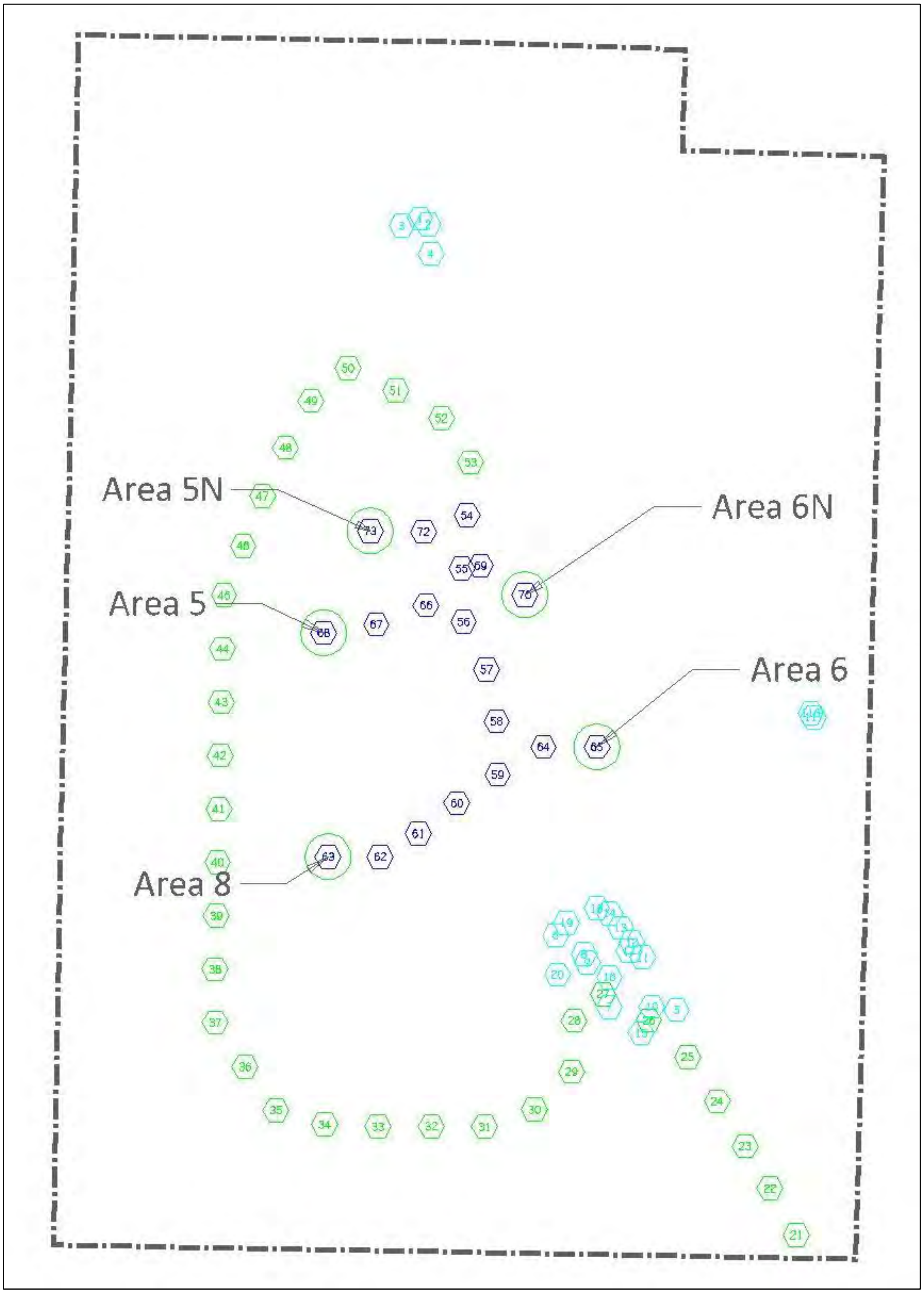
Alternative 3 has the highest landfill capacity of the three options. The completed landfill terrain contours of Alternatives 2 and 3 are identical for Areas 5, 6, 7, 8, 9, and the Central Pit. Alternative 3 provides for landfilling further north and with an increased top deck elevation in portions of Area 4 and the Main Hill. However, due to the anticipated sequencing for Alternative 3, the Alternative 2 volumes will be achieved and then the additional volumes/heights for Alternative 3 will be completed at a later stage. So, aside from the final landfilling to close out the north end of the landfill, the Alternative 2 configuration provides the contours and equipment operating locations that are applicable to most noise scenarios.

The source point locations used in the analysis are shown in Figure 1.1 and Figure 1.2. Facilities, NFS, BEW, and Cell Tower locations are applicable to all Alternatives.

Figure 1.5 shows the truck/landfilling operations positions specific to Alternative 3 only. The haul route points from the main gate to the west side of the landfill are the same as for Alternative 2. The road and source positions to the top deck and on the top of the elevated north top deck (green markers) are unique to Alternative 3

Figure 1.3 to Figure 1.5 show top deck noise source positions superimposed on the closed-out terrain contours. These positions are closely aligned with the points used in the main body of the report, while still having the active area on top of the top deck ridges. Spacing between the points was kept to approximately 350 feet to maintain equal durations for each segment/point. Some positions shown in these figures were not used.

FIGURE 1.1: NO ACTION ALTERNATIVE TOP DECK SOURCE POSITIONS



<u>FIGURE 1.2: ALTERNATIVE 3 TOP DECK SOURCE POSITION</u>

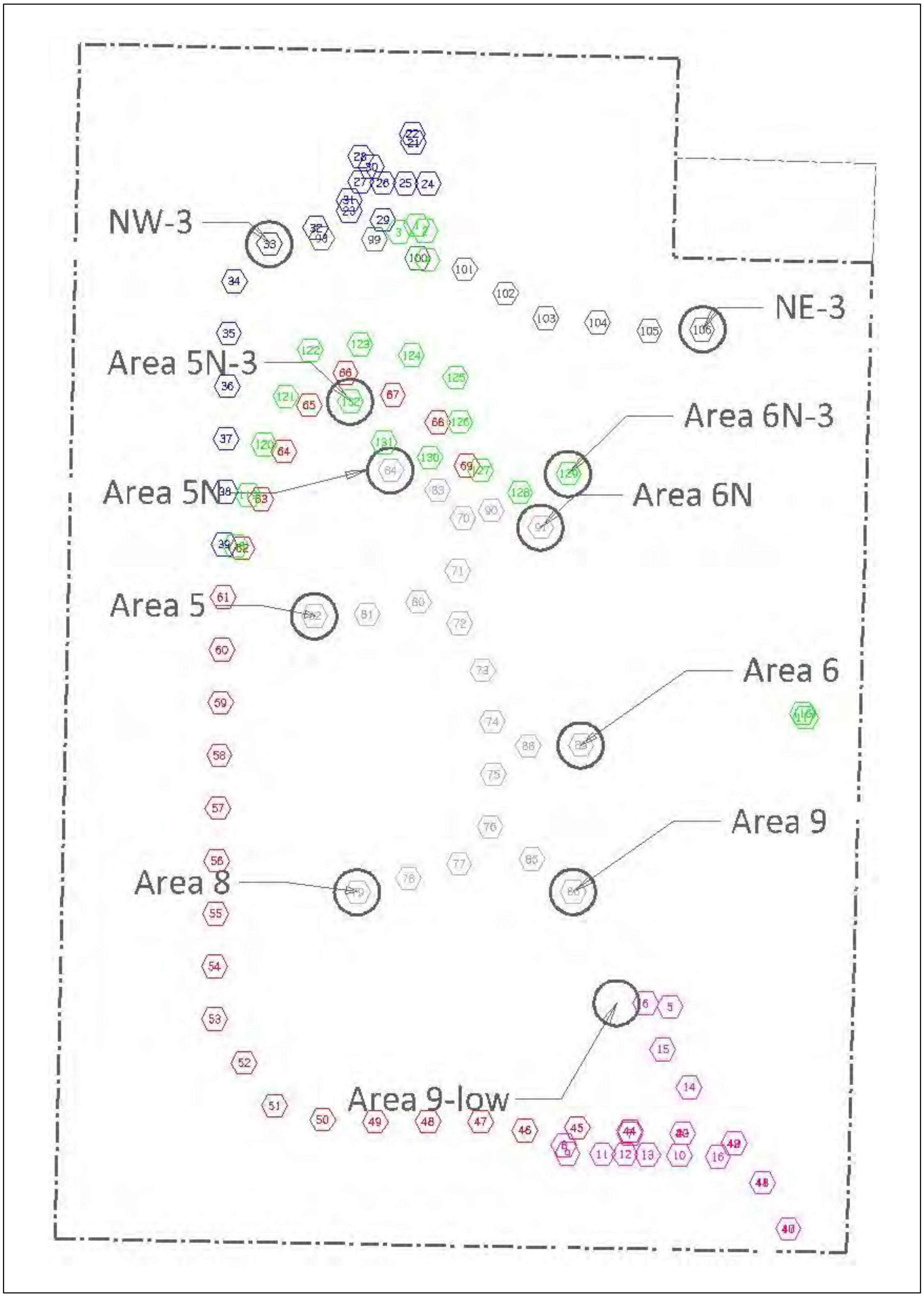
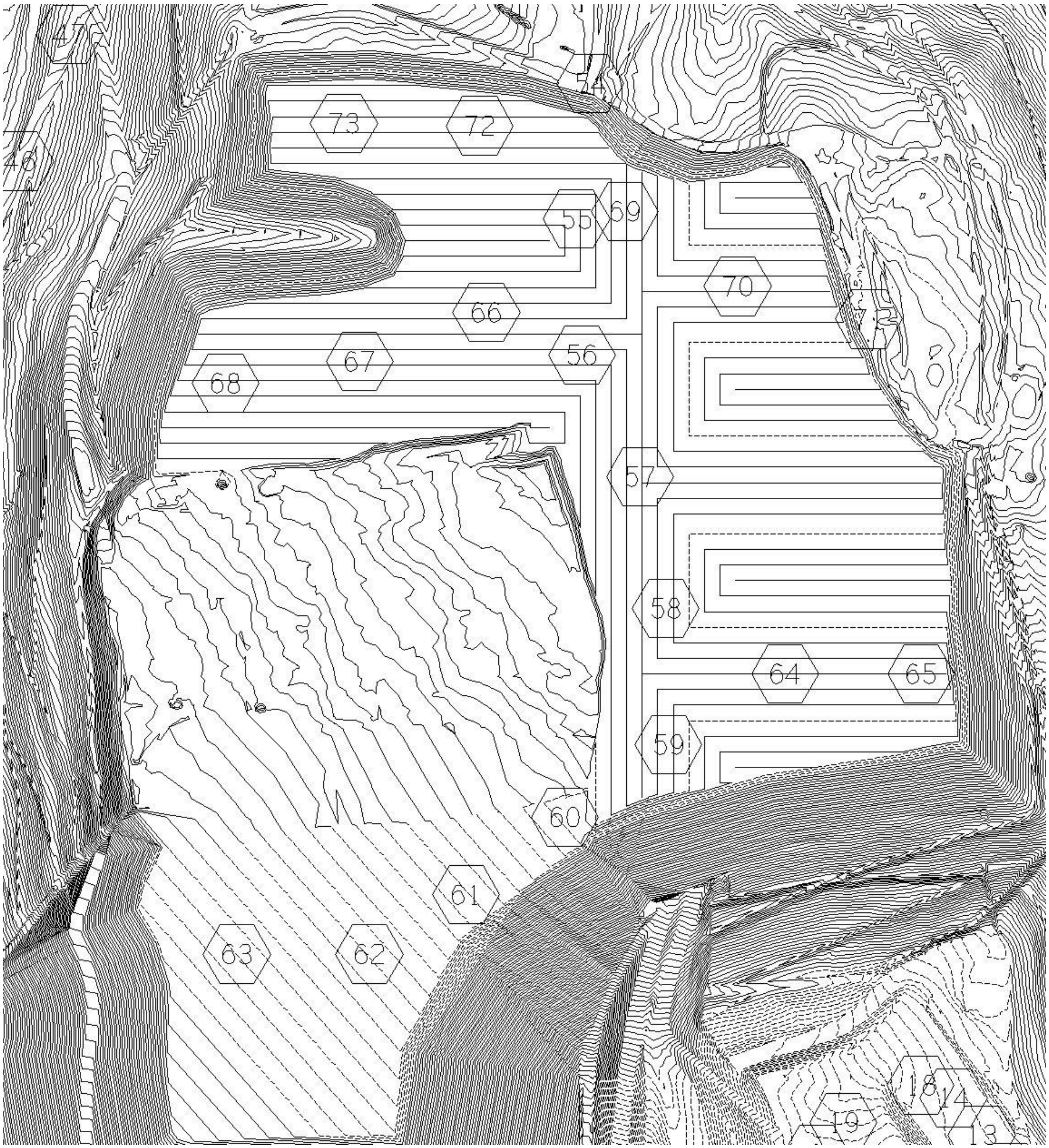


FIGURE 1.3: TOP DECK NOISE EVALUATION POINTS – NO ACTION ALTERNATIVE



<u>FIGURE 1.4: TOP DECK NOISE EVALUATION POINTS – ALTERNATIVE 2</u>

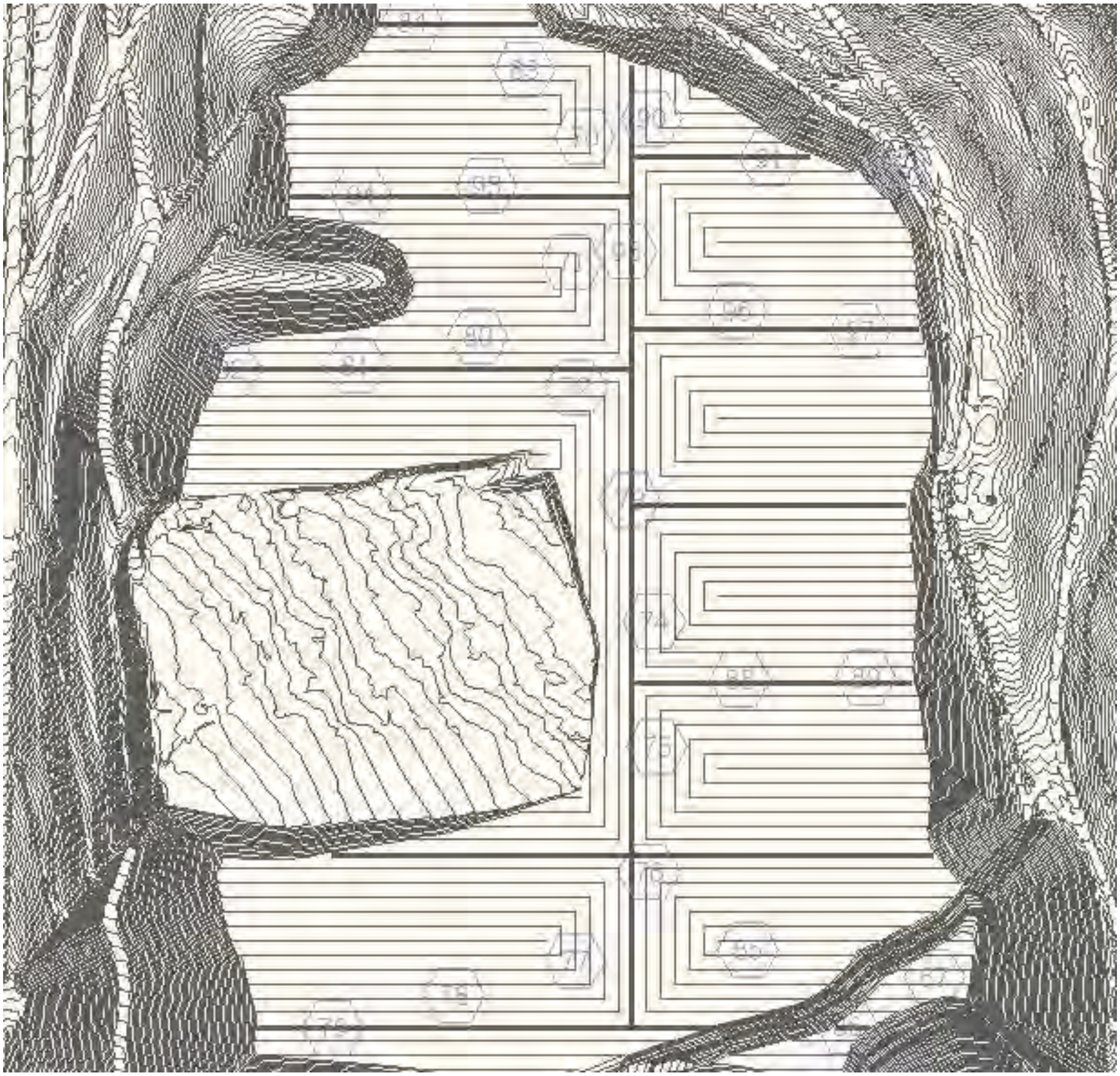


FIGURE 1.5: TOP DECK NOISE EVALUATION POINTS – ALTERNATIVE 3

The operational loads for each alternative are shown in Table 1.1 to Table 1.4. Only the Alternative 3 loads were used in this analysis since that yielded the most conservative results..

TABLE 1.1: 7-DAY LANDFILL OPERATIONS OPTIONS 1-2

	No Action		Alt 1		**Alt 2**		Alt 3	
	6am	10am	6am	10am	**6am**	**10am**	6am	10am
	# / Use Factor	# / Use Factor	# / Use Factor	# / Use Factor	# / Use Factor	**# / Use Factor**	# / Use Factor	# / Use Factor
Description								
North Flare Station Main Flare(s)	3	3	3	3	3	**3**	3	3
NFS Blowers	1	1	1	1	1	**1**	1	1
NFS Alt Candlestick	--	--	--	--	--	**--**	--	--
NFS Existing Candlestick	1	1	1	1	1	**1**	1	1
BEW	--	1	0	1	--	**1**	--	1
CAT Shack	--	0.25	0	0.25	--	**0.25**	--	0.25
Truck Wash	--	0.5	0	0.5	--	**0.5**	--	0.5
Maintenance Building AC	6	6	6	6	6	**6**	6	6
Maintenance Activities								
Maintenance	1	1	1	1	1	**1**	1	1
Fabrication	1	1	1	1	1	**1**	1	1
Pressure Wash	--	1	0	1	--	**1**	--	1
Admin Building AC	4	4	4	4	4	**4**	4	4
Truck Parking/Idling	22.80	5.50	26.76	6.41	27.09	**6.52**	31.05	7.45
POV noise	40.04	28.6	40.04	28.60	40.04	**28.60**	40.04	28.60
Haul Trucks (Exiting @ 6am).	22.80	--	26.76	--	27.09		31.05	
Haul Trucks (includes Commercial and Self Haul)	4.17	43.53	5.01	51.21	5.03	**50.43**	5.84	58.03
Haul Trucks (includes Commercial and Self Haul)	4.17	43.53	5.01	51.21	5.03	**50.43**	5.84	58.03
Scraper	4	--	4		4		4	
Landfill Active Area (Tippers, Dozers, Compactors)		1		1		**1**		1
Articulated Haul Trucks		8.2		9.61		**9.77**		11.17
Excavator		0.5		0.5		**0.5**		0.5
Screen+Excavator		0.5		0.5		**0.5**		0.5

TABLE 1.2: 7-DAY LANDFILL OPERATIONS OPTION 3

	Alt 1		**Alt 2**		Alt 3	
	6am	10am	**6am**	**10am**	6am	10am
Description						
North Flare Station Main Flare(s)	3	3	3	**3**	3	3
NFS Blowers	1	1	1	**1**	1	1
NFS Alt Candlestick	--	--	--	**--**	--	--
NFS Existing Candlestick	1	1	1	**1**	1	1
BEW	0	1	--	**1**	--	1
CAT Shack	0	0.25	--	**0.25**	--	0.25
Truck Wash	0	0.5	--	**0.5**	--	0.5
Maintenance Building AC						
Maintenance Activities (#1 West, #2 East End, #3 Pressure Washing)						
West						
East						
Pressure Wash						
Admin Building AC						
Truck Parking/Idling		6.41		**6.52**		7.45
POV noise	13.86	9.90	13.86	**9.90**	13.86	9.90
Haul Trucks (Exiting @ 6am).						
Haul Trucks (includes Commercial and Self Haul)	6.94	51.21	6.98	**50.43**	8.08	58.03
Haul Trucks (includes Commercial and Self Haul)	6.94	51.21	6.98	**50.43**	8.08	58.03
Scraper	4 passes		4 passes		4 passes	
Landfill Active Area (Tippers, Dozers, Compactors)		1		**1**		1
Articulated Haul Trucks		9.61		**9.77**		11.17
Excavator		0.5		**0.5**		0.5
Screen		1		**1**		1

TABLE 1.3: 5-DAY LANDFILL OPERATIONS OPTIONS 1-2

	No Action		Alt 1		**Alt 2**		Alt 3	
	6am	10am	6am	10am	**6am**	**10am**	6am	10am
	# / Use Factor							
Description								
North Flare Station Main Flare(s)	3	3	3	3	3	**3**	3	3
NFS Blowers	1	1	1	1	1	**1**	1	1
NFS Alt Candlestick	--	--	--	--	--	**--**	--	--
NFS Existing Candlestick	1	1	1	1	1	**1**	1	1
BEW	--	1	0	1	--	**1**	--	1
CAT Shack	--	0.25	0	0.25	--	**0.25**	--	0.25
Truck Wash	--	0.5	0	0.5	--	**0.5**	--	0.5
Maintenance Building AC	6	6	6	6	6	**6**	6	6
Maintenance Activities								
West	1	1	1	1	1	**1**	1	1
East	1	1	1	1	1	**1**	1	1
Pressure Wash	--	1	0	1	--	**1**	--	1
Admin Building AC	4	4	4	4	4	**4**	4	4
Truck Parking/Idling	30.18	6.78	35.21	7.87	35.90	8.09	40.93	9.20
POV noise	40.04	28.60	40.04	28.60	40.04	**28.60**	40.04	28.60
Haul Trucks (Exiting @ 6am).	30.18	--	35.21	--	35.90	**--**	40.93	
Commercial/Self Haul		--		--				
Haul Trucks (includes Commercial and Self Haul)	4.17	53.73	5.01	62.88	5.03	**62.60**	5.84	71.67
Haul Trucks (includes Commercial and Self Haul)	4.17	53.73	5.01	62.88	5.03	**62.60**	5.84	71.67
Scraper	4	--	4		4		4	
Landfill Active Area (Tippers, Dozers, Compactors)		1		1		**1**		1
Articulated Haul Trucks		12.0		14.05		**14.29**		16.32
Excavator		0.5		0.5		**0.5**		0.5
Screen		0.5		0.5		**0.5**		0.5

TABLE 1.4: 5-DAY LANDFILL OPERATIONS OPTION 3

			Alt 1		**Alt 2**		Alt 3	
			6am	10am	**6am**	**10am**	6am	10am
Description								
North Flare Station Main Flare(s)			3	3	3	**3**	3	3
NFS Blowers			1	1	1	**1**	1	1
Cell Tower AC	2	2	2	2	2	**2**	2	2
NFS Existing Candlestick			1	1	1	**1**	1	1
BEW	1	1	1	1	1	**1**	1	1
CAT Shack			0	0.25	--	**0.25**	--	0.25
Truck Wash			0	0.5	--	**0.5**	--	0.5
Maintenance Building AC								
Maintenance Activities (#1 West, #2 East End, #3 Pressure Washing)								
West								
East								
Pressure Wash								
Admin Building AC								
Truck Parking/Idling				7.87		**8.09**		9.20
POV noise			13.86	9.90	13.86	**9.90**	13.86	9.90
Haul Trucks (Exiting @ 6am).								
Commercial/Self Haul				--				
Haul Trucks (includes Commercial and Self Haul)			5.01	62.88	5.03	**62.60**	5.84	71.67
Haul Trucks (includes Commercial and Self Haul)			5.01	62.88	5.03	**62.60**	5.84	71.67
Scraper			4 passes		4 passes		4 passes	
Landfill Active Area (Tippers, Dozers, Compactors)				1		**1**		1
Articulated Haul Trucks				9.61		**9.77**		16.32
Excavator				0.5		**0.5**		0.5
Screen				0.5		**0.5**		0.5

2.0 NO ACTION ALTERNATIVE 7-DAY WORK WEEK

This section presents the results of the supplemental No Action Alternative analysis with noise projections for equipment on the approximate final top deck elevation. Continued use of a 7-day work week is assumed in this section. These contours represent the projected sound levels caused by landfill activity. When including non-landfill noise sources, the cumulative community sound levels will be higher. However, the cumulative noise level is not used for noise compliance. It is included when computing increases in cumulative noise for SEPA considerations.

Without mitigation, both the landfill and BEW are projected to create noise levels that are near or slightly above the King County 39 dBA nighttime noise code limit outside the landfill boundary in the southeast corner. It is anticipated that landfill operational noise sources are more conducive to mitigation and, with sufficient mitigation, can be shown to be less than the King County limit when analyzed on their own.. Where the contour crosses the boundary on the southern property line and southwestern corner, it is into industrial properties where the limit is higher.

2.1 No Action Alternative 6am 39 dBA Contours

Reference Figure 1.1 for locations of landfilling operations.

FIGURE 2.1: NO ACTION ALTERNATIVE 6AM AREA 6N

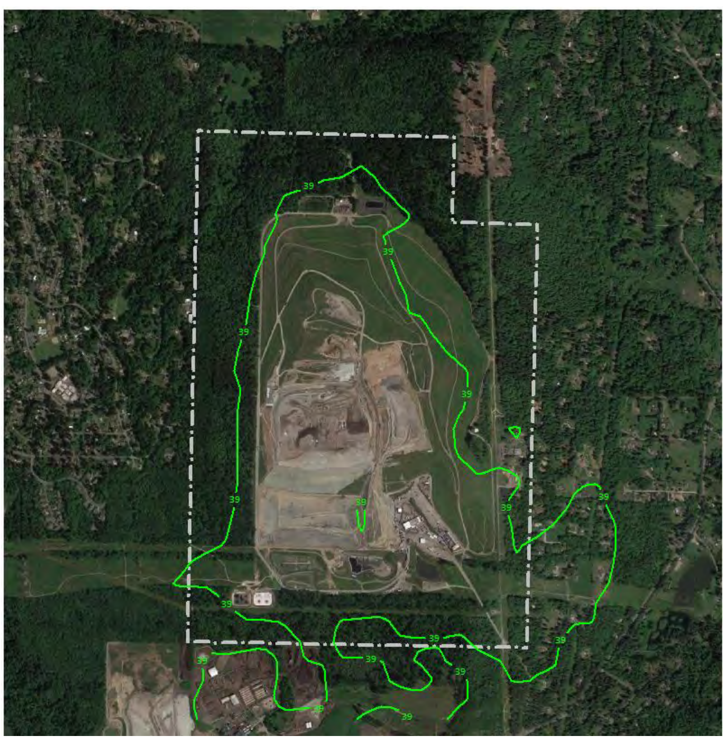


FIGURE 2.2: NO ACTION ALTERNATIVE 6AM AREA 5N

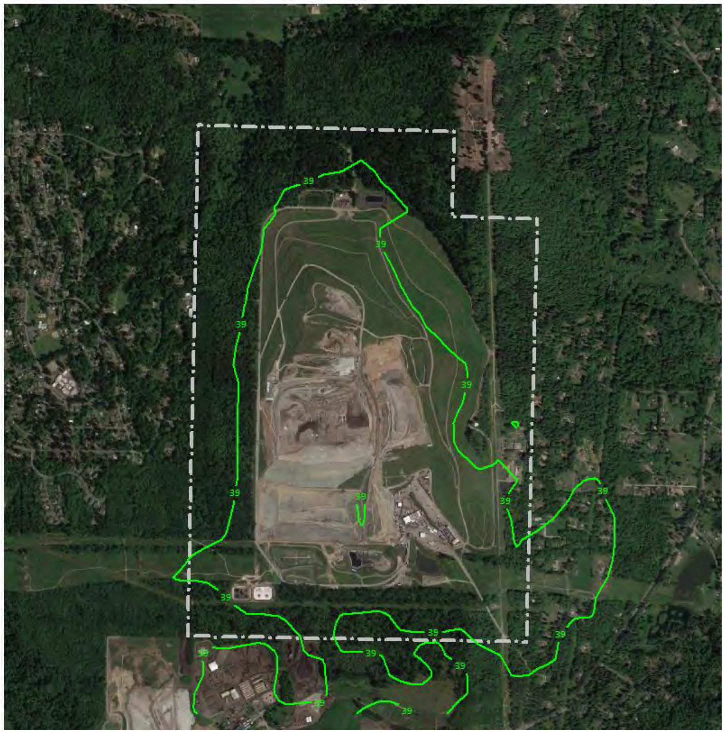
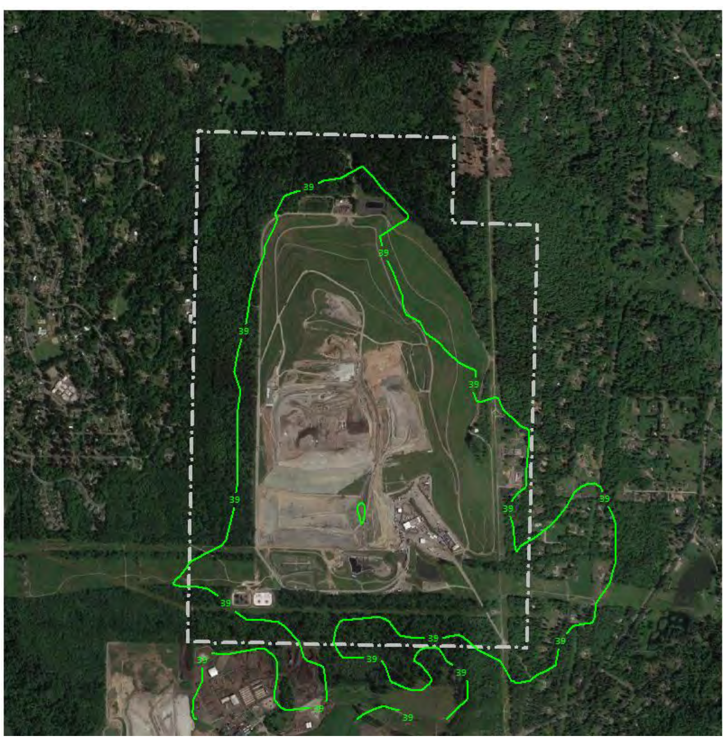
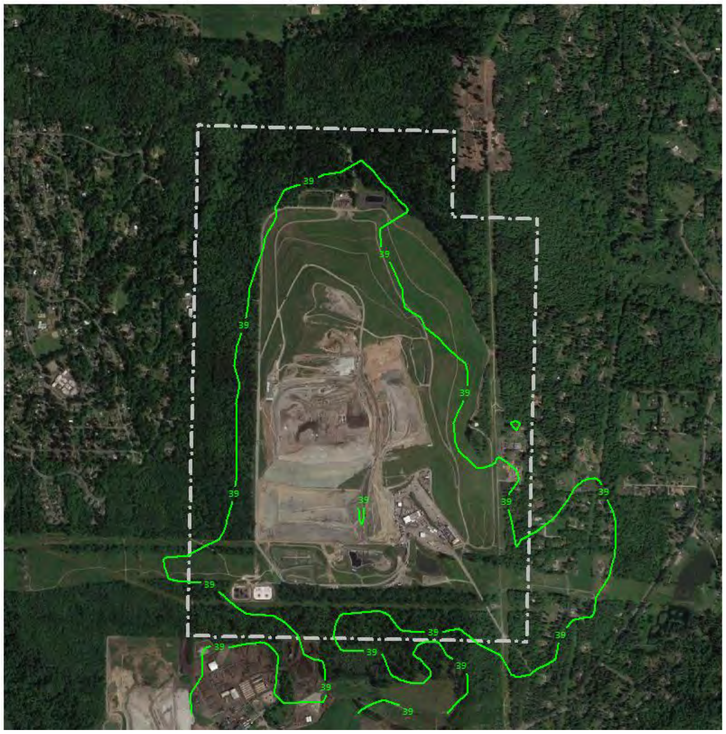


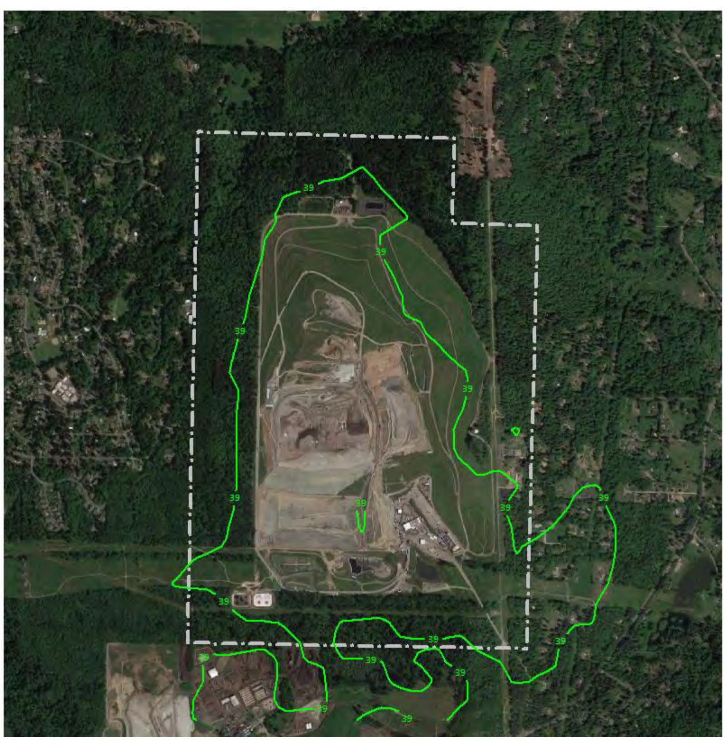
FIGURE 2.3: NO ACTION ALTERNATIVE 6AM AREA 6



<u>FIGURE 2.4: NO ACTION ALTERNATIVE 6AM AREA 8</u>



<u>FIGURE 2.5: NO ACTION ALTERNATIVE 6AM AREA 5</u>



2.2 No Action Alternative 10am 49 dBA Contours

FIGURE 2.6: NO ACTION ALTERNATIVE 10AM AREA 6N

FIGURE 2.7: NO ACTION ALTERNATIVE 10AM AREA 5N

<u>FIGURE 2.8: NO ACTION ALTERNATIVE 10AM AREA 6</u>

<u>FIGURE 2.9: NO ACTION ALTERNATIVE 10AM AREA 8</u>

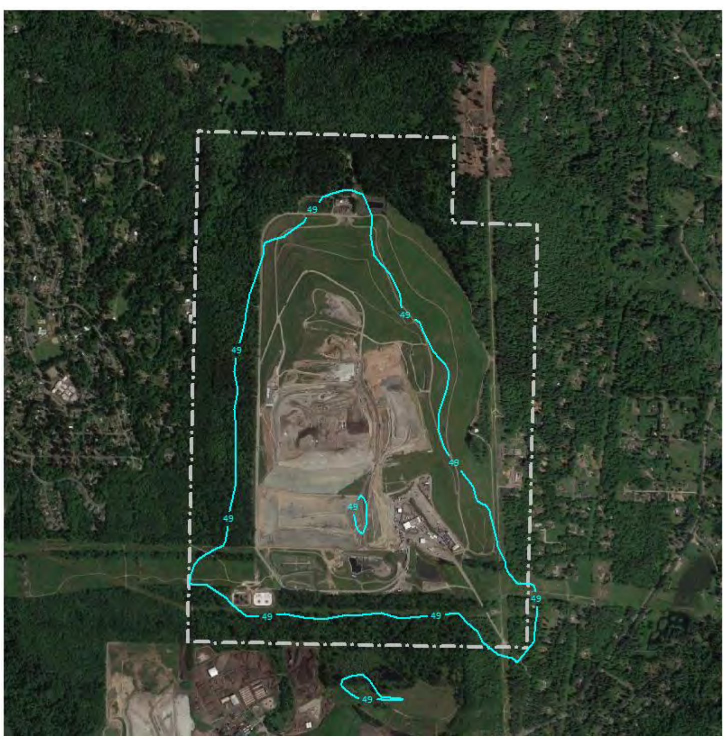


FIGURE 2.10: NO ACTION ALTERNATIVE 10AM AREA 5

3.0 NO ACTION ALTERNATIVE 5-DAY WORK WEEK

This section presents the results of the No Action Alternative for a 5-day workweek with noise projections with equipment on the approximate final top deck elevations. Contours are only slightly expanded compared to the 7-day work week.

3.1 No Action Alternative 6am 39 dBA Contours

FIGURE 3.1: NO ACTION ALTERNATIVE (5-DAY) 6AM AREA 6N

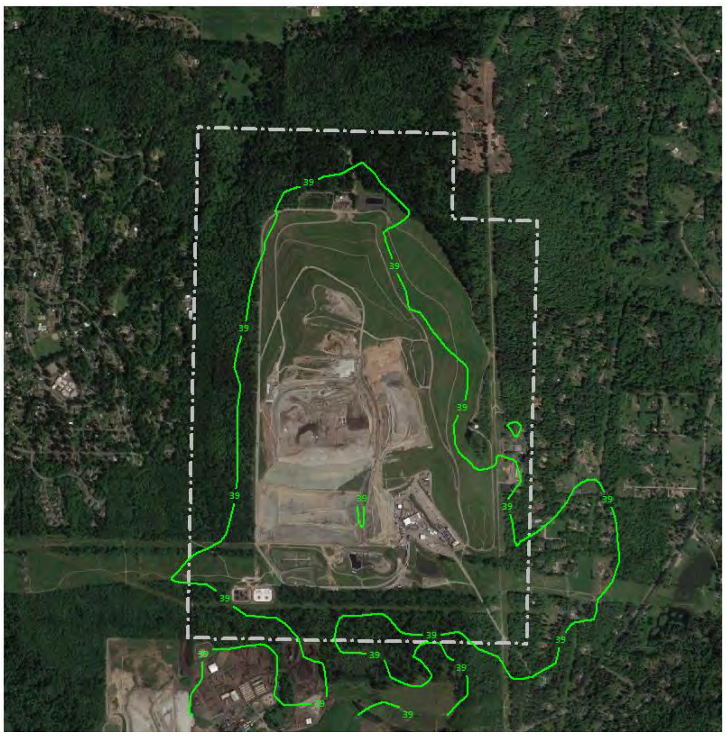


FIGURE 3.2: NO ACTION ALTERNATIVE (5-DAY) 6AM AREA 5N

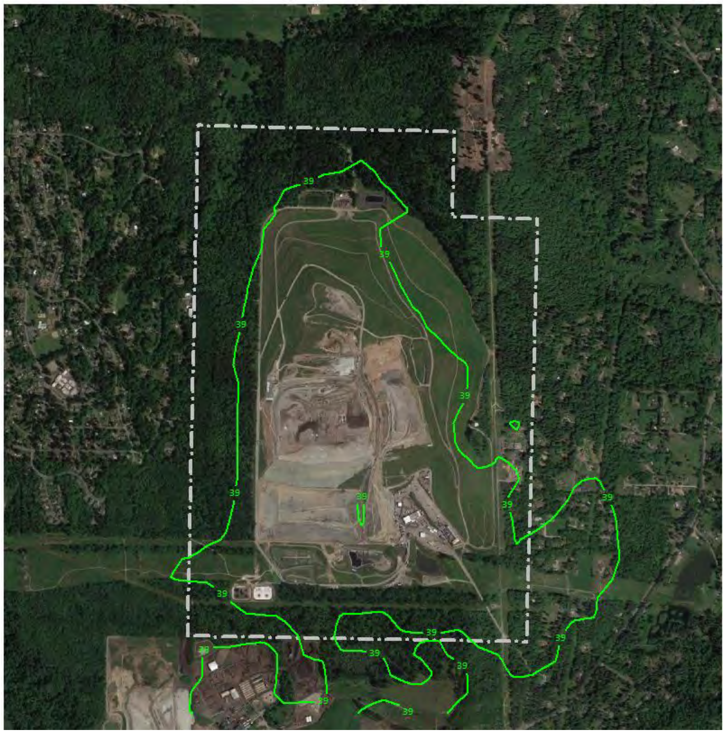


FIGURE 3.3: NO ACTION ALTERNATIVE (5-DAY) 6AM AREA 6

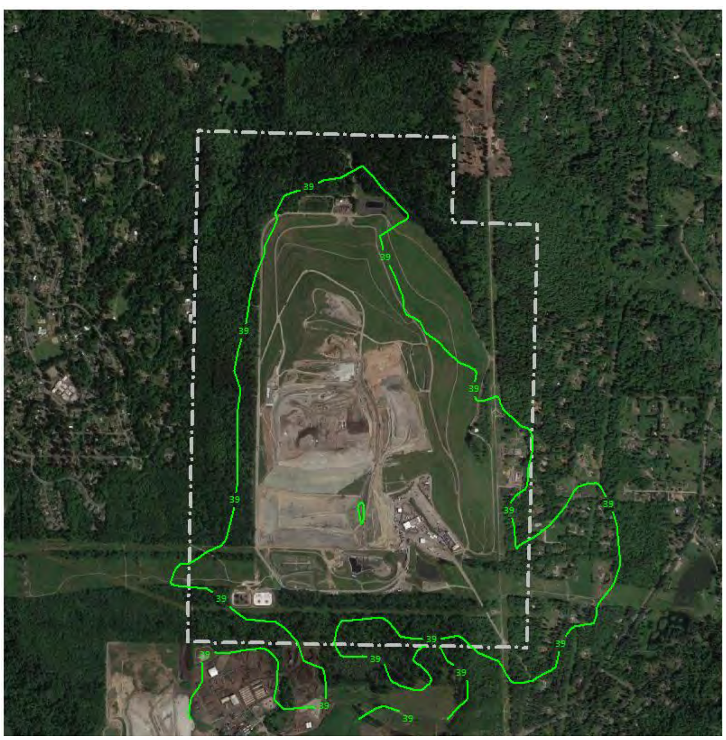


FIGURE 3.4: NO ACTION ALTERNATIVE (5-DAY) 6AM AREA 8

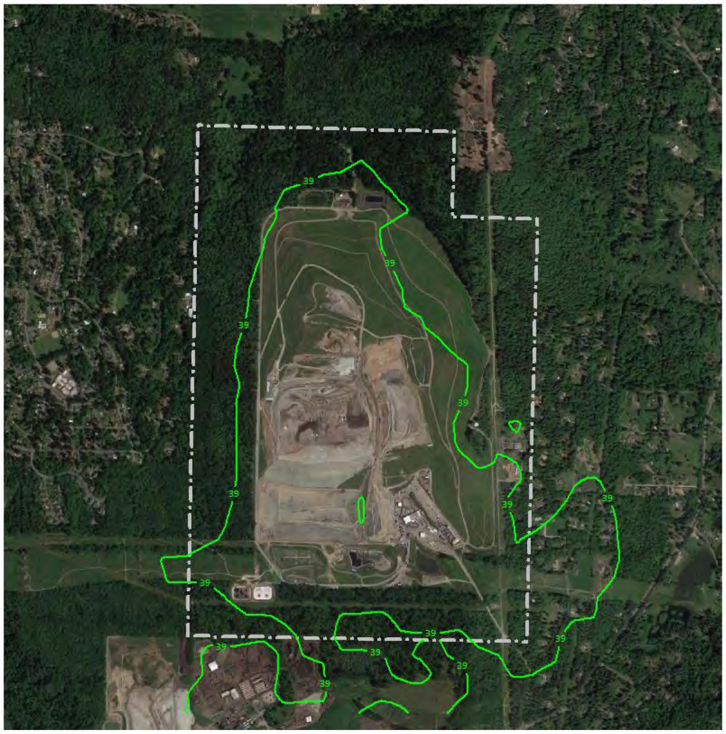
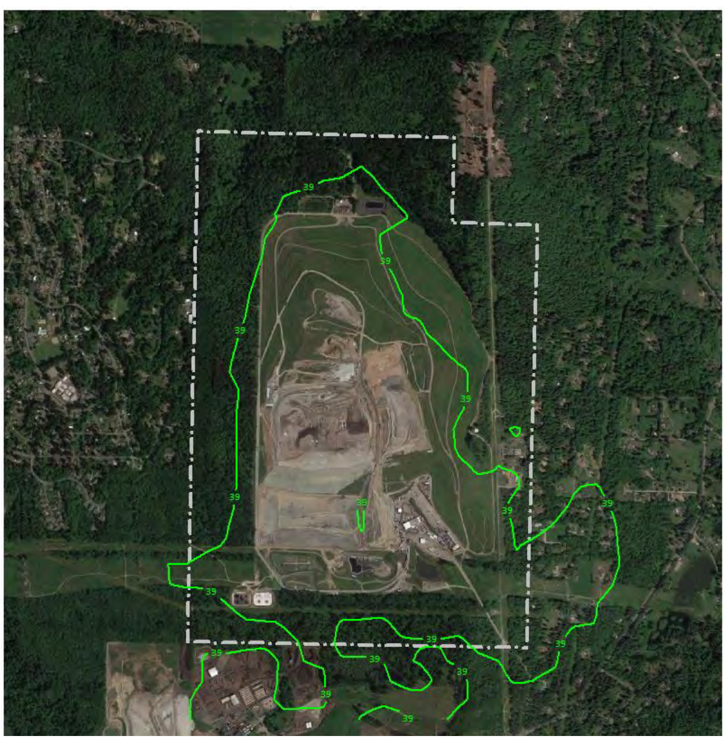


FIGURE 3.5: NO ACTION ALTERNATIVE (5-DAY) 6AM AREA 5



3.2 No Action Alternative 10am 49 dBA Contours

FIGURE 3.6: NO ACTION ALTERNATIVE (5-DAY) 10AM AREA 6N

FIGURE 3.7: NO ACTION ALTERNATIVE (5-DAY) 10AM AREA 5N

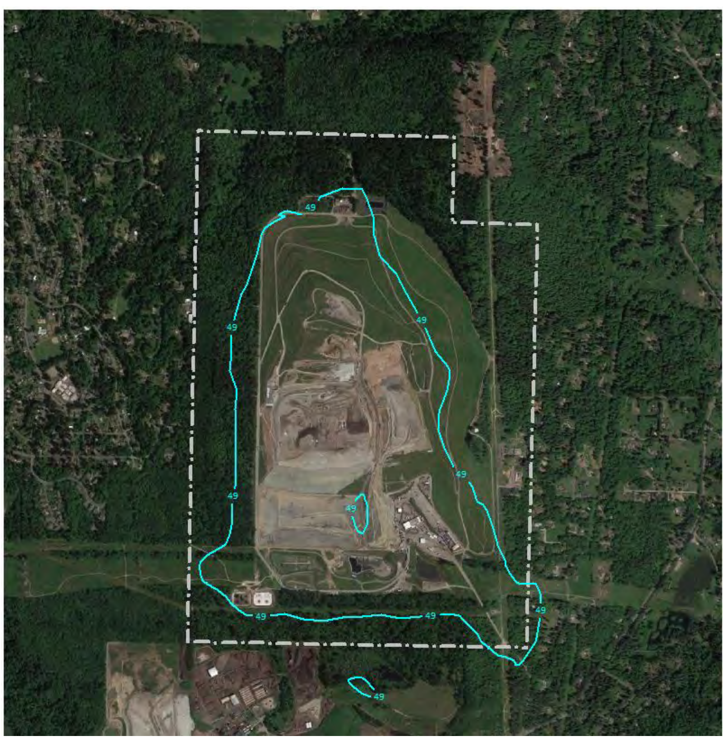


FIGURE 3.8: NO ACTION ALTERNATIVE (5-DAY) 10AM AREA 6

FIGURE 3.9: NO ACTION ALTERNATIVE (5-DAY) 10AM AREA 8

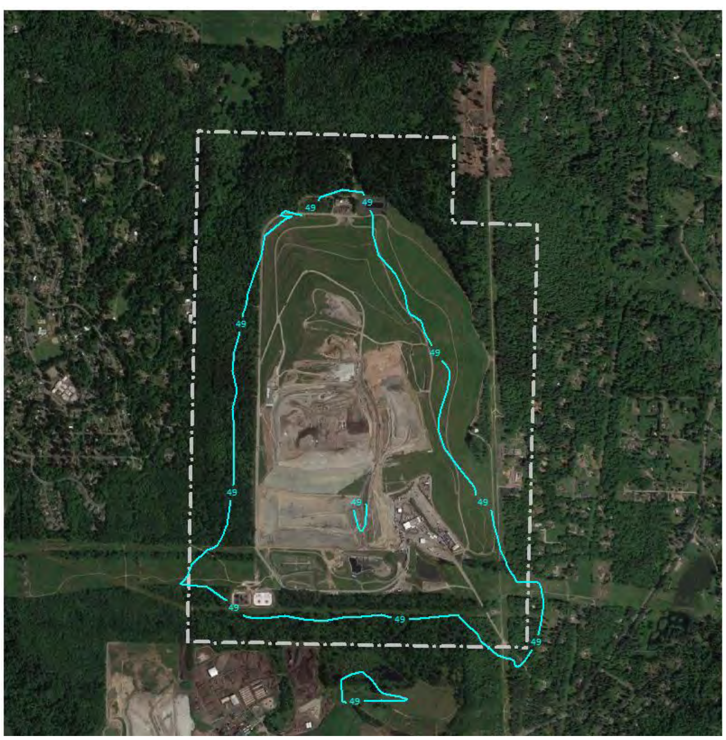


FIGURE 3.10: NO ACTION ALTERNATIVE (5-DAY) 10AM AREA 5

4.0 ALTERNATIVE 3 CONTOURS

4.1 Alternative 3 Option 1 6am 39 dB Noise Contours

Reference Figure 1.2 for locations of landfilling operations.

FIGURE 4.1: ALTERNATIVE 3 OPTION 1 6AM AREA 5N-3 LEQ

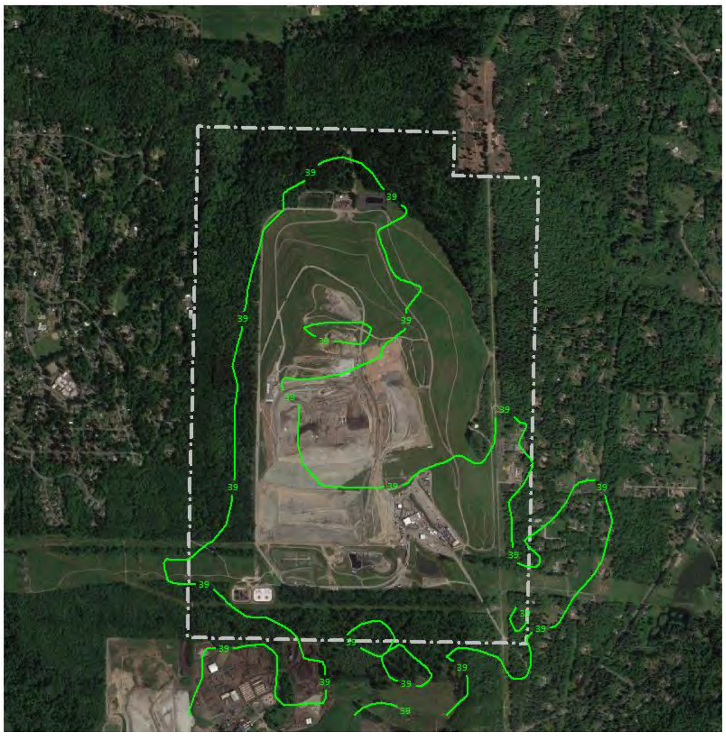


FIGURE 4.2: ALTERNATIVE 3 OPTION 1 6AM AREA 6N-3 LEQ

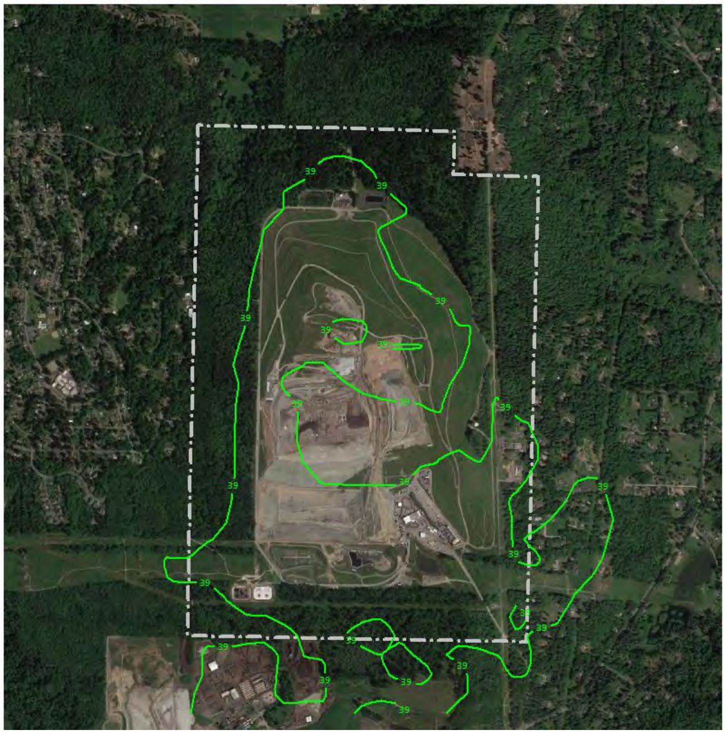
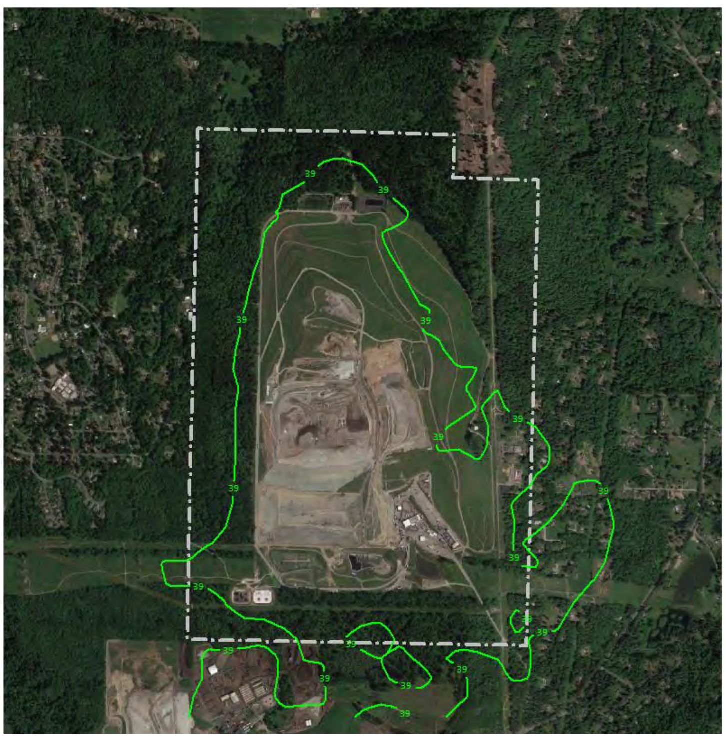
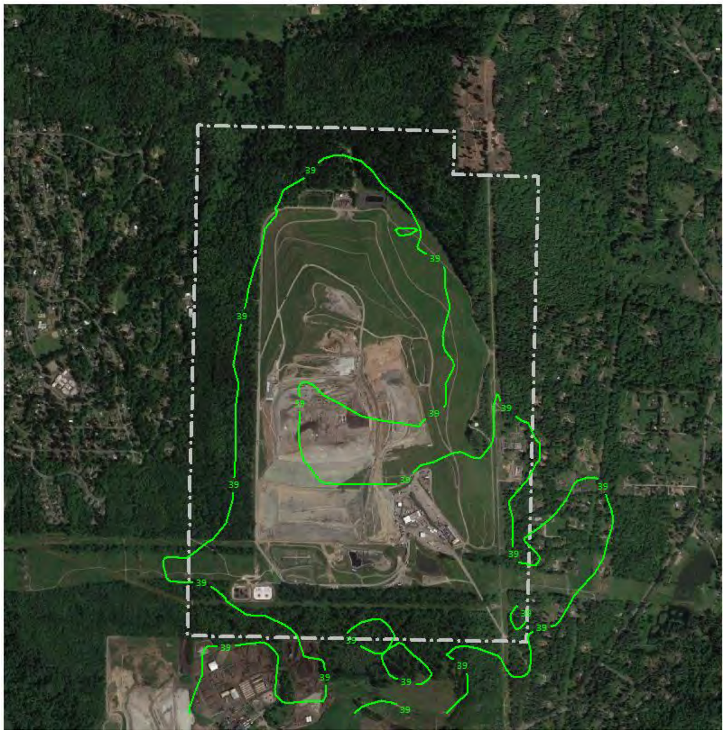


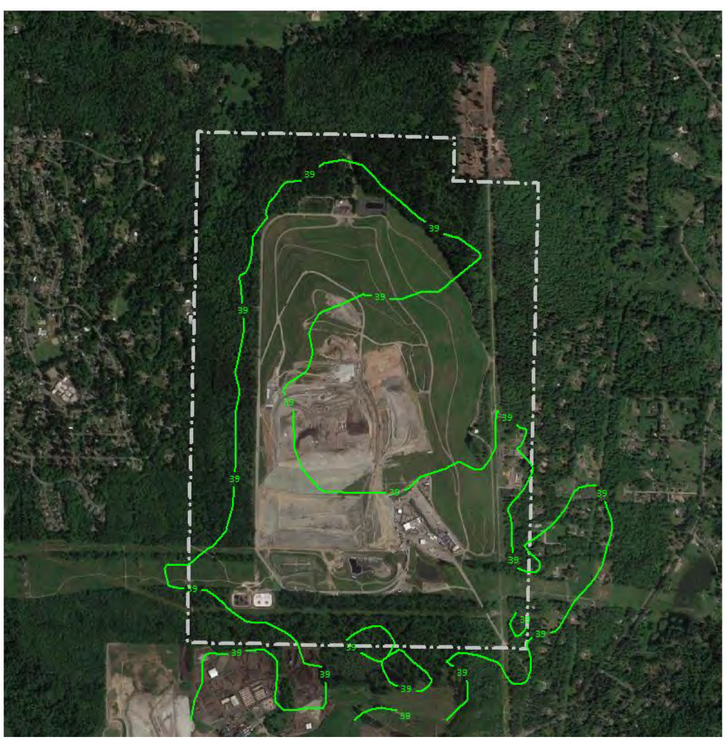
FIGURE 4.3: ALTERNATIVE 3 OPTION 1 6AM AREA 6 LEQ



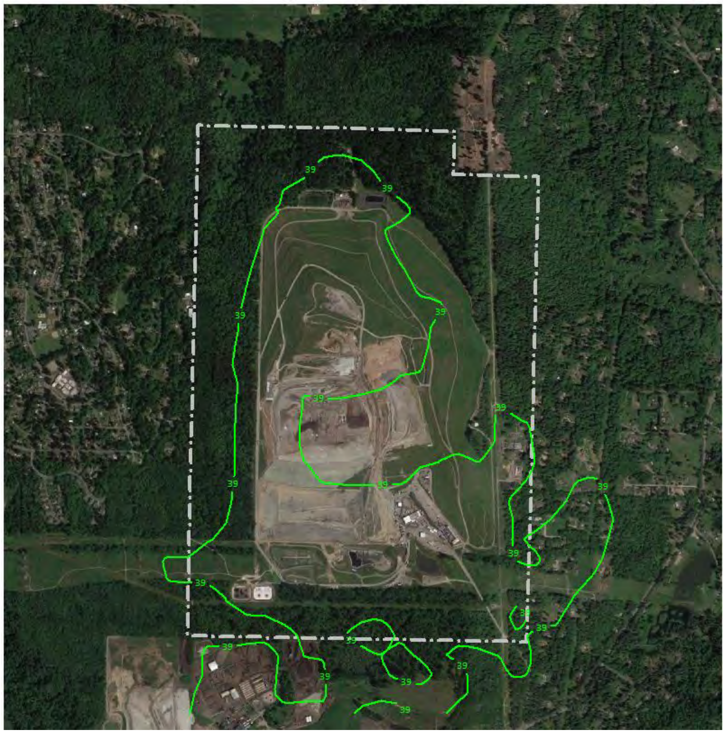
<u>FIGURE 4.4: ALTERNATIVE 3 OPTION 1 6AM AREA 6N LEQ</u>



<u>FIGURE 4.5: ALTERNATIVE 3 OPTION 1 6AM AREA NE-3 LEQ</u>



<u>FIGURE 4.6: ALTERNATIVE 3 OPTION 1 6AM AREA 5N LEQ</u>



<u>FIGURE 4.7: ALTERNATIVE 3 OPTION 1 6AM NW3 LEQ</u>

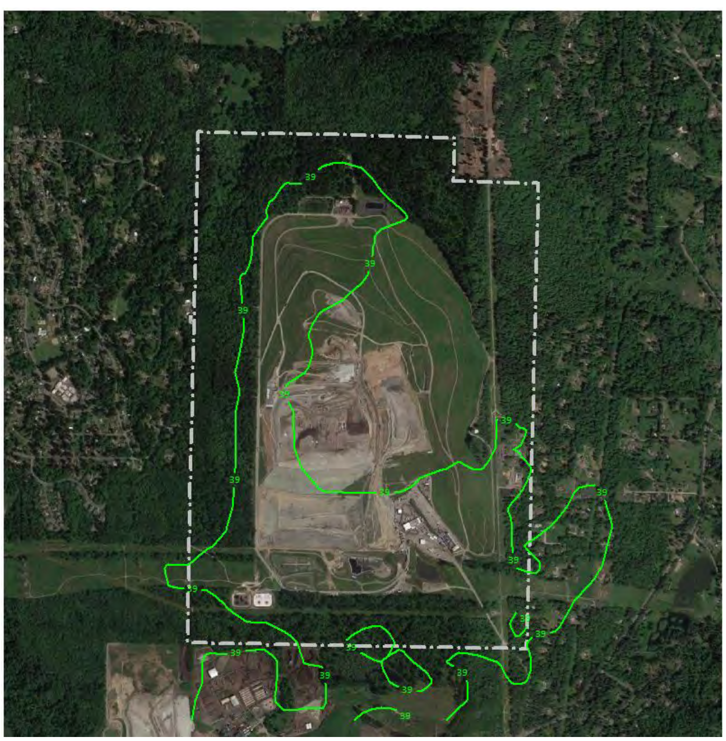


FIGURE 4.8: ALTERNATIVE 3 OPTION 1 6AM AREA 9 LEQ

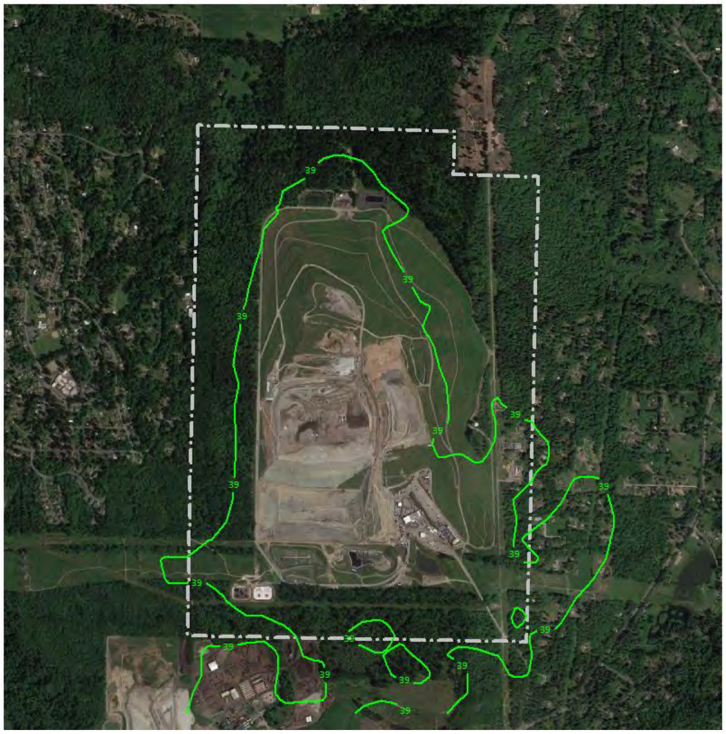
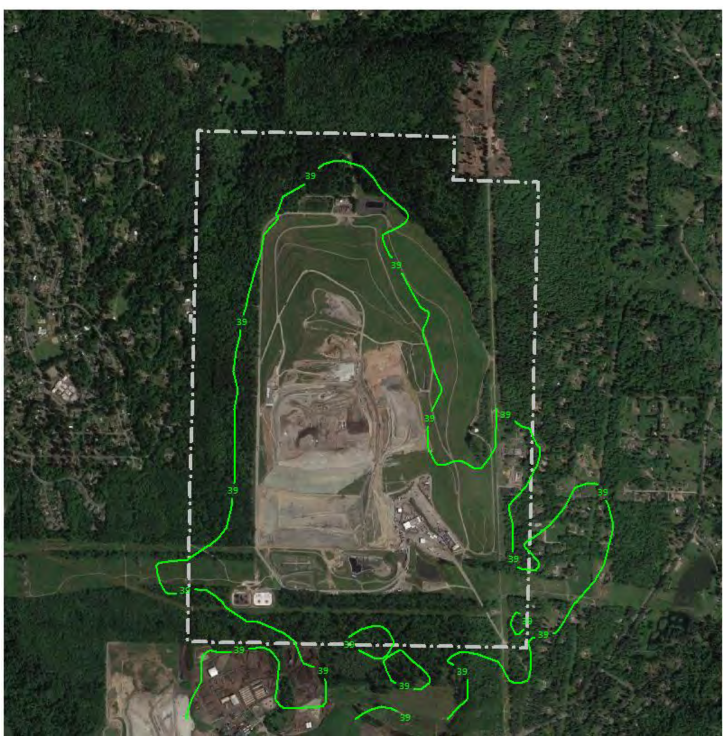
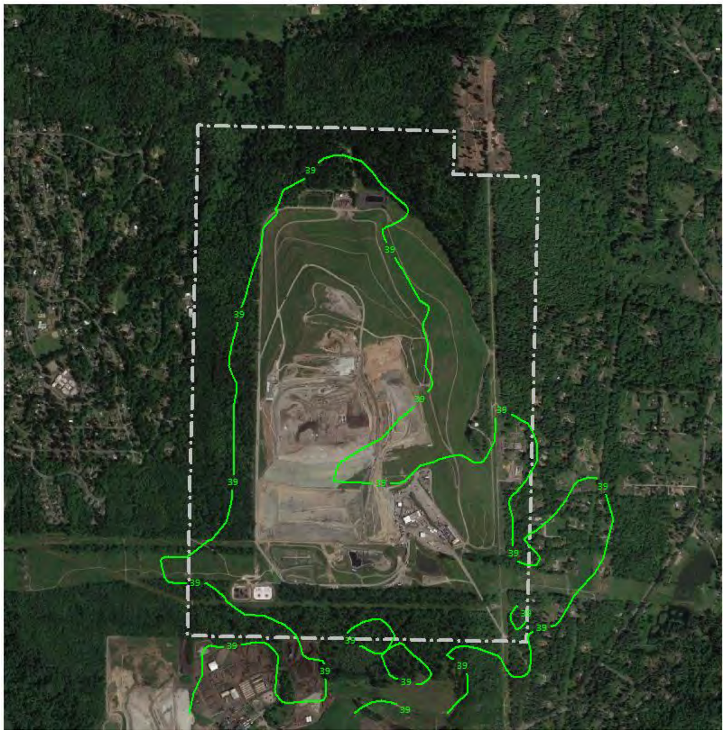


FIGURE 4.9: ALTERNATIVE 3 OPTION 1 6AM AREA 8 LEQ



<u>FIGURE 4.10: ALTERNATIVE 3 OPTION 1 6AM AREA 5 LEQ</u>



<u>FIGURE 4.11: ALTERNATIVE 3 OPTION 1 6AM AREA 9 LOW LEQ</u>

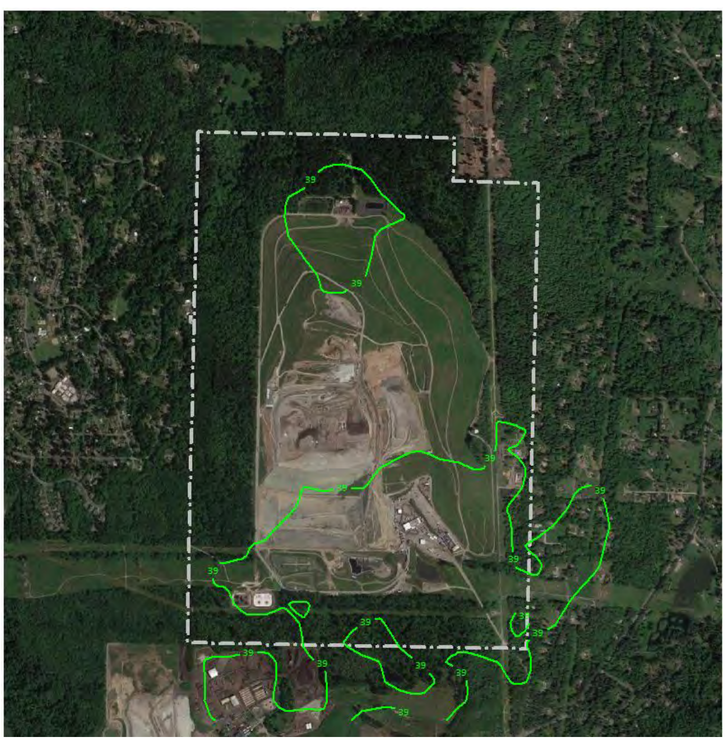


FIGURE 4.12: BEW-6DB WITH ALTERNATIVE 3 OPTION 1 6AM AREA 9 LEQ

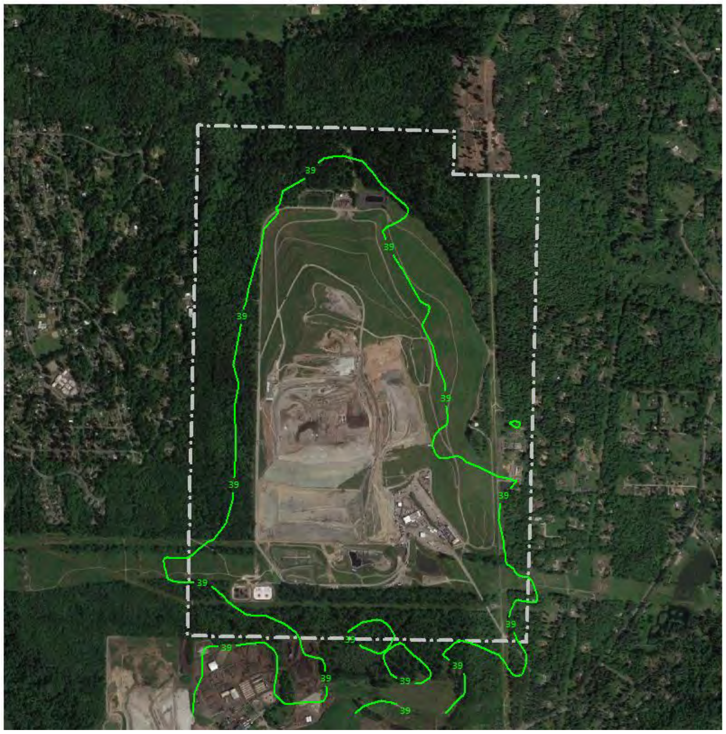


Figure 4.12 shows the potential impact of reducing the overall BEW noise by 6 dBA. The footprint of the 39 dBA contour that would extend outside the southeast corner of the property line is significantly reduced.

The 6 dBA reduction is the upper limit of what the noise model predicts is necessary for nighttime noise mitigation to be within the 39 dBA limit at the property line. Long term noise monitoring specific to BEW operations and general operational noise along the southeast property line may indicate that less mitigation is necessary.

4.2 Alternative 3 Option 1 10am 49 dB Noise Contours

FIGURE 4.13: ALTERNATIVE 3 OPTION 1 10AM AREA 5N-3 LEQ

FIGURE 4.14: ALTERNATIVE 3 OPTION 1 10AM AREA 6N-3 LEQ

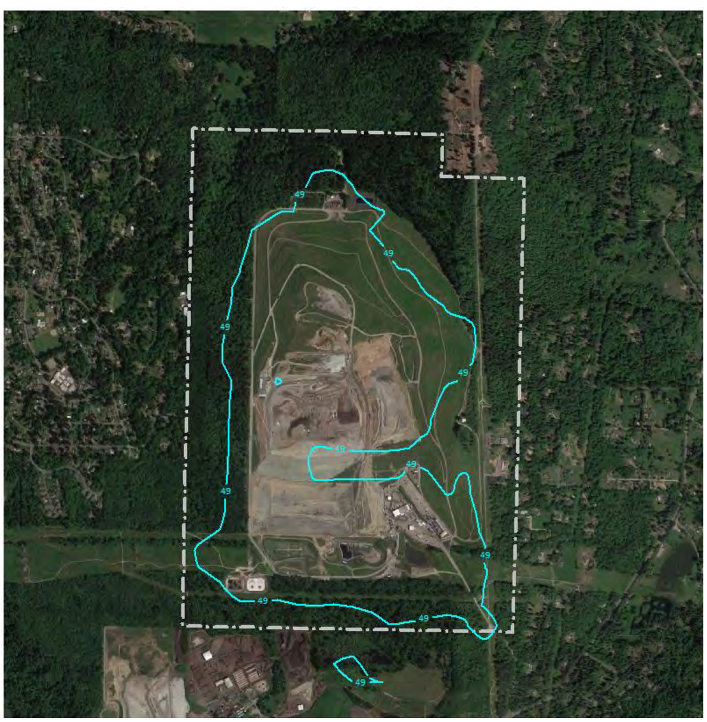


FIGURE 4.15: ALTERNATIVE 3 OPTION 1 10AM AREA 6 LEQ

FIGURE 4.16: ALTERNATIVE 3 OPTION 1 10AM AREA 6N LEQ

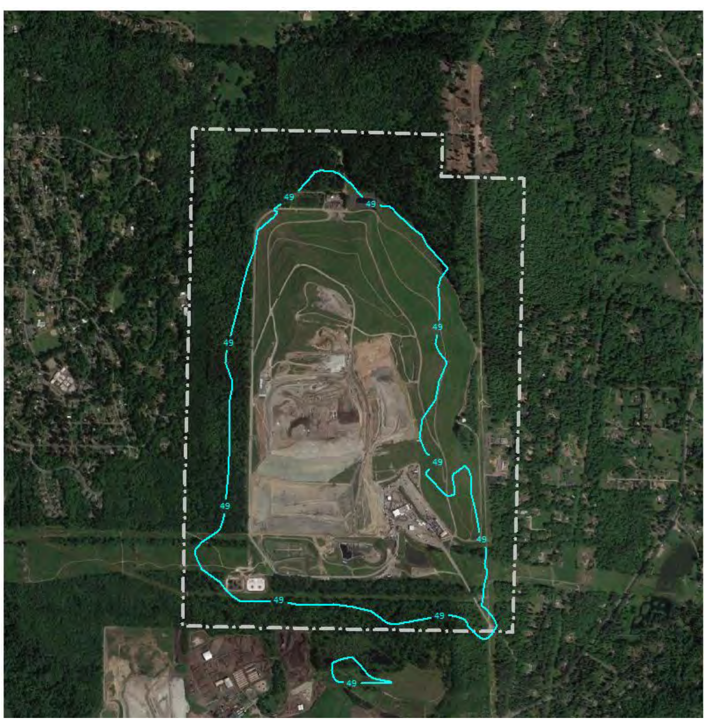


FIGURE 4.17: ALTERNATIVE 3 OPTION 1 10AM AREA NE-3 LEQ

FIGURE 4.18: ALTERNATIVE 3 OPTION 1 10AM AREA 5N LEQ

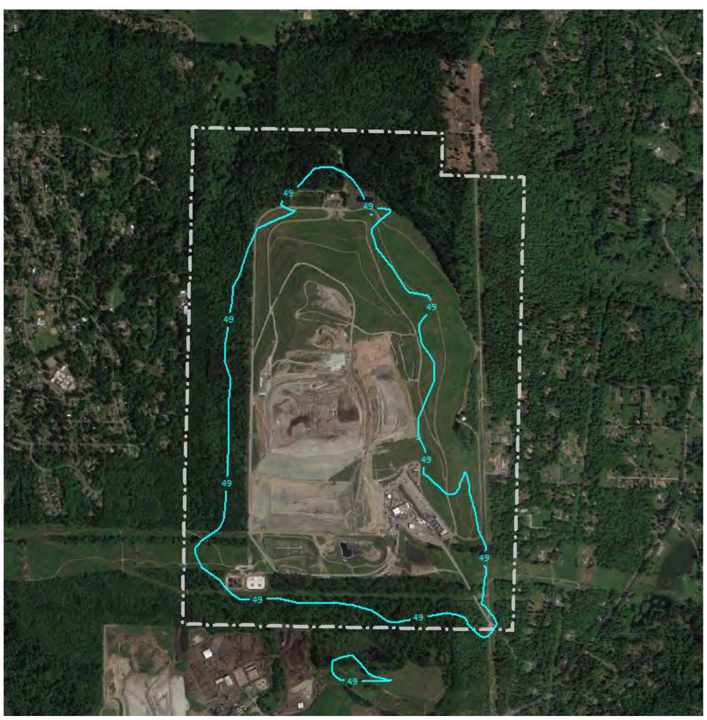


FIGURE 4.19: ALTERNATIVE 3 OPTION 1 10AM NW3 LEQ

FIGURE 4.20: ALTERNATIVE 3 OPTION 1 10AM AREA 9 LEQ

FIGURE 4.21: ALTERNATIVE 3 OPTION 1 10AM AREA 8 LEQ

FIGURE 4.22: ALTERNATIVE 3 OPTION 1 10AM AREA 5 LEQ

FIGURE 4.23: ALTERNATIVE 3 OPTION 1 10AM AREA 9 LOW LEQ

4.3 Alternative 3 Option 2 6am 39 dB Noise Contours

FIGURE 4.24: ALTERNATIVE 3 OPTION 2 6AM AREA 5N-3 LEQ

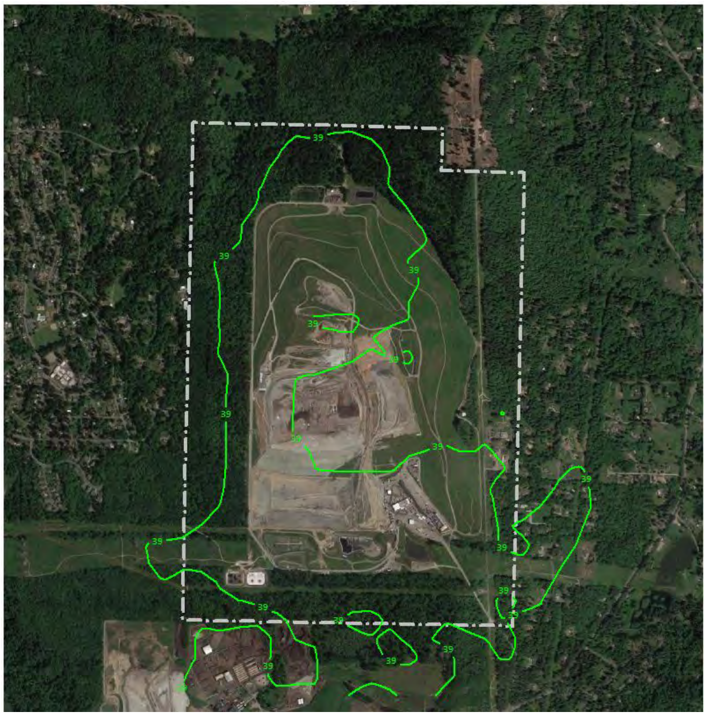


FIGURE 4.25: ALTERNATIVE 3 OPTION 2 6AM AREA 6N-3 LEQ

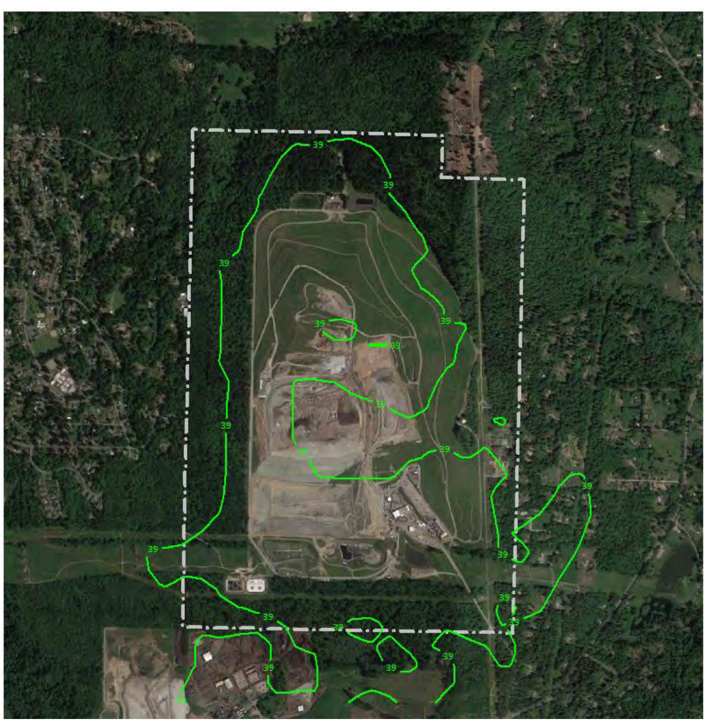


FIGURE 4.26: ALTERNATIVE 3 OPTION 2 6AM AREA 6 LEQ

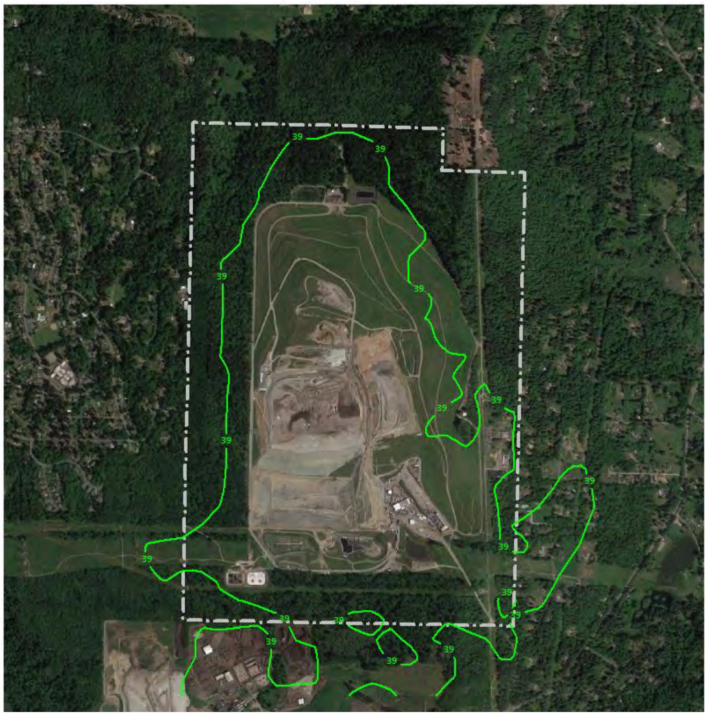


FIGURE 4.27: ALTERNATIVE 3 OPTION 2 6AM AREA 6N LEQ

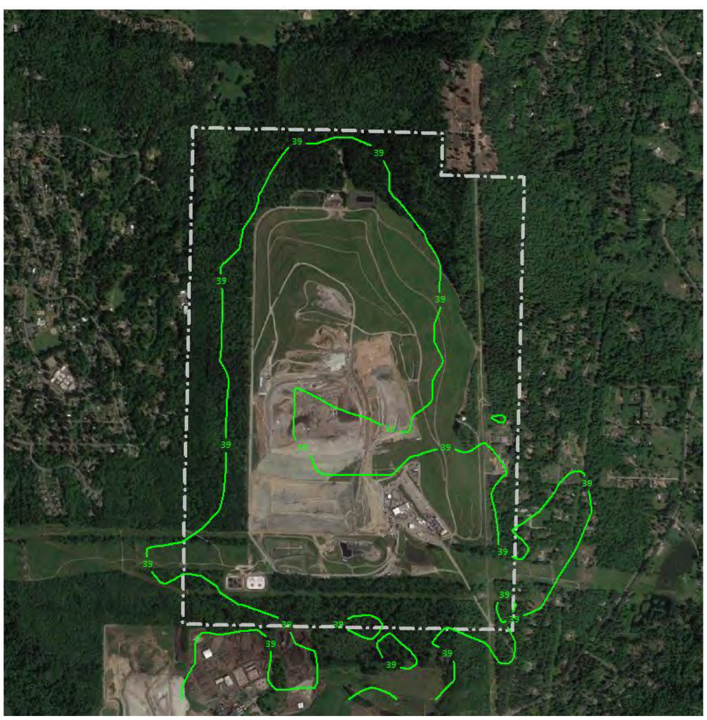


FIGURE 4.28: ALTERNATIVE 3 OPTION 2 6AM AREA NE-3 LEQ

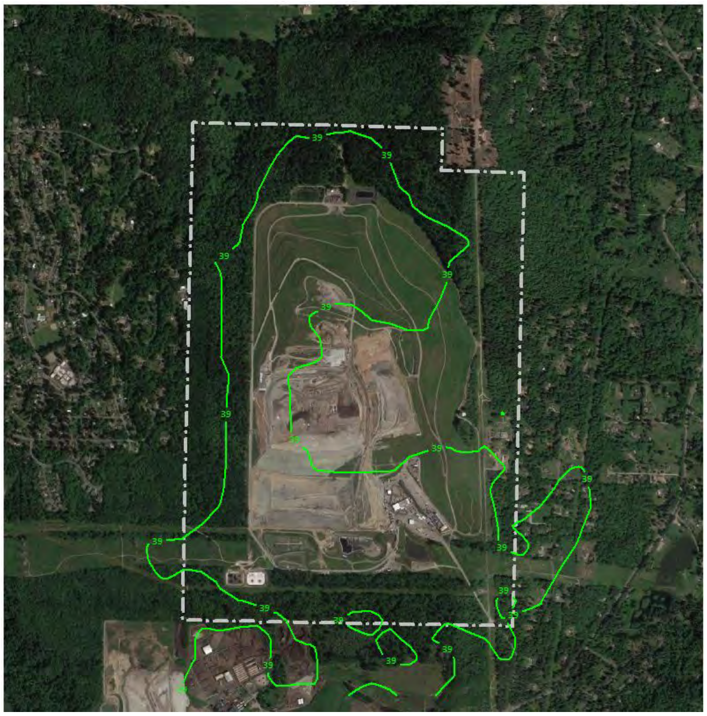


FIGURE 4.29: ALTERNATIVE 3 OPTION 2 6AM AREA 5N LEQ

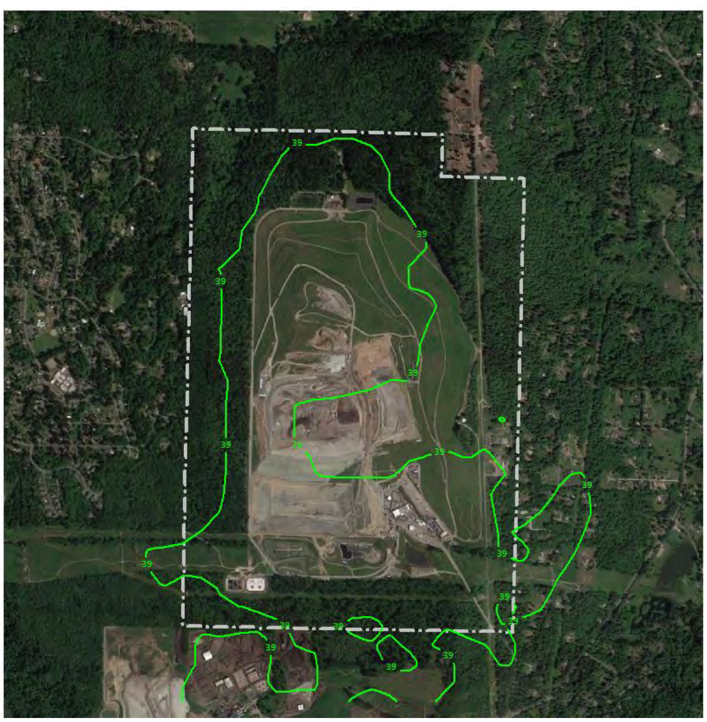


FIGURE 4.30: ALTERNATIVE 3 OPTION 2 6AM NW3 LEQ

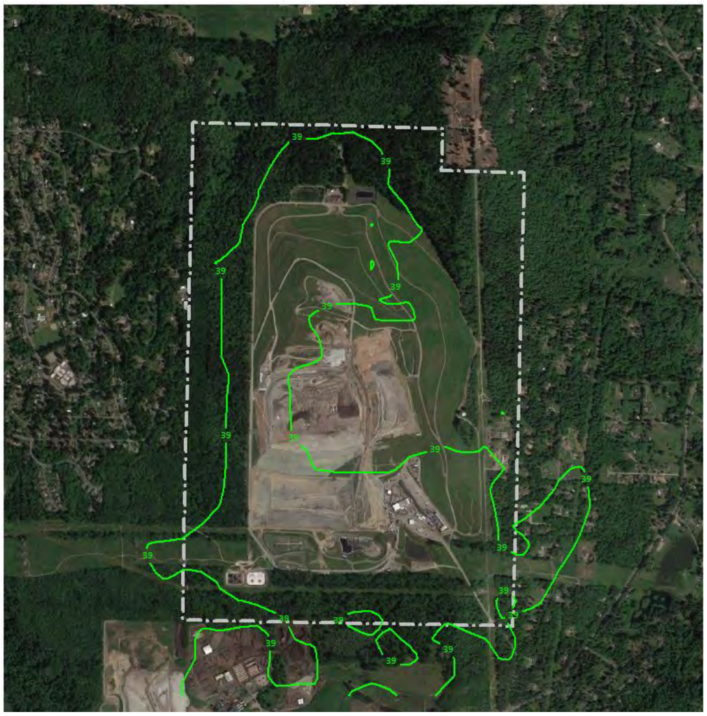
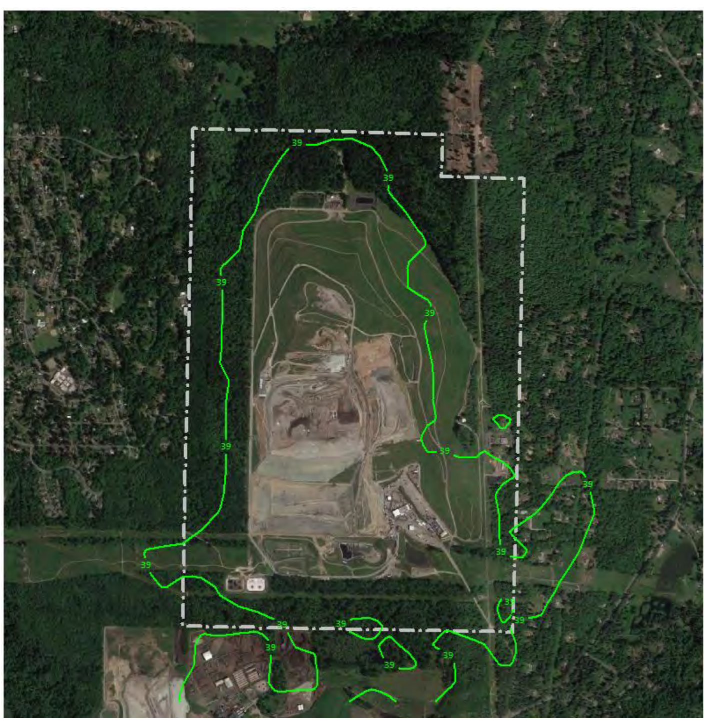
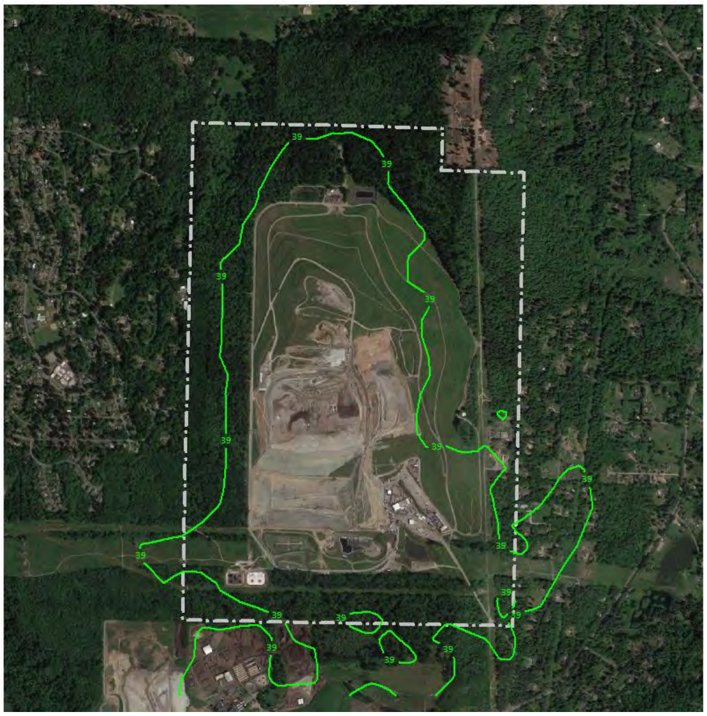


FIGURE 4.31: ALTERNATIVE 3 OPTION 2 6AM AREA 9 LEQ



<u>FIGURE 4.32: ALTERNATIVE 3 OPTION 2 6AM AREA 8 LEQ</u>



<u>FIGURE 4.33: ALTERNATIVE 3 OPTION 2 6AM AREA 5 LEQ</u>

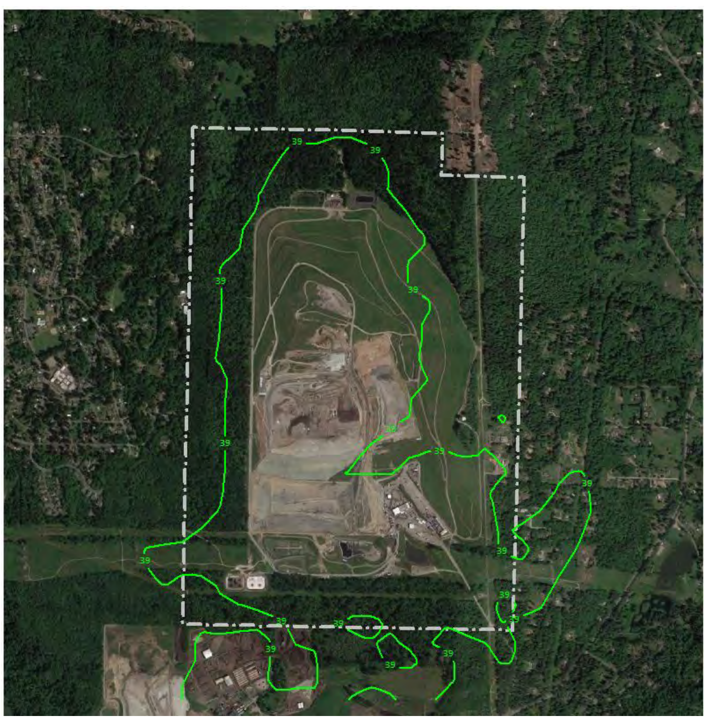
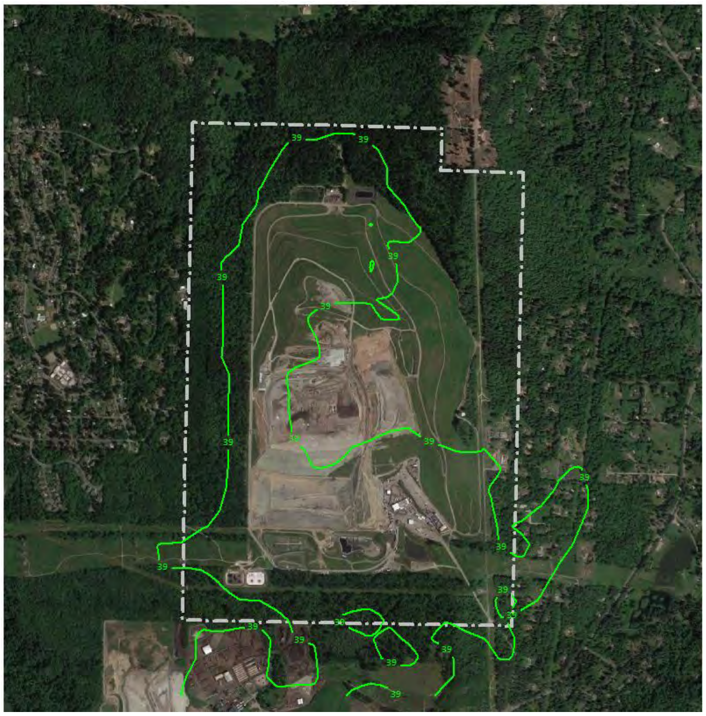


FIGURE 4.34: ALTERNATIVE 3 OPTION 2 6AM AREA 9 LOW LEQ



4.4 Alternative 3 Option 2 10am 49 dB Noise Contours

FIGURE 4.35: ALTERNATIVE 3 OPTION 2 10AM AREA 5N-3 LEQ

FIGURE 4.36: ALTERNATIVE 3 OPTION 2 10AM AREA 6N-3 LEQ

FIGURE 4.37: ALTERNATIVE 3 OPTION 2 10AM AREA 6 LEQ

FIGURE 4.38: ALTERNATIVE 3 OPTION 2 10AM AREA 6N LEQ

FIGURE 4.39: ALTERNATIVE 3 OPTION 2 10AM AREA NE-3 LEQ

FIGURE 4.40: ALTERNATIVE 3 OPTION 2 10AM AREA 5N LEQ

FIGURE 4.41: ALTERNATIVE 3 OPTION 2 10AM NW3 LEQ

FIGURE 4.42: ALTERNATIVE 3 OPTION 2 10AM AREA 9 LEQ

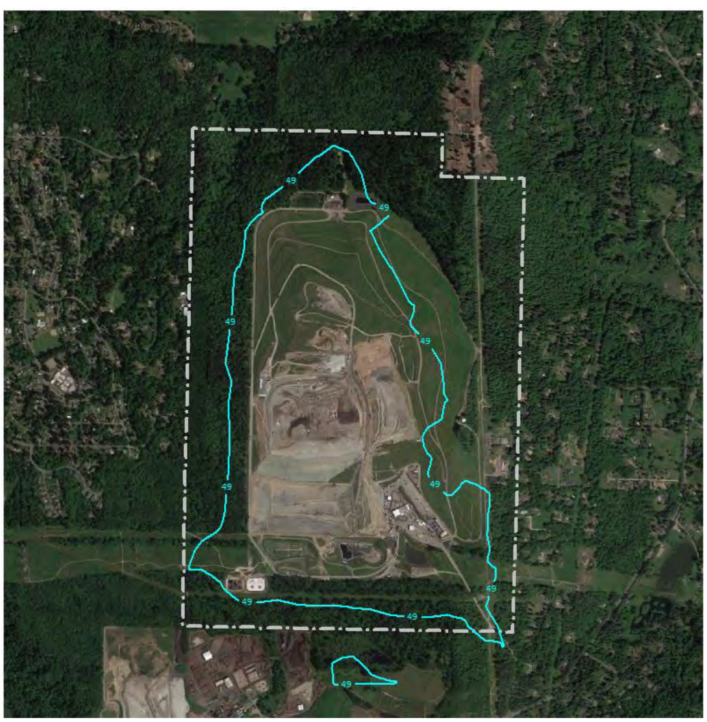
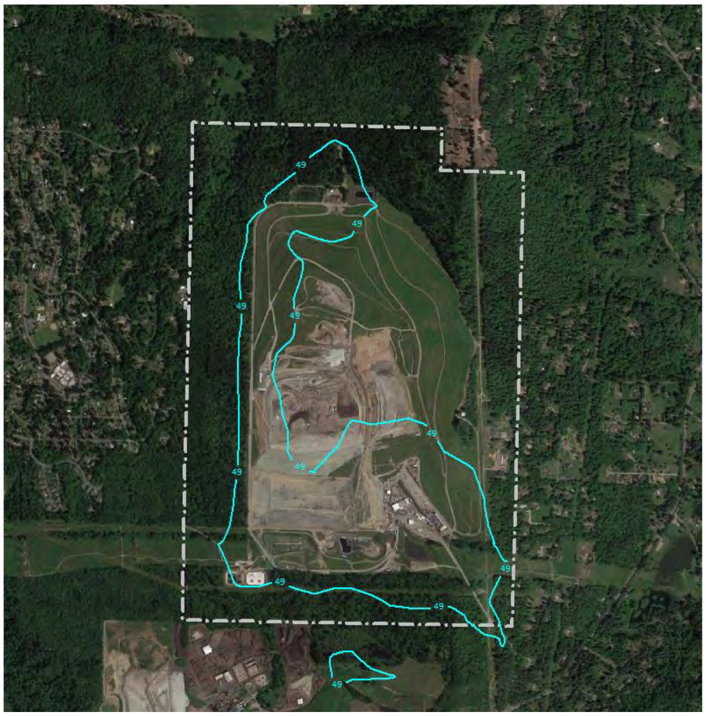


FIGURE 4.43: ALTERNATIVE 3 OPTION 2 10AM AREA 8 LEQ

FIGURE 4.44: ALTERNATIVE 3 OPTION 2 10AM AREA 5 LEQ

FIGURE 4.45: ALTERNATIVE 3 OPTION 2 10AM AREA 9 LOW LEQ



4.5 Alternative 3 Option 3 6am 39 dB Noise Contours

FIGURE 4.46: ALTERNATIVE 3 OPTION 3 6AM AREA 5N-3 LEQ

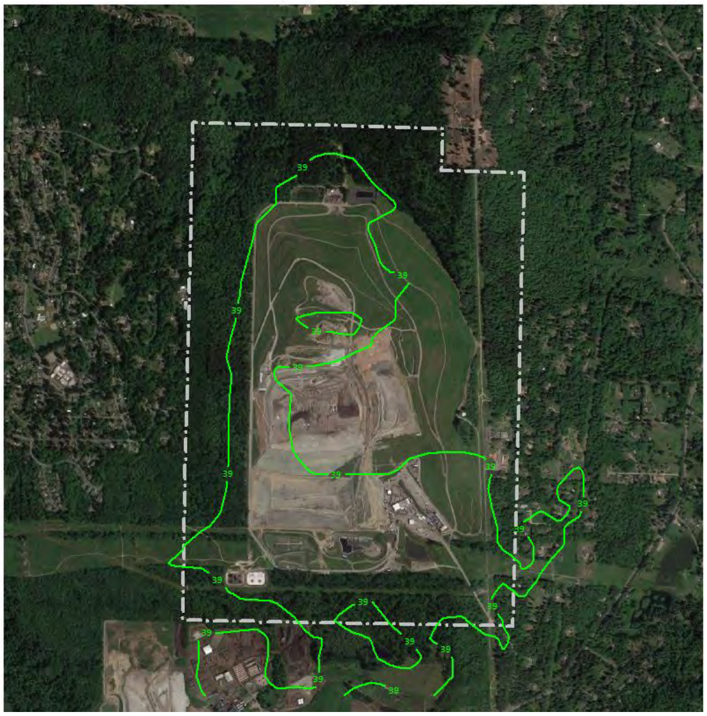


FIGURE 4.47: ALTERNATIVE 3 OPTION 3 6AM AREA 6N-3 LEQ

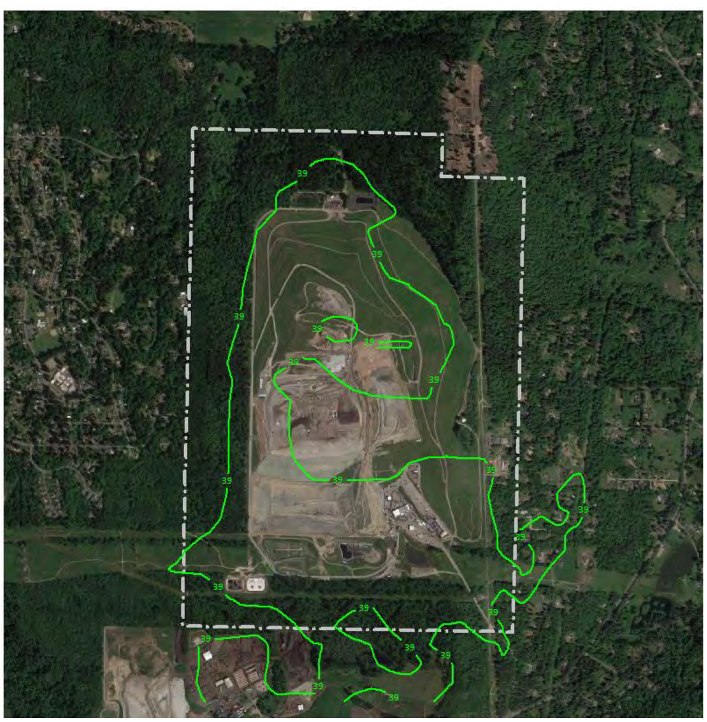


FIGURE 4.48: ALTERNATIVE 3 OPTION 3 6AM AREA 6 LEQ

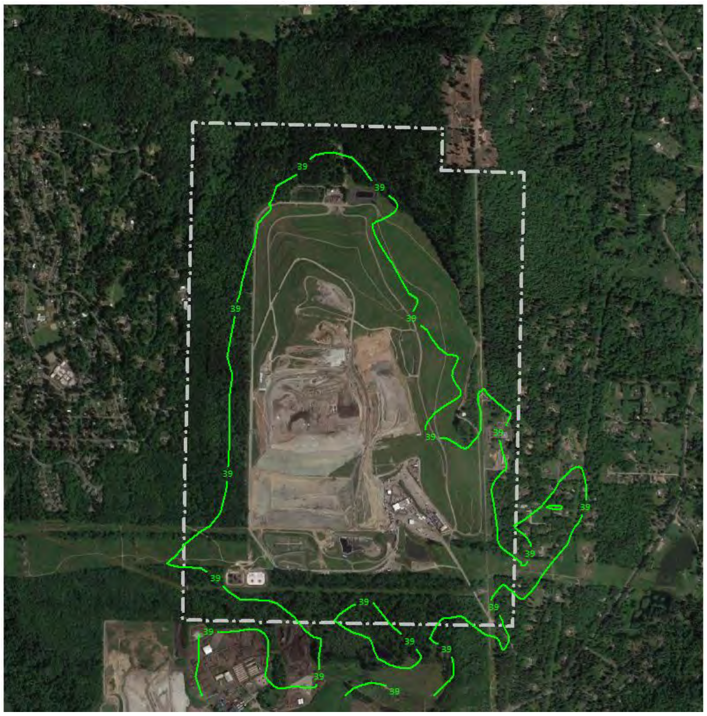


FIGURE 4.49: ALTERNATIVE 3 OPTION 3 6AM AREA 6N LEQ

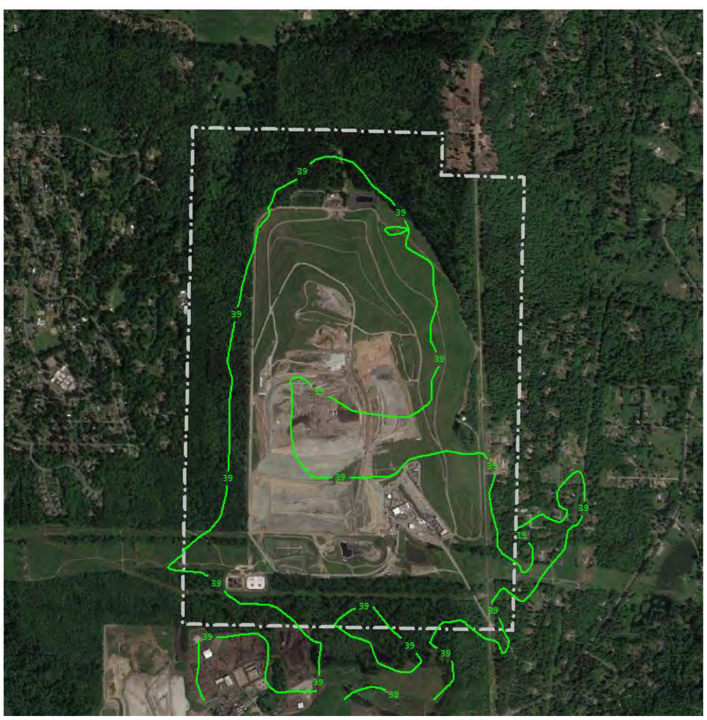


FIGURE 4.50: ALTERNATIVE 3 OPTION 3 6AM AREA NE-3 LEQ

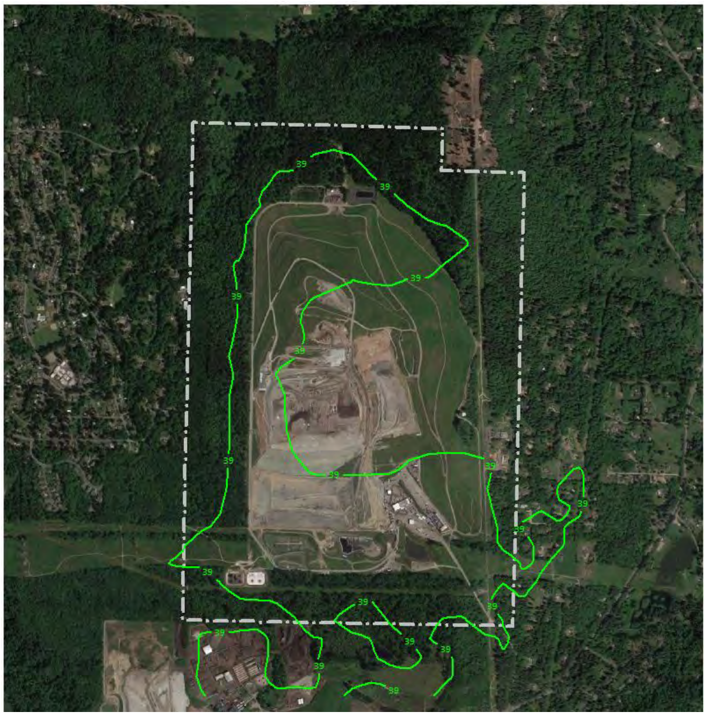


FIGURE 4.51: ALTERNATIVE 3 OPTION 3 6AM AREA 5N LEQ

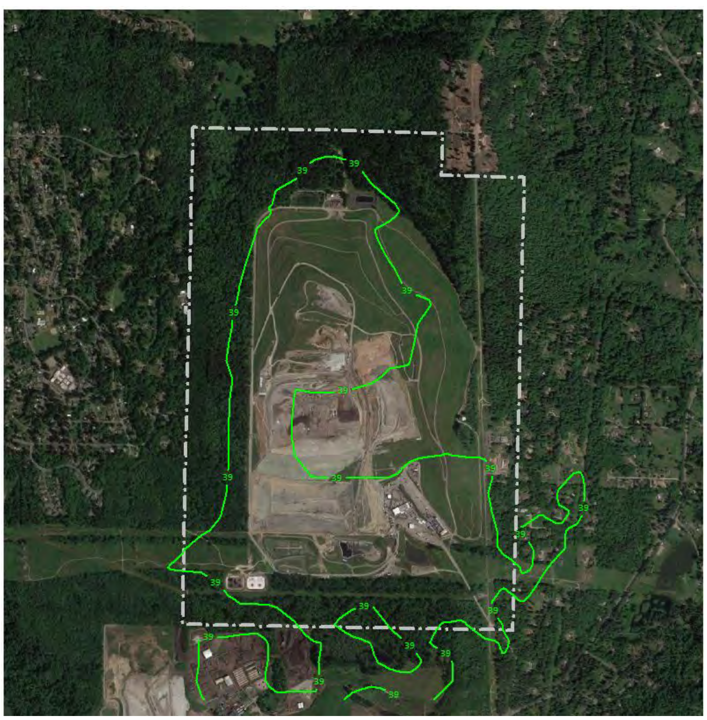


FIGURE 4.52: ALTERNATIVE 3 OPTION 3 6AM NW3 LEQ

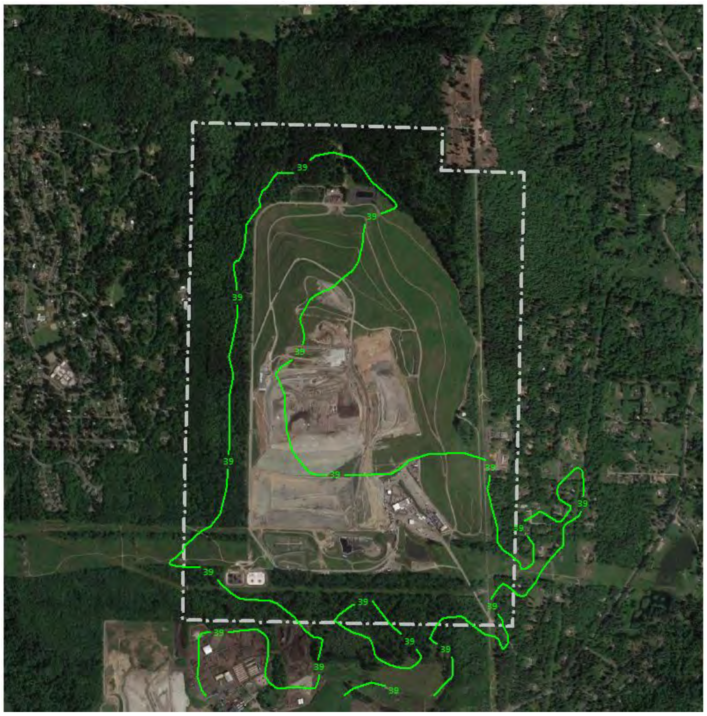
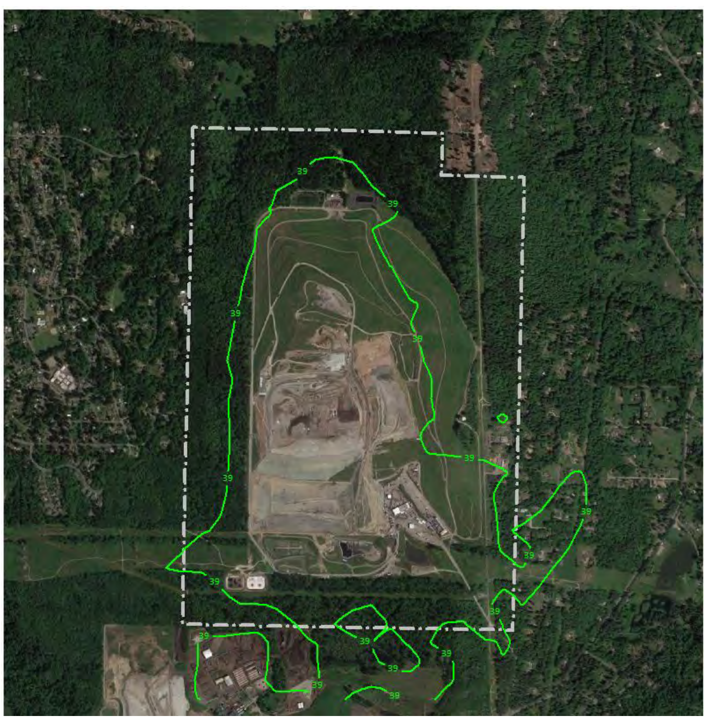
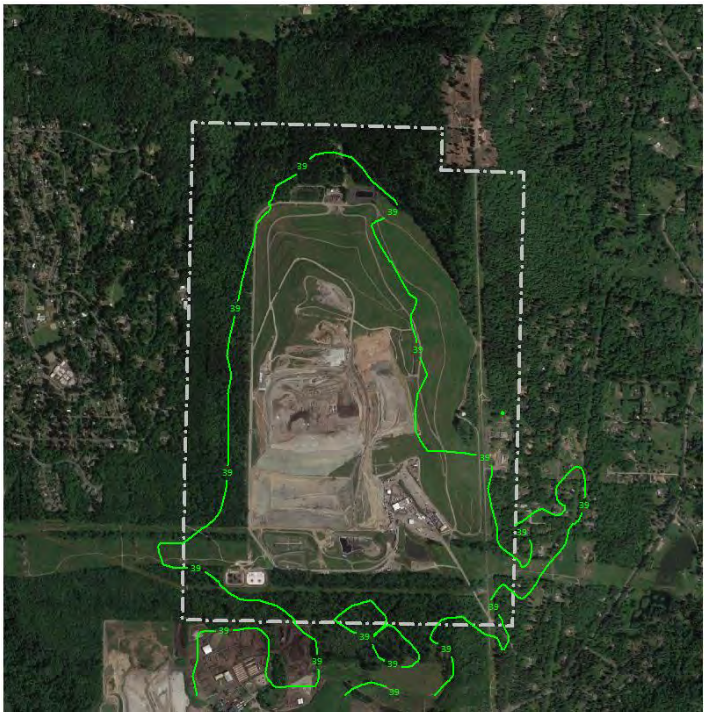


FIGURE 4.53: ALTERNATIVE 3 OPTION 3 6AM AREA 9 LEQ



<u>FIGURE 4.54: ALTERNATIVE 3 OPTION 3 6AM AREA 8 LEQ</u>



<u>FIGURE 4.55: ALTERNATIVE 3 OPTION 3 6AM AREA 5 LEQ</u>

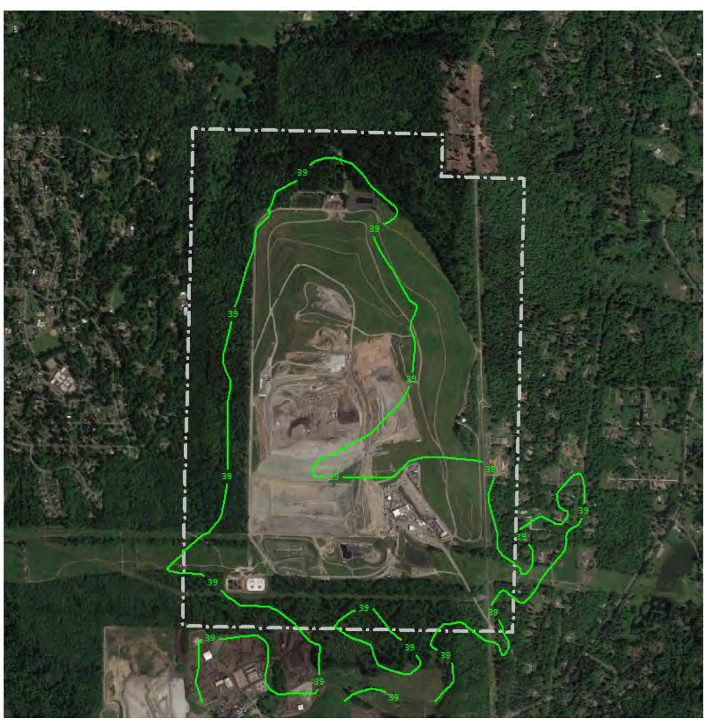
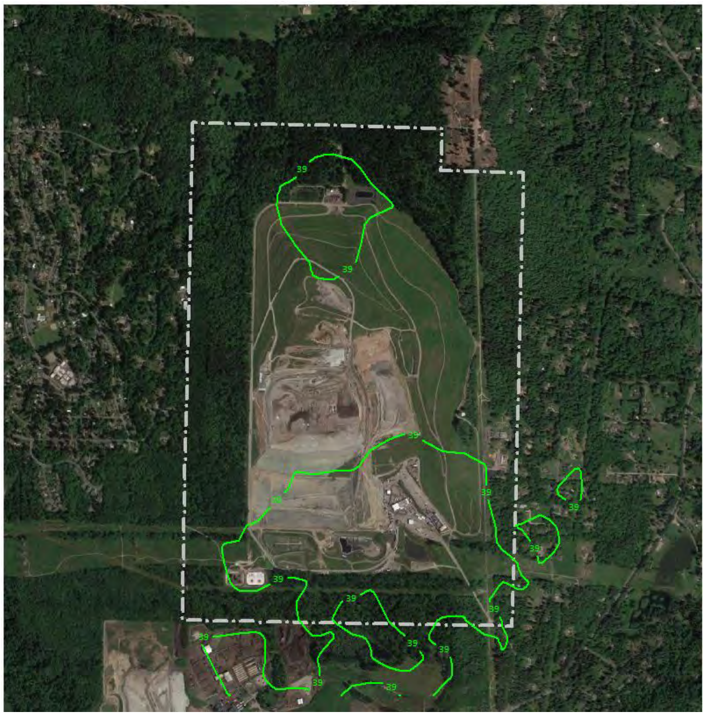


FIGURE 4.56: ALTERNATIVE 3 OPTION 3 6AM AREA 9 LOW LEQ



4.6 Alternative 3 Option 3 10am 49 dB Noise Contours

FIGURE 4.57: ALTERNATIVE 3 OPTION 3 10AM AREA 5N-3 LEQ

FIGURE 4.58: ALTERNATIVE 3 OPTION 3 10AM AREA 6N-3 LEQ

FIGURE 4.59: ALTERNATIVE 3 OPTION 3 10AM AREA 6 LEQ

FIGURE 4.60: ALTERNATIVE 3 OPTION 3 10AM AREA 6N LEQ

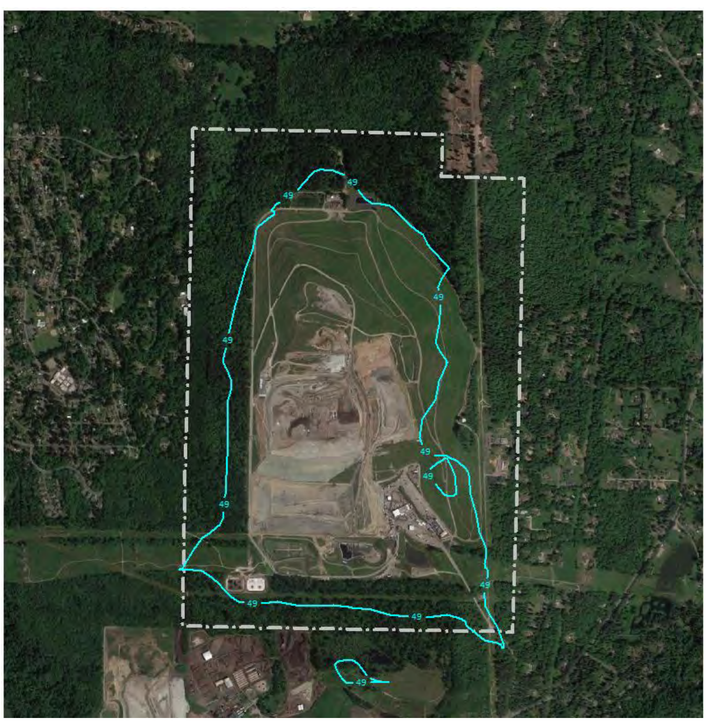


FIGURE 4.61: ALTERNATIVE 3 OPTION 3 10AM AREA NE-3 LEQ

FIGURE 4.62: ALTERNATIVE 3 OPTION 3 10AM AREA 5N LEQ

FIGURE 4.63: ALTERNATIVE 3 OPTION 3 10AM NW3 LEQ

FIGURE 4.64: ALTERNATIVE 3 OPTION 3 10AM AREA 9 LEQ

FIGURE 4.65: ALTERNATIVE 3 OPTION 3 10AM AREA 8 LEQ

FIGURE 4.66: ALTERNATIVE 3 OPTION 3 10AM AREA 5 LEQ

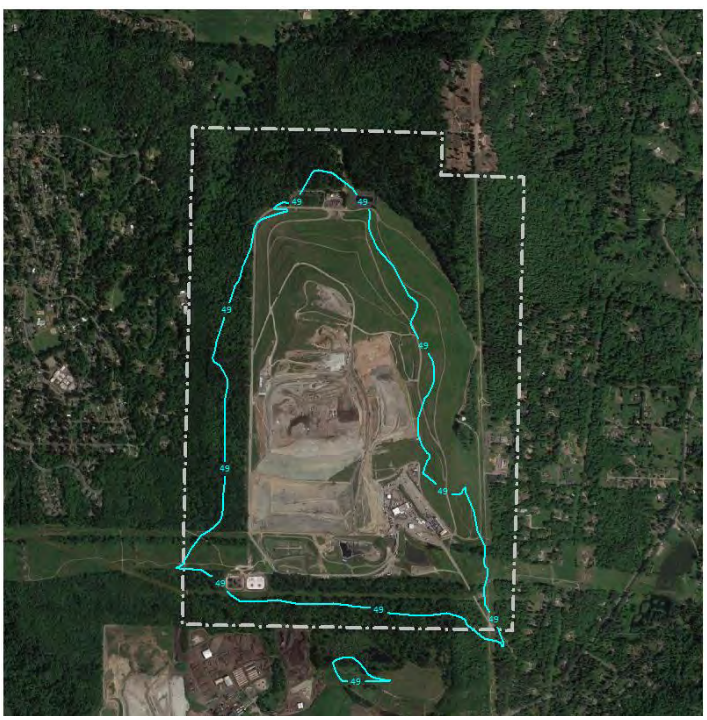


FIGURE 4.67: ALTERNATIVE 3 OPTION 3 10AM AREA 9 LOW LEQ

5.0 CHRLF 5-DAY OPERATIONS

Results from the 5-day week analysis follow. The analysis was performed for Alternative 3 loads since that would produce the highest noise levels. The other alternatives would be quieter and have less impact.

5.1 5-Day Week - Alternative 3 Option 1 6am 39 dB Noise Contours

FIGURE 5.1: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA 5N-3 LEQ

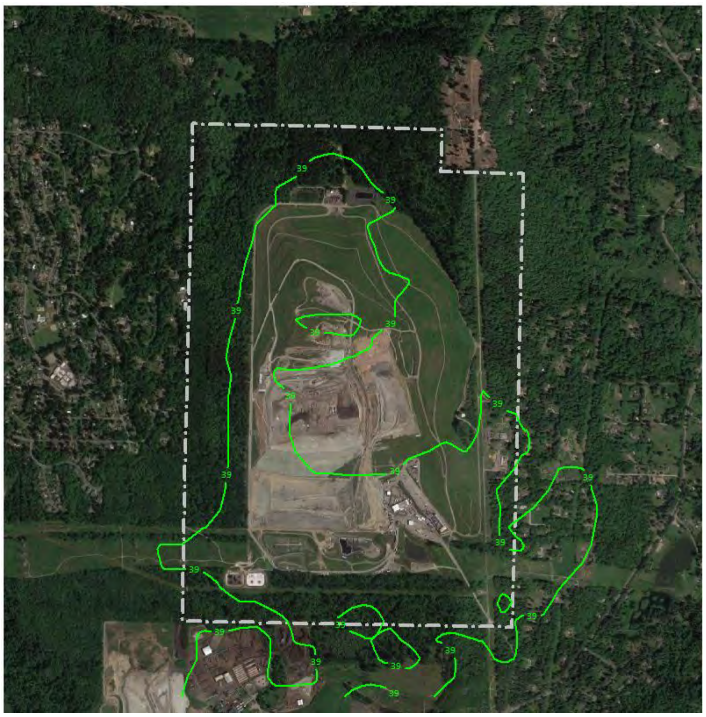


FIGURE 5.2: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA 6N-3 LEQ

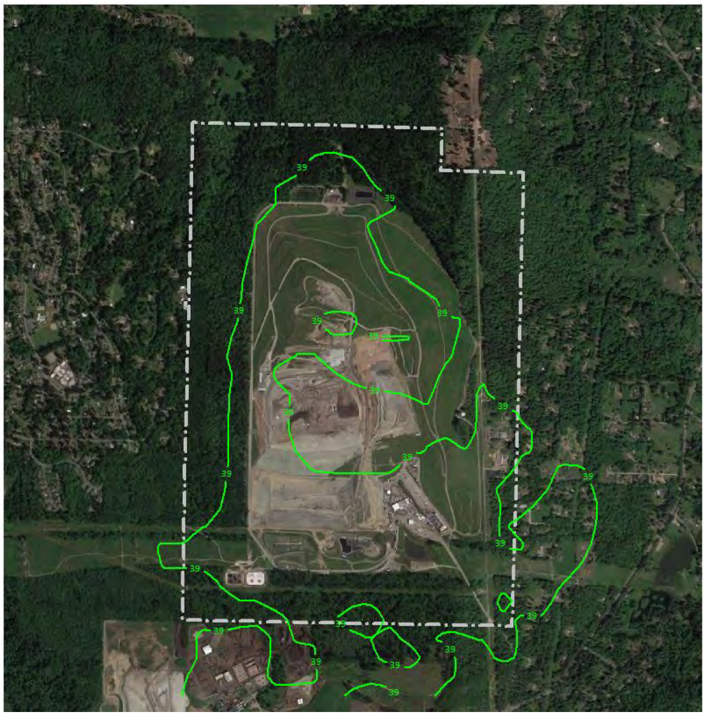


FIGURE 5.3: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA 6 LEQ

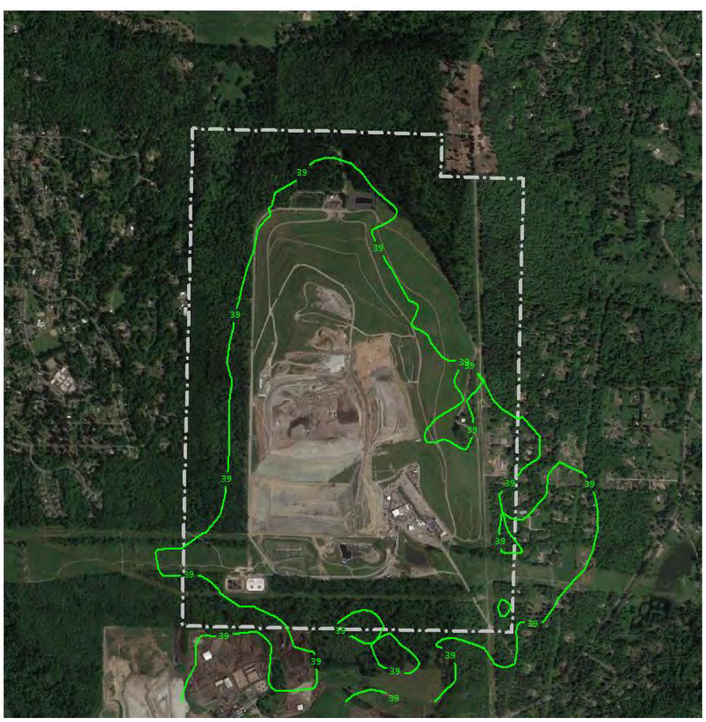


FIGURE 5.4: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA 6N LEQ

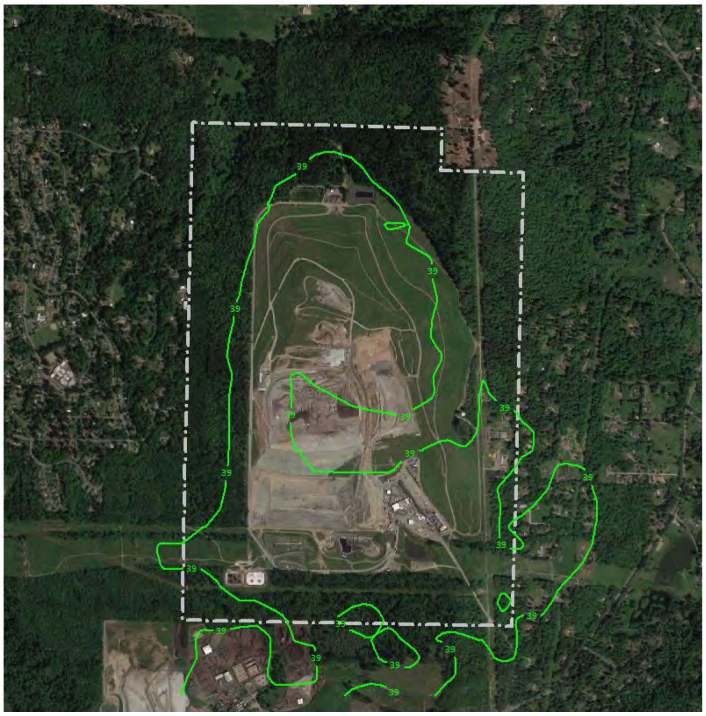


FIGURE 5.5: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA NE-3 LEQ

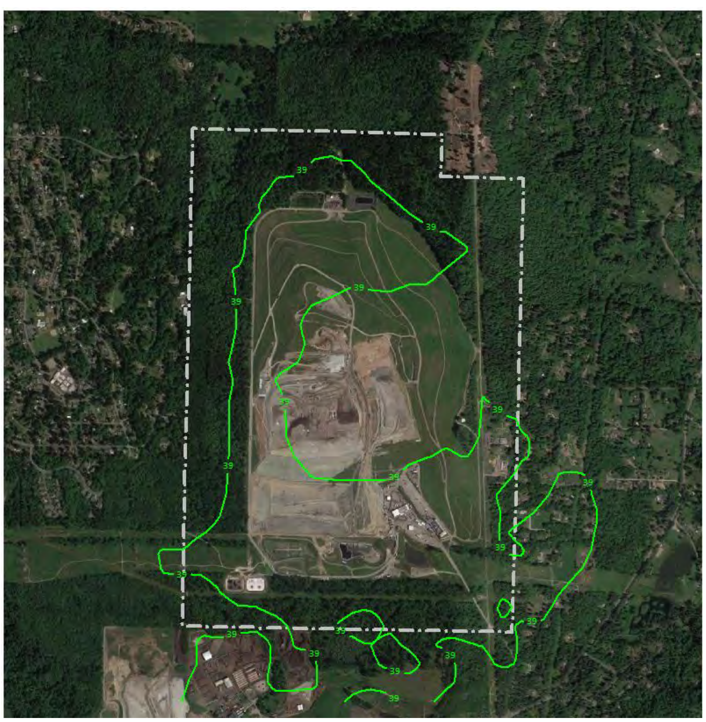


FIGURE 5.6: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA 5N LEQ

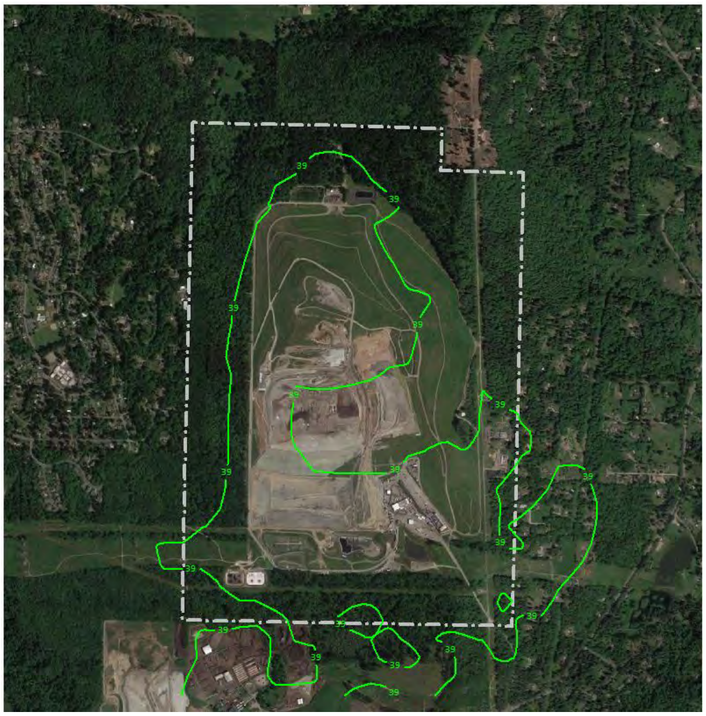
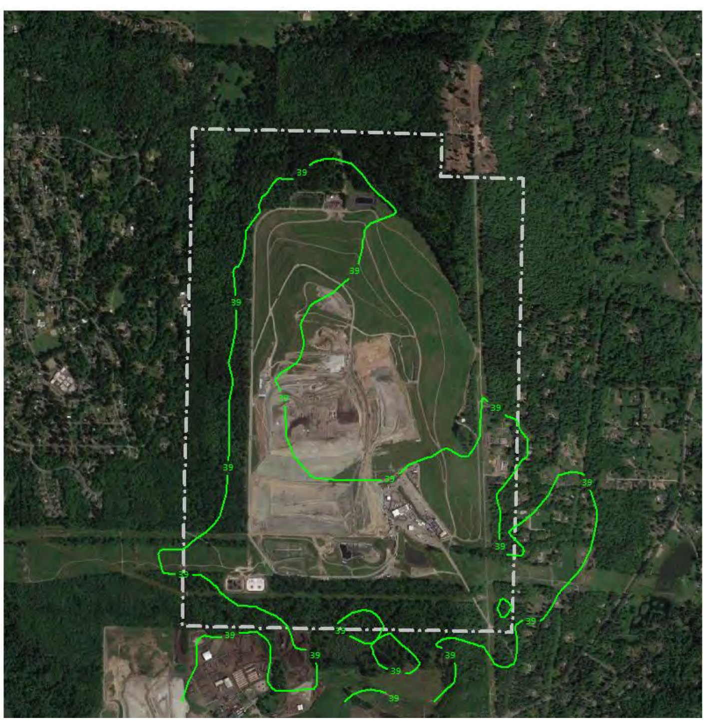
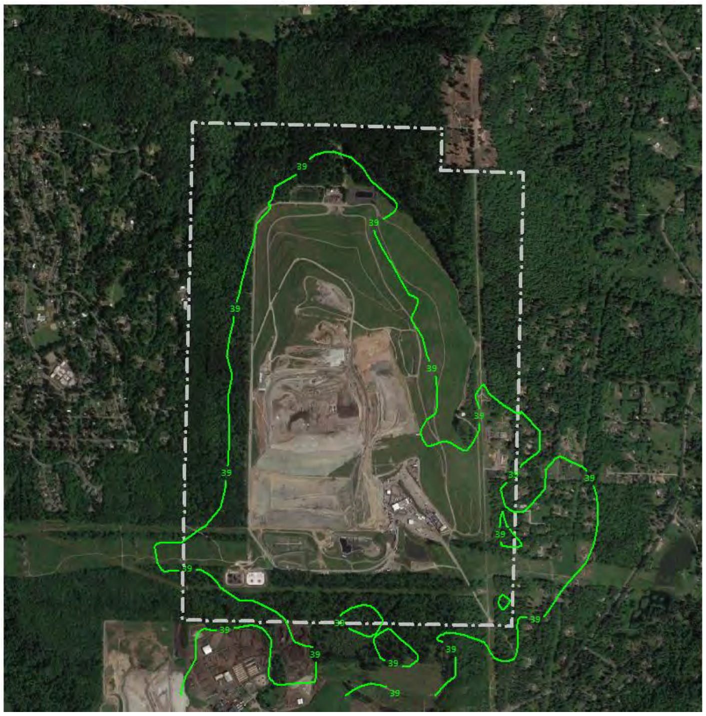


FIGURE 5.7: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM NW3 LEQ



<u>FIGURE 5.8: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA 9 LEQ</u>



<u>FIGURE 5.9: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA 8 LEQ</u>

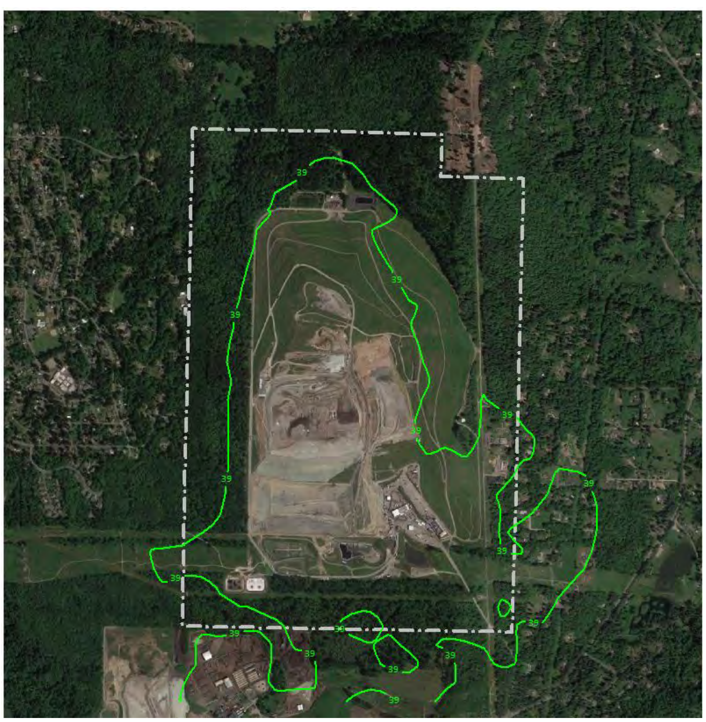


FIGURE 5.10: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA 5 LEQ

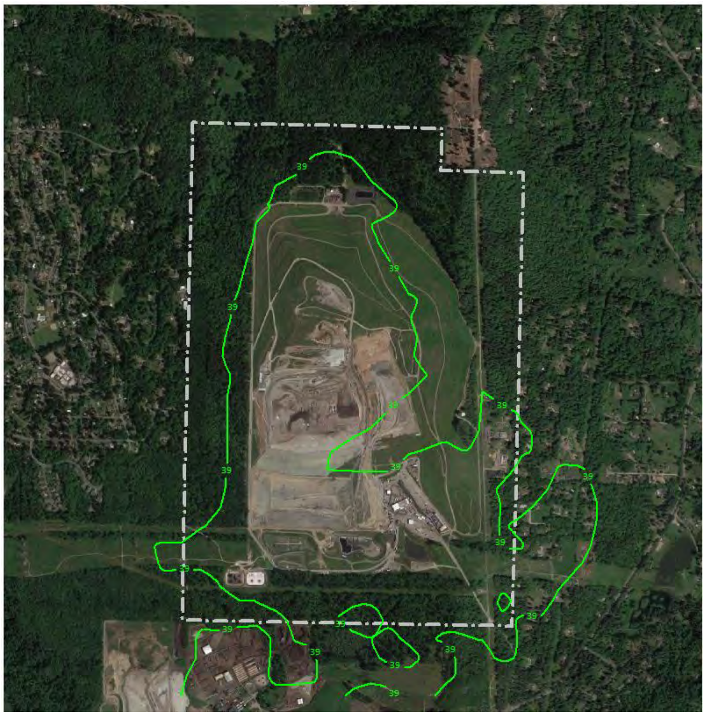
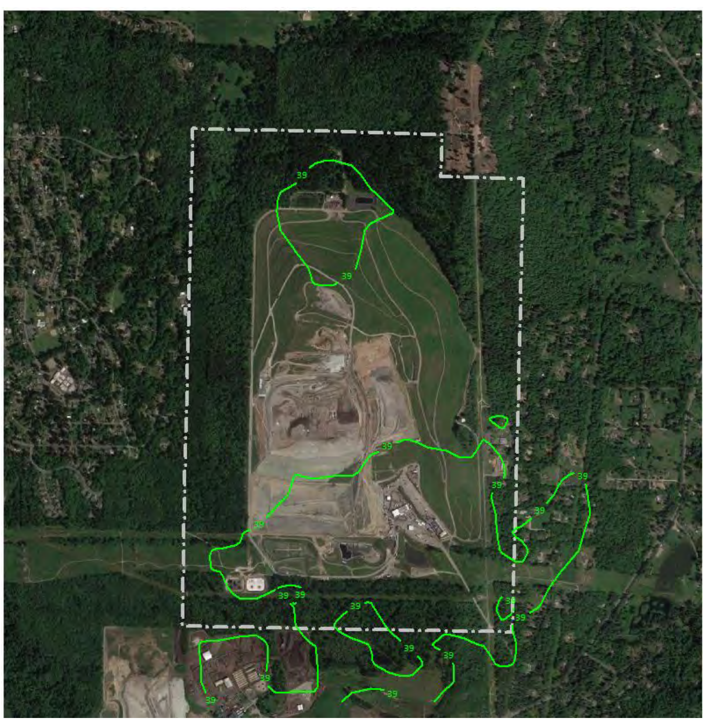


FIGURE 5.11: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 6AM AREA 9 LOW LEQ



5.2 5-Day Week - Alternative 3 Option 1 10am 49 dB Noise Contours

FIGURE 5.12: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA 5N-3 LEQ

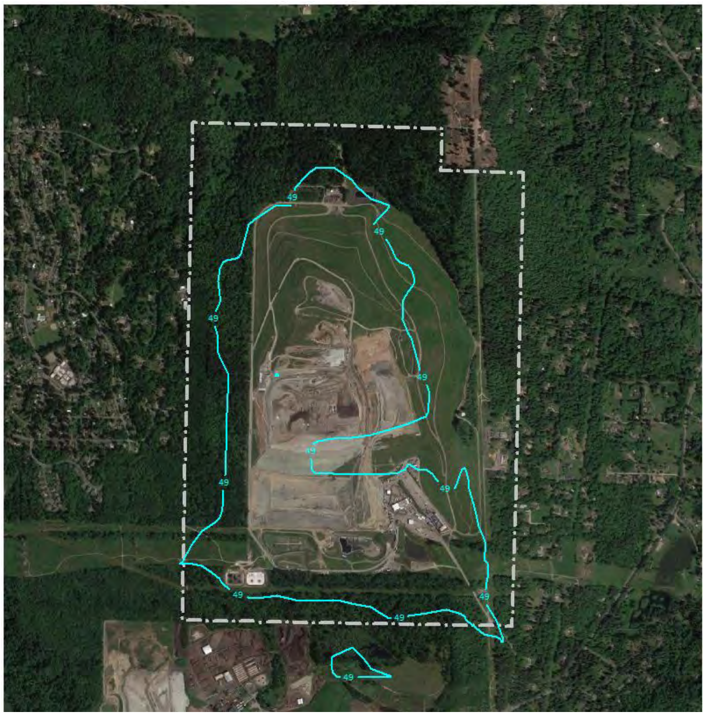


FIGURE 5.13: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA 6N-3 LEQ

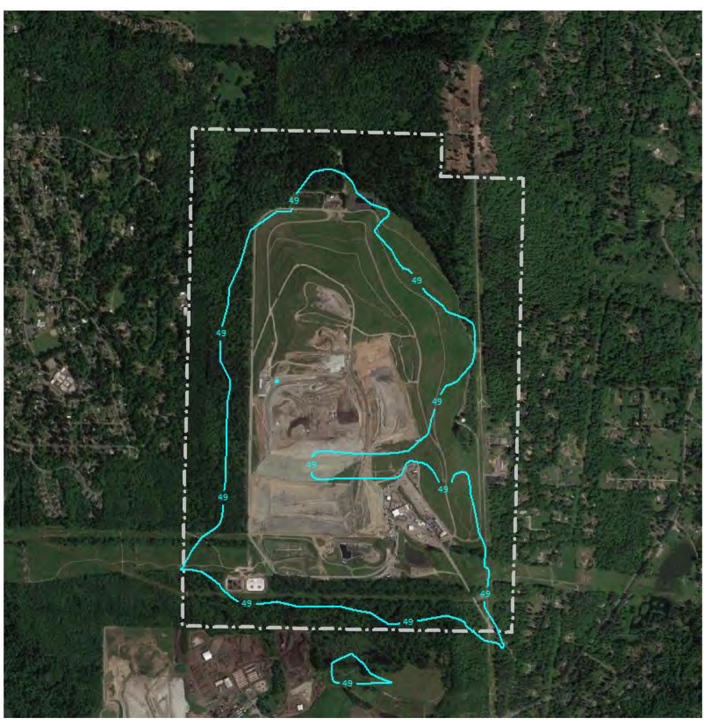


FIGURE 5.14: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA 6 LEQ

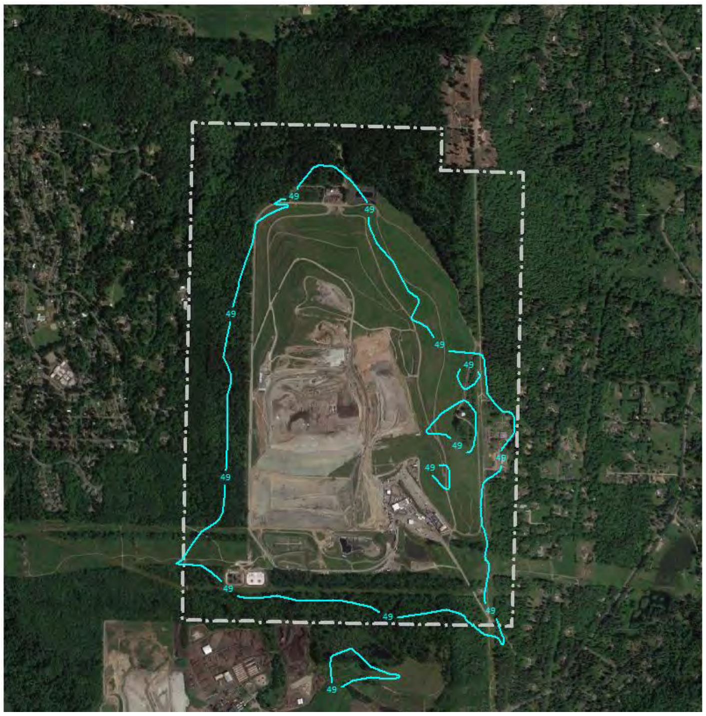


FIGURE 5.15: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA 6N LEQ

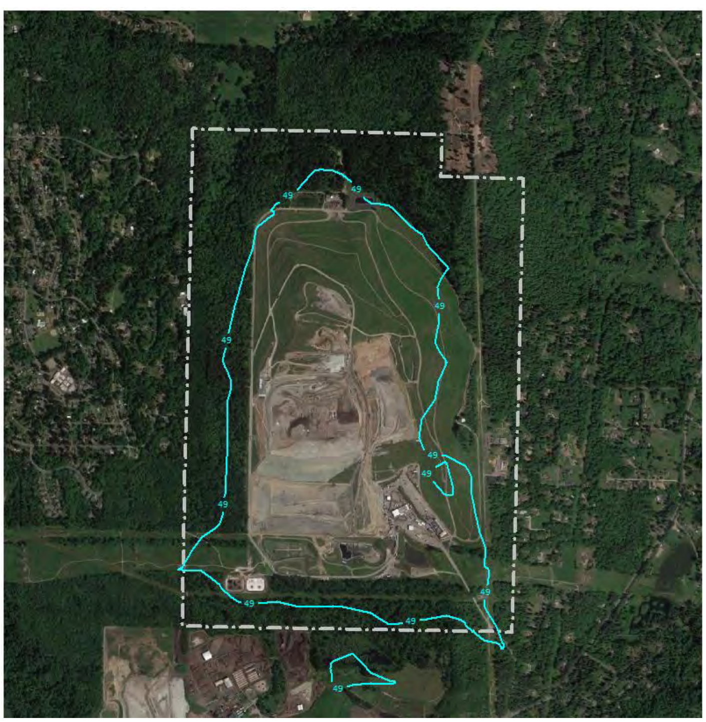


FIGURE 5.16: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA NE-3 LEQ

FIGURE 5.17: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA 5N LEQ

FIGURE 5.18: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM NW3 LEQ

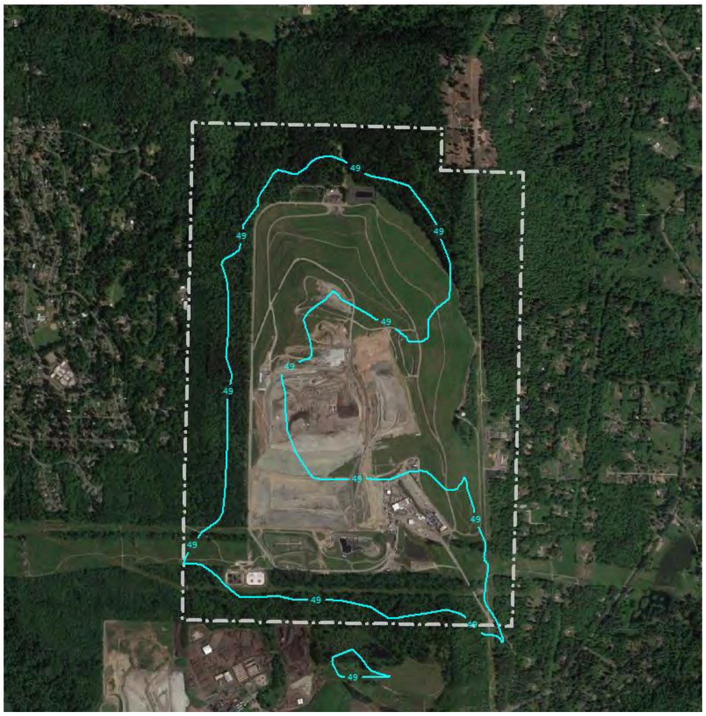


FIGURE 5.19: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA 9 LEQ

FIGURE 5.20: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA 8 LEQ

FIGURE 5.21: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA 5 LEQ

FIGURE 5.22: 5-DAY WEEK - ALTERNATIVE 3 OPTION 1 10AM AREA 9 LOW LEQ

5.3 5-Day Week - Alternative 3 Option 2 6am 39 dB Noise Contours

FIGURE 5.23: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA 5N-3 LEQ

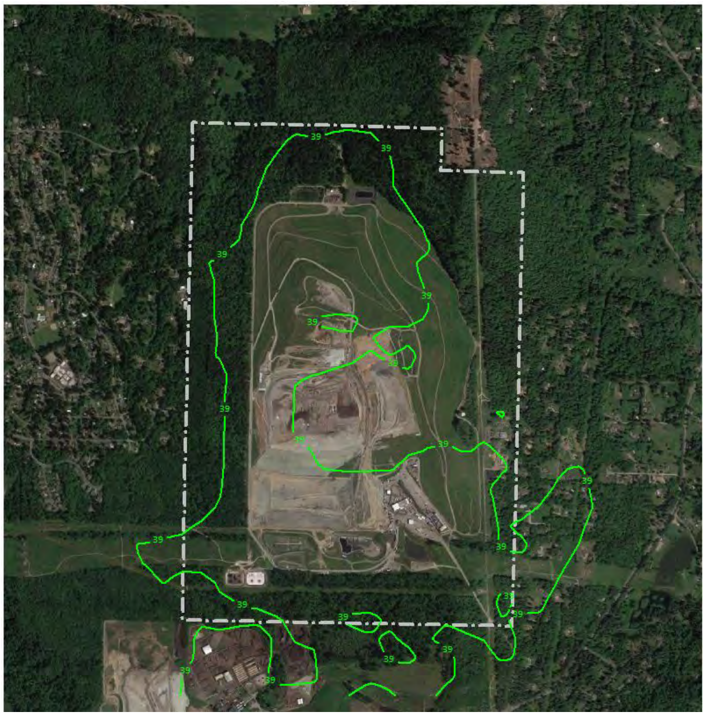


FIGURE 5.24: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA 6N-3 LEQ

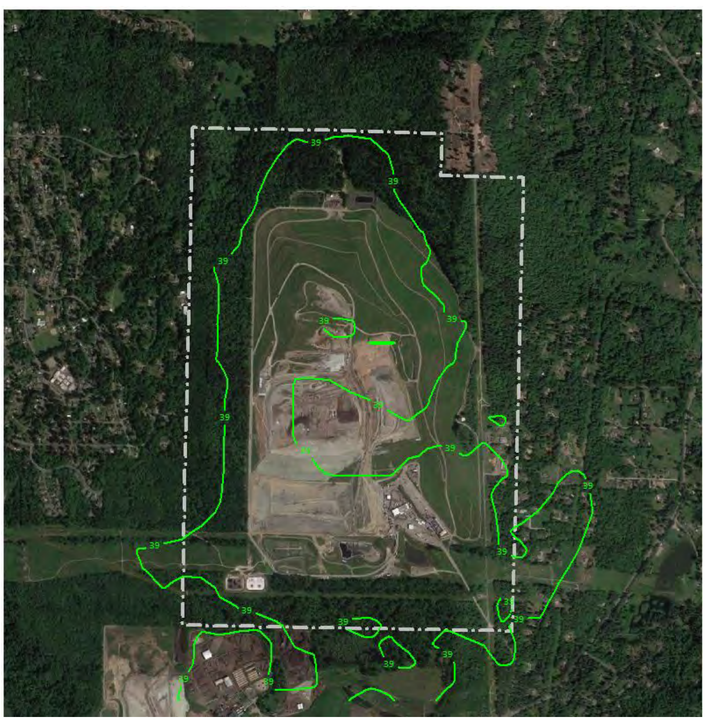


FIGURE 5.25: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA 6 LEQ

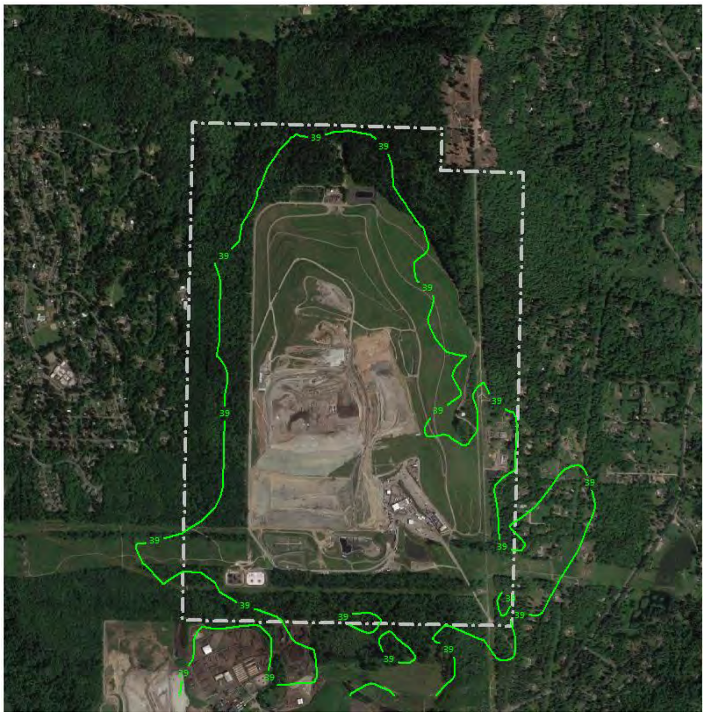


FIGURE 5.26: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA 6N LEQ

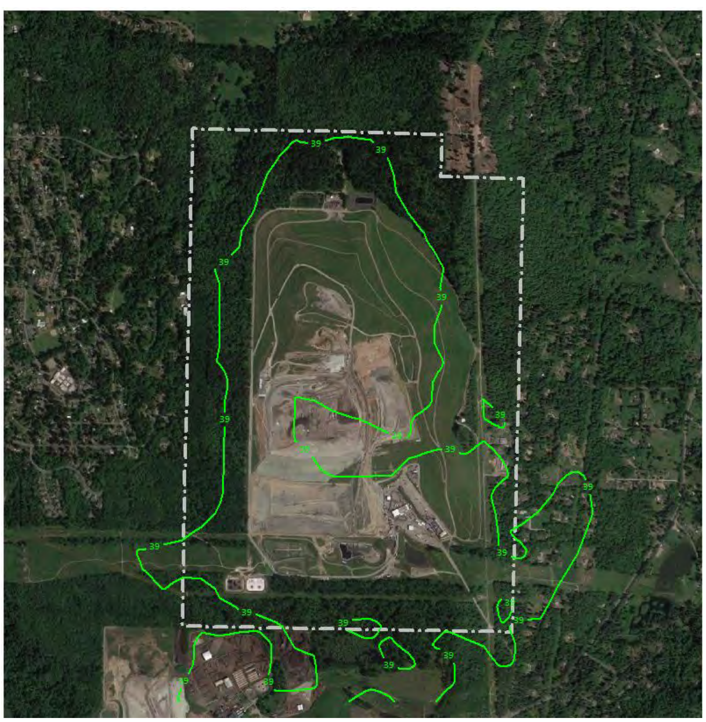


FIGURE 5.27: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA NE-3 LEQ

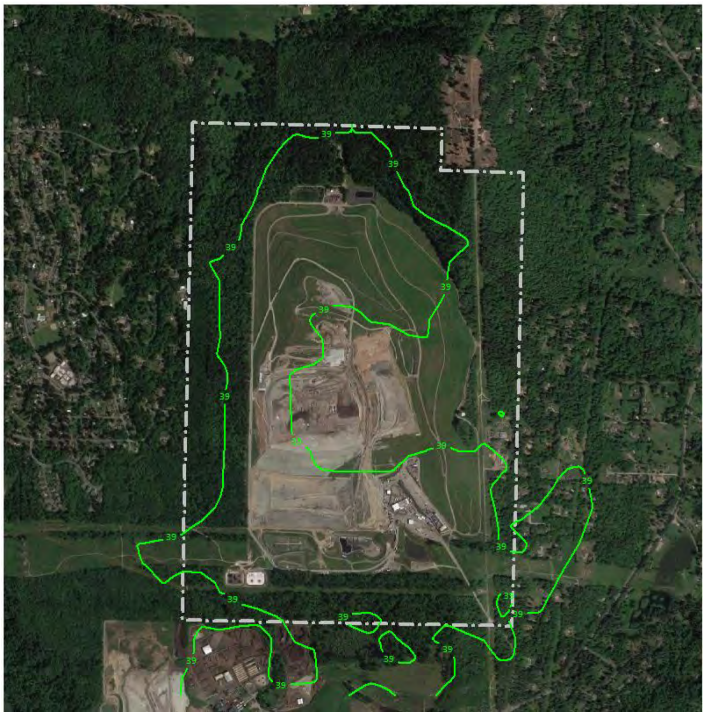


FIGURE 5.28: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA 5N LEQ

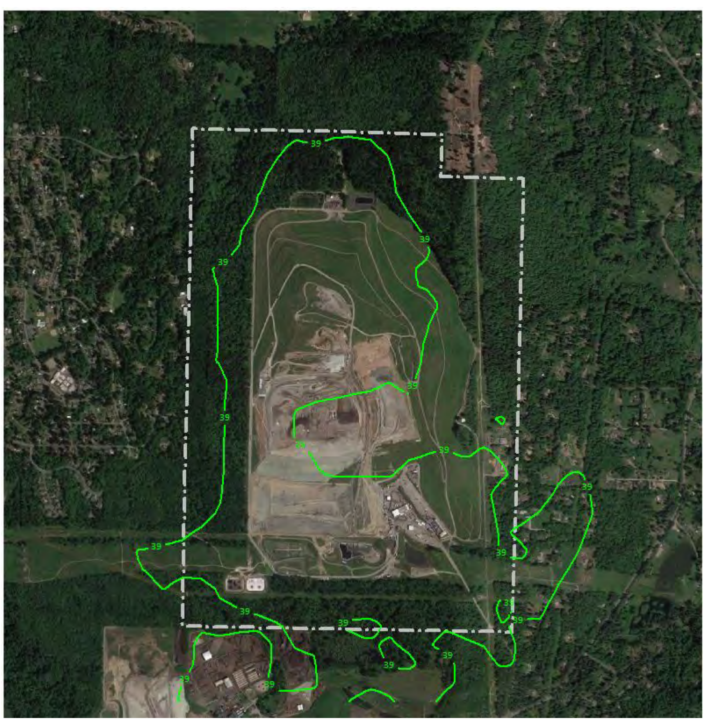


FIGURE 5.29: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM NW3 LEQ

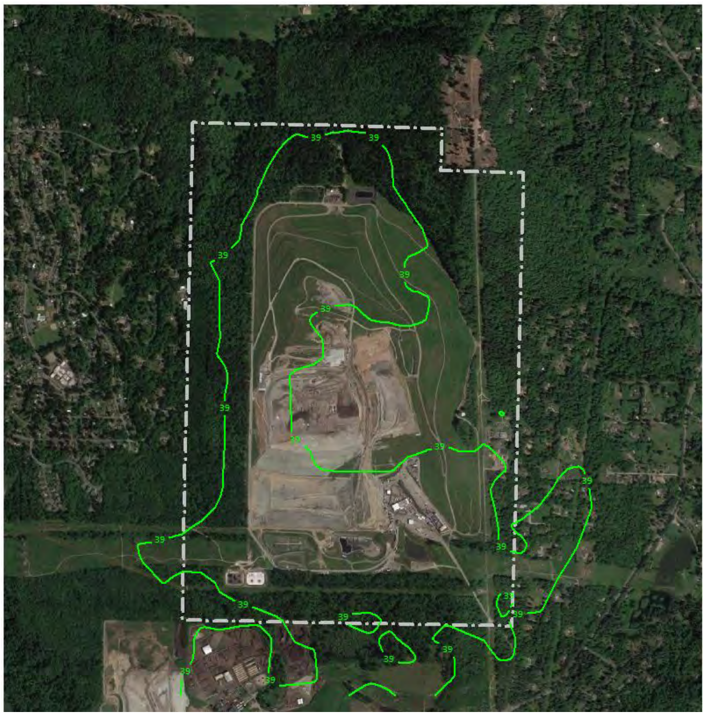
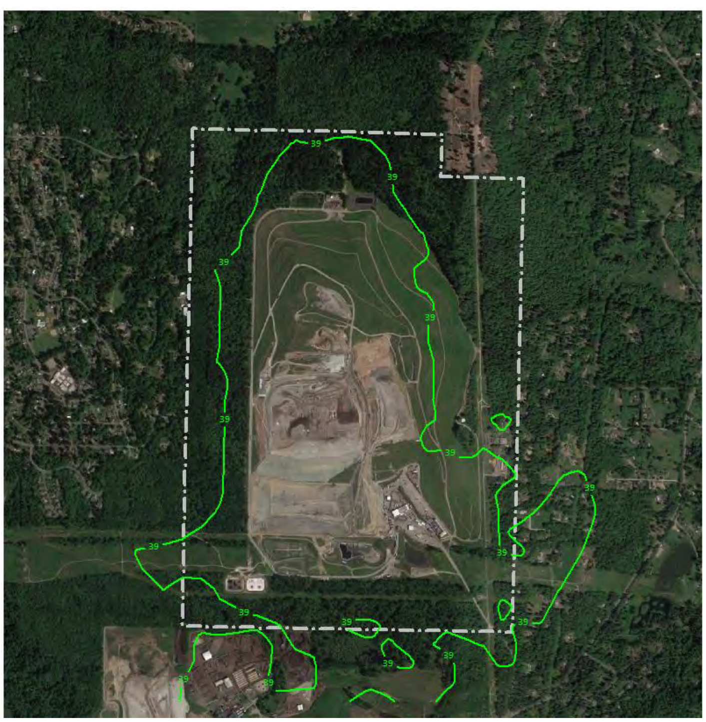
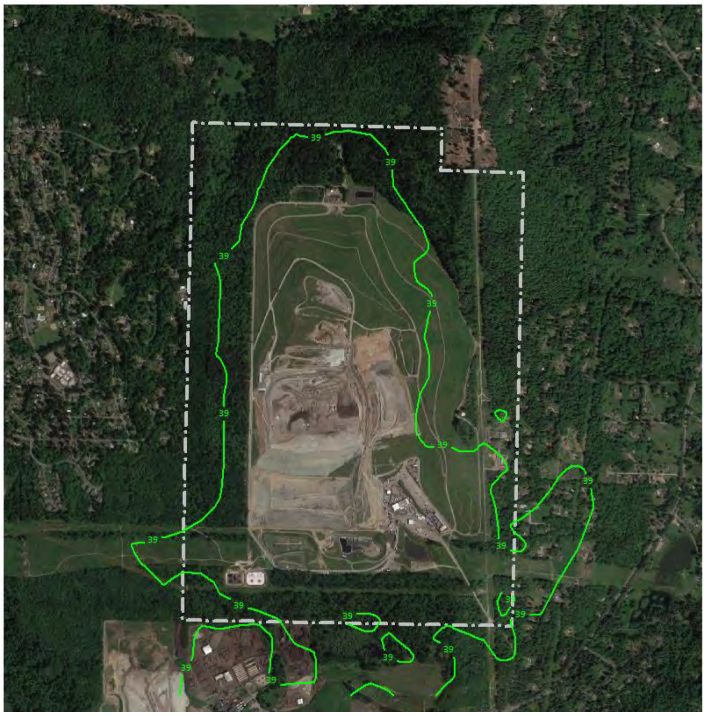


FIGURE 5.30: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA 9 LEQ



<u>FIGURE 5.31: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA 8 LEQ</u>



<u>FIGURE 5.32: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA 5 LEQ</u>

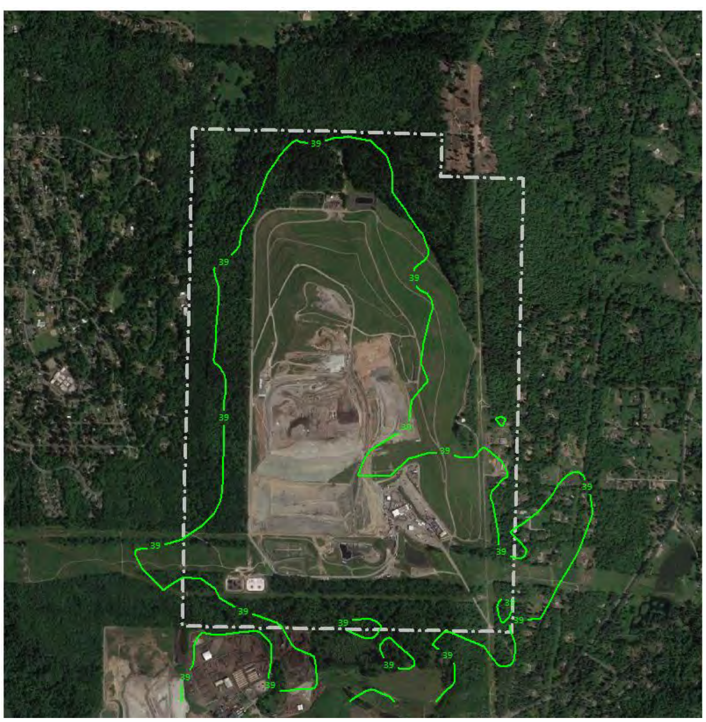
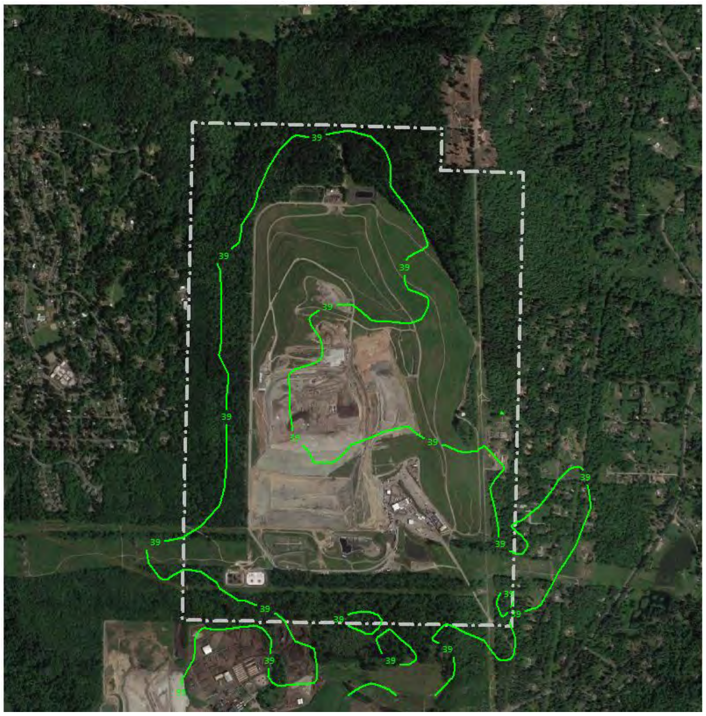


FIGURE 5.33: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 6AM AREA 9 LOW LEQ



5.4 5-Day Week - Alternative 3 Option 2 10am 49 dB Noise Contours

FIGURE 5.34: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA 5N-3 LEQ

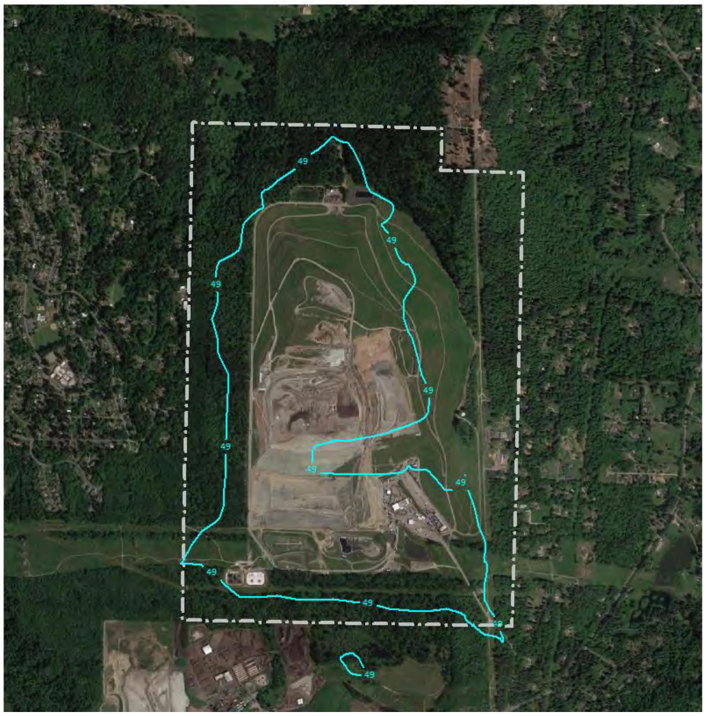


FIGURE 5.35: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA 6N-3 LEQ

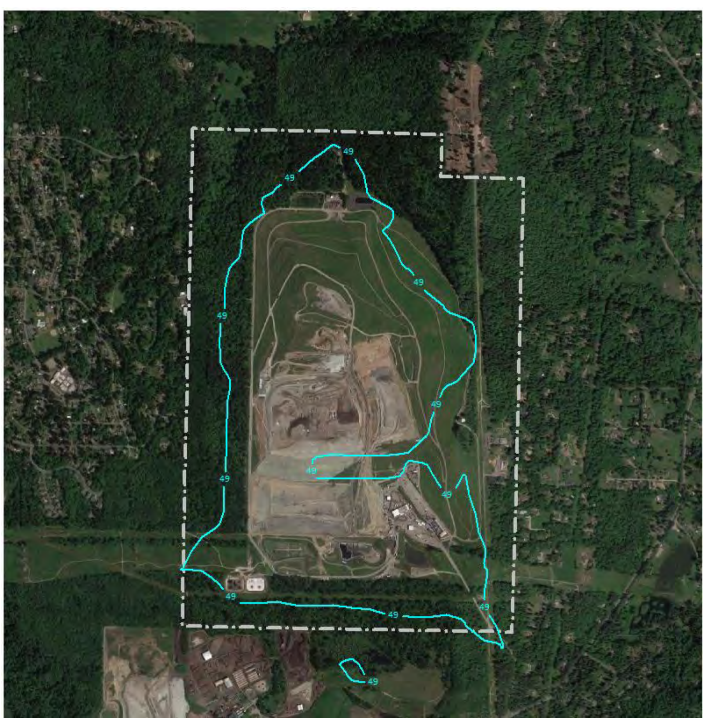


FIGURE 5.36: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA 6 LEQ

FIGURE 5.37: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA 6N LEQ

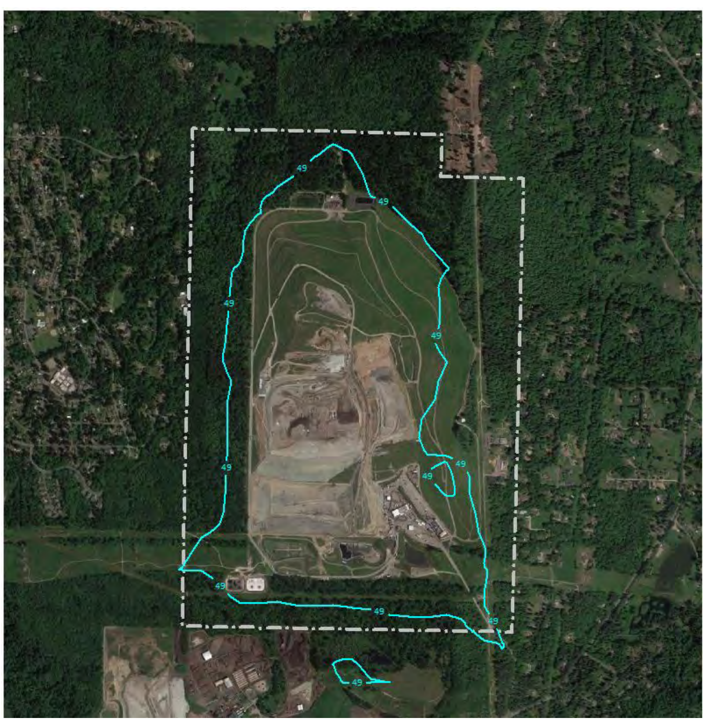


FIGURE 5.38: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA NE-3 LEQ

FIGURE 5.39: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA 5N LEQ

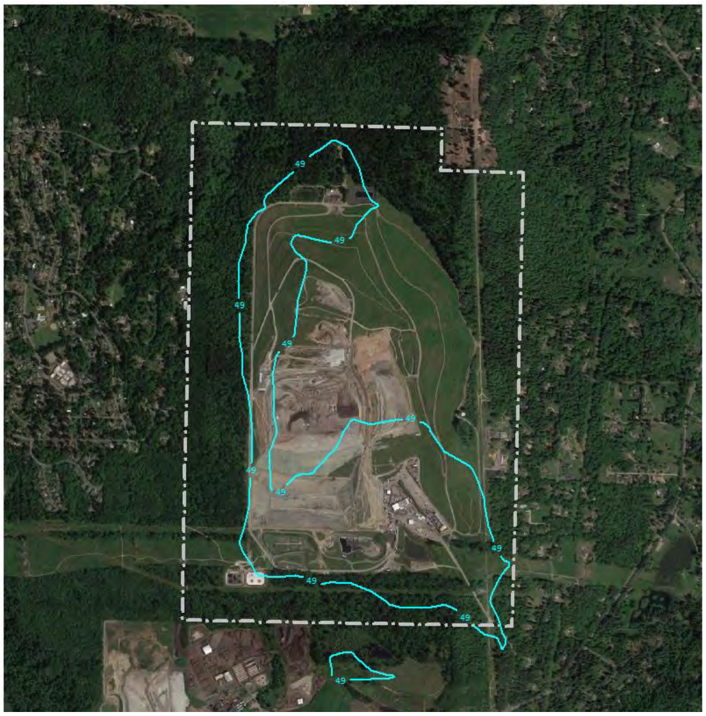
FIGURE 5.40: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM NW3 LEQ

FIGURE 5.41: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA 9 LEQ

FIGURE 5.42: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA 8 LEQ

FIGURE 5.43: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA 5 LEQ

FIGURE 5.44: 5-DAY WEEK - ALTERNATIVE 3 OPTION 2 10AM AREA 9 LOW LEQ



5.5 5-Day Week - Alternative 3 Option 3 6am 39 dB Noise Contours

For Alternative 3 Option 3 the loads per hour and facilities operations at the landfill are the same for 7-day and 5-day workweek. Thus, the noise contours are the same as presented in Section 4.5.

5.6 5-Day Week - Alternative 3 Option 3 10am 49 dB Noise Contours

FIGURE 5.45: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA 5N-3 LEQ

FIGURE 5.46: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA 6N-3 LEQ

FIGURE 5.47: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA 6 LEQ

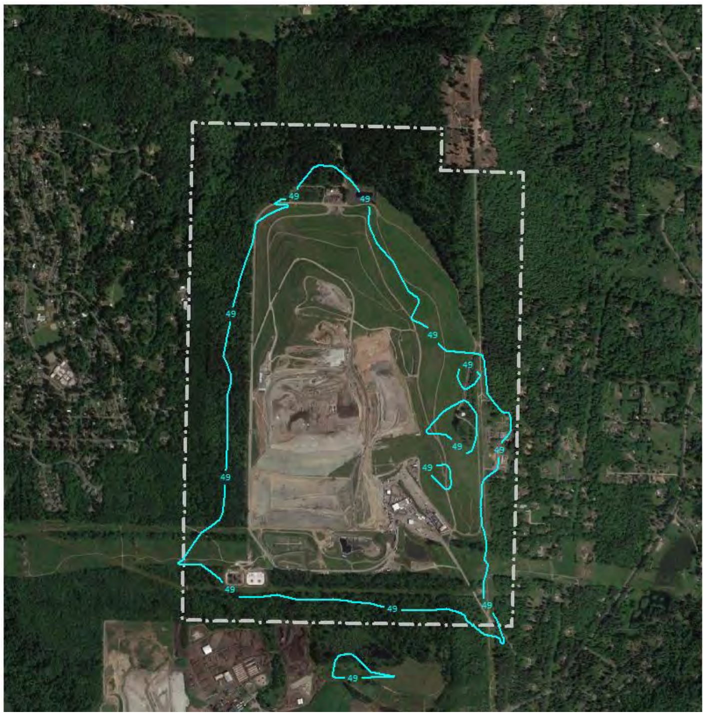


FIGURE 5.48: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA 6N LEQ

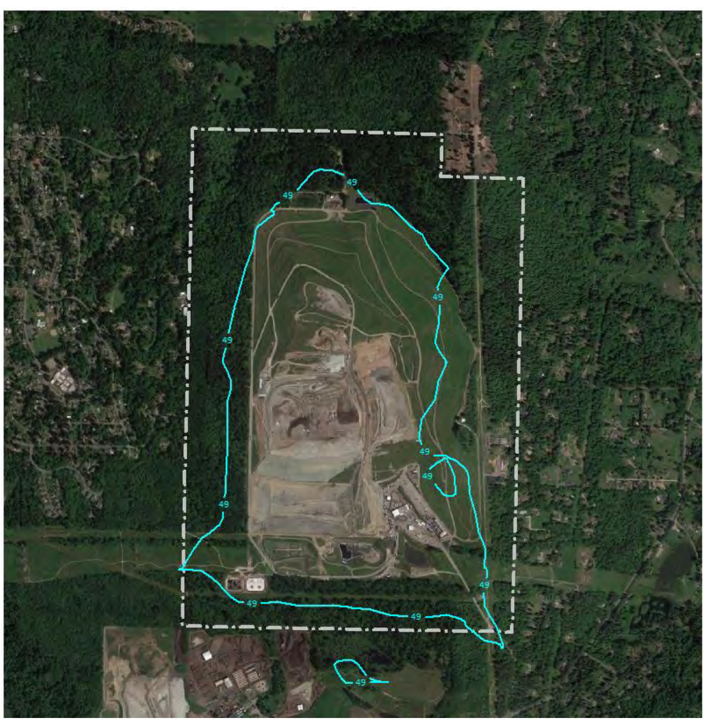


FIGURE 5.49: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA NE-3 LEQ

FIGURE 5.50: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA 5N LEQ

FIGURE 5.51: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM NW3 LEQ

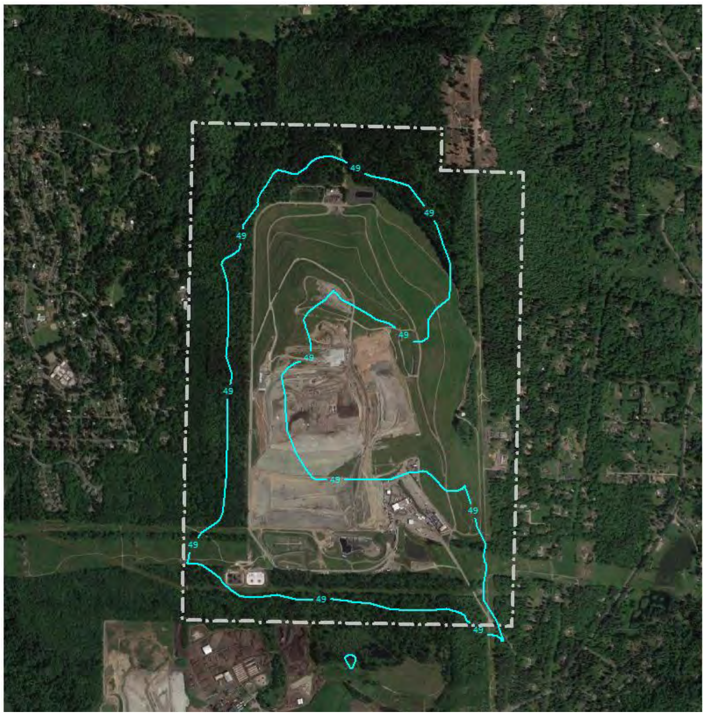


FIGURE 5.52: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA 9 LEQ

FIGURE 5.53: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA 8 LEQ

FIGURE 5.54: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA 5 LEQ

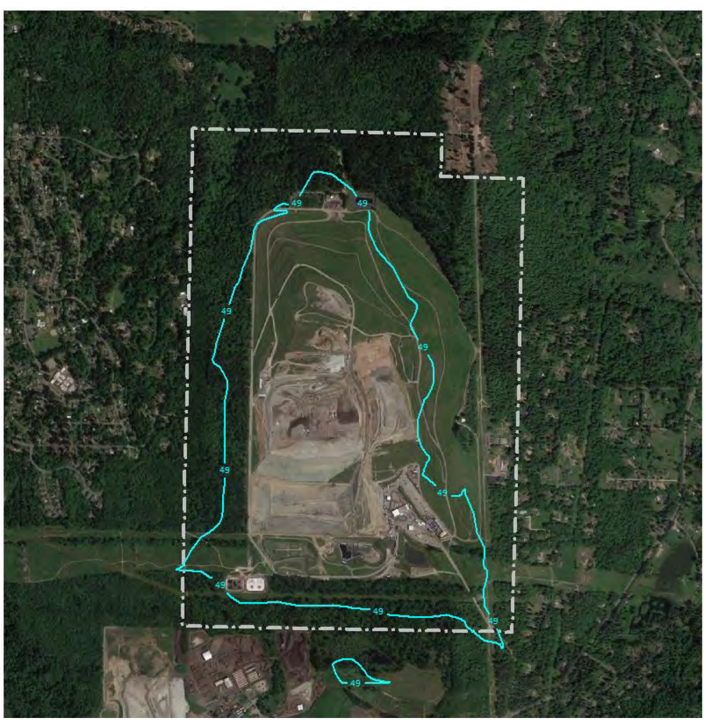
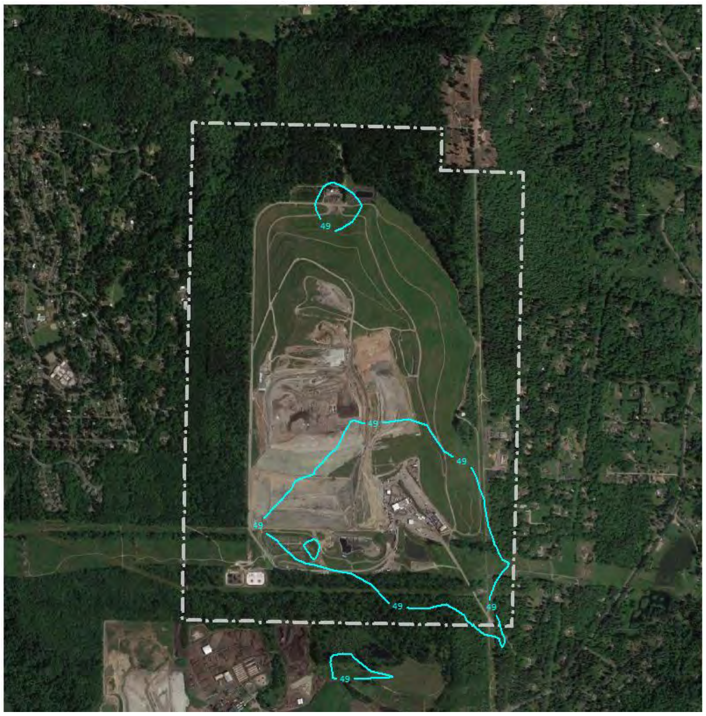


FIGURE 5.55: 5-DAY WEEK - ALTERNATIVE 3 OPTION 3 10AM AREA 9 LOW LEQ



6.0 PROJECTED SEPA NOISE INCREASES

Projected noise level increases for Alternative 3 relative to the No Action Alternative are provided in the following tables for each of the three Options. The 7-day and 5-day work week are considered for both the 6 a.m. and 10 a.m. hours of the day.

In all cases the projected increase remains significantly less than 10 dBA criteria proposed as the threshold for significance. The location with the highest increase, NM18 with an increase of about 6 dBA, was along the northern property line in an area that is very quiet under the current operations and site layout. Alternatives 1 and 2 with Option 1 or 3 would be quieter for that location since there is less activity nearby.

In cases where a reduction is indicated, this is due to the Alternative/Option having mitigation in place while the No Action Alternative would not have any mitigation. The mitigation is more than offsetting the increased loads for the alternative.

6.1 Alternative 3 6 a.m. 7-Day Week

TABLE 6.1: ALT3 OPT1 6AM (7-DAY WORK WEEK) NOISE INCREASE RE: NO ACTION

		No Action Alt Data							Alternative 3 Option 1 Data												
Position (4)	Measured Nighttime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	44	40.7	40.5	40.5	40.6	40.5	40.5 - 40.7	(1), (2)	38.5	38.0	38.1	38.2	38.0	38.0	38.1	38.6	38.3	38.1	37.7	37.7 - 38.6	-2.1
NM2	34.9	33.3	33.1	32.8	32.8	32.8	37.0 - 37.2		34.6	33.7	34.2	34.2	33.6	33.7	33.9	34.3	34.0	33.9	33.4	37.2 - 37.8	0.6
NM3	43.8	40.8	40.7	40.7	41.1	40.8	45.5 - 45.7		41.4	41.3	41.3	41.3	41.3	41.3	41.3	41.4	41.7	41.4	38.6	44.9 - 45.9	0.2
NM4	38.2	33.7	33.4	33.7	34.4	34.5	39.5 - 39.7		30.1	28.2	29.7	29.1	28.2	29.6	29.2	30.1	31.1	31.4	25.2	38.4 - 39.0	-0.7
NM5	40	29.3	29.4	29.7	32.1	31.0	40.4 - 40.7		30.6	29.4	30.0	30.2	29.4	30.4	30.4	30.6	32.0	31.6	24.6	40.1 - 40.6	-0.1
NM6	39.8	33.9	33.8	33.8	33.9	33.8	40.8 - 40.8		33.2	32.9	33.0	33.0	32.9	32.9	33.0	33.3	33.2	33.0	32.4	40.5 - 40.7	-0.1
NM7	37	27.5	26.4	25.4	26.0	25.5	37.3 - 37.5		27.6	24.8	26.2	26.5	23.5	24.6	25.5	27.5	26.5	25.6	22.2	37.1 - 37.5	0.0
NM8	37.5	40.2	40.1	40.0	40.1	40.0	41.9 - 42.1		40.4	40.1	40.2	40.2	40.1	40.1	40.1	40.4	40.2	40.2	39.9	41.9 - 42.2	0.1
NM9	33.5	37.6	36.9	36.6	36.8	36.7	38.4 - 39.0		38.7	37.8	38.0	38.1	37.7	37.8	37.9	38.6	38.2	38.0	37.4	38.9 - 39.8	0.8
NM10	41.9	35.6	35.6	35.6	36.1	35.8	42.8 - 42.9		35.8	35.5	35.6	35.7	35.5	35.6	35.8	35.9	36.2	36.0	34.0	42.6 - 42.9	0.0
NM11	38.6	35.5	35.4	35.6	36.1	35.9	40.3 - 40.5		36.1	35.4	35.8	35.9	35.4	35.9	36.1	36.1	36.5	36.5	34.3	40.0 - 40.7	0.2
NM12	35	32.2	32.3	32.5	32.3	32.4	36.8 - 36.9		31.2	30.6	30.7	31.3	29.6	31.3	31.6	31.2	31.2	31.4	28.2	35.8 - 36.6	-0.3
NM13	36.9	33.6	33.6	33.9	33.8	34.1	38.6 - 38.7		31.3	30.2	30.7	31.2	29.8	31.6	31.7	31.3	31.6	32.2	27.1	37.3 - 38.2	-0.5
NM14	34.1	33.4	33.5	33.8	33.6	33.8	36.8 - 37.0		32.0	30.1	30.8	32.0	29.3	31.8	32.5	32.0	32.2	32.6	27.0	34.9 - 36.4	-0.6
NM15	41.1	31.4	31.5	32.4	31.4	32.0	41.5 - 41.6		30.8	28.9	31.0	30.8	28.6	32.5	32.0	30.7	30.8	31.7	25.2	41.2 - 41.7	0.1
NM16	36.6	31.4	31.6	31.6	31.4	31.4	37.7 - 37.8		28.6	28.0	29.1	29.1	27.3	28.6	28.9	28.4	28.4	28.6	26.6	37.0 - 37.3	-0.5
NM17	35	24.6	23.8	23.8	23.7	23.7	35.3 - 35.4		25.2	24.4	29.9	27.7	22.8	21.6	26.1	24.8	24.7	24.4	21.5	35.2 - 36.2	0.8
NM18	34.5	32.8	32.9	33.0	32.8	32.9	32.8 - 33.0	(1), (2)	32.5	33.1	32.3	32.6	32.3	32.7	32.9	32.5	32.5	32.6	30.8	30.8 - 33.1	0.1

Comments

1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1
5. Projected noise level shown is for siimilar site near property line.

TABLE 6.2: ALT3 OPT2 6AM (7-DAY WORK WEEK) NOISE INCREASE RE: NO ACTION

		No Action Alt Data							Alternative 3 Option 2 Data												
Position (4)	Measured Nighttime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	44	40.7	40.5	40.5	40.6	40.5	40.5 - 40.7	(1), (2)	38.0	37.6	37.7	37.7	37.5	37.6	37.6	38.1	37.8	37.7	37.4	37.4 - 38.1	-2.6
NM2	34.9	33.3	33.1	32.8	32.8	32.8	37.0 - 37.2		33.8	32.8	33.4	33.3	32.7	32.8	32.9	33.4	33.0	33.0	32.5	36.9 - 37.4	0.2
NM3	43.8	40.8	40.7	40.7	41.1	40.8	45.5 - 45.7		42.3	42.2	42.2	42.2	42.2	42.2	42.3	42.3	42.5	42.3	41.5	45.8 - 46.2	0.5
NM4	38.2	33.7	33.4	33.7	34.4	34.5	39.5 - 39.7		31.5	30.2	31.2	30.7	30.2	31.1	30.8	31.4	32.2	32.4	29.6	38.8 - 39.2	-0.5
NM5	40	29.3	29.4	29.7	32.1	31.0	40.4 - 40.7		32.0	31.3	31.8	31.7	31.3	32.0	31.9	32.0	33.1	32.7	30.4	40.4 - 40.8	0.1
NM6	39.8	33.9	33.8	33.8	33.9	33.8	40.8 - 40.8		32.4	32.2	32.2	32.2	32.1	32.2	32.2	32.5	32.4	32.2	31.7	40.4 - 40.5	-0.3
NM7	37	27.5	26.4	25.4	26.0	25.5	37.3 - 37.5		29.2	27.8	28.6	28.5	27.2	27.7	27.8	29.1	28.5	28.0	26.7	37.4 - 37.7	0.2
NM8	37.5	40.2	40.1	40.0	40.1	40.0	41.9 - 42.1		39.7	39.4	39.5	39.5	39.4	39.4	39.4	39.8	39.6	39.5	39.2	41.5 - 41.8	-0.3
NM9	33.5	37.6	36.9	36.6	36.8	36.7	38.4 - 39.0		37.6	36.6	36.9	36.9	36.4	36.6	36.6	37.5	37.0	36.7	36.1	38.0 - 39.0	0.0
NM10	41.9	35.6	35.6	35.6	36.1	35.8	42.8 - 42.9		36.5	36.4	36.5	36.5	36.4	36.5	36.5	36.6	36.9	36.7	35.9	42.9 - 43.1	0.2
NM11	38.6	35.5	35.4	35.6	36.1	35.9	40.3 - 40.5		36.7	36.4	36.7	36.6	36.4	36.8	36.7	36.8	37.1	37.1	36.1	40.5 - 40.9	0.4
NM12	35	32.2	32.3	32.5	32.3	32.4	36.8 - 36.9		35.8	35.9	36.0	35.9	35.7	36.2	36.0	35.8	35.9	35.9	35.5	38.3 - 38.6	1.7
NM13	36.9	33.6	33.6	33.9	33.8	34.1	38.6 - 38.7		33.1	33.0	33.2	33.1	32.8	33.8	33.4	33.1	33.4	33.8	32.1	38.1 - 38.6	-0.1
NM14	34.1	33.4	33.5	33.8	33.6	33.8	36.8 - 37.0		34.4	34.2	34.5	34.4	33.9	35.0	34.6	34.4	34.5	34.7	33.5	36.8 - 37.6	0.6
NM15	41.1	31.4	31.5	32.4	31.4	32.0	41.5 - 41.6		33.6	33.5	34.3	33.6	33.4	35.1	34.2	33.6	33.6	34.1	32.7	41.7 - 42.1	0.5
NM16	36.6	31.4	31.6	31.6	31.4	31.4	37.7 - 37.8		30.2	30.3	30.9	30.5	29.9	30.6	30.4	30.1	30.1	30.2	29.5	37.4 - 37.6	-0.2
NM17	35	24.6	23.8	23.8	23.7	23.7	35.3 - 35.4		28.6	28.8	31.6	30.0	28.3	28.0	29.1	28.4	28.4	28.3	27.9	35.8 - 36.6	1.2
NM18	34.5	32.8	32.9	33.0	32.8	32.9	32.8 - 33.0	(1), (2)	38.1	38.4	38.2	38.1	38.2	38.3	38.2	38.1	38.1	38.1	37.9	37.9 - 38.4	5.4

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

TABLE 6.3: ALT3 OPT3 6AM (7-DAY WORK WEEK) NOISE INCREASE RE: NO ACTION

		No Action Alt Data							Alternative 3 Option 3 Data												
Position (4)	Measured Nighttime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	44	40.7	40.5	40.5	40.6	40.5	40.5 - 40.7	(1), (2)	37.1	36.5	36.6	36.7	36.4	36.5	36.6	37.2	36.9	36.6	36.0	36.0 - 37.2	-3.5
NM2	34.9	33.3	33.1	32.8	32.8	32.8	37.0 - 37.2		33.3	31.9	32.7	32.7	31.8	32.0	32.3	32.8	32.4	32.3	31.6	36.6 - 37.2	0.0
NM3	43.8	40.8	40.7	40.7	41.1	40.8	45.5 - 45.7		41.0	40.8	40.9	40.9	40.8	40.9	40.9	41.0	41.3	41.0	37.7	44.8 - 45.7	0.0
NM4	38.2	33.7	33.4	33.7	34.4	34.5	39.5 - 39.7		29.4	27.0	28.9	28.2	27.0	28.8	28.3	29.3	30.5	30.8	22.3	38.3 - 38.9	-0.8
NM5	40	29.3	29.4	29.7	32.1	31.0	40.4 - 40.7		29.6	28.1	28.9	29.2	28.1	29.4	29.4	29.7	31.4	30.8	18.0	40.0 - 40.6	-0.1
NM6	39.8	33.9	33.8	33.8	33.9	33.8	40.8 - 40.8		30.5	30.2	30.2	30.3	30.1	30.1	30.2	30.7	30.5	30.3	29.1	40.2 - 40.3	-0.5
NM7	37	27.5	26.4	25.4	26.0	25.5	37.3 - 37.5		27.5	24.5	26.1	26.3	23.2	24.4	25.3	27.4	26.3	25.5	21.7	37.1 - 37.5	0.0
NM8	37.5	40.2	40.1	40.0	40.1	40.0	41.9 - 42.1		38.9	38.6	38.6	38.7	38.5	38.6	38.6	39.0	38.8	38.6	38.2	40.9 - 41.3	-0.8
NM9	33.5	37.6	36.9	36.6	36.8	36.7	38.4 - 39.0		36.6	35.2	35.6	35.7	35.0	35.2	35.4	36.5	35.8	35.5	34.4	37.0 - 38.3	-0.7
NM10	41.9	35.6	35.6	35.6	36.1	35.8	42.8 - 42.9		35.4	35.0	35.1	35.3	35.0	35.2	35.3	35.4	35.8	35.5	33.3	42.5 - 42.8	-0.1
NM11	38.6	35.5	35.4	35.6	36.1	35.9	40.3 - 40.5		35.6	34.9	35.4	35.5	34.9	35.5	35.6	35.7	36.1	36.1	33.7	39.8 - 40.5	0.0
NM12	35	32.2	32.3	32.5	32.3	32.4	36.8 - 36.9		30.9	30.2	30.3	31.0	29.2	31.0	31.3	30.9	30.9	31.1	27.6	35.7 - 36.5	-0.4
NM13	36.9	33.6	33.6	33.9	33.8	34.1	38.6 - 38.7		30.6	29.4	29.9	30.5	28.9	31.0	31.1	30.6	31.0	31.7	25.2	37.2 - 38.1	-0.6
NM14	34.1	33.4	33.5	33.8	33.6	33.8	36.8 - 37.0		31.6	29.5	30.3	31.6	28.5	31.4	32.1	31.6	31.8	32.2	25.6	34.7 - 36.3	-0.7
NM15	41.1	31.4	31.5	32.4	31.4	32.0	41.5 - 41.6		30.5	28.5	30.7	30.5	28.2	32.3	31.8	30.4	30.6	31.5	24.1	41.2 - 41.6	0.0
NM16	36.6	31.4	31.6	31.6	31.4	31.4	37.7 - 37.8		27.8	27.1	28.4	28.4	26.2	27.8	28.2	27.6	27.7	27.8	25.4	36.9 - 37.2	-0.6
NM17	35	24.6	23.8	23.8	23.7	23.7	35.3 - 35.4		25.0	24.3	29.9	27.6	22.5	21.3	26.0	24.6	24.5	24.2	21.1	35.2 - 36.2	0.8
NM18	34.5	32.8	32.9	33.0	32.8	32.9	32.8 - 33.0	(1), (2)	32.4	33.0	32.1	32.5	32.1	32.5	32.7	32.3	32.3	32.5	30.6	30.6 - 33.0	0.0

Comments

1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

6.2 Alternative 3 10 a.m. 7-Day Week

TABLE 6.4: ALT3 OPT1 10AM (7-DAY WORK WEEK) NOISE INCREASE RE: NO ACTION

		No Action Alt Data							Alternative 3 Option 1 Data												
Position (4)	Measured Daytime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	47.1	47.0	46.0	45.7	46.2	45.8	45.7 - 47.0	(1), (2)	44.5	42.3	42.6	42.5	41.7	42.2	42.0	44.9	43.2	42.2	43.4	41.7 - 44.9	-2.1
NM2	40.3	41.7	41.1	39.7	39.3	39.5	42.8 - 44.0		42.7	37.7	41.4	41.4	37.0	39.2	39.9	41.2	39.6	39.8	36.5	41.8 - 44.7	0.7
NM3	44.7	48.4	48.3	48.3	49.7	48.6	49.9 - 50.9		49.1	48.7	49.0	48.9	48.8	49.0	49.0	49.3	50.2	49.2	43.1	47.0 - 51.3	0.4
NM4	43.0	42.4	41.8	42.5	44.2	44.6	45.4 - 46.9		42.6	36.6	41.6	41.5	36.6	41.4	41.7	42.3	43.6	44.1	34.1	43.5 - 46.6	-0.3
NM5	42.9	41.1	41.3	41.7	44.8	43.6	45.1 - 47.0		41.8	38.3	41.1	41.6	38.4	41.6	41.9	41.8	44.0	43.6	32.5	43.3 - 46.5	-0.5
NM6	46.6	39.8	39.3	39.1	39.5	39.1	47.3 - 47.4		39.0	37.5	37.5	38.3	36.9	37.3	38.1	39.5	38.9	38.2	38.4	47.0 - 47.4	0.0
NM7	44.6	40.6	39.6	38.4	38.6	38.3	45.5 - 46.1		40.6	38.7	39.0	39.6	36.1	37.4	38.4	40.3	39.0	38.4	34.0	45.0 - 46.1	0.0
NM8	50.2	46.1	45.1	44.6	45.0	44.7	51.3 - 51.6		45.8	43.4	43.6	44.6	42.7	43.2	44.2	46.2	44.7	44.3	44.6	50.9 - 51.6	0.0
NM9	41.4	47.3	45.6	44.5	44.9	44.5	46.2 - 48.3		47.2	43.6	44.1	45.4	41.9	42.9	44.5	46.8	45.2	44.6	41.6	44.5 - 48.2	-0.1
NM10	48.0	42.9	42.8	43.1	44.5	43.6	49.1 - 49.6		43.5	41.9	42.9	43.3	42.0	43.1	43.4	43.7	44.7	44.1	38.5	48.5 - 49.7	0.1
NM11	45.5	43.3	43.4	44.0	45.3	44.9	47.6 - 48.4		44.0	40.9	43.9	43.8	41.0	44.3	44.2	44.1	45.3	45.4	37.8	46.2 - 48.5	0.1
NM12	38.7	39.4	39.9	40.6	39.5	40.1	42.1 - 42.7		39.8	42.3	41.9	40.3	40.3	42.8	41.1	39.6	39.7	40.5	32.1	39.6 - 44.2	1.5
NM13	44.7	41.3	41.6	42.9	42.2	43.2	46.3 - 47.0		41.5	38.9	42.7	41.6	39.4	43.7	42.7	41.3	42.0	43.4	34.4	45.1 - 47.3	0.3
NM14	39.7	41.4	41.7	42.8	41.8	42.7	43.6 - 44.5		41.8	41.1	43.2	42.1	39.9	44.3	43.0	41.7	42.0	43.2	33.2	40.6 - 45.6	1.1
NM15	42.0	40.5	41.0	43.0	40.6	42.3	44.3 - 45.6		40.7	38.8	43.6	41.0	39.3	45.6	43.3	40.5	40.7	42.7	29.7	42.2 - 47.1	1.5
NM16	40.0	37.3	38.5	38.3	37.1	37.6	41.8 - 42.3		37.2	39.9	41.0	38.9	38.1	40.7	38.5	36.5	36.6	37.3	31.4	40.6 - 43.6	1.3
NM17	39.0	33.8	31.1	31.1	30.7	30.7	39.6 - 40.2		34.5	40.1	42.9	39.5	37.2	26.0	36.7	33.2	32.9	31.9	25.2	39.2 - 44.4	4.2
NM18	38.2	38.9	39.6	40.1	38.9	39.5	38.9 - 40.1	(1), (2)	39.5	43.6	41.1	40.2	43.0	43.3	41.1	39.2	39.3	40.0	32.8	32.8 - 43.6	3.5

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1
5. Projected noise level shown is for siimilar site near property line.

TABLE 6.5: ALT3 OPT2 10AM (7-DAY WORK WEEK) NOISE INCREASE RE: NO ACTION

		No Action Alt Data							Alternative 3 Option 2 Data												
Position (4)	Measured Daytime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	47.1	47.0	46.0	45.7	46.2	45.8	45.7 - 47.0	(1), (2)	44.5	42.2	42.5	42.4	41.5	42.1	41.8	44.9	43.1	42.1	43.6	41.5 - 44.9	-2.1
NM2	40.3	41.7	41.1	39.7	39.3	39.5	42.8 - 44.0		42.6	37.5	41.4	41.3	36.7	39.0	39.8	41.1	39.5	39.7	36.4	41.8 - 44.6	0.6
NM3	44.7	48.4	48.3	48.3	49.7	48.6	49.9 - 50.9		49.0	48.6	48.9	48.8	48.7	48.9	48.9	49.2	50.1	49.1	45.4	48.1 - 51.2	0.3
NM4	43.0	42.4	41.8	42.5	44.2	44.6	45.4 - 46.9		42.6	36.7	41.6	41.5	36.7	41.4	41.7	42.3	43.6	44.2	35.7	43.7 - 46.6	-0.3
NM5	42.9	41.1	41.3	41.7	44.8	43.6	45.1 - 47.0		41.8	38.1	41.0	41.5	38.2	41.6	41.8	41.7	44.0	43.5	34.8	43.5 - 46.5	-0.5
NM6	46.6	39.8	39.3	39.1	39.5	39.1	47.3 - 47.4		38.9	37.3	37.4	38.2	36.7	37.2	37.9	39.5	38.8	38.1	38.6	47.0 - 47.4	0.0
NM7	44.6	40.6	39.6	38.4	38.6	38.3	45.5 - 46.1		40.7	38.8	39.2	39.8	36.3	37.6	38.6	40.4	39.1	38.6	34.5	45.0 - 46.1	0.0
NM8	50.2	46.1	45.1	44.6	45.0	44.7	51.3 - 51.6		45.7	43.2	43.4	44.4	42.5	43.0	44.1	46.1	44.6	44.2	44.7	50.9 - 51.6	0.0
NM9	41.4	47.3	45.6	44.5	44.9	44.5	46.2 - 48.3		47.1	43.4	43.9	45.3	41.6	42.7	44.4	46.8	45.0	44.4	41.6	44.5 - 48.2	-0.1
NM10	48.0	42.9	42.8	43.1	44.5	43.6	49.1 - 49.6		43.5	41.7	42.8	43.2	41.9	43.0	43.4	43.6	44.7	44.0	39.7	48.6 - 49.7	0.1
NM11	45.5	43.3	43.4	44.0	45.3	44.9	47.6 - 48.4		44.0	40.8	43.8	43.8	40.9	44.2	44.2	44.0	45.3	45.4	39.1	46.4 - 48.4	0.0
NM12	38.7	39.4	39.9	40.6	39.5	40.1	42.1 - 42.7		40.5	42.5	42.4	41.0	40.6	43.2	41.7	40.4	40.5	41.1	35.7	40.5 - 44.5	1.8
NM13	44.7	41.3	41.6	42.9	42.2	43.2	46.3 - 47.0		41.6	38.9	42.8	41.7	39.4	43.8	42.7	41.5	42.1	43.5	35.9	45.2 - 47.3	0.3
NM14	39.7	41.4	41.7	42.8	41.8	42.7	43.6 - 44.5		42.1	41.3	43.4	42.3	40.1	44.4	43.2	42.0	42.3	43.3	35.6	41.1 - 45.7	1.2
NM15	42.0	40.5	41.0	43.0	40.6	42.3	44.3 - 45.6		41.1	38.9	43.9	41.4	39.4	45.7	43.6	40.9	41.1	43.0	34.1	42.7 - 47.3	1.7
NM16	40.0	37.3	38.5	38.3	37.1	37.6	41.8 - 42.3		37.5	39.9	41.2	39.1	38.2	40.8	38.7	36.8	36.9	37.6	32.6	40.7 - 43.6	1.3
NM17	39.0	33.8	31.1	31.1	30.7	30.7	39.6 - 40.2		35.1	40.2	43.0	39.7	37.5	29.2	37.0	34.1	33.8	33.0	28.9	39.4 - 44.5	4.3
NM18	38.2	38.9	39.6	40.1	38.9	39.5	38.9 - 40.1	(1), (2)	42.8	45.0	43.6	43.2	44.5	45.0	43.7	42.7	42.7	43.1	40.9	40.9 - 45.0	4.9

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

TABLE 6.6: ALT3 OPT3 10AM (7-DAY WORK WEEK) NOISE INCREASEE RE: NO ACTION

		No Action Alt Data							Alternative 3 Option 3 Data												
Position (4)	Measured Daytime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	47.1	47.0	46.0	45.7	46.2	45.8	45.7 - 47.0	(1), (2)	44.4	42.1	42.5	42.3	41.5	42.0	41.8	44.9	43.1	42.1	43.3	41.5 - 44.9	-2.1
NM2	40.3	41.7	41.1	39.7	39.3	39.5	42.8 - 44.0		42.6	37.4	41.3	41.3	36.7	39.0	39.7	41.1	39.4	39.6	36.1	41.7 - 44.6	0.6
NM3	44.7	48.4	48.3	48.3	49.7	48.6	49.9 - 50.9		48.9	48.5	48.9	48.8	48.6	48.9	48.8	49.2	50.1	49.1	42.5	46.7 - 51.2	0.3
NM4	43.0	42.4	41.8	42.5	44.2	44.6	45.4 - 46.9		42.5	36.5	41.6	41.5	36.5	41.3	41.6	42.3	43.6	44.1	33.8	43.5 - 46.6	-0.3
NM5	42.9	41.1	41.3	41.7	44.8	43.6	45.1 - 47.0		41.7	37.9	40.9	41.4	38.1	41.5	41.7	41.6	43.9	43.4	30.8	43.2 - 46.4	-0.6
NM6	46.6	39.8	39.3	39.1	39.5	39.1	47.3 - 47.4		38.9	37.3	37.4	38.1	36.8	37.2	37.9	39.5	38.8	38.1	38.2	47.0 - 47.4	0.0
NM7	44.6	40.6	39.6	38.4	38.6	38.3	45.5 - 46.1		40.6	38.7	39.0	39.6	36.1	37.4	38.4	40.3	38.9	38.4	33.9	45.0 - 46.1	0.0
NM8	50.2	46.1	45.1	44.6	45.0	44.7	51.3 - 51.6		45.7	43.2	43.4	44.5	42.6	43.0	44.1	46.1	44.6	44.2	44.5	50.9 - 51.6	0.0
NM9	41.4	47.3	45.6	44.5	44.9	44.5	46.2 - 48.3		47.1	43.5	43.9	45.3	41.6	42.7	44.4	46.8	45.0	44.4	41.3	44.4 - 48.2	-0.1
NM10	48.0	42.9	42.8	43.1	44.5	43.6	49.1 - 49.6		43.4	41.6	42.7	43.1	41.8	42.9	43.3	43.5	44.6	44.0	37.9	48.4 - 49.6	0.0
NM11	45.5	43.3	43.4	44.0	45.3	44.9	47.6 - 48.4		43.9	40.7	43.7	43.7	40.7	44.1	44.1	43.9	45.2	45.3	37.2	46.1 - 48.4	0.0
NM12	38.7	39.4	39.9	40.6	39.5	40.1	42.1 - 42.7		39.7	42.3	41.9	40.3	40.3	42.8	41.1	39.5	39.7	40.5	31.6	39.5 - 44.2	1.5
NM13	44.7	41.3	41.6	42.9	42.2	43.2	46.3 - 47.0		41.3	38.7	42.6	41.5	39.2	43.7	42.6	41.2	41.9	43.4	33.7	45.0 - 47.2	0.2
NM14	39.7	41.4	41.7	42.8	41.8	42.7	43.6 - 44.5		41.8	41.0	43.1	42.0	39.8	44.2	43.0	41.6	42.0	43.1	32.6	40.5 - 45.5	1.0
NM15	42.0	40.5	41.0	43.0	40.6	42.3	44.3 - 45.6		40.6	38.7	43.6	41.0	39.2	45.5	43.3	40.4	40.6	42.6	28.9	42.2 - 47.1	1.5
NM16	40.0	37.3	38.5	38.3	37.1	37.6	41.8 - 42.3		37.0	39.8	41.0	38.9	38.0	40.6	38.4	36.3	36.4	37.2	30.9	40.5 - 43.5	1.2
NM17	39.0	33.8	31.1	31.1	30.7	30.7	39.6 - 40.2		34.4	40.1	42.9	39.5	37.2	25.8	36.6	33.2	32.9	31.9	25.0	39.2 - 44.4	4.2
NM18	38.2	38.9	39.6	40.1	38.9	39.5	38.9 - 40.1	(1), (2)	39.5	43.6	41.0	40.2	43.0	43.2	41.1	39.2	39.2	40.0	32.5	32.5 - 43.6	3.5

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

6.3 Alternative 3 6 a.m. 5-Day Week

TABLE 6.7: ALT3 OPT1 6AM (5-DAY WORK WEEK) NOISE INCREASE RE: NO ACTION

		No Action Alt Data							Alternative 3 Option 1 Data												
Position (4)	Measured Nighttime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	44	41.2	41.1	41.0	41.1	41.0	41.0 - 41.2	(1), (2)	38.8	38.4	38.4	38.5	38.3	38.4	38.4	38.9	38.6	38.5	37.4	37.4 - 38.9	-2.3
NM2	34.9	33.4	33.2	32.9	32.9	32.9	37.0 - 37.2		34.9	34.1	34.5	34.6	34.0	34.1	34.3	34.6	34.4	34.3	33.0	37.1 - 37.9	0.7
NM3	43.8	40.9	40.8	40.8	41.2	40.9	45.6 - 45.7		41.5	41.4	41.4	41.4	41.4	41.4	41.4	41.5	41.8	41.5	38.4	44.9 - 45.9	0.2
NM4	38.2	33.7	33.5	33.7	34.4	34.5	39.5 - 39.7		30.3	28.5	29.9	29.4	28.5	29.8	29.5	30.3	31.3	31.5	25.0	38.4 - 39.0	-0.7
NM5	40	29.4	29.4	29.7	32.1	31.1	40.4 - 40.7		30.8	29.7	30.3	30.5	29.7	30.7	30.6	30.8	32.2	31.8	23.9	40.1 - 40.7	0.0
NM6	39.8	34.5	34.4	34.4	34.5	34.4	40.9 - 40.9		33.7	33.5	33.5	33.6	33.5	33.5	33.5	33.8	33.7	33.6	32.0	40.5 - 40.8	-0.1
NM7	37	27.5	26.5	25.5	26.1	25.6	37.3 - 37.5		27.7	24.8	26.3	26.6	23.6	24.7	25.5	27.5	26.6	25.7	22.1	37.1 - 37.5	0.0
NM8	37.5	40.5	40.4	40.3	40.4	40.3	42.1 - 42.3		40.7	40.5	40.5	40.6	40.5	40.5	40.5	40.8	40.6	40.5	39.5	41.6 - 42.5	0.2
NM9	33.5	37.8	37.2	36.9	37.1	37.0	38.6 - 39.2		39.1	38.4	38.5	38.6	38.3	38.3	38.5	39.0	38.7	38.5	36.8	38.4 - 40.2	1.0
NM10	41.9	35.8	35.7	35.8	36.2	35.9	42.8 - 42.9		36.0	35.7	35.7	35.9	35.6	35.8	35.9	36.0	36.3	36.1	33.9	42.5 - 43.0	0.1
NM11	38.6	35.6	35.6	35.7	36.2	36.0	40.4 - 40.6		36.2	35.6	35.9	36.1	35.6	36.1	36.2	36.2	36.6	36.6	34.2	40.0 - 40.7	0.1
NM12	35	32.3	32.4	32.5	32.3	32.5	36.9 - 37.0		31.3	30.7	30.8	31.4	29.7	31.4	31.7	31.3	31.3	31.5	28.1	35.8 - 36.7	-0.3
NM13	36.9	33.7	33.7	34.1	33.9	34.2	38.6 - 38.8		31.4	30.4	30.9	31.3	30.0	31.7	31.8	31.4	31.7	32.4	26.8	37.3 - 38.2	-0.6
NM14	34.1	33.5	33.6	33.9	33.6	33.9	36.8 - 37.0		32.1	30.3	30.9	32.1	29.5	31.9	32.6	32.1	32.3	32.7	26.8	34.8 - 36.5	-0.5
NM15	41.1	31.4	31.5	32.4	31.5	32.1	41.5 - 41.6		30.9	29.0	31.0	30.8	28.7	32.5	32.0	30.8	30.9	31.7	25.0	41.2 - 41.7	0.1
NM16	36.6	31.5	31.7	31.7	31.5	31.5	37.8 - 37.8		28.7	28.2	29.2	29.2	27.5	28.8	29.0	28.6	28.6	28.7	26.4	37.0 - 37.3	-0.5
NM17	35	24.6	23.8	23.8	23.7	23.7	35.3 - 35.4		25.2	24.5	29.9	27.8	22.9	21.7	26.1	24.8	24.7	24.4	21.4	35.2 - 36.2	0.8
NM18	34.5	32.8	32.9	33.0	32.8	32.9	32.8 - 33.0	(1), (2)	32.5	33.2	32.3	32.7	32.3	32.7	32.9	32.5	32.5	32.6	30.8	30.8 - 33.2	0.2

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1
5. Projected noise level shown is for siimilar site near property line.

TABLE 6.8: ALT3 OPT2 6AM (5-DAY WORK WEEK) NOISE INCREASE RE: NO ACTION

		No Action Alt Data							Alternative 3 Option 2 Data												
Position (4)	Measured Nighttime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	44	41.2	41.1	41.0	41.1	41.0	41.0 - 41.2	(1), (2)	38.3	37.9	37.9	38.0	37.9	37.9	37.9	38.4	38.1	38.0	37.7	37.7 - 38.4	-2.8
NM2	34.9	33.4	33.2	32.9	32.9	32.9	37.0 - 37.2		33.9	33.0	33.6	33.5	32.9	33.0	33.1	33.5	33.2	33.2	32.7	36.9 - 37.5	0.3
NM3	43.8	40.9	40.8	40.8	41.2	40.9	45.6 - 45.7		42.9	42.8	42.8	42.8	42.8	42.8	42.8	42.9	43.1	42.9	42.2	46.1 - 46.5	0.8
NM4	38.2	33.7	33.5	33.7	34.4	34.5	39.5 - 39.7		32.1	31.0	31.9	31.4	31.0	31.8	31.5	32.0	32.7	32.9	30.5	38.9 - 39.3	-0.4
NM5	40	29.4	29.4	29.7	32.1	31.1	40.4 - 40.7		32.7	32.2	32.5	32.5	32.2	32.8	32.6	32.8	33.7	33.4	31.4	40.6 - 40.9	0.2
NM6	39.8	34.5	34.4	34.4	34.5	34.4	40.9 - 40.9		32.8	32.6	32.7	32.7	32.6	32.6	32.7	32.9	32.8	32.7	32.2	40.5 - 40.6	-0.3
NM7	37	27.5	26.5	25.5	26.1	25.6	37.3 - 37.5		29.7	28.4	29.1	29.0	27.9	28.3	28.4	29.6	29.0	28.5	27.5	37.5 - 37.7	0.2
NM8	37.5	40.5	40.4	40.3	40.4	40.3	42.1 - 42.3		39.9	39.7	39.7	39.7	39.6	39.7	39.7	40.0	39.8	39.7	39.5	41.6 - 41.9	-0.4
NM9	33.5	37.8	37.2	36.9	37.1	37.0	38.6 - 39.2		37.9	36.9	37.2	37.2	36.8	36.9	37.0	37.8	37.3	37.0	36.5	38.3 - 39.2	0.0
NM10	41.9	35.8	35.7	35.8	36.2	35.9	42.8 - 42.9		37.0	36.9	36.9	36.9	36.9	37.0	37.0	37.1	37.3	37.1	36.5	43.0 - 43.2	0.3
NM11	38.6	35.6	35.6	35.7	36.2	36.0	40.4 - 40.6		37.2	36.9	37.1	37.1	36.9	37.2	37.2	37.2	37.5	37.5	36.6	40.7 - 41.1	0.5
NM12	35	32.3	32.4	32.5	32.3	32.5	36.9 - 37.0		36.7	36.8	36.8	36.7	36.6	37.0	36.8	36.7	36.7	36.8	36.4	38.8 - 39.1	2.1
NM13	36.9	33.7	33.7	34.1	33.9	34.2	38.6 - 38.8		33.8	33.7	33.9	33.8	33.5	34.4	34.1	33.8	34.0	34.4	32.9	38.4 - 38.8	0.0
NM14	34.1	33.5	33.6	33.9	33.6	33.9	36.8 - 37.0		35.1	35.0	35.2	35.1	34.7	35.6	35.3	35.1	35.2	35.4	34.4	37.3 - 37.9	0.9
NM15	41.1	31.4	31.5	32.4	31.5	32.1	41.5 - 41.6		34.4	34.3	35.0	34.4	34.2	35.7	34.9	34.3	34.4	34.8	33.7	41.8 - 42.2	0.6
NM16	36.6	31.5	31.7	31.7	31.5	31.5	37.8 - 37.8		30.7	30.8	31.4	31.0	30.5	31.1	30.9	30.6	30.7	30.7	30.2	37.5 - 37.8	0.0
NM17	35	24.6	23.8	23.8	23.7	23.7	35.3 - 35.4		29.3	29.5	32.0	30.5	29.0	28.8	29.7	29.2	29.1	29.0	28.7	35.9 - 36.8	1.4
NM18	34.5	32.8	32.9	33.0	32.8	32.9	32.8 - 33.0	(1), (2)	38.7	39.0	38.8	38.7	38.8	38.9	38.8	38.7	38.7	38.7	38.6	38.6 - 39.0	6.0

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

Reducing the number of days where material is hauled to the site only affects county haul truck operation. For Option 3, there are no haul trucks stored at the landfill. So, there would not be change relative to the Alternative 3 Option 3 6 a.m. results for the 7-day work week.

6.4 Alternative 3 10 a.m. 5-Day Week

TABLE 6.9: ALT3 OPT1 10AM (5-DAY WORK WEEK) RE: NO ACTION ALTERNATIVE

		No Action Alt Data							Alternative 3 Option 1 Data												
Position (4)	Measured Daytime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	47.1	47.4	46.5	46.2	46.7	46.3	46.2 - 47.4	(1), (2)	44.9	42.7	43.0	42.9	42.1	42.6	42.4	45.2	43.5	42.7	43.6	42.1 - 45.2	-2.2
NM2	40.3	41.9	41.3	40.0	39.6	39.8	43.0 - 44.2		42.9	38.0	41.6	41.6	37.1	39.4	40.1	41.4	43.4	40.0	36.5	41.8 - 45.1	0.9
NM3	44.7	49.1	49.0	49.0	50.3	49.2	50.4 - 51.3		49.9	49.5	49.8	49.7	49.6	49.8	49.7	50.0	50.8	50.0	43.1	47.0 - 51.7	0.4
NM4	43.0	42.7	42.1	42.8	44.5	44.8	45.6 - 47.0		43.0	37.5	42.1	41.9	37.5	41.8	42.0	42.7	43.8	44.4	34.3	43.5 - 46.8	-0.2
NM5	42.9	41.5	41.8	42.1	45.1	43.9	45.3 - 47.2		42.4	39.1	41.7	42.1	39.3	42.2	42.3	42.3	45.2	43.9	32.6	43.3 - 47.2	0.0
NM6	46.6	40.2	39.7	39.5	40.0	39.6	47.4 - 47.5		39.4	38.0	38.0	38.7	37.5	37.8	38.5	39.9	39.3	38.7	38.5	47.1 - 47.4	-0.1
NM7	44.6	40.8	39.7	38.6	38.9	38.5	45.6 - 46.1		40.8	39.0	39.2	39.8	36.2	37.6	38.6	40.5	39.1	38.6	34.0	45.0 - 46.1	0.0
NM8	50.2	46.4	45.4	45.0	45.4	45.1	51.4 - 51.7		46.1	43.8	43.9	44.9	43.1	43.5	44.5	46.4	45.0	44.6	44.7	51.0 - 51.7	0.0
NM9	41.4	47.6	45.8	44.8	45.2	44.9	46.5 - 48.5		47.4	44.0	44.4	45.7	42.2	43.2	44.8	47.1	45.3	44.8	41.7	44.5 - 48.4	-0.1
NM10	48.0	43.4	43.3	43.6	44.9	44.1	49.3 - 49.7		44.1	42.6	43.5	43.9	42.7	43.7	44.0	44.3	45.1	44.6	38.6	48.5 - 49.8	0.1
NM11	45.5	43.8	43.8	44.4	45.7	45.3	47.7 - 48.6		44.5	41.7	44.5	44.3	41.7	44.8	44.7	44.6	45.6	45.8	37.9	46.2 - 48.7	0.1
NM12	38.7	40.0	40.4	41.0	40.0	40.6	42.4 - 43.0		40.5	42.9	42.4	40.9	40.7	43.2	41.6	40.3	39.2	41.1	32.2	39.6 - 44.5	1.5
NM13	44.7	41.8	42.0	43.2	42.6	43.5	46.5 - 47.2		42.0	39.6	43.2	42.1	39.8	44.2	43.1	41.9	41.7	43.9	34.5	45.1 - 47.5	0.3
NM14	39.7	42.0	42.3	43.2	42.4	43.1	44.0 - 44.8		42.5	41.7	43.7	42.7	40.3	44.7	43.6	42.4	41.3	43.7	33.3	40.6 - 45.9	1.1
NM15	42.0	41.1	41.6	43.4	41.2	42.7	44.6 - 45.8		41.4	39.6	44.4	41.6	39.9	46.1	43.7	41.2	41.8	43.2	29.8	42.3 - 47.5	1.7
NM16	40.0	37.7	38.8	38.7	37.6	37.9	42.0 - 42.4		37.7	40.2	41.3	39.3	38.3	40.9	38.9	37.1	39.0	37.8	31.5	40.6 - 43.7	1.3
NM17	39.0	34.3	31.9	31.9	31.5	31.5	39.7 - 40.3		35.0	40.3	43.0	39.7	37.2	26.2	37.0	33.9	37.5	32.7	25.2	39.2 - 44.5	4.2
NM18	38.2	39.5	40.0	40.5	39.5	40.0	39.5 - 40.5	(1), (2)	40.1	44.2	41.6	40.7	43.3	43.6	41.6	39.8	40.3	40.6	32.8	32.8 - 44.2	3.7

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1
5. Projected noise level shown is for siimilar site near property line.

TABLE 6.10: ALT3 OPT2 10AM (5-DAY WORK WEEK) RE: NO ACTION ALTERNATIVE

		No Action Alt Data							Alternative 3 Option 2 Data												
Position (4)	Measured Daytime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	47.1	47.4	46.5	46.2	46.7	46.3	46.2 - 47.4	(1), (2)	44.8	42.6	42.9	42.8	41.9	42.5	42.3	45.2	43.4	42.5	43.6	41.9 - 45.2	-2.2
NM2	40.3	41.9	41.3	40.0	39.6	39.8	43.0 - 44.2		42.8	37.8	41.5	41.5	36.9	39.2	40.0	41.4	43.3	39.9	36.4	41.8 - 45.1	0.9
NM3	44.7	49.1	49.0	49.0	50.3	49.2	50.4 - 51.3		49.8	49.4	49.7	49.7	49.5	49.7	49.7	50.0	50.7	49.9	43.7	47.2 - 51.7	0.4
NM4	43.0	42.7	42.1	42.8	44.5	44.8	45.6 - 47.0		43.0	37.5	42.1	41.9	37.5	41.9	42.0	42.7	43.8	44.4	34.9	43.6 - 46.8	-0.2
NM5	42.9	41.5	41.8	42.1	45.1	43.9	45.3 - 47.2		42.3	38.9	41.6	42.0	39.1	42.1	42.3	42.2	45.2	43.9	33.1	43.3 - 47.2	0.0
NM6	46.6	40.2	39.7	39.5	40.0	39.6	47.4 - 47.5		39.3	37.8	37.9	38.6	37.3	37.7	38.4	39.8	39.2	38.5	38.5	47.1 - 47.4	-0.1
NM7	44.6	40.8	39.7	38.6	38.9	38.5	45.6 - 46.1		40.9	39.1	39.4	39.9	36.4	37.9	38.8	40.7	39.2	38.8	34.5	45.0 - 46.2	0.1
NM8	50.2	46.4	45.4	45.0	45.4	45.1	51.4 - 51.7		46.0	43.6	43.8	44.7	42.9	43.3	44.4	46.3	44.8	44.5	44.6	50.9 - 51.7	0.0
NM9	41.4	47.6	45.8	44.8	45.2	44.9	46.5 - 48.5		47.4	43.8	44.2	45.5	41.9	43.0	44.6	47.0	45.2	44.7	41.5	44.5 - 48.3	-0.2
NM10	48.0	43.4	43.3	43.6	44.9	44.1	49.3 - 49.7		44.1	42.5	43.5	43.8	42.6	43.6	44.0	44.2	45.1	44.6	38.8	48.5 - 49.8	0.1
NM11	45.5	43.8	43.8	44.4	45.7	45.3	47.7 - 48.6		44.5	41.5	44.4	44.3	41.6	44.8	44.7	44.6	45.6	45.8	38.3	46.3 - 48.7	0.1
NM12	38.7	40.0	40.4	41.0	40.0	40.6	42.4 - 43.0		41.2	43.0	42.9	41.6	41.0	43.6	42.2	41.1	40.2	41.8	35.9	40.5 - 44.8	1.8
NM13	44.7	41.8	42.0	43.2	42.6	43.5	46.5 - 47.2		42.1	39.7	43.3	42.2	39.9	44.2	43.2	42.1	41.8	43.9	35.5	45.2 - 47.5	0.3
NM14	39.7	42.0	42.3	43.2	42.4	43.1	44.0 - 44.8		42.8	41.9	43.9	43.0	40.5	44.9	43.8	42.7	41.6	43.9	35.4	41.1 - 46.0	1.2
NM15	42.0	41.1	41.6	43.4	41.2	42.7	44.6 - 45.8		41.8	39.7	44.6	42.1	40.0	46.2	44.0	41.7	42.2	43.5	34.2	42.7 - 47.6	1.8
NM16	40.0	37.7	38.8	38.7	37.6	37.9	42.0 - 42.4		38.0	40.3	41.4	39.5	38.4	41.1	39.1	37.4	39.2	38.1	32.7	40.7 - 43.8	1.4
NM17	39.0	34.3	31.9	31.9	31.5	31.5	39.7 - 40.3		35.6	40.5	43.1	40.0	37.5	29.5	37.4	34.7	37.8	33.7	29.1	39.4 - 44.6	4.3
NM18	38.2	39.5	40.0	40.5	39.5	40.0	39.5 - 40.5	(1), (2)	43.2	45.4	44.0	43.5	44.8	45.3	44.0	43.1	43.3	43.5	41.1	41.1 - 45.4	4.9

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

TABLE 6.11: ALT3 OPT3 10AM (5-DAY WORK WEEK) RE: NO ACTION ALTERNATIVE

		No Action Alt Data							Alternative 3 Option 3 Data												
Position (4)	Measured Daytime LEQ	Area 6	Area 6N	Area 5N	Area 8	Area 5	Projected Cumulative Range	Comments	Area 6	NE-3	Area 6N-3	Area 6N	NW-3	Area 5N-3	Area 5N	Area 9	Area 8	Area 5	Area 9-Low	Projected Cumulative Range	Increase (3)
NM1	47.1	47.4	46.5	46.2	46.7	46.3	46.2 - 47.4	(1), (2)	44.8	42.6	42.8	42.7	42.0	42.4	42.2	45.2	43.4	42.5	43.4	42.0 - 45.2	-2.2
NM2	40.3	41.9	41.3	40.0	39.6	39.8	43.0 - 44.2		42.8	37.8	41.5	41.5	36.8	39.2	39.9	41.3	43.3	39.9	36.2	41.7 - 45.1	0.9
NM3	44.7	49.1	49.0	49.0	50.3	49.2	50.4 - 51.3		49.7	49.4	49.7	49.6	49.5	49.7	49.6	49.9	50.7	49.8	42.6	46.8 - 51.7	0.4
NM4	43.0	42.7	42.1	42.8	44.5	44.8	45.6 - 47.0		42.9	37.4	42.0	41.8	37.4	41.8	42.0	42.7	43.8	44.4	34.0	43.5 - 46.8	-0.2
NM5	42.9	41.5	41.8	42.1	45.1	43.9	45.3 - 47.2		42.2	38.8	41.5	41.9	39.0	42.0	42.2	42.1	45.2	43.8	31.0	43.2 - 47.2	0.0
NM6	46.6	40.2	39.7	39.5	40.0	39.6	47.4 - 47.5		39.3	37.9	37.9	38.6	37.3	37.7	38.4	39.8	39.2	38.5	38.4	47.1 - 47.4	-0.1
NM7	44.6	40.8	39.7	38.6	38.9	38.5	45.6 - 46.1		40.8	39.0	39.2	39.8	36.2	37.6	38.6	40.5	39.1	38.6	34.0	45.0 - 46.1	0.0
NM8	50.2	46.4	45.4	45.0	45.4	45.1	51.4 - 51.7		46.0	43.6	43.8	44.8	43.0	43.4	44.4	46.3	44.9	44.5	44.5	51.0 - 51.7	0.0
NM9	41.4	47.6	45.8	44.8	45.2	44.9	46.5 - 48.5		47.4	43.9	44.2	45.5	41.9	43.0	44.6	47.0	45.2	44.7	41.4	44.4 - 48.3	-0.2
NM10	48.0	43.4	43.3	43.6	44.9	44.1	49.3 - 49.7		44.0	42.4	43.4	43.7	42.5	43.5	43.9	44.1	45.0	44.5	38.0	48.4 - 49.8	0.1
NM11	45.5	43.8	43.8	44.4	45.7	45.3	47.7 - 48.6		44.4	41.4	44.3	44.2	41.4	44.7	44.6	44.5	45.6	45.7	37.4	46.1 - 48.6	0.0
NM12	38.7	40.0	40.4	41.0	40.0	40.6	42.4 - 43.0		40.4	42.8	42.4	40.9	40.7	43.2	41.6	40.2	39.1	41.0	31.7	39.5 - 44.5	1.5
NM13	44.7	41.8	42.0	43.2	42.6	43.5	46.5 - 47.2		41.9	39.4	43.1	42.0	39.6	44.1	43.0	41.8	41.6	43.8	33.9	45.0 - 47.4	0.2
NM14	39.7	42.0	42.3	43.2	42.4	43.1	44.0 - 44.8		42.4	41.7	43.7	42.7	40.2	44.7	43.5	42.4	41.2	43.6	32.7	40.5 - 45.9	1.1
NM15	42.0	41.1	41.6	43.4	41.2	42.7	44.6 - 45.8		41.3	39.5	44.4	41.6	39.8	46.1	43.7	41.1	41.8	43.1	29.1	42.2 - 47.5	1.7
NM16	40.0	37.7	38.8	38.7	37.6	37.9	42.0 - 42.4		37.5	40.2	41.3	39.2	38.2	40.9	38.8	36.9	38.9	37.7	31.0	40.5 - 43.7	1.3
NM17	39.0	34.3	31.9	31.9	31.5	31.5	39.7 - 40.3		34.9	40.3	43.0	39.7	37.2	26.0	37.0	33.9	37.4	32.7	25.0	39.2 - 44.5	4.2
NM18	38.2	39.5	40.0	40.5	39.5	40.0	39.5 - 40.5	(1), (2)	40.1	44.2	41.6	40.7	43.3	43.5	41.6	39.8	40.3	40.5	32.6	32.6 - 44.2	3.7

Comments
1. Monitoring location within CHRLF property line. Projected noise levels shown for similar site near property line.
2. The measured community noise level already contained significant amounts of Landfill noise. Increases calculated as the difference in No Action and Action Alternative levels.
3. Difference in projected cumulative levels.
4. Reference Figure 7.1

7.0 MITIGATION

Figure 7.1 shows potential mitigation for the North Facilities. The noise wall along the northwest corner of the haul truck route (or other equivalent form of mitigation) would also be required for Alternative 3 since there would be vehicular traffic in that area.

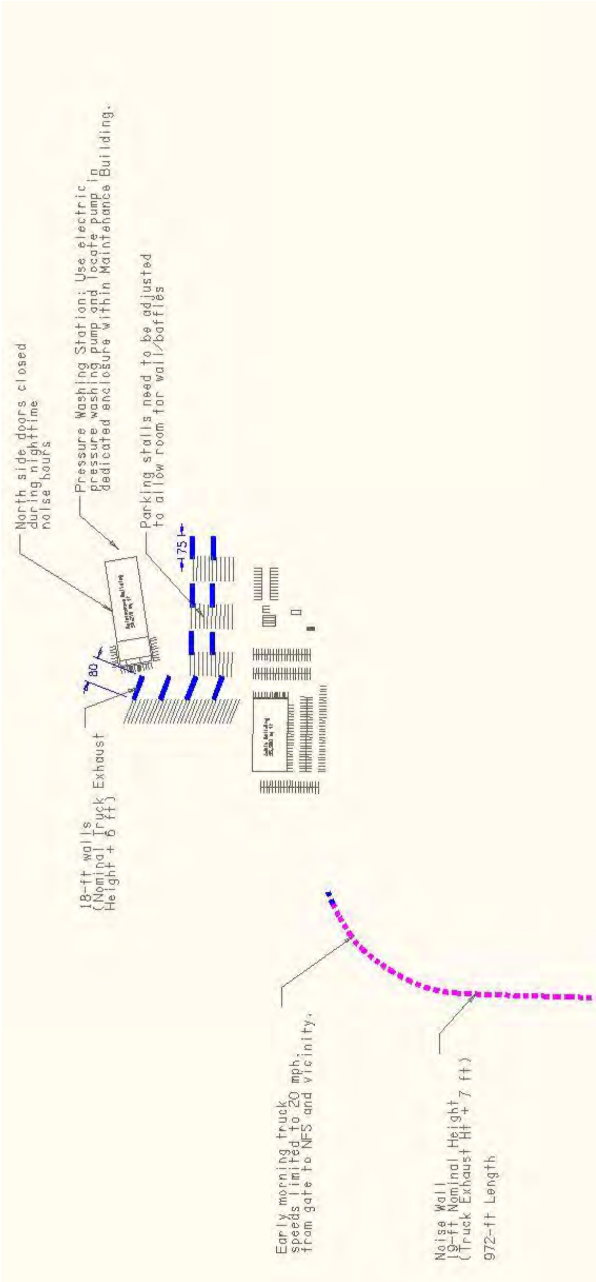
The 2019 noise analysis (limited to the 7-day workweek) prescribed a 750-foot long wall that was 5 feet above the height of the truck exhaust (resulting in a nominal 17-foot wall height); the revised analysis for the 7-day workweek operations maintains the 750-foot length, but the specified height is increased to 7 feet above the truck exhaust (nominally 19-foot wall)[1]. The mitigation for the 5-day workweek would be to extend the wall on the north end so that the wall is 972 feet in length and continue to maintain the wall height of 7 feet above the truck exhaust (nominal 19-foot height).

The length of the noise wall shown in Figure 7.1 is 972 feet. This was the minimum mitigation for the 5-day work week scenario. The length of the wall could be shortened to 750 feet as shown in the DEIS if the 7-day work week were used. Height of the wall was the height of the trucks + 7 feet (about 19 feet).

As mentioned in the summary, a mobile noise wall or screen system, similar to that described for use in the early stages of Area 9 filling (see Section 13.4, main report), would likely be required while the landfilling is occurring in the northwest corner of Alternative 3. The reason is that the terrain in the buffer drops down to a valley before rising again near the property line, and the vegetation would not provide the additional noise reduction that occurs along other portions of the western property line.

[1] This height increase maintains the minimum wall height above the truck assuming a nominal 2-foot decrease in panel top elevation between adjacent panel sections.

<u>FIGURE 7.1: REVISED NORTH END MITIGATION</u>



With the 5-day week, the increase in the number of haul trucks and in their activity resulted in the need for an extension of the noise wall as shown in Figure 7.1. After implementation of the noise wall, there was still a small noise exceedance at some receiver locations for the North Facilities location as well as for Area 9 Low. It was found that by reducing warmup idle time from 10 minutes down to 5 minutes per truck that a sufficient reduction in noise level was achieved.

It is recommended that the reduction in idle time be implemented for all options, if possible, for minimum community noise exposure.

8.0 NOISE MODEL VALIDATION

Measured sound levels and projected sound levels were compared at locations on the eastern and western property lines. The results of the analysis are presented in Reference 5 (included as Appendix A). The projected levels generally matched the measured levels well. Haul truck noise in the southeast corner was overpredicted by the noise model compared to measured noise levels. This produces slightly conservative noise modeling results.

No changes were found to be necessary to the noise model used for the CHRLF Final EIS noise technical report.

9.0 TREE ATTENUATION

An analysis was performed to review the noise model's prediction of sound attenuation through trees. Specifically, the objective was to determine if the attenuation was applicable to winter conditions where leaves are off the trees. The results of the analysis were reported in Reference 6 (included as Appendix B).

The tree attenuation model used in the DEIS noise prediction was compared against measured test data in an environment where there was no foliage on the trees within the western buffer zone. The propagation conditions during the noise measurements were likely slightly adverse and the measured spectral data matches the adverse propagation model well up to about 4 kHz above which the background noise limits the comparison. The results indicated that the model yields conservative A-weighted noise levels. Having leaves on the trees would result in lower noise levels than the model predicts.

If a neutral atmosphere were present during the tests, the results show that the model still overpredicted the A-weighted noise level that would be used for noise compliance (although by a lesser amount), but the high frequency spectral content was slightly underpredicted. These high frequencies do not generally influence the A-weighted noise levels from industrial sites.

The data indicate that the algorithm used to compute noise attenuation by trees in the noise model is slightly conservative in the prediction of A-weighted noise levels and a change in the noise model methodology does not appear to be warranted. The predicted noise levels are slightly higher than measured noise levels.

10.0 SUPPLEMENTAL ANALYSIS FOR RENTON (OPTION 3)

The discussion in this section provides supplemental analysis to the DEIS specific to the Renton site.

1. For the supplemental analysis, the currently empty lot to the northeast of the transfer station was assumed to be filled to approximately the level of Jefferson Street (332 ft MSL). This increases noise levels at that location for both the No Action Alternative and the Action Alternatives since the shielding provided by the excavation is eliminated or reduced.

   Also for the supplemental analysis, it was assumed that noise mitigation walls required for noise compliance would be accomplished by having an elevated perimeter wall height relative to the noise sources (primarily trucks) through a variance to Renton Code, or having noise mitigation walls as tall as Renton Code permits around the perimeter and then excavating the ground level of the new facilities down to achieve the same perimeter edge height relative to the noise source. The technical or economic feasibility are unknown at this time.

   The excavation method would yield approximately similar noise results to the mitigation described herein, which still incorporates the taller perimeter walls. Some adjustment (increase in wall height) would be necessary to account for slightly changed propagation angles between the facility operations and the community. Also, it would be likely that a barrier along the west side of the property line near the maintenance building would be required – the previously discussed mitigation did not include a wall along that portion of the property line.

2. Measurements and analysis were used to determine the expected increase in traffic noise if the landfill support facilities were moved to the Renton site.

Also, new analysis is provided to support the potential shift to a 5-day workweek at CHRLF. This only affects loads to the landfill and the number of trucks that may be based on the site. The transfer station and roads division operations are unchanged.

TABLE 10.1: RENTON 7-DAY NOISE MODEL OPERATIONS (UNCHANGED FROM DEIS)

	Existing		Alt 1		Alt 2		Alt 3	
	6am	**10am**	**6am**	**10am**	**6am**	**10am**	**6am**	**10am**
Description	Number/Use Factor							
Administrative Bldg AC			6	6	6	**6**	6	6
Maintenance Building AC			4	4	4	**4**	4	4
Maintenance Building Operations East			1	1	1	**1**	1	1
Maintenance Building Operations West			1	1	1	**1**	1	1
Pressure Wash			0	1	0	**1**	0	1
POV Lot			27	19	27	**19**	27	19
Truck Parking/Idling			25.65		26		30	
Truck Upper Lot Loop			25.65		26.1		29.8	
Truck Lower Lot Loop			38.47		39.1		44.7	
Transfer Station: With Commercial Trucks		3.27		3.82		**3.88**		4.44
Transfer Station: No Garbage Trucks present		3.27		3.82		**3.88**		4.44
Commercial Trucks Driving on Access Rd		3.27		3.82		**3.88**		4.44
Self Haul Vehicles on Access Rd		26.48		30.90		**31.41**		35.89
Roads Division Heavy Trucks		3.25		3.25		**3.25**		3.25
Roads Division Light Trucks		4.5		4.50		**4.5**		4.5
Roads Loading Activity		1		1		**1**		1
Roads Dump Truck Unloading		1		1		**1**		1
Roads Division Sweeper		0.059		0.059		**0.059**		0.059
Yard Truck		1.12		1.31		**1.33**		1.52

5-Day operations were calculated from the 7-day operations by multiplying truck operations by (7/5). This impacted the idling, trucks exiting from the upper and lower parking lots, and the yard truck operations. Transfer station hours and roads division operations are otherwise unaffected.

TABLE 10.2: RENTON 5-DAY NOISE MODEL OPERATIONS (UNCHANGED FROM DEIS)

	Existing		Alt 1		**Alt 2**		Alt 3	
	6am	10am	6am	10am	**6am**	**10am**	6am	10am
Description	Number/Use Factor							
Administrative Bldg AC			6	6	6	**6**	6	6
Maintenance Building AC			4	4	4	**4**	4	4
Maintenance Building Operations East			1	1	1	**1**	1	1
Maintenance Building Operations West			1	1	1	**1**	1	1
Pressure Wash			0	1	0	**1**	0	1
POV Lot			27	19	27	**19**	27	19
Truck Parking/Idling			35.90		36.5		41.7	
Truck Upper Lot Loop			35.90		36.5		41.7	
Truck Lower Lot Loop			53.86		54.8		62.6	
Transfer Station: With Commercial Trucks		3.27		3.82		**3.88**		4.44
Transfer Station: No Garbage Trucks present		3.27		3.82		**3.88**		4.44
Commercial Trucks Driving on Access Rd		3.27		3.82		**3.88**		4.44
Self Haul Vehicles on Access Rd		26.48		30.90		**31.41**		35.89
Roads Division Heavy Trucks		3.25		3.25		**3.25**		3.25
Roads Division Light Trucks		4.5		4.50		**4.5**		4.5
Roads Loading Activity		1		1		**1**		1
Roads Dump Truck Unloading		1		1		**1**		1
Roads Division Sweeper		0.059		0.059		**0.059**		0.059
Yard Truck		1.57		1.83		**1.87**		2.13

10.1 No Action Alternative 7-Day Week

10.1.1 Existing Traffic Noise

Measured, existing traffic noise at the site is shown in the Figure 10.1 and Figure 10.2. This is unchanged from what was reported in the body of the report and is reproduced here for reference only.

FIGURE 10.1: COMBINED LIBERTY RIDGE LOCAL TRAFFIC + NE 3RD/4TH ST NOISE 0600-0700

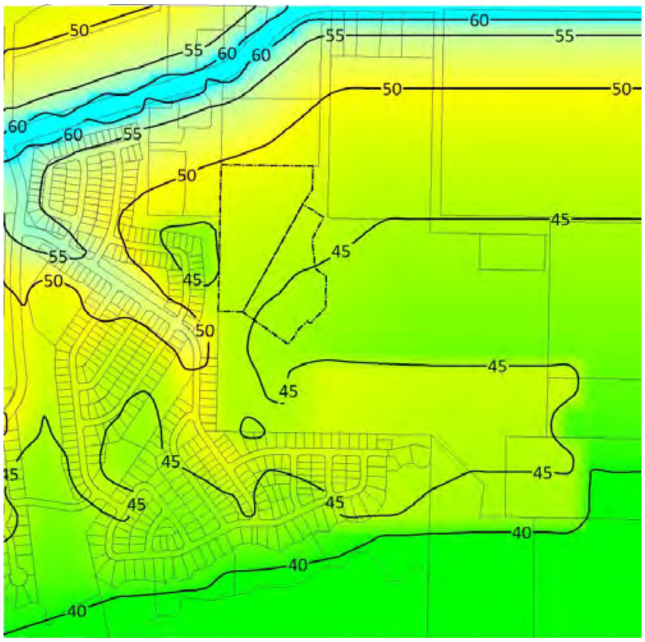
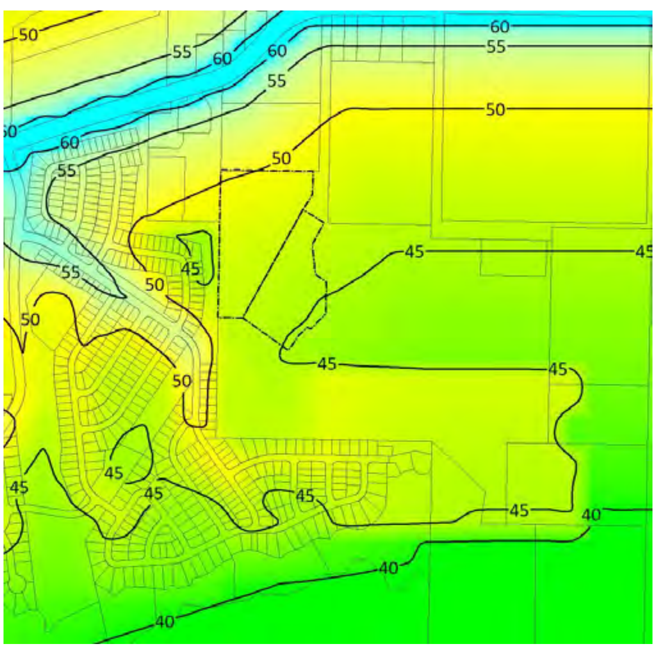


FIGURE 10.2: COMBINED LIBERTY RIDGE LOCAL TRAFFIC + NE 3RD/4TH ST NOISE 1000-1100



10.1.2 6 a.m. Operations

Traffic noise is only ambient noise since there are no transfer station operations and roads division noise is minimal/unknown.

Figure 10.3 shows the 50 dBA nighttime contour within the King County property boundary with residential properties. (Note: some contours extend slightly outside the property, but these are due to interpolation between analysis points. The level directly on the other side of barriers or abrupt terrain drop-offs should be within the allowable limits.

Figure 10.4 shows the cumulative noise level for the Renton Facilities operations and the anticipated traffic noise. The noise increase relative to the No Action case is presented in Figure 10.5. There are no significant differences except in the parcel which is now assumed to be filled to grade and no significant unavoidable impacts are created.

Note, the increase is computed by subtracting the 2046 (Alternative 3 completion year) No Action cumulative noise levels (computed from combining transfer station noise, roads division noise, and traffic noise) from the Alternative 3 cumulative noise levels (computed from facilities noise, transfer station noise, roads division noise, and traffic noise). Other alternatives would have a smaller increase due to less trucking activity.

FIGURE 10.3: ALTERNATIVE 3 OPTION 3 6 A.M. FACILITIES NOISE

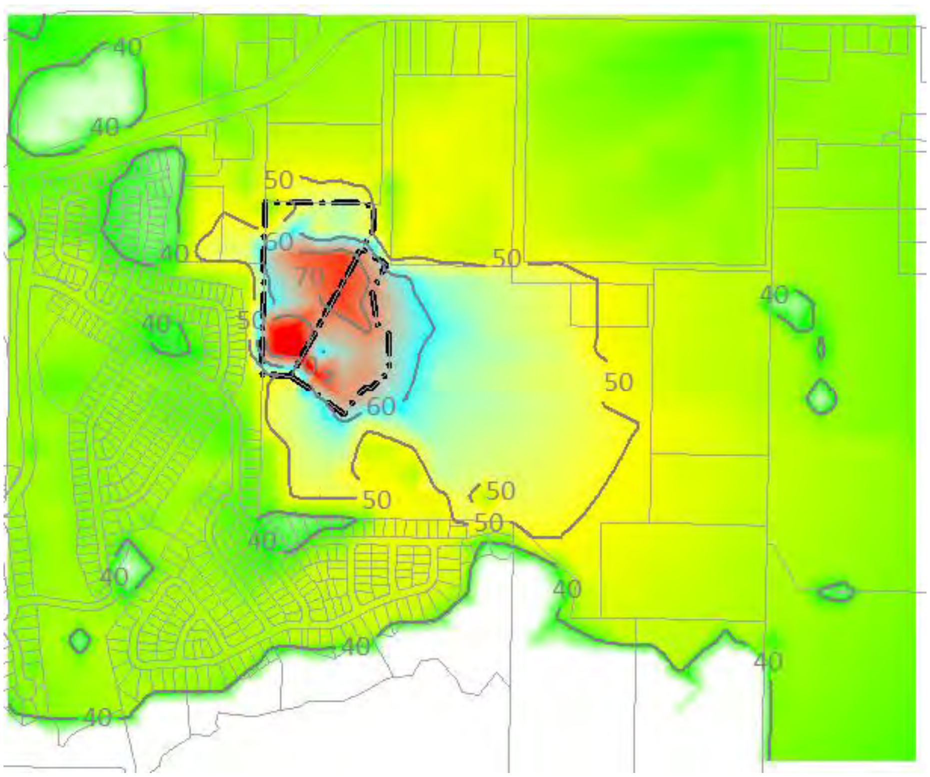


FIGURE 10.4: ALT 3 OPTION 3 6 A.M. CUMULATIVE FACILITIES + TRAFFIC NOISE

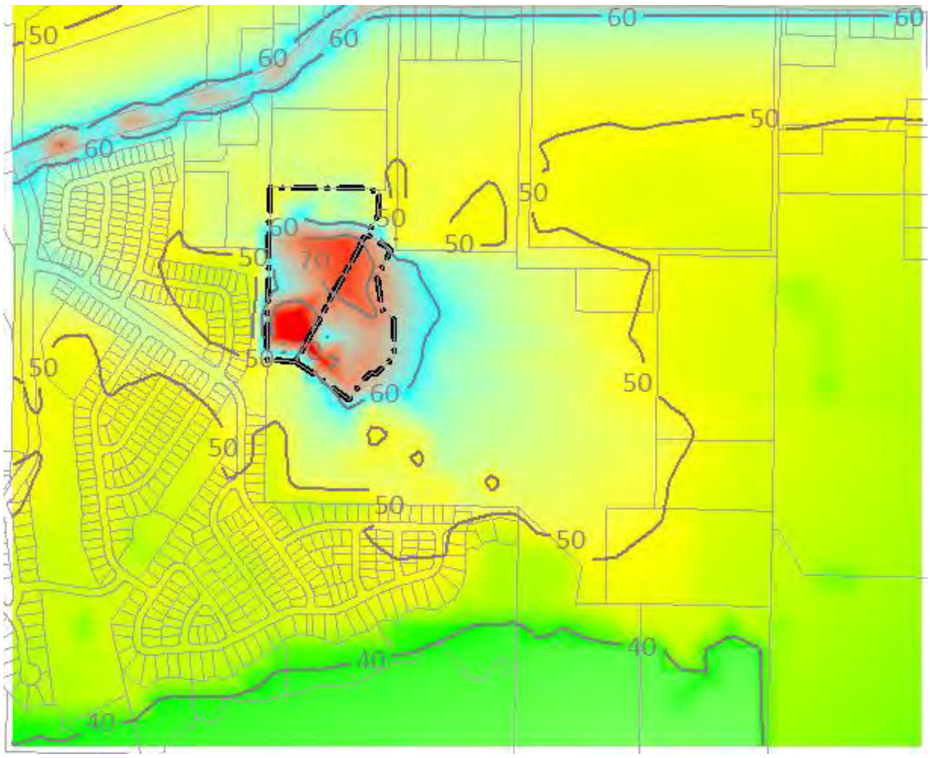
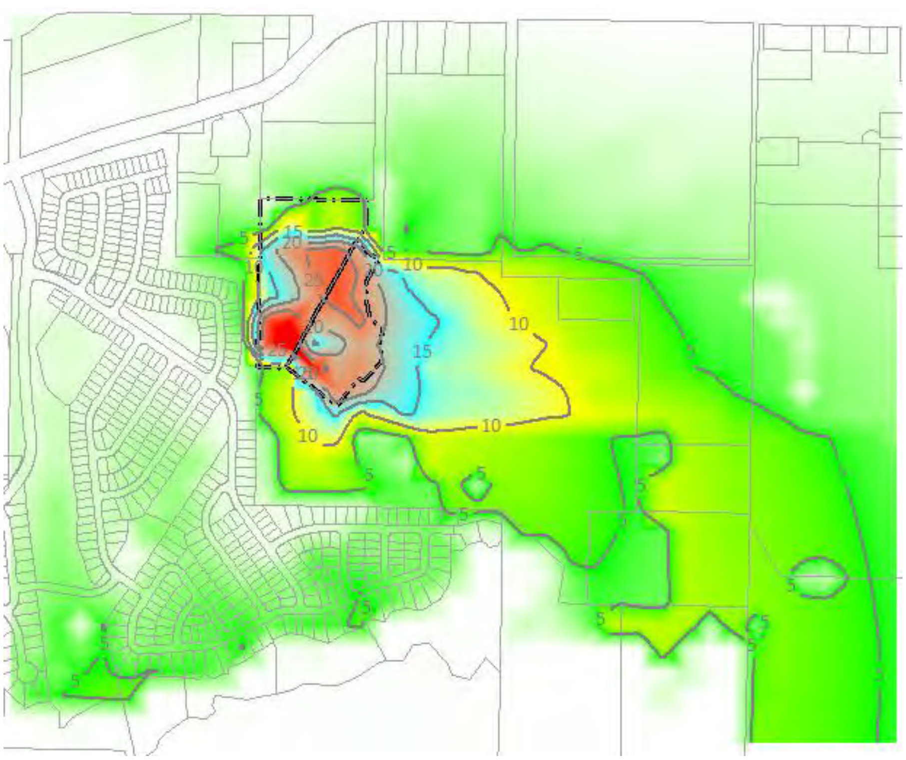


FIGURE 10.5; ALT 3 OPTION 3 NOISE INCREASE RE: NO ACTION ALTERNATIVE



10.1.3 10 a.m. Operations

Similar analysis for 10 a.m. was performed to demonstrate compliance with the noise code and compute the projected increase in noise compared to the No Action Case. The projected cumulative noise level with the transfer station and traffic noise is give in Figure 10.6. Compliance with the noise code is demonstrated in

Figure 10.7 where noise from both KCSWD properties is shown. Figure 10.8 shows the projected cumulative noise from all noise sources. Figure 10.9 presents the computed noise increase relative to the No Action Alternative. Noise increases are smaller for the 10 a.m. case because most activity occurs when trucks are leaving in the 6 a.m. hour.

FIGURE 10.6: 1000-1100 EXISTING CUMULATIVE COMMUNITY NOISE LEVEL (TRANSFER STN + ROADS DIVISION + TRAFFIC)

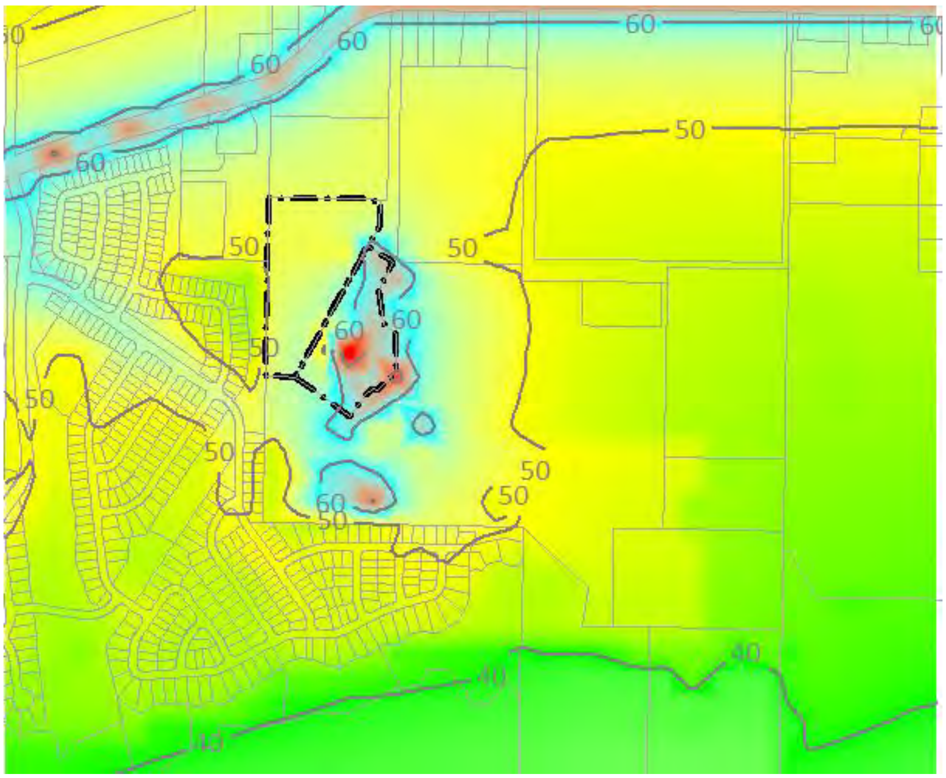


FIGURE 10.7: 10AM FACILITIES + TRANSFER STATION (KCSWD PROPERTY NOISE) – SHOWS COMPLIANCE

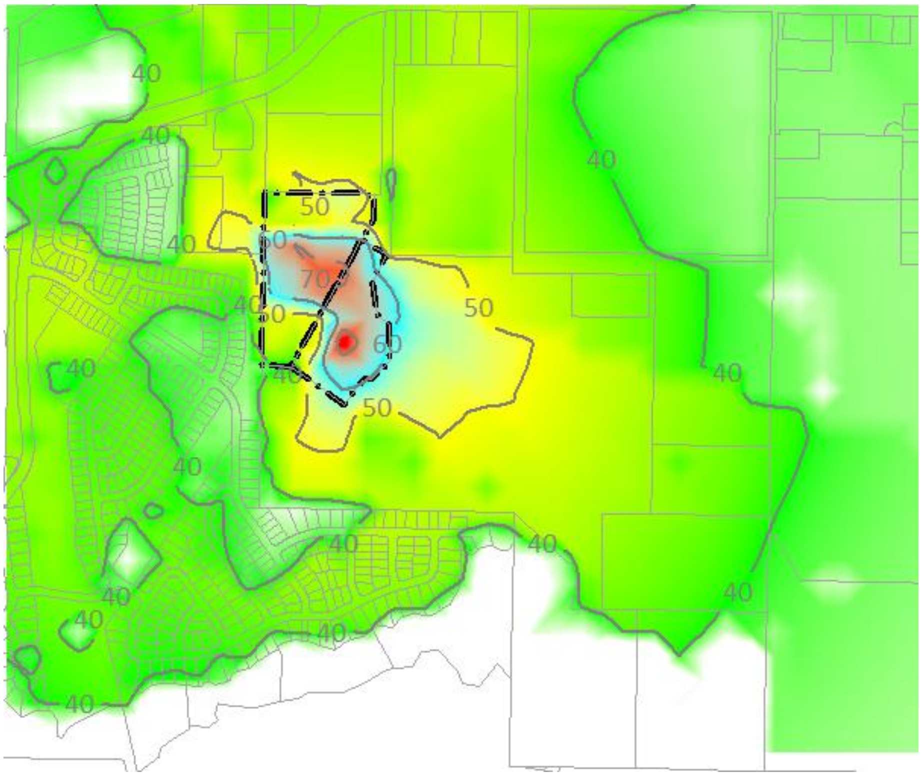


FIGURE 10.8: CUMULATIVE: FACILITIES + TRANSFER STATION + ROADS DIVISION + TRAFFIC NOISE

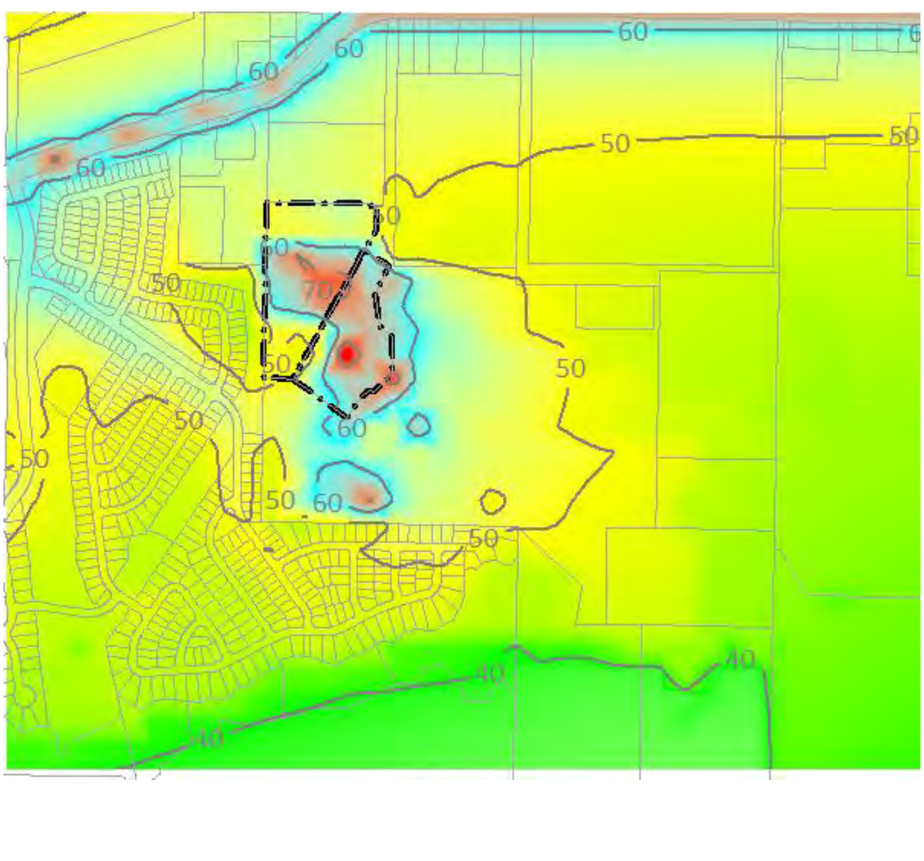


FIGURE 10.9: INCREASE. COMPLIANCE SHOWN SINCE INCREASE OUTSIDE OF PROPERTY BOUNDARIES IS LESS THAN 10 DBA

10.2 No Action Alternative 5-Day Week

Traffic noise and Roads Division noise will be the same as the for the 7-day week scenario.

Loads data was not provided for the 5-day week. Therefore, the number of haul truck related events at Renton are assumed to increase by 7/5. This increases the number of trucks idling and then leaving the facility in the morning, and the number of loads removed from the site during the transfer station operating hours.

The projected noise levels if no mitigation were implemented would exceed the city noise limits as documented in the main body of the noise analysis. Since the activity only increases with the 5-day week, noise levels will only increase too. No further documentation of the need for mitigation is necessary.

To meet the noise limits at the gravel mine to the northeast (assuming approximate fill to grade), it was necessary to increase the height of the barrier along the southern boundary of that property as well as the section that runs northward along Jefferson. The increase should be 2 feet taller than specified for the 7-day week. Other mitigation is unchanged from the 7-day workweek analysis.

The following figures present the noise contours and noise increases expected for the 5-day analysis case. The logic and presentation order is identical to the 7-day case above. KCSWD compliance with the noise code is demonstrated by evaluating the facilities noise combined with the transfer station noise (not operational in the 6 am hour). Noise increases are shown in the final figure of each section. As with the 7-day week, the noise increases are generally 5 dBA or less in the surrounding community.

10.2.1 6 a.m. Operations

FIGURE 10.10: ALT3 FACILITIES NOISE +TRANSFER STATION NOISE

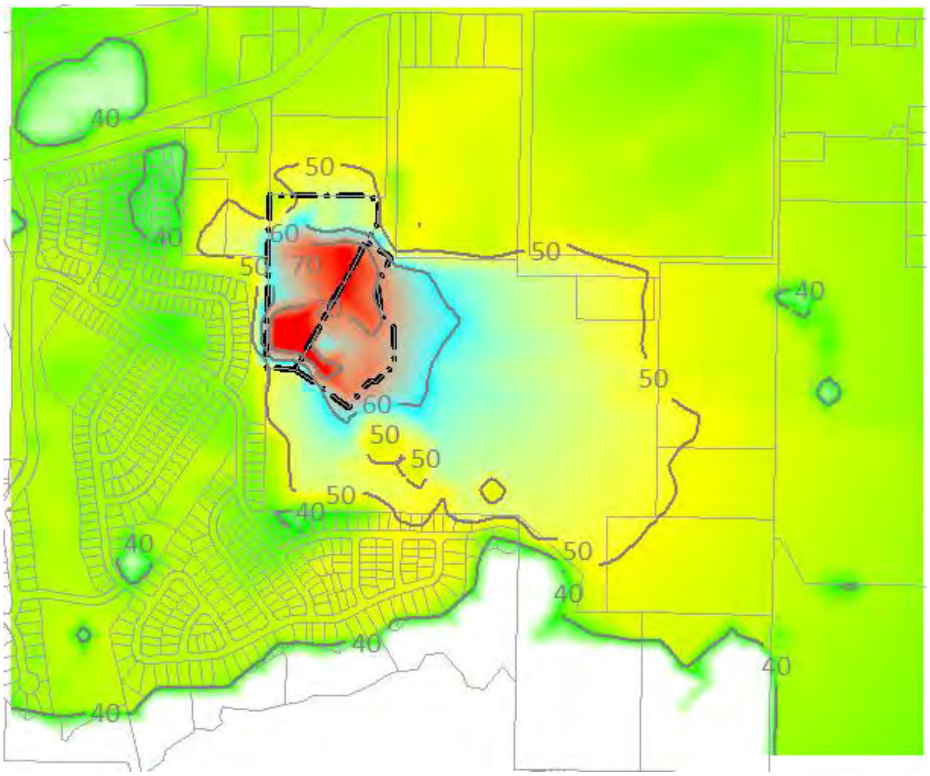


FIGURE 10.11: CUMULATIVE FACILITIES + TRAFFIC

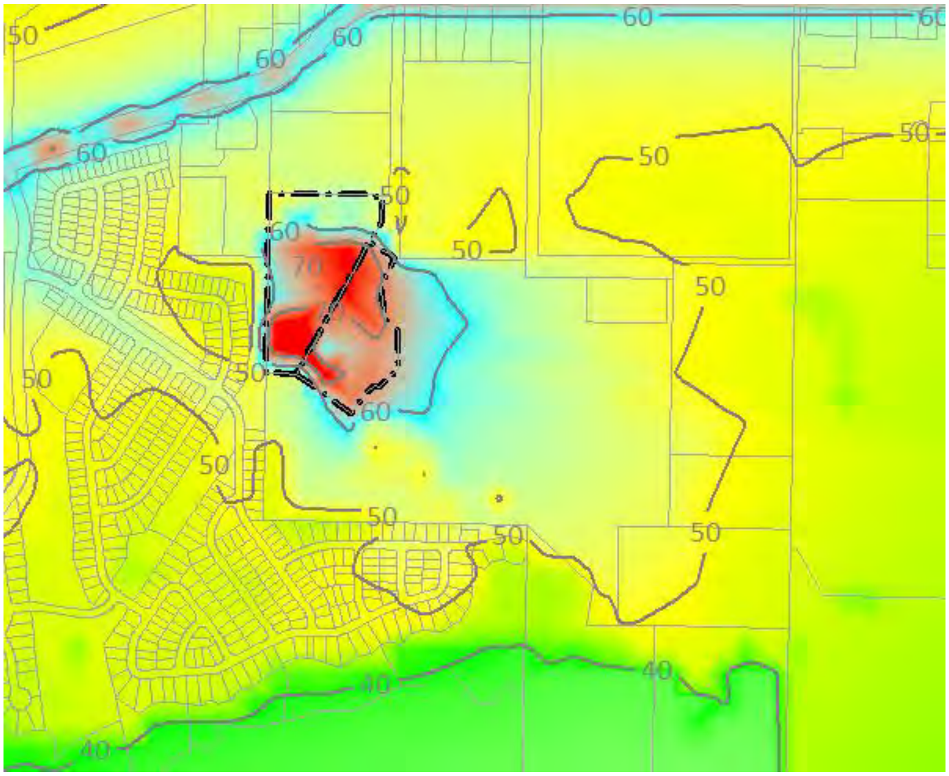
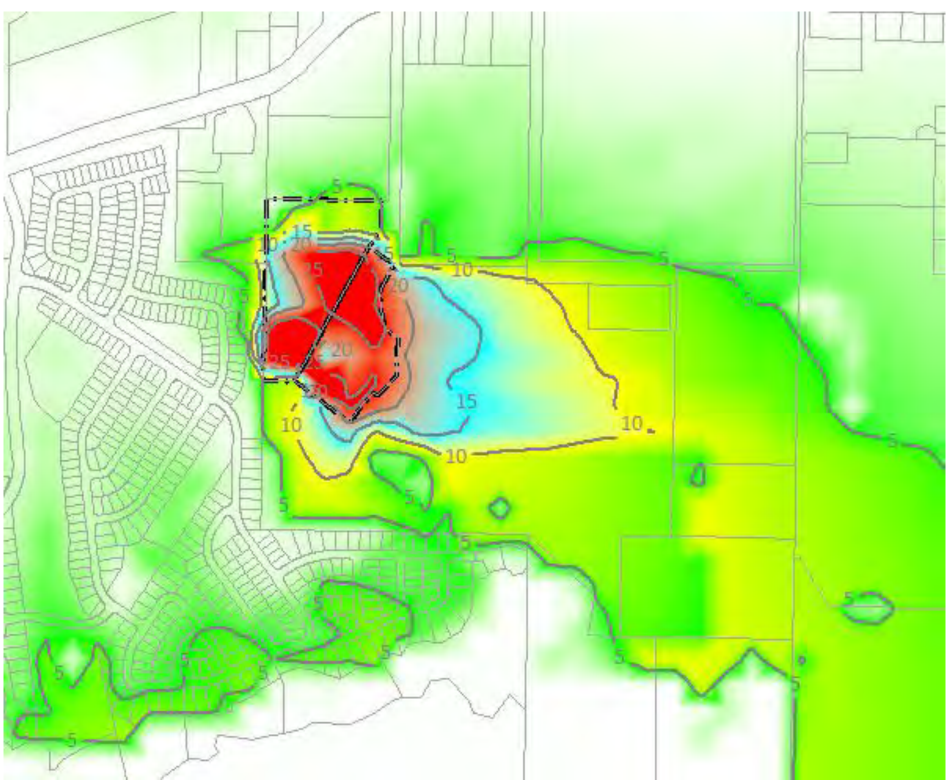


FIGURE 10.12: NOISE INCREASE RELATIVE TO NO ACTION ALTERNATIVE



10.2.2 10 a.m. Operations

FIGURE 10.13: 1000-1100 COMMUNITY NOISE LEVEL (TRANSFER STN + ROADS DIV + TRAFFIC)

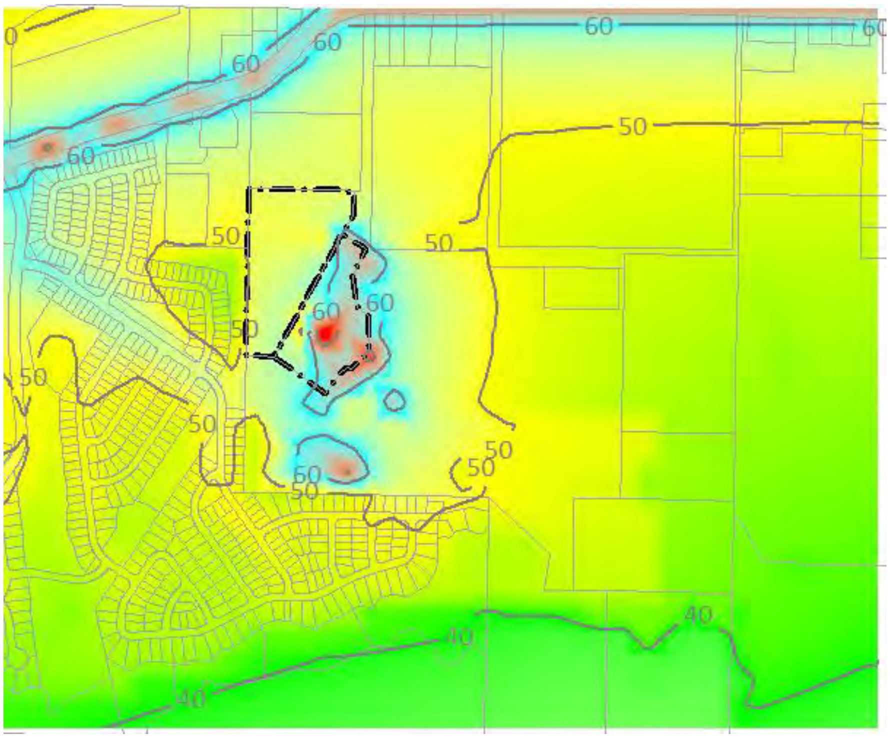


FIGURE 10.14: 10AM FACILITIES + TRANSFER STATION (KCSWD PROPERTY NOISE)

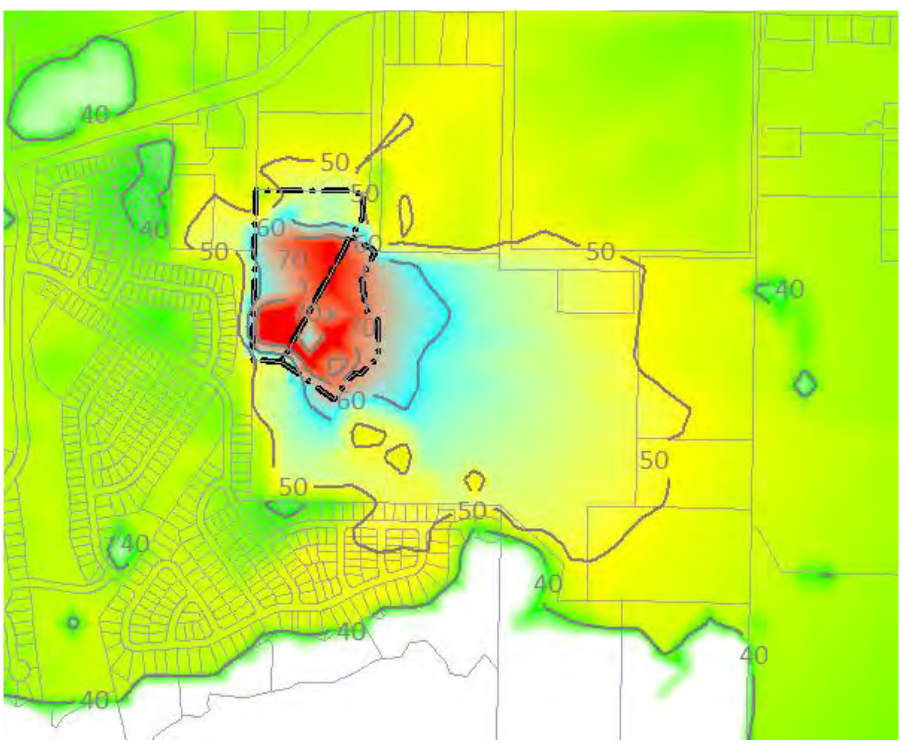


FIGURE 10.15: CUMULATIVE: FACILITIES + TRANSFER STATION + ROADS DIVISION + TRAFFIC NOISE

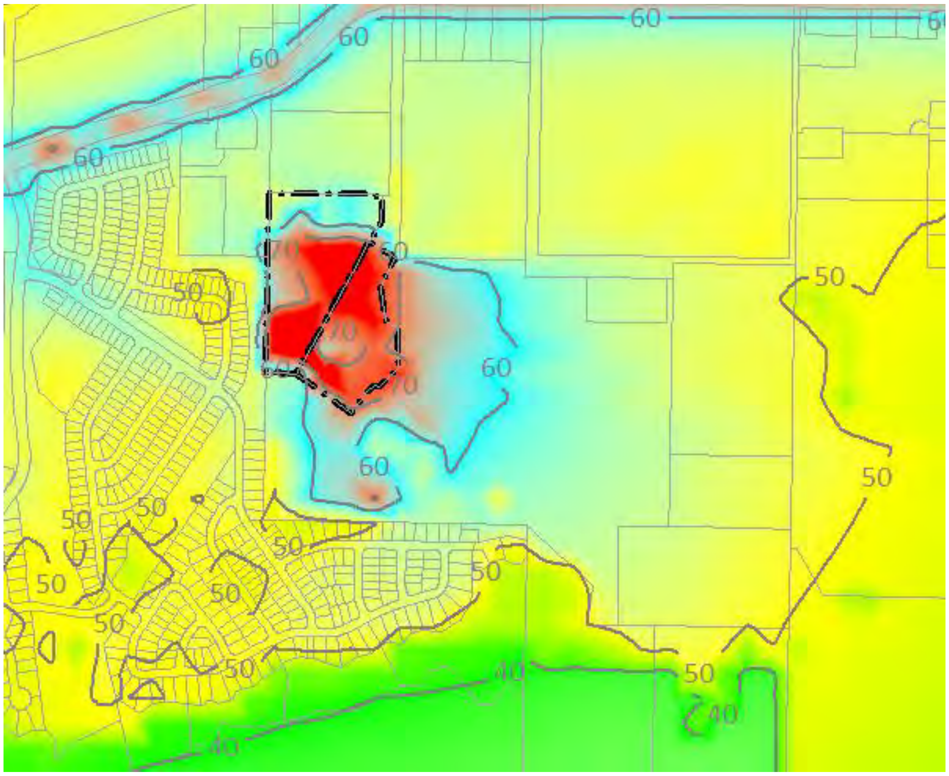


FIGURE 10.16: NOISE INCREASE RELATIVE TO NO ACTION

10.3 Traffic Noise Along NE 3rd/4th St

Noise measurements were taken along the edge of NE 3rd Street, between Edmonds and Jefferson Avenues. The measurements were taken at approximately 3:40-4:40 pm. The microphone was located about 45 feet from the edge of the road. The LEQ (energy equivalent sound level) during the measurements was 68.7 dBA.

Based on the measured level and the nominal traffic count volume (provided in City of Renton document) for the 0700-0800 hour, the anticipated traffic noise level during the 7 a.m. hour could be estimated by adjusting for the difference in traffic volumes.

The noise level for King County haul trucks travelling at approximately 30-35 mph was determined via measurements at the landfill. Based on the calculated sound power of the trucks and the speeds along NE 3rd, the expected sound exposure level for a single truck passing by was calculated and then adjusted to account for the fact there could be up to about 75 trucks at the site at the conclusion of Alternative 3 (with the 7-day week truck count). The cumulative sound level from 75 trucks spread over the course of an hour was then converted to LEQ and then added to the projected traffic level. The projected increase for the 7 a.m. hour was 3.3 dB.

The Renton traffic data did not extend to the 6 a.m. hour, which is when the trucks may be leaving the proposed Renton Facilities location.

The Institute of Transportation Engineers (ITE) indicates that for residential detached homes, the ratio of traffic at 6-7 am to 7-8am is about 0.56. Based on the City of Renton projected traffic count at 7-8 am, the volume in the 6-7 am hour would be about 1106 vehicles per hour. Using this information with the added truck noise described above, the projected increase in the 6-7 a.m. hour for 75 trucks leaving the Renton Facilities site would be about 4.9 dBA.

The increase in the 6 a.m. hour or the 7 a.m. hour are both less than the 10 dBA criteria for significant impact.

The estimated increases in noise assume that all truck traffic from the facilities site go the same direction when reaching NE 3rd/4th. Having some go east and some go west would reduce the projected noise increase listed above.

Further, the projected increase is likely conservative as it is based on future truck noise volumes (and noise level) being added to a base noise level generated by current traffic volumes. As the population grows, it would be expected that the traffic volume on NE 3rd/4th would be greater than that used to calculate the noise increment. Thus, in 2046, the increment may be less than these projections indicate.

The daytime noise increment would be much, much smaller due to the trivial amount of truck traffic associated with the landfill support facilities.

TABLE 10.3: TRAFFIC NOISE ANALYSIS ON NE 3RD/4TH ST.

Data from City of Renton Traffic Study						
Location	Time	Volume			Time	Volume
3rd/Jefferson Eastbound	07:00-08:00	818			16:00-17:00	1046
3rd/Edmunds Westbound	07:00-08:00	1159			16:00-17:00	1329
Projection to 7-8 am						
Estimated Traffic Count on 3rd Jefferson to Edmunds		1977				2375
Measured LEQ (15:40-16:40)	68.7					
Projected LEQ (07:00-08:00)	67.9					
Avg SEL for Single Truck (66.35 ft)	85.4					
# of Trucks	75.0					
Avg SEL for All Trucks	104.1					
Hourly LEQ for All Trucks	68.6					
Cumulative LEQ	71.3					
Increase	3.3					
Projection to 6-7 am						
Estimated Ratio of Traffic	0.5597					
Projected Volume 6-7 am	1106.5299					
Nominal Traffic Count during measurement	2375					
Projected LEQ for 0600-0700	65.4					
Avg SEL for Single Truck (66.35 ft)	85.4					
# of Trucks	75.0					
Avg SEL for All Trucks	104.1					
Hourly LEQ for All Trucks	68.6					
Cumulative LEQ	70.3					
Increase	4.9					

11.0 ADDITIONAL NOISE MITIGATION REQUIRED

The filling of the NE lot to approximate street grade increases noise levels at that property – most significantly near the shared border with the Roads Division. Additional mitigation was required in this area to meet the nighttime noise limits which would be applicable for 6am operations.

For the 7-day work week, the additional mitigation would be to extend the 12-foot tall noise wall all the way to the eastern corner of the NE lot. The top of the noise wall along NE 2nd St could stay at a constant height (does not need to increase with increasing ground level to the east). The noise wall along Jefferson and around the SW corner of the lot would remain as described in the body of the report.

For the 5-day work week, the length of the wall described above for the 7-day week would be maintained, but the height would need to be increased by 2 feet (nominally 14 feet tall).

The noise contours presented in Section 10.0 assume the above mitigation (or equivalent) is implemented.

FIGURE 11.1: 7-DAY OPERATIONS MITIGATION

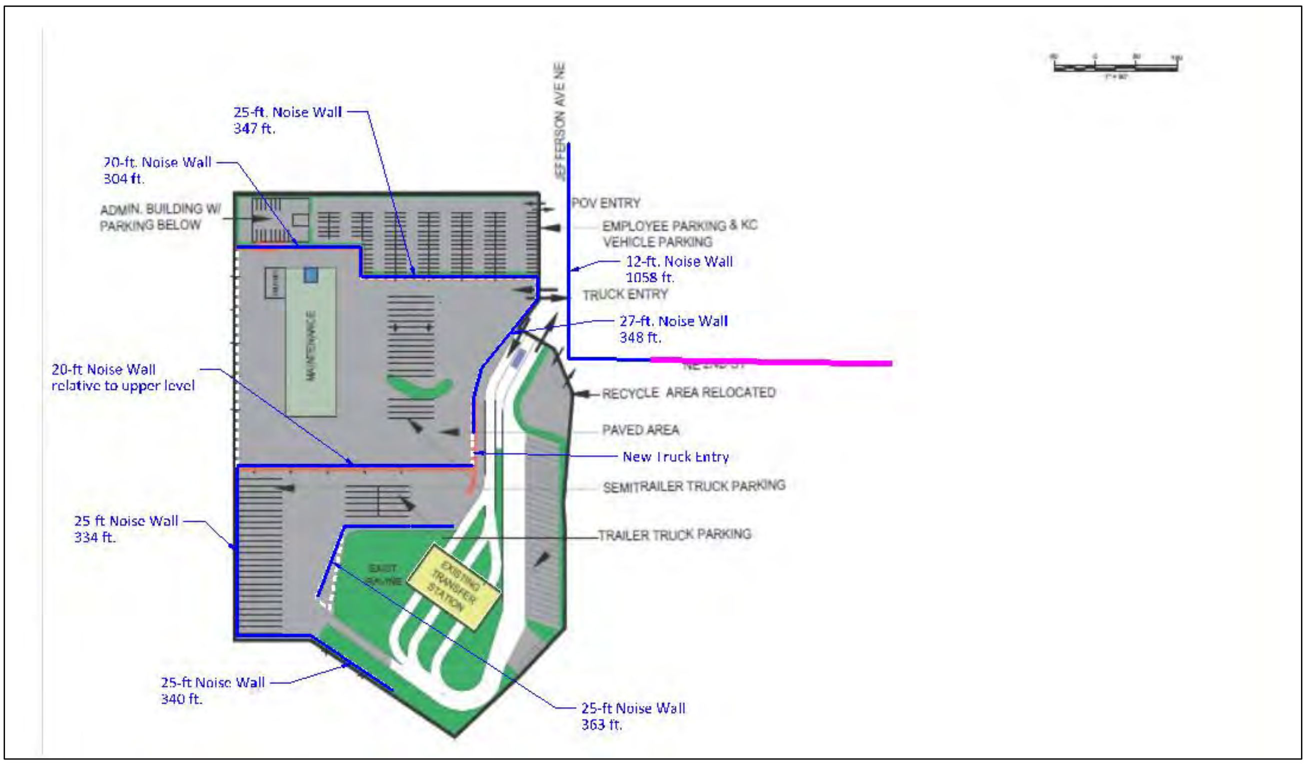
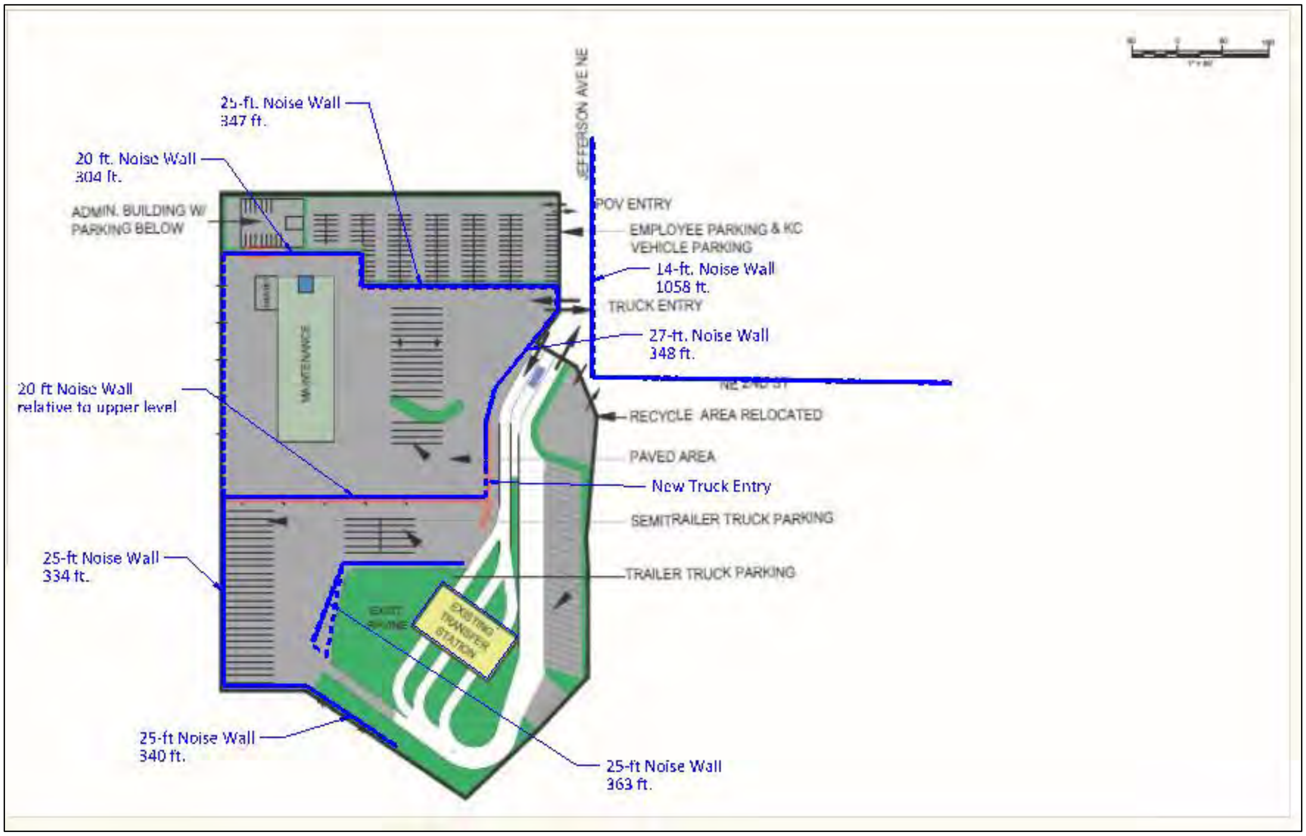


FIGURE 11.2: 5-DAY OPERATIONS MITIGATION



APPENDIX A: NOISE MODEL VALIDATION

ENGINEERING COORDINATION MEMO

ECM NO.: **JRE-HECI-20210924**
SUBJECT: **NOISE MODEL VALIDATION**

Date: September 24, 2021
To: Phil Coughlin (Herrera Environmental Consultants)
cc:

Prepared by: Greg Price, Quietly Superior (greg@quietlysuperior.com)

1.0 INTRODUCTION

Noise measurements were taken at two perimeter locations of Cedar Hills Regional Landfill for the purpose of comparing the measure sound levels with those predicted by the noise model used in the EIS noise analysis. One measurement location was along the eastern property line and data was acquired on March 12, 2021. The other location was in the southeastern portion of the property and measurements were performed on September 14, 2021.

2.0 DISCUSSION

2.1 Western Property Line

The measurement s along the western property line were acquired on March 12, 2021. Data for the tree attenuation analysis was acquired concurrently though different portions of data were used for each analysis.

During the measurements, the landfill active area, the area where waste was being stockpiled, was in the far southwestern corner of Area 8. The activity was generally at ,or near, the grade of the surrounding topography. This represents the closest point that the landfill equipment will get to the western property line in Area 8.

A microphone was placed near an ecology well head at the Property Line Mic location shown in Figure 1.

Figure 1: Measurement Position

The active area during the measurements is represented by the shaded polygon in Figure 1. The reference microphone position shown was not used in the model validation.

Noise data was recorded from approximately 11 a.m. to 2:30 p.m. on March 12, 2021. During this time, the ambient noise level at the property line microphone was heavily influenced by eagles and other birds in the trees. Aircraft were the other readily noticeable sources of ambient noise during the measurements. The bird noises were significantly louder than noise caused by the landfill operations. Because of these intermittent noise sources contaminating the measured landfill noise, it was necessary to identify time periods when the birds were quiet and limit analysis to those time periods. This was accomplished by listening to the recorded samples and by review of 3-D spectral plots.

Time segments from 11 a.m. to 1 p.m. were used for the analysis since the observed prevailing wind (at ground level) was from the southeast, which is more likely to produce higher noise levels at the western property line and is also the downwind condition projected by the noise model thereby providing a better comparison. The segments used were at least a minute in length. In all, approximately 23 minutes of recorded data was used for the analysis.

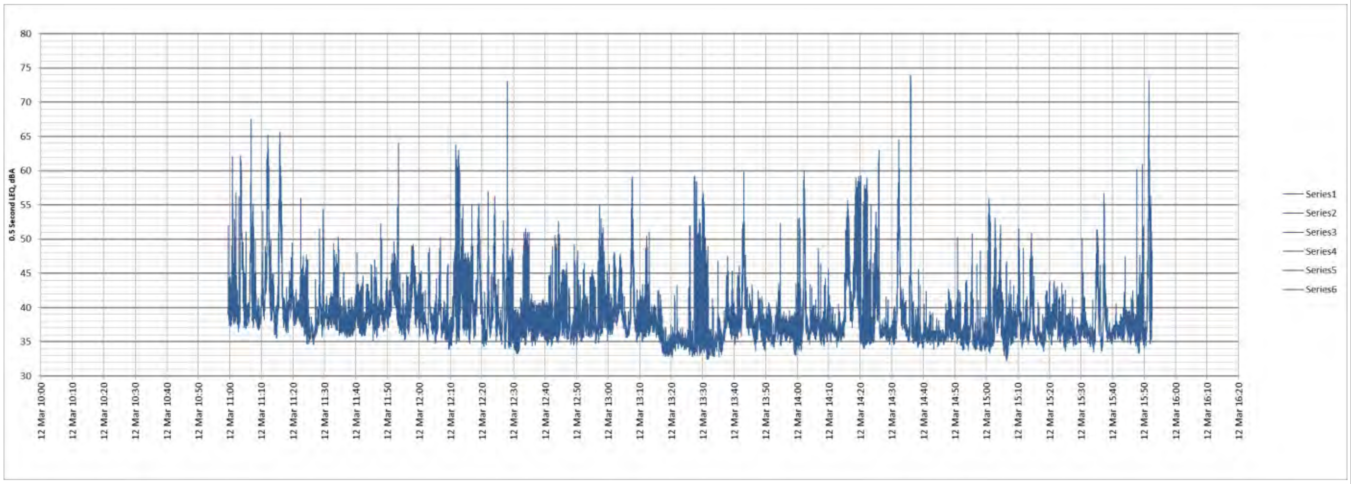


Figure 2: A-Weighted Time History – 11:00 a.m. – 2:30 p.m.

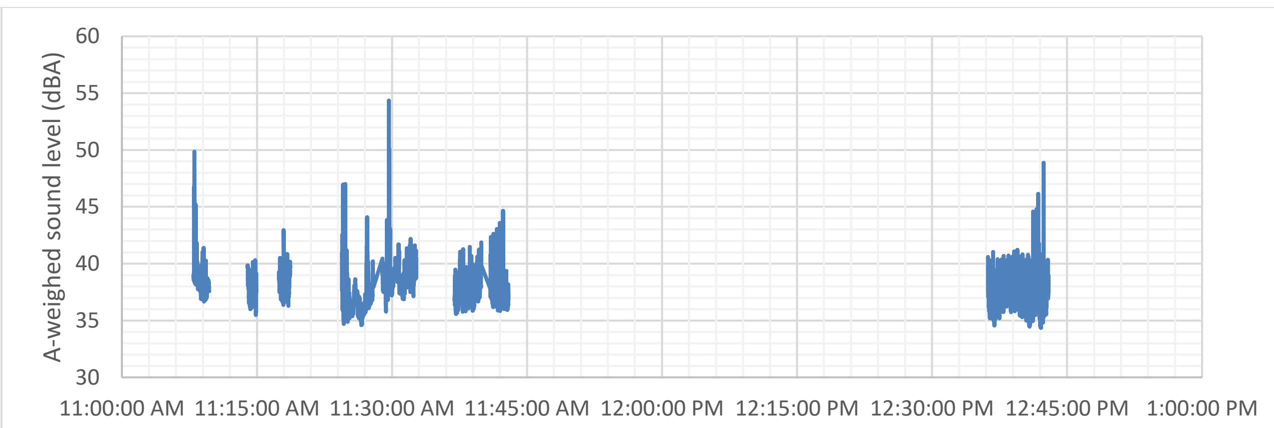


Figure 3: Time Segments for Analysis

The segments of data shown in Figure 3 were linearly averaged and the 1/3 octave band spectra were computed. These were then corrected for background noise using data from quiet periods when the active area was shut down (from 11:50 to 12:30) for the lunch break. The measured noise level did not significantly exceed the ambient noise level. In bands where the measured noise level exceeded the ambient level by at least 3 dB, the levels were anti-log subtracted. If this criterion was not met, 3 dB was subtracted from the measured level, which yields a conservative estimate of the actual noise level. This yielded a measured overall A-weighted sound level of 37.3 dBA.

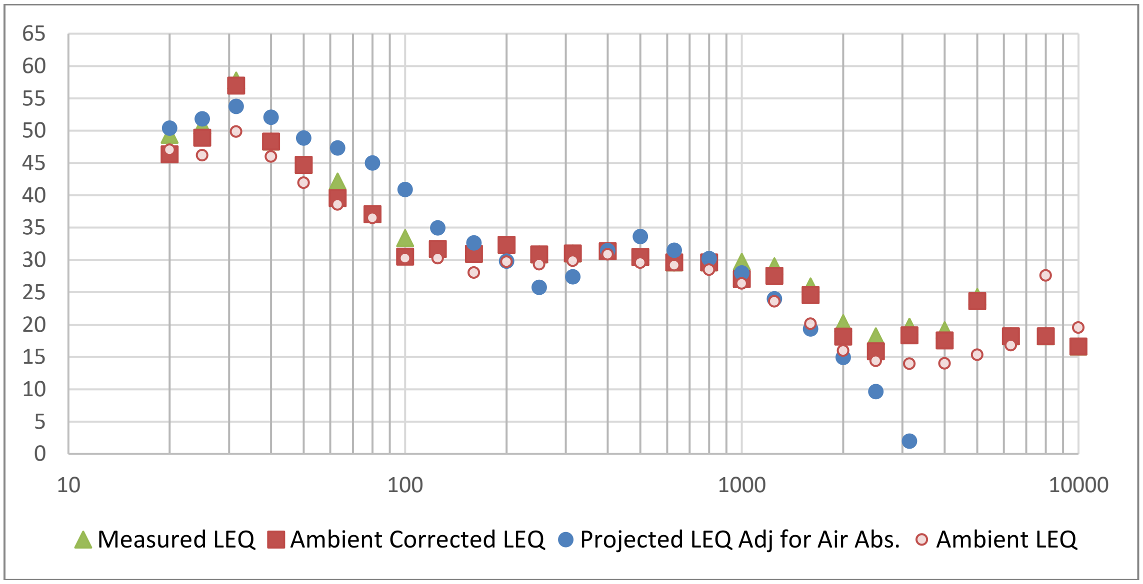


Figure 4: Spectral Comparison

The projected levels were calculated for the active area in operation with a nominal hourly truck rate of 10 loads per hour (20 trips). Additionally, scrapers were in operation that were included in the model. BEW was also included though it is a weak contributor to the total noise level at that position.

The noise model projects noise for an ISA standard day (59 degrees F, 70 % relative humidity). The conditions during the day of the test were 56 degrees and 37 percent RH which has a higher rate of sound absorption than the standard day. To more accurately compare the measured and modeled results, the sound levels projected by the model were adjusted to account for the different air absorption rate. The air absorption model presented in SAE ARP866A was used to compute these differences. The fully corrected projected spectra are shown in Figure 4. This has an A-weighted L_{EQ} of 37.4 dBA.

The projected noise level higher than the measured noise level by less than 1 dBA, which is conservative. No changes to the model are necessary.

2.2 Eastern Property Line

Noise levels at the eastern property line were measured on September 14, 2021 for the purpose of validating the noise model results. The objective was to capture BEW noise and truck noise since these were not significant influences in the sound levels observed at the western property line location. Locations where both of these sources were likely to be heard were scarce. A location under the BPA easement along the southern section of the east property line was chosen since it did not require significant bushwhacking to get to the property line, the property boundary was clearly marked, and there was minimal terrain shielding between either the trucks or BEW. It is also believed that this approximate location was used in previous studies.

Figure 5: East Property Line Measurement Locations

The negative aspect of the location was that the power lines created a crackling noise that added to the ambient noise levels. BEW noise was not plainly audible over the noise generated by the power lines.

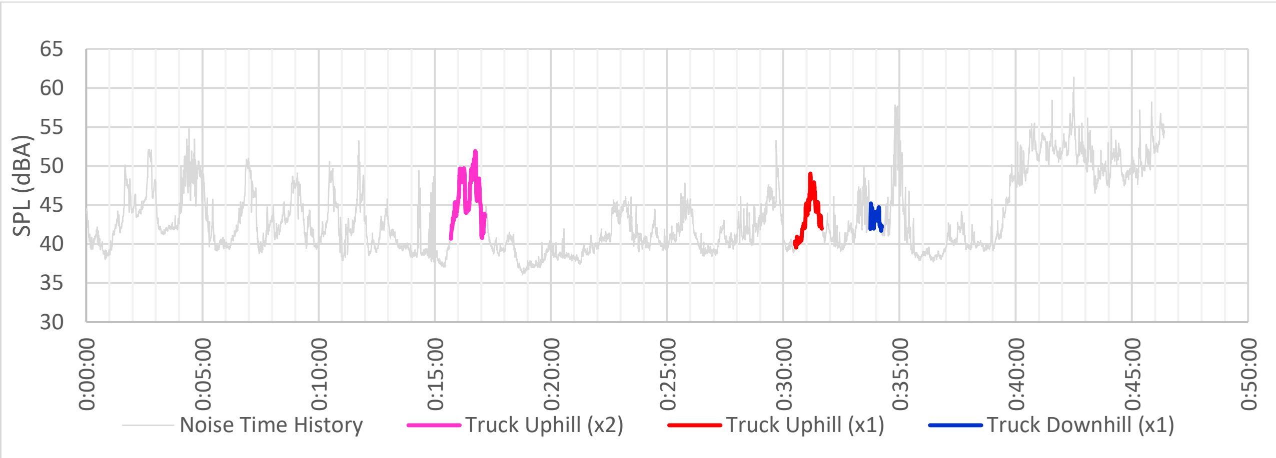


Figure 6: East Property Line Noise Time History

Noise levels were measured for approximately one hour. During this time period there were several contractor dump trucks entering and exiting the site, but only 3 confirmed landfill haul trucks entering the site and 1 leaving it. The red portions of the time history in Figure 6 show the landfill trucks entering the site. The blue segment is the only landfill truck leaving the site. Measurements were stopped when a neighbor began operating a riding lawnmower on one of the adjacent lots; the impact of the lawnmower is seen beginning at about the 39 minute mark of the recorded data shown in Figure 6.

Trucks entering the site were most noticeable just as they crossed the landfill property line boundary. As they moved further up the hill (closer to the main gate), the noise level tended to decrease despite the fact that the were closer. It is believed that this is due to the different loads placed on the engine. The downhill truck trip was much quieter than the uphill loads as was observed during the measurements used to develop the noise model.

The sound exposure level of the landfill haul trucks[2] was calculated for the events of interest from which an hourly L_{EQ} could be calculated and compared with noise model results. Measured sound levels were corrected for microphone and windscreen response and power supply gain and for background noise. Additional corrections were made to reflect that the test conditions had higher atmospheric sound absorption characteristics than the conditions assumed in the noise model. The three uphill truck event sound exposure levels were anti-log averaged (64.9 dBA) and this level was anti-log averaged with the downhill sound exposure level (56.8 dBA) to get the average sound exposure level for a single truck trip (62.5 dBA). For a single truck trip in an hour this sound exposure level results in a L_{EQ} = 27 dBA.

[2] Using noise of the contractor trucks was considered since the overall noise generated sounded similar to the landfill haul trucks. However, the contractor trucks turned westward off of the entrance road and onto a rough gravel road. This would have lead possibly misleading results since the trips would have had a shorter duration and the increased noise from the trucks/trailers travelling over the large gauge gravel at the intersection.

The No Action Alternative morning sound levels were used as the basis for the comparison with the measured values. For the 4.17 trip per hour rate of the No Action Alternative 6am condition, the projected L_{EQ} at a similar location was 38.3 dBA. One truck trip per hour would have a projected L_{EQ} of 32 dBA.

The noise model overpredicted the truck noise by about 5 dBA, in terms of the L_{EQ}. Though conservative, this difference is greater than expected. However, a larger sample size may tend to harmonize this difference.

Because BEW noise was not readily observable at the position under the power lines, an auxiliary measurement was taken along SE 227th at a location approximately due east of the BEW plant. The measured noise level (L_{EQ}) at that location was 42.8 dBA (corrected for atmospheric conditions).

The L_{EQ} projected by the noise model was 42.9 dBA, less than a 1 dBA difference.

Also of note is that the noise time history under the power lines [Figure 6] indicates that even with the power line crackle, the measured noise level is about 39-40 dBA when there was no activity on the road. The contribution from BEW to the noise level at that location was less than this 39-40 range on the day that the measurements were taken.

3.0 CONCLUSIONS

Measured sound levels and projected sound levels were compared at locations on the eastern and western property lines. The projected levels generally matched the measured levels well. Haul truck noise in the southeast corner was overpredicted by the noise model compared to measured noise levels. This produces slightly conservative noise modeling results.

No changes are proposed to the noise model used for the CHRLF Final EIS noise technical report. Mitigation described in the noise technical report will provide a conservative estimate on mitigation to comply with county noise limits which can be used to inform the EIS.

APPENDIX: ADDITIONAL PHOTOS

Figure 7: Property Line Microphone

Figure 8: View Looking Eastward Through Trees

Figure 9: View from Reference Microphone Towards Active Area

Figure 10: View Looking North Towards Trees in Western Buffer Zone

APPENDIX B: SOUND ATTENUATION OF TREES IN NOISE MODEL AT CHRLF

ENGINEERING COORDINATION MEMO

ECM NO.: **JRE-HECI-20210831**
SUBJECT: **SOUND ATTENUATION OF TREES IN NOISE MODEL AT CHRLF**

Date: August 31, 2021
To:
cc:

Prepared by: Greg Price, Quietly Superior (greg@quietlysuperior.com)

Reference

1. FAA Advisory Circular AC150-5320-14 Airport Landscaping for Noise Control Purposes, January 31, 1978
2. ISO 9613-2, Acoustics – Attenuation of Sound During Propagation Outdoors

---

1.0 INTRODUCTION

The Quietly Superior scope of work for the Cedar Hills Regional Landfill (CHRLF) final EIS includes addressing the community comments on the Draft EIS that the attenuation from trees should not be used in winter months. Reference 1 provided a comparison of attenuation of several tree types including deciduous trees with and without foliage. Comparison with Reference 2 foliage attenuation indicated the ISO procedure was conservative and that the attenuation coefficients in the ISO standard were closer to the no leaf condition from the Advisory Circular.

2.0 DISCUSSION

To address these comments a set of measurements were made on March 12, 2021 while leaves were off the trees. Landfilling was occurring in the southwest corner of Area 8 and was at approximately the closest position to the western property line. Measurements were taken in two locations as shown in Figure 1. The closer microphone was used to determine source noise levels occurring in the active area. The other microphone was located just inside the western boundary of the landfill, about 1200 feet from the active area. Aerial images showed no significant stands of evergreen trees between the active area and the western property line microphone. Underbrush did not appear to have leaves when the measurements were taken. The vegetation was as bare as could be expected.

The intent was to use hour-long (or longer) measurements near the active area and at the property line to determine the sound attenuation properties through the trees. However, in spite of the fact that the landfilling was occurring at the closest point to the property line, the active area noise at the property line microphone position was low and often inaudible. Most of the recorded sound data did not readily exceed the steady state ambient noise level by a reasonable margin. Compounding low signal to noise ratio was the number of eagles in the nearby trees that were often making significant amounts of noise.

Because of the poor signal to background noise ratio, the noise levels from 8 banging tailgate (or other impact) events were evaluated for the demonstration. The banging occurred as part of the tipping process. These provided a useable but not ideal signal to noise ratio. The banging caused by the tailgate was generally low-mid frequency in nature which propagated well over the long distance to the property line. High frequencies were not strong enough to exceed the background noise or the noise floor of the measuring/recording instrumentation.

Use of the backup alarms was considered as a higher frequency source (about 1500 Hz), but due to potential directivity differences between propagation paths to the reference microphone and the property line microphone, this approach was not used.

FIGURE 1: SITE LAYOUT

The analytical approach was to use the sound pressure level observed at the reference microphone to determine the sound power level emitted from events in the active area (the shaded area in Area 8 in Figure 1). The sound power was calculated by using the measured sound pressure level and then adjusting for distance(s) to the source (divergence), atmospheric sound absorption, ground effects, shielding (none), and trees (none). The same methods to compute these terms were used as would be used in the noise projection model.

Based on the computed sound power level of the banging tailgates, the noise model was used to project noise levels at the property line microphone. The same propagation characteristics listed in the previous paragraph were included in the projection though there were trees as well as potential shielding from terrain.

The projected sound levels were then compared with the measured sound levels at the property line location.

Downwind propagation or propagation in a temperature inversion, is considered an adverse propagation condition and sound tends to bend downwards towards the earth. During noise neutral conditions, the sound tends to follow a more linear propagation path. A cross section of the propagation path between the tipper and the receiving microphone position is shown in Figure 2.

Temperature at the approximate mid-point of the measurements was 56 degrees Fahrenheit and 37% relative humidity measured with a handheld meter and sensor during the measurement period. These conditions were used to determine the atmospheric air absorption characteristics. During the measurement period used for analysis (approximately 11:15 a.m. to 1:15 p.m.) our observation was that the prevailing wind direction was from the south or southeast though there was some variation. Wind speed was generally light. These observations align with the hourly data from the Renton Airport weather station.

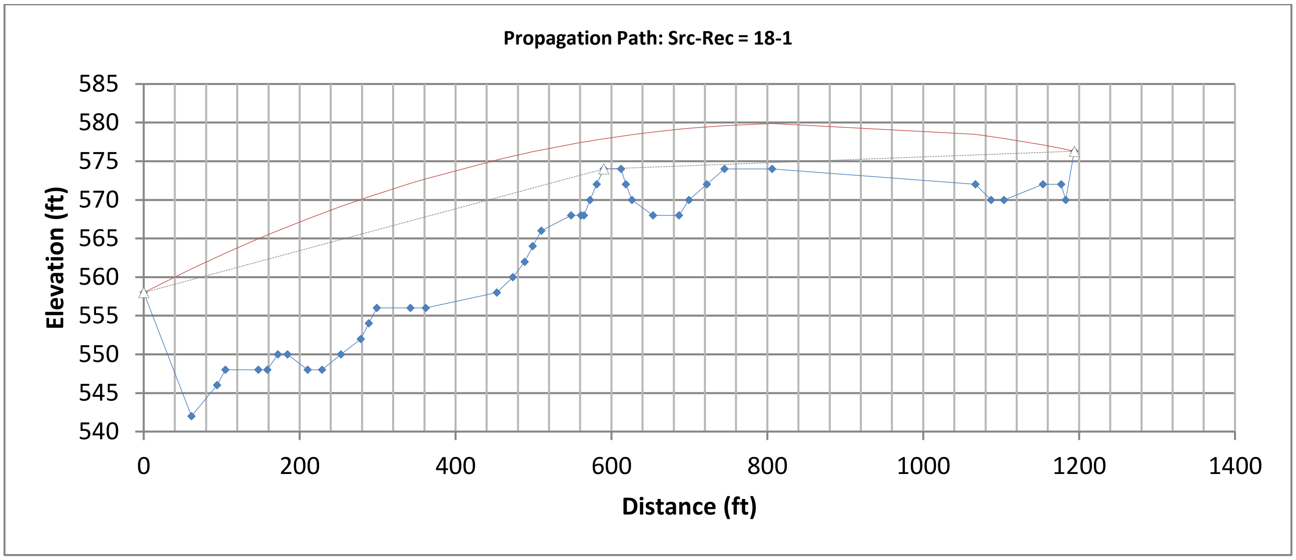
A southeast or east wind (or temperature inversion) would put the conditions in the adverse category resulting in the downward arcing propagation path as would a temperature inversion (we were unable to measure conditions aloft to determine if a temperature inversion was present). However, for discussion purposes, both an arced propagation path and a linear propagation path were considered.

TABLE 1: HOURLY WEATHER OBSERVATIONS FROM RENTON MUNICIPAL (KRNT)

Daily Observations

Time	Temperature	Dew Point	Humidity	Wind	Wind Speed	Wind Gust	Pressure	Pre(
1:53 AM	36 °F	30 °F	79 %	CALM	0 mph	0 mph	30.29 in	0.0 i
2:53 AM	35 °F	29 °F	78 %	CALM	0 mph	0 mph	30.30 in	0.0 i
3:53 AM	34 °F	29 °F	82 %	S	3 mph	0 mph	30.30 in	0.0 i
4:53 AM	34 °F	29 °F	82 %	SSE	3 mph	0 mph	30.29 in	0.0 i
5:53 AM	34 °F	29 °F	82 %	CALM	0 mph	0 mph	30.30 in	0.0 i
6:53 AM	32 °F	28 °F	85 %	CALM	0 mph	0 mph	30.31 in	0.0 i
7:53 AM	33 °F	29 °F	85 %	CALM	0 mph	0 mph	30.33 in	0.0 i
8:53 AM	36 °F	30 °F	79 %	S	3 mph	0 mph	30.33 in	0.0 i
9:53 AM	40 °F	31 °F	70 %	S	3 mph	0 mph	30.34 in	0.0 i
10:53 AM	45 °F	32 °F	60 %	SSE	6 mph	0 mph	30.34 in	0.0 i
11:53 AM	48 °F	34 °F	58 %	VAR	3 mph	0 mph	30.33 in	0.0 i
12:53 PM	52 °F	33 °F	49 %	SSE	3 mph	0 mph	30.31 in	0.0 i
1:53 PM	55 °F	34 °F	45 %	N	5 mph	0 mph	30.29 in	0.0 i
2:53 PM	56 °F	33 °F	42 %	N	5 mph	0 mph	30.27 in	0.0 i
3:53 PM	56 °F	31 °F	39 %	NNW	5 mph	0 mph	30.26 in	0.0 i
4:53 PM	57 °F	34 °F	42 %	N	5 mph	0 mph	30.25 in	0.0 i
5:53 PM	56 °F	34 °F	44 %	NNW	5 mph	0 mph	30.24 in	0.0 i
6:53 PM	52 °F	32 °F	47 %	CALM	0 mph	0 mph	30.22 in	0.0 i
7:53 PM	48 °F	39 °F	71 %	N	3 mph	0 mph	30.24 in	0.0 i
8:53 PM	47 °F	33 °F	59 %	CALM	0 mph	0 mph	30.25 in	0.0 i
9:53 PM	45 °F	35 °F	68 %	CALM	0 mph	0 mph	30.25 in	0.0 i
10:53 PM	44 °F	31 °F	60 %	SSE	3 mph	0 mph	30.25 in	0.0 i

FIGURE 2: PROPAGATION PATH FROM TIPPER TO WESTERN PROPERTY LINE MICROPHONE



Propagation Path: Src-Rec = 18-1
Linear Direct: 1193.881
Linear Prop: 1193.962
Delta R Lin: 0.081

Arc Direct: 1194.145
Arc Prop: 1194.145
Delta R Arc: 0

Gsrc: 0
Grec: 1
Gp: 0.8719
Avg Prop Ht: 11.1980
Use Arc: True

Tree Dist: 1035.287

FIGURE 3: COMPARISON USING ARCED PROPAGATION PATH

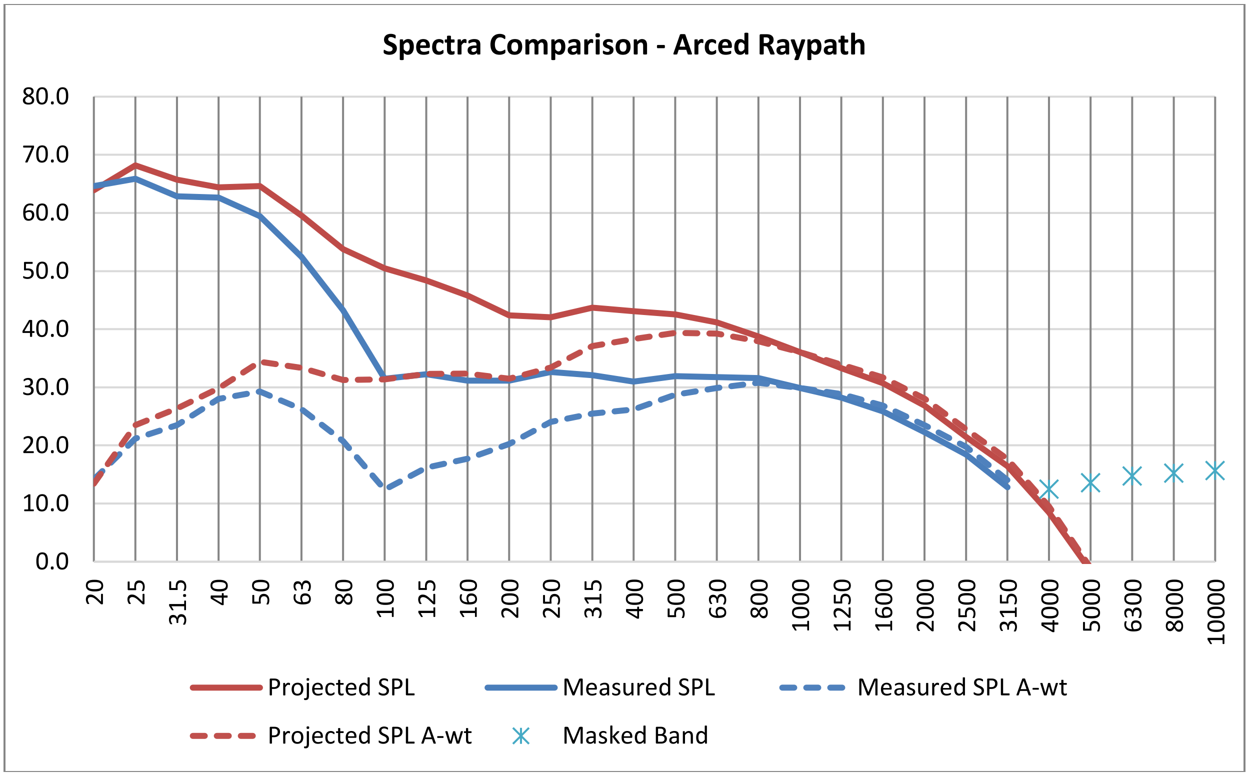
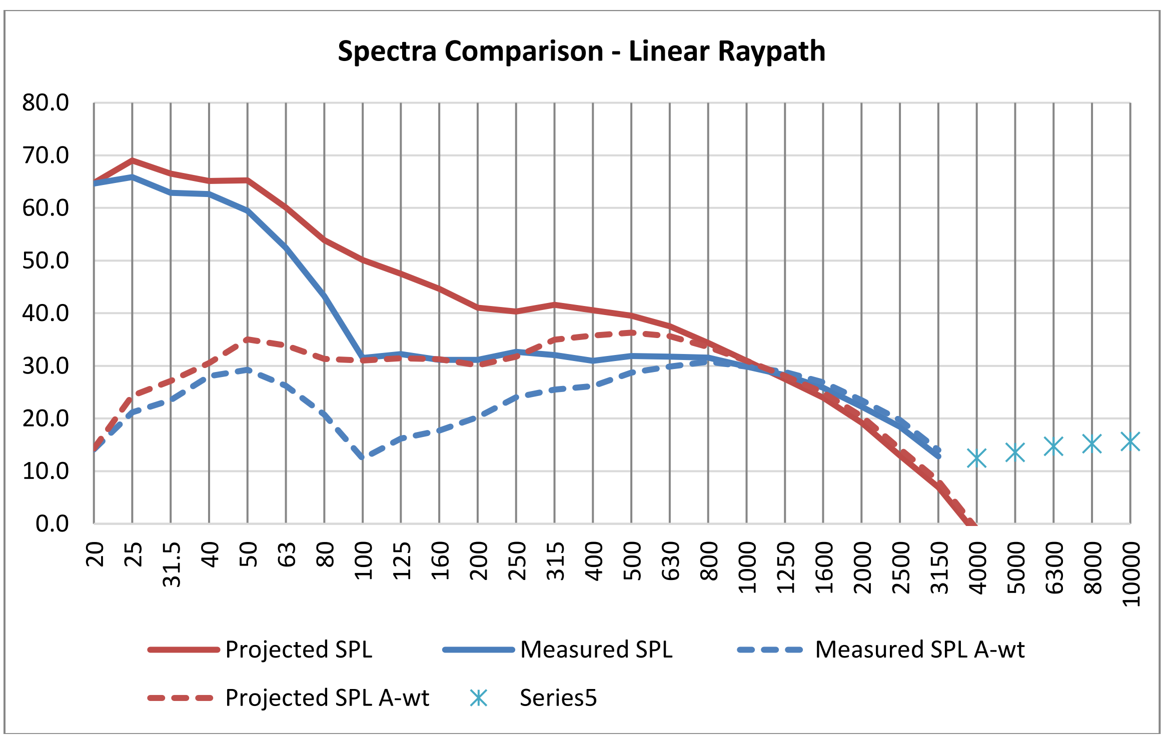


FIGURE 4: COMPARISON USING LINEAR PROPAGATION PATH



At or above 4000 Hz, and possibly as low as 2500 Hz., the background noise and instrumentation noise floor is influencing the measured sound level at the property line position.

The results indicate that:

- For the Arced Raypath condition
  - The projected A-weighted sound level (the metric for King County noise compliance) for the banging tailgate was 48.0 dBA. The measured sound level at the property line for the same condition was 40.9 dBA (this value includes any artificially high third-octave spectra due to instrument noise floor).
  - On a third-octave spectral basis, the projected levels are higher (often significantly) up to about 3150 Hz. Above this frequency, the noise floor is the dominant factor, and the results are inconclusive. Regardless, over the long propagation distances at CHRLF, these high frequencies are not critical in community noise level evaluations since they are heavily attenuated by atmospheric absorption.
  - The projected A-weighted level is conservative when evaluated against the measured values.
- For the Linear Raypath analysis
  - The projected A-weighted sound levels at the property line microphone position was 45.3 dBA and the measured sound level was 40.9. So, the model over-predicted the noise level by about 4.4 dBA.
  - If the linear case were applicable (which would not appear to be the case), the spectral comparison shows that the projected sound levels at or above about 1250 Hz are below the measured spectral levels.
  - The projected A-weighted level is conservative when evaluated against the measured values.

3.0 CONCLUSION

The noise model used in the DEIS was implemented in an environment where there was no foliage on the trees within the western buffer zone. The propagation conditions during the noise measurements were likely slightly adverse and the measured spectral data matches the adverse propagation model well up to about 4 kHz above which the background noise limits the comparison. The results indicated that the model yields conservative A-weighted noise levels. Having leaves on the trees would result in lower noise levels than the model predicts.

If a neutral atmosphere were present during the tests, the results show that the model still overpredicted the A-weighted noise level that would be used for noise compliance (although by a lesser amount), but the high frequency spectral content was slightly underpredicted. These high frequencies do not generally influence the A-weighted noise levels from industrial sites.

The data indicate that the algorithm used to compute noise attenuation by trees in the noise model is slightly conservative in the prediction of A-weighted noise levels and a change in the noise model methodology does not appear to be warranted. The predicted noise levels are slightly higher than measured noise levels.

APPENDIX: ADDITIONAL PHOTOS AND CHARTS/TABLES

FIGURE 5: PROPERTY LINE MICROPHONE

FIGURE 6: VIEW LOOKING EASTWARD THROUGH TREES

FIGURE 7: VIEW FROM REFERENCE MICROPHONE TOWARDS ACTIVE AREA

FIGURE 8: VIEW LOOKING NORTH TOWARDS TREES IN WESTERN BUFFER ZONE

FIGURE 9: TREE ATTENUATION DATA FROM REFERENCE 2

Table A.1 — Attenuation of an octave band of noise due to propagation a distance d_f through dense foliage

Propagation distance d_f m	Nominal midband frequency Hz							
	63	125	250	500	1 000	2 000	4 000	8 000
	Attenuation, dB:							
$10 \leqslant d_f \leqslant 20$	0	0	1	1	1	1	2	3
	Attenuation, dB/m:							
$20 \leqslant d_f \leqslant 200$	0,02	0,03	0,04	0,05	0,06	0,08	0,09	0,12

FIGURE 10: TREE ATTENUATION DATA FROM REFERENCE 1