

King County Department of Natural Resources and Parks Solid Waste Division

Phase 1 – Enumclaw Closed Landfill
CONTRACT NO. E00102E08
Task No. 530.4.1 - D530.4.1.9

Post-Closure Maintenance Evaluation Report Cover Settlement Addendum

Prepared by
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King County

Department of
Natural Resources and Parks
Solid Waste Division

<i>Waste</i> Prevention	<i>Resource</i> Recovery	<i>Waste</i> Disposal
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www.kingcounty.gov/solidwaste

July 27, 2018
FINAL



TECHNICAL MEMORANDUM

Date: July 27, 2018

To: Erick Miller, LHG, Aspect Consulting, LLC

From: Noah Allen, PE, PMP, BHC Consultants, LLC

CC: Bard Horton, PE, BHC Consultants, LLC

Subject: **D530.4.1.9, Enumclaw Closed Landfill Post-Closure Maintenance Evaluation Report - Cover Settlement Addendum**



Introduction and Purpose

The Enumclaw Closed Landfill (ELF) Post-Closure Maintenance and Evaluation Report in Preparation for Termination of Post-Closure (ELF Post-Closure Report) dated September 2017 provided recommendations for meeting the requirements of the Washington Administrative Code (WAC) Chapter 173-304, termination of post-closure care at ELF. Washington State Department of Ecology (Ecology) guidance on termination of post-closure care suggests monitoring of settlement occur over a 2-year period. At the time of the ELF Post-Closure Report, the required 2 years of site settlement data was not available, but a bi-annual settlement survey program had been established to monitor settlement at the site. This supplement to the ELF Post-Closure Report presents the results of the 2-year settlement monitoring program.

Site History

The cover system at the ELF was constructed in two closure phases (Phase I in 1989 and Phase II in 1993). Both closure phases utilized similar 3-foot-thick cover systems that consisted of the following components (bottom to top):

- Foundation material (1-foot)
- Geomembrane layer
- Drain material (1-foot)
- Separation geotextile
- Topsoil/vegetative layer (1-foot, seeded)



In addition to the cover system, several rows of trees planted on swales were included as part of the cover at ELF. Regular maintenance of the cover system has been performed by King County Solid Waste Division (KCSWD) as prescribed by their Post-Closure Care Plan for ELF, including monitoring and maintenance of the trees to maintain the integrity of the cover system.

Regulatory Requirements

The requirements for termination of post-closure care are included in WAC 173-304 and in the Ecology post-closure termination guidance document (Publication No. 11-07-006). These documents establish criteria for demonstrating stabilization at a closed landfill by demonstrating there is little to no cover settlement.

The termination of post-closure care publication provides suggested monitoring requirements for collection of data related to settlement as follows. Over a 2-year period, at a minimum, complete two benchmark surveys using the following guidelines:

- Use survey points from fixed points on the closure cap. Use permanent markers, such as a rod of rebar, to denote survey points, taking care not to punch holes through anti-infiltration layers or geomembranes
- Measure one point for every 20,000 square feet and additional points to cover anomalies such as dead vegetation or depressions
- Use equipment that is precise to within 0.5 inches

The guidance documentation indicates that a landfill is considered to be experiencing little or no settlement if the following criteria is met.

- Uniform slopes between 2 percent and 33 percent and maintains design slopes
- No evidence of differential settlement
- Settlement trend curve approaches zero slope
- Uniform settlement is less than 0.5 inch over a 2-year period

Data Collection

To collect the required settlement information, KCSWD established a biannual settlement survey program to collect settlement information over a 2-year period. The baseline survey was completed on November 19, 2015. Four additional surveys were completed between November



2015 and December 2017 at approximately 6-month intervals to collect settlement information. Surveys were completed on the following dates:

- November 19, 2015 (Baseline Survey)
- May 18, 2016
- December 7, 2016
- July 6, 2017
- December 13, 2017

Settlement surveys were completed by King County Department of Transportation (KCDOT) using the following summarized procedures. Specific information related to establishment of coordinates, vertical datum, and survey completion are provided in Appendix A – Enumclaw Landfill Settlement Survey.

- Establishment of coordinates and vertical datum
- Installation of 14-inch-long Berntsen “Feno” Spikes with 2-inch aluminum caps at minimum one point per 20,000 square feet
- Calibration of measurement equipment to provide measurements with accuracy to within 0.01 feet (0.12 inches)

The bi-annual settlement survey results were tabulated and are included as Appendix B.

Results of Settlement Survey

Review of the 2 years of settlement data at the 59 fixed markers, shown on Figure 1, included in the settlement survey indicated that between 0.0 and 1.0 inches of settlement occurred at ELF. The majority of the site is experiencing settlement of less than 0.5 inches over a 2-year period. However, at seven of the settlement markers the measured settlement was between 0.5 and 1.0 inch, representing approximately 12 percent of the survey settlement markers. Appendix C includes a summary of the total 2-year settlement at each marker. The results from each survey event are included in Appendix B.

Elevation fluctuations, up and down, were observed at 43 of the 59 settlement marker locations included in the program. However, these fluctuations were within the level of accuracy of the survey, with a few exceptions. None of the fluctuations accounted for a change in settlement exceeding 0.5 inches.



All of the settlement that exceeds 0.5 inches is located on the south side of the landfill on the Phase II Closure. These locations are shown on Figure 2 as darker shaded areas, are identified in Table 1, and are referred to as “greater than 0.5-inch points.”

Table 1. Locations of Settlement Greater than 0.5 Inch

Marker No.	Settlement (inches)
68	1.00
90	0.60
92	0.60
105	0.60
107	0.60
108	0.72
109	0.72

The greater than 0.5-inch points are all located on either the downhill side of the band of trees or within the prism of a surface water ditch and are generally contiguous. The point of greatest settlement (1.0 inch) is at settlement marker 68, which is located within the prism of the toe of slope surface water ditch in the southeast corner of the Phase II Closure. The second area of greater than 0.5-inch points is a section that includes markers 105, 107, 108, 90, and 92. This area can be seen on Figure 1 and is located immediately downhill or adjacent to the outer ring of trees and associated swale. The remaining greater than 0.5-inch point (marker 109) is also located on the downhill side of the upper row of trees on the south slope of the Phase II Closure. Average settlement values for the site and by closure phase are included in Appendix B and summarized in Table 2.

Table 2. Average Settlement

Area	Settlement (inches)
Entire Site	0.22
Phase I Closure	0.09
Phase II Closure	0.36

Over the 2-year period, settlement exceeding 0.5 inches was limited to seven locations, only one that was greater than 0.72 inches during the period. However, the section of settlement greater than 0.5 inches is located in a generally contiguous area representing common cover features. The increased settlement in these areas may be due to additional weight from the



trees, maintenance associated with the features in this area, or erosion from additional surface water flows associated with swales/ditches near these settlement markers. In general, the results of the 2-year settlement survey indicate that settlement at ELF is uniform and within Ecology's guidance criteria.

Recommendations

Review of the settlement information and review of site information indicate that the following settlement criteria for termination of post-closure care, identified in the regulatory requirements section of this memorandum, have been attained:

- Slopes are uniform and do not exceed minimum or maximum criteria
- Routine site inspections performed by KCSWD show no evidence of differential settlement
- Generally, uniform settlement is less than 0.5 inches of settlement over a 2-year monitoring period. Sufficient data points to prepare settlement trend curves are not available

Over 2 years, evidence of significant differential settlement has not been observed at ELF. Uniform settlement, represented by the average settlement values, is less than the guidance criteria. Since ELF currently meets the closed landfill settlement guidance criteria for termination of post-closure care, we recommend an annual cover survey and inspection, for whether soil erosion, vegetation, animal activity, or factors other than settlement could be affecting measurements, until such a time as a request to terminate post-closure care is submitted to Ecology.

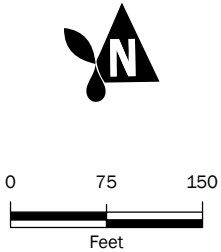
Attachments: Figure 1 – Settlement Monitoring Locations
Figure 2 – Settlement Monitoring December 2017
Appendix A – Enumclaw Landfill Settlement Survey
Appendix B – Bi-Annual Settlement Survey Results
Appendix C – Total 2-Year Settlement Summary



GIS Path: T:\projects_8\KingCounty_SolidWaste\EnumclawLandfill\Delivered\SettlementMonitoringLocations.mxd | Coordinate System: NAD 1983 StatePlane Washington North FIPS 4601 Feet | Date Saved: 7/27/2018 | User: rpepin | Print Date: 7/27/2018

- Phase I Closure (1989)
- Phase II Closure (1993)
- Inert Refuse Material
- Enumclaw Landfill Property

- Building
- Fence



Settlement Monitoring Locations
Enumclaw Landfill
King County, Washington

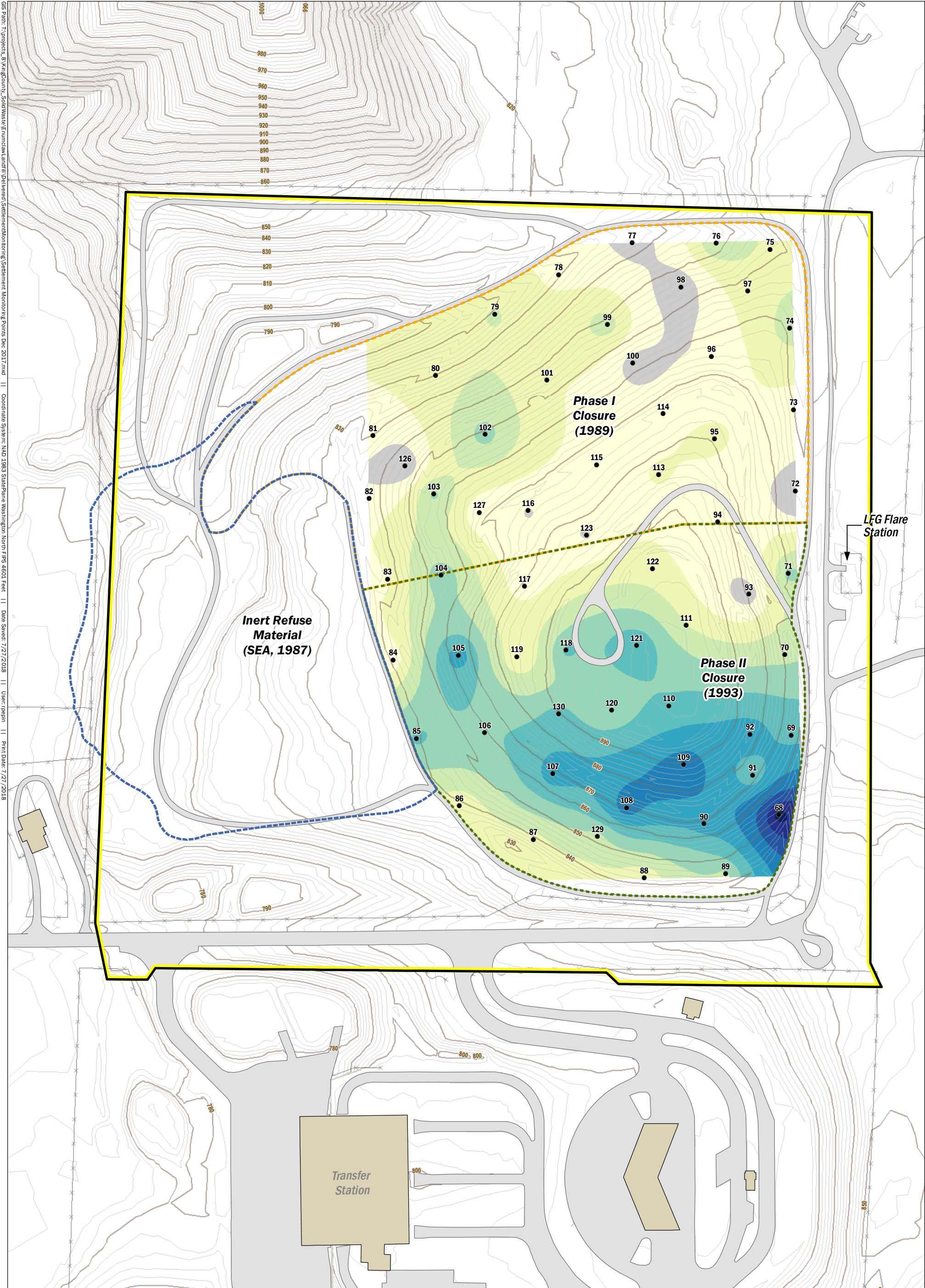


JUL-2018
BY:
KSL / RAP / EWM

FIGURE NO.
1

Note: Topographic contours from King County survey dated May 18, 2016.

Basemap Layer Credits | Pictometry International Corp.



Settlement (2015 to 2017)
in inches

0.9 - 1.0	0.3 - 0.4
0.8 - 0.9	0.2 - 0.3
0.7 - 0.8	0.1 - 0.2
0.6 - 0.7	> 0 - 0.1
0.5 - 0.6	Settlement Not Occurring
0.4 - 0.5	

Phase I Closure (1989)

Phase II Closure (1993)

Inert Refuse Material

Enumclaw Landfill Property

Building

Fence

Road

0

75

150

Feet

Settlement Monitoring December 2017
Enumclaw Landfill
King County, Washington

JUL-2018

BY:
KSL / RAP / EWM

FIGURE NO.

2

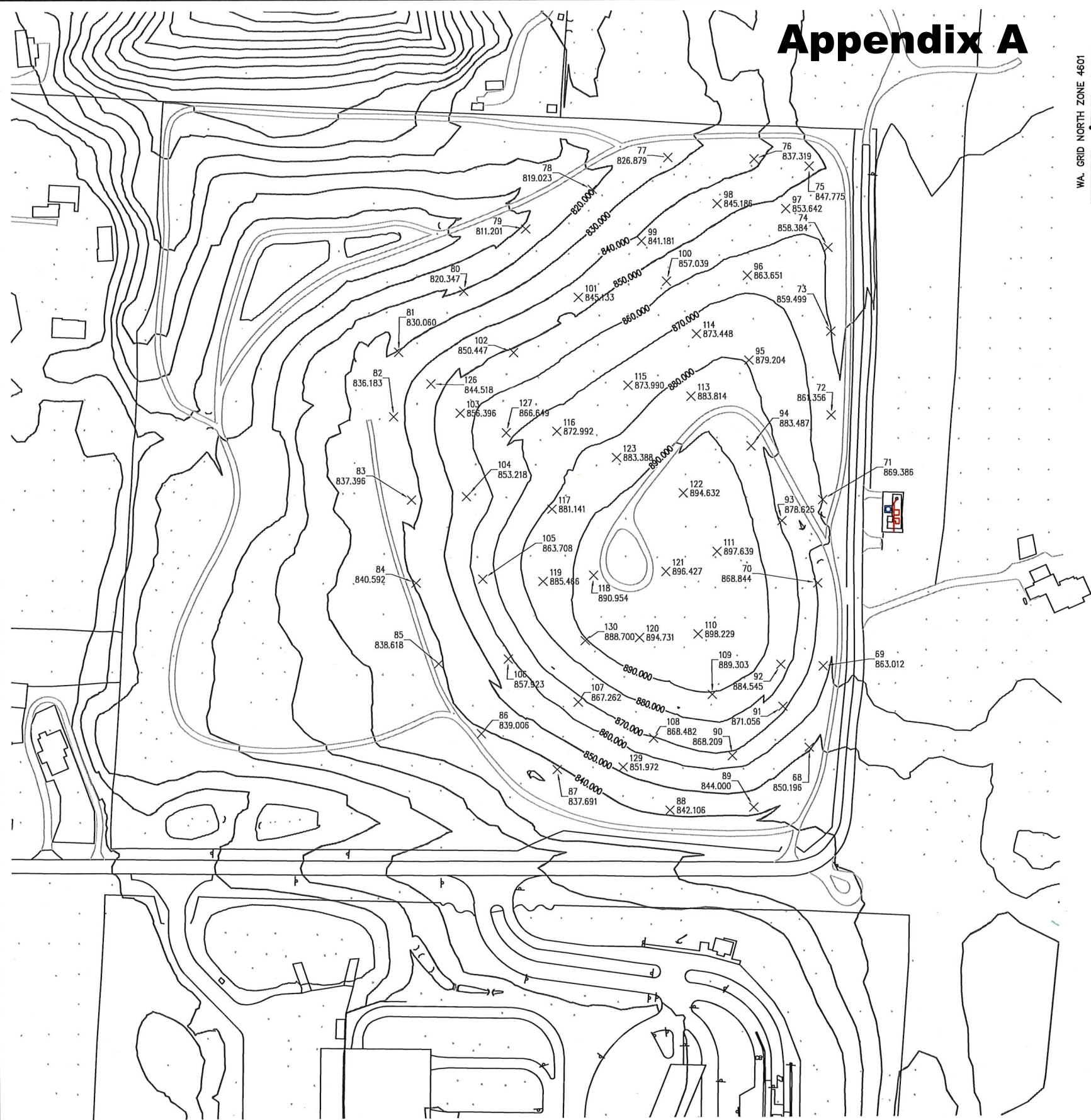
Note: Settlement baseline surveyed on November 19, 2015, update surveyed December 13, 2017.
Topographic contours from King County survey dated May 18, 2016.



Appendix A

Enumclaw Landfill Settlement Survey

Appendix A



MONITORING POINT COORDINATES
OBSERVED 12/13/2017

PT	NORTHING	EASTING	ELEV	DESC
68	77592.751	1362029.966	850.196	FENO
69	77727.549	1362053.429	863.012	FENO
70	77865.125	1362044.416	868.844	FENO
71	78003.086	1362052.667	869.386	FENO
72	78142.979	1362066.958	861.356	FENO
73	78281.500	1362066.161	859.499	FENO
74	78420.048	1362061.547	858.384	FENO
75	78554.661	1362030.221	847.775	FENO
76	78566.895	1361939.022	837.319	FENO
77	78569.600	1361796.229	826.879	FENO
78	78517.389	1361670.304	819.023	FENO
79	78452.042	1361560.661	811.201	FENO
80	78349.195	1361457.871	820.347	FENO
81	78248.643	1361350.034	830.060	FENO
82	78141.725	1361341.879	836.183	FENO
83	78004.177	1361371.202	837.396	FENO
84	77866.450	1361378.576	840.592	FENO
85	77732.401	1361415.997	838.618	FENO
86	77616.600	1361486.732	839.006	FENO
87	77557.088	1361611.925	837.691	FENO
88	77489.124	1361799.312	842.106	FENO
89	77493.879	1361937.868	844.000	FENO
90	77579.299	1361902.516	868.209	FENO
91	77660.654	1361986.490	871.056	FENO
92	77730.458	1361983.047	884.545	FENO
93	77968.506	1361985.137	878.625	FENO
94	78092.309	1361934.112	883.487	FENO
95	78234.175	1361930.528	879.204	FENO
96	78374.219	1361928.001	863.651	FENO
97	78484.552	1361991.318	853.642	FENO
98	78493.131	1361878.107	845.186	FENO
99	78431.646	1361751.822	841.181	FENO
100	78364.971	1361793.890	857.039	FENO
101	78338.561	1361647.580	845.133	FENO
102	78247.595	1361540.857	850.447	FENO
103	78147.467	1361451.690	856.396	FENO
104	78009.397	1361462.092	853.218	FENO
105	77872.845	1361489.473	863.708	FENO
106	77740.199	1361531.685	857.923	FENO
107	77668.636	1361646.889	867.262	FENO
108	77608.650	1361771.538	868.482	FENO
109	77680.838	1361869.617	889.303	FENO
110	77780.862	1361846.317	898.229	FENO
111	77917.591	1361877.805	897.639	FENO
112	78174.629	1361834.759	883.814	FENO
113	78277.819	1361843.708	873.448	FENO
114	78192.851	1361729.555	873.990	FENO
115	78117.104	1361611.859	872.992	FENO
116	77988.511	1361603.602	881.141	FENO
117	77878.629	1361672.498	890.954	FENO
118	77868.675	1361588.978	885.466	FENO
119	77775.305	1361748.279	894.731	FENO
120	77884.644	1361792.714	896.427	FENO
121	78014.538	1361822.007	894.632	FENO
122	78073.410	1361710.611	883.388	FENO
123	78195.985	1361403.414	844.518	FENO
124	78114.944	1361528.713	866.649	FENO
125	77560.713	1361720.864	851.972	FENO
126	77770.437	1361658.539	888.700	FENO

SECTION 19 T20N R7E W.M.

MONITORING SURVEY NARRATIVE

THE PURPOSE OF THIS SURVEY IS TO DETERMINE IF THE ENUMCLAW LANDFILL SETTLEMENT RATE IS LESS THAN 1/2" PER OVER A TWO YEAR PERIOD AND ALSO TO ASCERTAIN IF ANY SLOPES EXCEEDING 33 PER CENT.

THE LANDFILL WAS CLOSED IN 1992 WHEN THE TRANSFER STATION BECAME OPERATIONAL, PREVIOUSLY WAS A KING COUNTY GRAVEL PIT, AND THE LANDFILL/TRANSFER STATION SITE HAVE BEEN AERIAL MAPPED SURVEYS SEVERAL TIMES. THE AERIAL MAPPING WAS BASED ON A LOCAL HORIZONTAL DATUM AND AN APPARENT NGVD 1929 VERTICAL DATUM. THE LAST AERIAL MAPPING WAS FLOWN ON FEBRUARY 20, 2013 AND COMPILED AT 1"=500' PHOTO SCALE WITH A 152.856 MM CALIBRATED CAMERA AND COMPILED INTO MAPPING MEETING 1"=100' SCALE NATIONAL MAP ACCURACY STANDARDS BY 3DI (GEO TERRA MAPPING GROUP JOB#13-037) EUGENE OREGON.

EVALUATION OF THE COMPILED DIGITAL AERIAL MAPPING REVEALED THAT THE DATUMS USED WERE A LOCAL COORDINATE SYSTEM AS STATED ABOVE. THE ACCURACY OF THE AERIAL SURVEY WAS MORE THAN SUFFICIENT TO SHOW THE TOPOGRAPHIC SURFACE SLOPES, LIMITS OF THE REFUSE SITE, AND SURROUNDING FEATURES. AERIAL MAPPING, DEPLOYMENT OF GPS RTK USING THE WASHINGTON STATE REFERENCE NETWORK (WSRN), ROBOTIC TOTAL STATIONS, AND OTHER SOURCES OF MODERN SPATIAL DATA WARRANTED THAT THIS MONITORING SURVEY & AERIAL MAPPING BE ON THE NAD83/2011 HORIZONTAL DATUM AND NAVD88 VERTICAL DATUM.

THE BASIS OF COORDINATES WERE DERIVED USING WSRN CORS STATION "ENUM", WASHINGTON NORTH ZONE 4601: N 77251.703 E 1361459.185 U.S. FEET. FOR CONVERTING GROUND DISTANCES TO GRID APPLY COMBINATION SCALE FACTOR OF 1.00003.

THE BASIS OF VERTICAL DATUM WAS DERIVED FROM "RM1" NGS POINT ID DK3681, 3D STAINLESS STEEL ROD IN CASE, BEING A SECOND ORDER CLASS 1 BENCHMARK HAVING A NAVD88 ELEVATION OF 807.739 FEET.

14" LONG BERTSEN "FENO" SPIKES WITH 2" ALUMINUM CAPS WERE SET FOR MONITORING POINTS. THE FENO MARKER ANCHORING SYSTEM CAN ACHIEVE BETTER STABILITY WITHOUT NEEDING TO BE LONGER IN LENGTH THAT COULD POTENTIALLY PUNCTURE THE REFUSE LINER COVER. VEGETATIVE GROWTH, INCLUSIVE OF TREES OBSTRUCTING LINES OF SIGHT WARRANTED A DEPARTURE FROM A GRID TYPE SPACING TO A CIRCULAR LAYOUT AS DEPICTED HEREON THIS MAP.

INITIAL BASELINE MEASUREMENTS WERE TAKEN DURING WEEK OF NOVEMBER 10, 2015 ON THE FENO MONITORING MARKERS. EACH MARKER WAS MEASURED TWICE WITH TRIMBLE R8 RTK RECEIVERS, BUT ON DIFFERENT DAYS. SOME OF THE MONITORING POINTS HAD POOR GPS SKY VISIBILITY, SUCH THAT REDUNDANT MEASUREMENT VARIANCES HAD EXCEEDED THE OBJECTIVE 1CM LIMIT. TERRESTRIAL CONTROL TRAVERSE WAS RAN THE FOLLOWING WEEK TO OBTAIN MEASUREMENTS ON SKY OBSTRUCTED MARKERS WITH LEICA TCRP1203 ROBOTIC TOTAL STATIONS, AND THE DATA WAS ADJUSTED WITH STAR-NET. THE ADJUSTED STANDARD COORDINATE AND ELEVATIONS RESIDUALS WERE ALL LESS THAN 0.01 FEET.

DURING GPS AND TRAVERSE OPERATIONS, EXISTING PHOTO PANEL POINTS FOR THE SAID 2013 AERIAL MAPPING WERE RECOVERED AND MEASURED. EVALUATION OF THE DATA AND TRANSLATION FOR ANY PRIOR AERIAL MAPPING SHOULD BE AS FOLLOWS:

ADD 67,359.31 TO NORTHINGS, ADD 1,349,512.53 TO EASTINGS, AND ADD 3.74 FEET IN ELEVATION TO EXISTING LOCAL AERIAL MAPPING COORDINATES-FEATURES. THEN, ROTATE ON THE SE PANEL POINT NAD83/2011 COORDINATES N 76856.97 E 1361774.39 ELEV. 807.98 CLOCKWISE 0° 41'51".

DURING OBSERVATIONS OF THE FENO MONITORING MARKERS WITH POOR GPS SKY VISIBILITY, MARKERS WITH GOOD SKY VISIBILITY WERE ALSO OBSERVED WITH THE LEICA 1203 TOTAL STATION WITH DIRECT AND REVERSE MEASUREMENTS. THE AVERAGE VARIANCE OF 3D POSITIONAL MEASUREMENT BETWEEN RTK AND TOTAL STATION WAS LESS THAN 0.01 FEET.

RE-OBSERVATION OF THE FENO MARKERS WERE MEASURED IN MAY AND DECEMBER 2016; AND JULY AND DECEMBER 2017 USING LEICA 1203 TOTAL STATIONS. THE DECEMBER 13, 2017 FENO SETTLEMENT MARKERS ARE SHOWN HEREON. FOR OTHER RE-OBSERVATION COORDINATES, ELEVATIONS, AND DIFFERENCES IN XYZ, REFER TO THE SPREADSHEET REPORT.

SURVEY JOB No:	15098	11/30/15	#1	REPLACED POINTS WITH 12-13-17 OBSERVATIONS	DSR	3/23/18
CHECKED:						
CAD ENTERED:	RIECKEN, DAVE					
DESIGNED:						
CHECKED:						
SUPERVISOR:						
SECTION MANAGER APPROVED:						
NUM.				REVISION	BY	DATE



FED. AID No.	
ARMS PROJECT No.	
ORACLE PROJECT No.	
MAINTENANCE DIVISION No.	

KING COUNTY
DEPARTMENT OF TRANSPORTATION
ROADS SERVICE DIVISION - SURVEY UNIT
155 MONROE AVE NE, RENTON WA. 98056
(206)477-1773 FAX (206)-7719

ENUMCLAW LANDFILL
SETTLEMENT MONITORING SURVEY
FOR
DEPT. OF NATURAL RESOURCES SOLID WASTE DIVISION



SHEET
OF
1
SHEETS



Appendix B

Bi-Annual Settlement Survey Results

Appendix B							
KCSWD Enumclaw Closed Landfill - Raw Settlement Survey Data							
MARKER	NORTH USF	EAST USF	ELEV USF	DIFF N	DIFF E	DIFF EL	DATE
68	77592.746	1362029.978	850.279	0.000	0.000	0.000	11/19/15
68	77592.739	1362029.976	850.263	-0.007	-0.002	-0.016	05/18/16
68	77592.753	1362029.976	850.237	0.007	-0.002	-0.042	12/07/16
68	77592.760	1362029.962	850.214	0.014	-0.016	-0.065	07/06/17
68	77592.751	1362029.966	850.196	0.005	-0.012	-0.083	12/13/17
69	77727.557	1362053.438	863.051	0.000	0.000	0.000	11/19/15
69	77727.548	1362053.433	863.051	-0.009	-0.005	0.000	05/18/16
69	77727.555	1362053.436	863.033	-0.002	-0.002	-0.018	12/07/16
69	77727.556	1362053.428	863.027	-0.001	-0.010	-0.024	07/06/17
69	77727.549	1362053.429	863.012	-0.008	-0.009	-0.039	12/13/17
70	77865.147	1362044.429	868.866	0.000	0.000	0.000	11/19/15
70	77865.137	1362044.433	868.864	-0.010	0.004	-0.002	05/18/16
70	77865.141	1362044.433	868.859	-0.006	0.004	-0.007	12/07/16
70	77865.132	1362044.423	868.854	-0.015	-0.006	-0.012	07/06/17
70	77865.125	1362044.416	868.844	-0.022	-0.013	-0.022	12/13/17
71	78003.095	1362052.701	869.416	0.000	0.000	0.000	11/19/15
71	78003.088	1362052.694	869.414	-0.007	-0.007	-0.002	05/18/16
71	78003.093	1362052.683	869.401	-0.002	-0.018	-0.015	12/07/16
71	78003.088	1362052.679	869.394	-0.007	-0.022	-0.022	07/06/17
71	78003.086	1362052.667	869.386	-0.009	-0.034	-0.030	12/13/17
72	78142.993	1362066.943	861.337	0.000	0.000	0.000	11/19/15
72	78142.971	1362066.945	861.338	-0.022	0.002	0.000	05/18/16
72	78142.982	1362066.912	861.336	-0.011	-0.031	-0.001	12/07/16
72	78142.975	1362066.962	861.359	-0.018	0.019	0.022	07/06/17
72	78142.979	1362066.958	861.356	-0.014	0.015	0.019	12/13/17
73	78281.525	1362066.173	859.501	0.000	0.000	0.000	11/19/15
73	78281.499	1362066.170	859.494	-0.026	-0.003	-0.007	05/18/16
73	78281.511	1362066.167	859.486	-0.014	-0.006	-0.015	12/07/16
73	78281.516	1362066.149	859.461	-0.009	-0.024	-0.040	07/06/17
73	78281.500	1362066.161	859.499	-0.025	-0.012	-0.002	12/13/17
74	78420.039	1362061.553	858.405	0.000	0.000	0.000	11/19/15
74	78420.021	1362061.540	858.396	-0.018	-0.013	-0.009	05/18/16
74	78420.050	1362061.541	858.397	0.011	-0.012	-0.008	12/07/16
74	78420.050	1362061.527	858.383	0.011	-0.026	-0.022	07/06/17
74	78420.048	1362061.547	858.384	0.009	-0.006	-0.021	12/13/17
75	78554.674	1362030.208	847.790	0.000	0.000	0.000	11/19/15
75	78554.648	1362030.214	847.788	-0.026	0.006	-0.002	05/18/16
75	78554.670	1362030.210	847.792	-0.004	0.002	0.002	12/07/16
75	78554.650	1362030.218	847.773	-0.024	0.010	-0.017	07/06/17
75	78554.661	1362030.221	847.775	-0.013	0.013	-0.015	12/13/17
76	78566.902	1361939.021	837.346	0.000	0.000	0.000	11/19/15
76	78566.908	1361938.992	837.329	0.006	-0.029	-0.017	05/18/16
76	78566.906	1361939.023	837.336	0.004	0.002	-0.010	12/07/16
76	78566.904	1361939.019	837.313	0.002	-0.002	-0.033	07/06/17
76	78566.895	1361939.022	837.319	-0.007	0.001	-0.027	12/13/17

Appendix B KCSWD Enumclaw Closed Landfill - Raw Settlement Survey Data							
MARKER	NORTH USF	EAST USF	ELEV USF	DIFF N	DIFF E	DIFF EL	DATE
77	78569.589	1361796.235	826.875	0.000	0.000	0.000	11/19/15
77	78569.611	1361796.248	826.865	0.022	0.013	-0.010	05/18/16
77	78569.609	1361796.231	826.877	0.020	-0.004	0.002	12/07/16
77	78569.582	1361796.233	826.860	-0.007	-0.002	-0.015	07/06/17
77	78569.600	1361796.229	826.879	0.011	-0.006	0.004	12/13/17
78	78517.386	1361670.304	819.027	0.000	0.000	0.000	11/19/15
78	78517.406	1361670.303	819.017	0.020	-0.001	-0.010	05/18/16
78	78517.395	1361670.293	819.031	0.009	-0.011	0.004	12/07/16
78	78517.399	1361670.298	819.011	0.013	-0.006	-0.016	07/06/17
78	78517.389	1361670.304	819.023	0.003	0.000	-0.004	12/13/17
79	78452.039	1361560.658	811.219	0.000	0.000	0.000	11/19/15
79	78452.055	1361560.670	811.216	0.016	0.012	-0.003	05/18/16
79	78452.047	1361560.654	811.221	0.008	-0.004	0.002	12/07/16
79	78452.047	1361560.659	811.204	0.008	0.001	-0.015	07/06/17
79	78452.042	1361560.661	811.201	0.003	0.003	-0.018	12/13/17
80	78349.201	1361457.870	820.358	0.000	0.000	0.000	11/19/15
80	78349.219	1361457.876	820.359	0.018	0.006	0.001	05/18/16
80	78349.202	1361457.861	820.364	0.001	-0.009	0.006	12/07/16
80	78349.202	1361457.872	820.347	0.001	0.002	-0.011	07/06/17
80	78349.195	1361457.871	820.347	-0.006	0.001	-0.011	12/13/17
81	78248.661	1361350.024	830.066	0.000	0.000	0.000	11/19/15
81	78248.674	1361350.021	830.060	0.013	-0.003	-0.006	05/18/16
81	78248.648	1361350.024	830.063	-0.013	0.000	-0.003	12/07/16
81	78248.644	1361350.023	830.060	-0.017	-0.001	-0.006	07/06/17
81	78248.643	1361350.034	830.060	-0.018	0.010	-0.006	12/13/17
82	78141.726	1361341.874	836.185	0.000	0.000	0.000	11/19/15
82	78141.730	1361341.893	836.189	0.004	0.019	0.004	05/18/16
82	78141.729	1361341.866	836.186	0.003	-0.008	0.001	12/07/16
82	78141.732	1361341.896	836.182	0.006	0.022	-0.003	07/06/17
82	78141.725	1361341.879	836.183	-0.001	0.005	-0.002	12/13/17
83	78004.179	1361371.197	837.401	0.000	0.000	0.000	11/19/15
83	78004.205	1361371.192	837.400	0.026	-0.005	-0.001	05/18/16
83	78004.184	1361371.192	837.398	0.005	-0.005	-0.003	12/07/16
83	78004.178	1361371.225	837.391	-0.001	0.028	-0.010	07/06/17
83	78004.177	1361371.202	837.396	-0.002	0.005	-0.005	12/13/17
84	77866.455	1361378.554	840.591	0.000	0.000	0.000	11/19/15
84	77866.481	1361378.568	840.590	0.026	0.014	-0.001	05/18/16
84	77866.455	1361378.569	840.593	0.000	0.015	0.002	12/07/16
84	77866.456	1361378.574	840.586	0.001	0.020	-0.005	07/06/17
84	77866.450	1361378.576	840.592	-0.005	0.022	0.001	12/13/17
85	77732.411	1361415.991	838.654	0.000	0.000	0.000	11/19/15
85	77732.432	1361416.007	838.634	0.021	0.016	-0.020	05/18/16
85	77732.404	1361416.004	838.634	-0.007	0.013	-0.020	12/07/16
85	77732.408	1361416.001	838.614	-0.003	0.010	-0.040	07/06/17
85	77732.401	1361415.997	838.618	-0.010	0.006	-0.036	12/13/17
86	77616.606	1361486.726	839.014	0.000	0.000	0.000	11/19/15
86	77616.632	1361486.728	839.007	0.026	0.002	-0.007	05/18/16
86	77616.610	1361486.735	839.011	0.004	0.009	-0.003	12/07/16
86	77616.615	1361486.732	839.001	0.009	0.006	-0.013	07/06/17
86	77616.600	1361486.732	839.006	-0.006	0.006	-0.008	12/13/17

Appendix B KCSWD Enumclaw Closed Landfill - Raw Settlement Survey Data							
MARKER	NORTH USF	EAST USF	ELEV USF	DIFF N	DIFF E	DIFF EL	DATE
87	77557.075	1361611.920	837.703	0.000	0.000	0.000	11/19/15
87	77557.102	1361611.924	837.697	0.027	0.004	-0.006	05/18/16
87	77557.082	1361611.924	837.699	0.007	0.004	-0.004	12/07/16
87	77557.096	1361611.923	837.690	0.021	0.003	-0.013	07/06/17
87	77557.088	1361611.925	837.691	0.013	0.005	-0.012	12/13/17
88	77489.133	1361799.320	842.114	0.000	0.000	0.000	11/19/15
88	77489.146	1361799.318	842.112	0.013	-0.002	-0.002	05/18/16
88	77489.123	1361799.315	842.109	-0.010	-0.005	-0.005	12/07/16
88	77489.143	1361799.316	842.107	0.010	-0.004	-0.007	07/06/17
88	77489.124	1361799.312	842.106	-0.009	-0.008	-0.008	12/13/17
89	77493.878	1361937.878	844.022	0.000	0.000	0.000	11/19/15
89	77493.893	1361937.864	844.012	0.015	-0.014	-0.010	05/18/16
89	77493.873	1361937.874	844.006	-0.005	-0.004	-0.016	12/07/16
89	77493.888	1361937.870	844.004	0.010	-0.008	-0.018	07/06/17
89	77493.879	1361937.868	844.000	0.001	-0.010	-0.022	12/13/17
90	77579.292	1361902.528	868.256	0.000	0.000	0.000	11/19/15
90	77579.320	1361902.521	868.241	0.028	-0.007	-0.015	05/18/16
90	77579.292	1361902.519	868.229	0.000	-0.009	-0.027	12/07/16
90	77579.323	1361902.523	868.217	0.031	-0.005	-0.039	07/06/17
90	77579.299	1361902.516	868.209	0.007	-0.012	-0.047	12/13/17
91	77660.646	1361986.510	871.088	0.000	0.000	0.000	11/19/15
91	77660.640	1361986.490	871.079	-0.006	-0.020	-0.009	05/18/16
91	77660.657	1361986.509	871.067	0.011	-0.001	-0.021	12/07/16
91	77660.652	1361986.495	871.062	0.006	-0.015	-0.026	07/06/17
91	77660.654	1361986.490	871.056	0.008	-0.020	-0.032	12/13/17
92	77730.442	1361983.044	884.594	0.000	0.000	0.000	11/19/15
92	77730.456	1361983.027	884.581	0.014	-0.017	-0.013	05/18/16
92	77730.458	1361983.044	884.572	0.016	0.000	-0.022	12/07/16
92	77730.471	1361983.046	884.560	0.029	0.002	-0.034	07/06/17
92	77730.458	1361983.047	884.545	0.016	0.003	-0.049	12/13/17
93	77968.527	1361985.154	878.617	0.000	0.000	0.000	11/19/15
93	77968.510	1361985.162	878.619	-0.017	0.008	0.002	05/18/16
93	77968.513	1361985.150	878.639	-0.014	-0.004	0.022	12/07/16
93	77968.517	1361985.152	878.625	-0.010	-0.002	0.008	07/06/17
93	77968.506	1361985.137	878.625	-0.021	-0.017	0.008	12/13/17
94	78092.353	1361934.124	883.488	0.000	0.000	0.000	11/19/15
94	78092.338	1361934.139	883.490	-0.015	0.015	0.001	05/18/16
94	78092.339	1361934.125	883.504	-0.014	0.001	0.016	12/07/16
94	78092.322	1361934.122	883.491	-0.031	-0.002	0.003	07/06/17
94	78092.309	1361934.112	883.487	-0.044	-0.012	-0.001	12/13/17
95	78234.188	1361930.532	879.215	0.000	0.000	0.000	11/19/15
95	78234.167	1361930.547	879.214	-0.021	0.015	-0.001	05/18/16
95	78234.177	1361930.534	879.231	-0.011	0.002	0.016	12/07/16
95	78234.181	1361930.524	879.212	-0.007	-0.008	-0.003	07/06/17
95	78234.175	1361930.528	879.204	-0.013	-0.004	-0.011	12/13/17
96	78374.228	1361928.022	863.651	0.000	0.000	0.000	11/19/15
96	78374.213	1361927.997	863.648	-0.015	-0.025	-0.003	05/18/16
96	78374.229	1361927.995	863.644	0.001	-0.027	-0.007	07/06/17
96	78374.219	1361928.001	863.651	-0.009	-0.021	0.000	12/13/17

Appendix B KCSWD Enumclaw Closed Landfill - Raw Settlement Survey Data							
MARKER	NORTH USF	EAST USF	ELEV USF	DIFF N	DIFF E	DIFF EL	DATE
97	78484.558	1361991.319	853.655	0.000	0.000	0.000	11/19/15
97	78484.547	1361991.301	853.651	-0.011	-0.018	-0.004	05/18/16
97	78484.559	1361991.323	853.656	0.001	0.004	0.001	12/07/16
97	78484.561	1361991.316	853.638	0.003	-0.003	-0.017	07/06/17
97	78484.552	1361991.318	853.642	-0.007	-0.001	-0.013	12/13/17
98	78493.120	1361878.108	845.178	0.000	0.000	0.000	11/19/15
98	78493.113	1361878.082	845.190	-0.007	-0.026	0.012	05/18/16
98	78493.137	1361878.102	845.192	0.017	-0.006	0.014	12/07/16
98	78493.125	1361878.115	845.182	0.005	0.007	0.004	07/06/17
98	78493.131	1361878.107	845.186	0.011	-0.001	0.008	12/13/17
99	78431.648	1361751.817	841.205	0.000	0.000	0.000	11/19/15
99	78431.659	1361751.828	841.203	0.011	0.011	-0.002	05/18/16
99	78431.653	1361751.816	841.200	0.005	-0.001	-0.005	12/07/16
99	78431.632	1361751.832	841.175	-0.016	0.015	-0.030	07/06/17
99	78431.646	1361751.822	841.181	-0.002	0.005	-0.024	12/13/17
100	78364.976	1361793.897	857.033	0.000	0.000	0.000	11/19/15
100	78364.971	1361793.880	857.039	-0.005	-0.017	0.006	05/18/16
100	78364.974	1361793.891	857.045	-0.002	-0.006	0.012	12/07/16
100	78364.958	1361793.911	857.020	-0.018	0.014	-0.013	07/06/17
100	78364.971	1361793.890	857.039	-0.005	-0.007	0.006	12/13/17
101	78338.564	1361647.587	845.142	0.000	0.000	0.000	11/19/15
101	78338.577	1361647.576	845.148	0.013	-0.011	0.006	05/18/16
101	78338.576	1361647.569	845.154	0.012	-0.018	0.012	12/07/16
101	78338.582	1361647.576	845.137	0.018	-0.011	-0.005	07/06/17
101	78338.561	1361647.580	845.133	-0.003	-0.007	-0.009	12/13/17
102	78247.589	1361540.869	850.478	0.000	0.000	0.000	11/19/15
102	78247.562	1361540.862	850.481	-0.027	-0.007	0.003	05/18/16
102	78247.593	1361540.860	850.475	0.004	-0.009	-0.003	12/07/16
102	78247.584	1361540.852	850.453	-0.005	-0.017	-0.025	07/06/17
102	78247.595	1361540.857	850.447	0.006	-0.012	-0.031	12/13/17
103	78147.485	1361451.694	856.425	0.000	0.000	0.000	11/19/15
103	78147.486	1361451.704	856.429	0.001	0.010	0.004	05/18/16
103	78147.474	1361451.679	856.411	-0.011	-0.015	-0.014	12/07/16
103	78147.488	1361451.707	856.403	0.003	0.013	-0.022	07/06/17
103	78147.467	1361451.690	856.396	-0.018	-0.004	-0.029	12/13/17
104	78009.384	1361462.111	853.250	0.000	0.000	0.000	11/19/15
104	78009.390	1361462.085	853.247	0.006	-0.026	-0.003	05/18/16
104	78009.386	1361462.105	853.235	0.002	-0.006	-0.015	12/07/16
104	78009.416	1361462.154	853.223	0.032	0.043	-0.027	07/06/17
104	78009.397	1361462.092	853.218	0.013	-0.019	-0.032	12/13/17
105	77872.842	1361489.469	863.760	0.000	0.000	0.000	11/19/15
105	77872.870	1361489.477	863.741	0.028	0.008	-0.019	05/18/16
105	77872.832	1361489.479	863.734	-0.010	0.010	-0.026	12/07/16
105	77872.843	1361489.483	863.713	0.001	0.014	-0.047	07/06/17
105	77872.845	1361489.473	863.708	0.003	0.004	-0.052	12/13/17
106	77740.205	1361531.685	857.956	0.000	0.000	0.000	11/19/15
106	77740.191	1361531.676	857.941	-0.014	-0.009	-0.015	05/18/16
106	77740.185	1361531.700	857.941	-0.020	0.015	-0.015	12/07/16
106	77740.204	1361531.691	857.924	-0.001	0.006	-0.032	07/06/17
106	77740.199	1361531.685	857.923	-0.006	0.000	-0.033	12/13/17

Appendix B KCSWD Enumclaw Closed Landfill - Raw Settlement Survey Data							
MARKER	NORTH USF	EAST USF	ELEV USF	DIFF N	DIFF E	DIFF EL	DATE
107	77668.610	1361646.870	867.310	0.000	0.000	0.000	11/19/15
107	77668.633	1361646.885	867.285	0.023	0.015	-0.025	05/18/16
107	77668.621	1361646.884	867.281	0.011	0.014	-0.029	12/07/16
107	77668.639	1361646.906	867.263	0.029	0.036	-0.047	07/06/17
107	77668.636	1361646.889	867.262	0.026	0.019	-0.048	12/13/17
108	77608.632	1361771.539	868.540	0.000	0.000	0.000	11/19/15
108	77608.653	1361771.524	868.518	0.021	-0.015	-0.022	05/18/16
108	77608.637	1361771.542	868.510	0.005	0.003	-0.030	12/07/16
108	77608.667	1361771.542	868.490	0.035	0.003	-0.050	07/06/17
108	77608.650	1361771.538	868.482	0.018	-0.001	-0.058	12/13/17
109	77680.830	1361869.619	889.361	0.000	0.000	0.000	11/19/15
109	77680.857	1361869.629	889.373	0.027	0.010	0.012	05/18/16
109	77680.830	1361869.625	889.335	0.000	0.006	-0.026	12/07/16
109	77680.850	1361869.623	889.300	0.020	0.004	-0.061	07/06/17
109	77680.838	1361869.617	889.303	0.008	-0.002	-0.058	12/13/17
110	77780.865	1361846.295	898.263	0.000	0.000	0.000	11/19/15
110	77780.865	1361846.281	898.252	0.000	-0.014	-0.011	05/18/16
110	77780.866	1361846.304	898.248	0.001	0.009	-0.015	12/07/16
110	77780.870	1361846.303	898.226	0.005	0.008	-0.037	07/06/17
110	77780.862	1361846.317	898.229	-0.003	0.022	-0.034	12/13/17
111	77917.595	1361877.792	897.656	0.000	0.000	0.000	11/19/15
111	77917.574	1361877.785	897.650	-0.021	-0.007	-0.006	05/18/16
111	77917.591	1361877.801	897.653	-0.004	0.009	-0.003	12/07/16
111	77917.600	1361877.794	897.639	0.005	0.002	-0.017	07/06/17
111	77917.591	1361877.805	897.639	-0.004	0.013	-0.017	12/13/17
113	78174.619	1361834.754	883.823	0.000	0.000	0.000	11/19/15
113	78174.602	1361834.749	883.807	-0.017	-0.005	-0.016	05/18/16
113	78174.621	1361834.751	883.834	0.002	-0.003	0.011	12/07/16
113	78174.619	1361834.758	883.819	0.000	0.004	-0.004	07/06/17
113	78174.629	1361834.759	883.814	0.010	0.005	-0.009	12/13/17
114	78277.811	1361843.705	873.454	0.000	0.000	0.000	11/19/15
114	78277.813	1361843.689	873.451	0.002	-0.016	-0.003	05/18/16
114	78277.798	1361843.707	873.457	-0.013	0.002	0.003	12/07/16
114	78277.816	1361843.706	873.450	0.005	0.001	-0.004	07/06/17
114	78277.819	1361843.708	873.448	0.008	0.003	-0.006	12/13/17
115	78192.825	1361729.564	873.997	0.000	0.000	0.000	11/19/15
115	78192.858	1361729.580	873.978	0.033	0.016	-0.019	05/18/16
115	78192.839	1361729.544	873.988	0.014	-0.020	-0.009	12/07/16
115	78192.846	1361729.556	873.969	0.021	-0.008	-0.028	07/06/17
115	78192.851	1361729.555	873.990	0.026	-0.009	-0.007	12/13/17
116	78117.111	1361611.867	872.991	0.000	0.000	0.000	11/19/15
116	78117.125	1361611.885	872.988	0.014	0.018	-0.003	05/18/16
116	78117.107	1361611.856	872.995	-0.004	-0.011	0.004	12/07/16
116	78117.103	1361611.865	872.984	-0.008	-0.002	-0.007	07/06/17
116	78117.104	1361611.859	872.992	-0.007	-0.008	0.001	12/13/17
117	77988.528	1361603.590	881.144	0.000	0.000	0.000	11/19/15
117	77988.537	1361603.615	881.148	0.009	0.025	0.004	05/18/16
117	77988.520	1361603.595	881.147	-0.008	0.005	0.003	12/07/16
117	77988.513	1361603.599	881.135	-0.015	0.009	-0.009	07/06/17
117	77988.511	1361603.602	881.141	-0.017	0.012	-0.003	12/13/17

Appendix B KCSWD Enumclaw Closed Landfill - Raw Settlement Survey Data							
MARKER	NORTH USF	EAST USF	ELEV USF	DIFF N	DIFF E	DIFF EL	DATE
118	77878.656	1361672.504	890.991	0.000	0.000	0.000	11/19/15
118	77878.627	1361672.517	890.966	-0.029	0.013	-0.025	05/18/16
118	77878.642	1361672.507	890.967	-0.014	0.003	-0.024	12/07/16
118	77878.633	1361672.501	890.952	-0.023	-0.003	-0.039	07/06/17
118	77878.629	1361672.498	890.954	-0.027	-0.006	-0.037	12/13/17
119	77868.670	1361588.963	885.472	0.000	0.000	0.000	11/19/15
119	77868.673	1361588.935	885.510	0.003	-0.028	0.038	05/18/16
119	77868.666	1361588.973	885.469	-0.004	0.010	-0.003	07/06/17
119	77868.675	1361588.978	885.466	0.005	0.015	-0.006	12/13/17
120	77775.312	1361748.266	894.755	0.000	0.000	0.000	11/19/15
120	77775.306	1361748.243	894.746	-0.006	-0.023	-0.009	05/18/16
120	77775.305	1361748.274	894.749	-0.007	0.008	-0.006	12/07/16
120	77775.308	1361748.263	894.723	-0.004	-0.003	-0.032	07/06/17
120	77775.305	1361748.279	894.731	-0.007	0.013	-0.024	12/13/17
121	77884.641	1361792.687	896.471	0.000	0.000	0.000	11/19/15
121	77884.641	1361792.687	896.471	-0.001	0.000	0.000	05/18/16
121	77884.643	1361792.703	896.448	0.002	0.016	-0.023	12/07/16
121	77884.641	1361792.710	896.434	0.000	0.023	-0.037	07/06/17
121	77884.644	1361792.714	896.427	0.003	0.027	-0.044	12/13/17
122	78014.536	1361822.019	894.645	0.000	0.000	0.000	11/19/15
122	78014.516	1361822.014	894.626	-0.020	-0.005	-0.019	05/18/16
122	78014.533	1361822.012	894.641	-0.003	-0.007	-0.004	12/07/16
122	78014.543	1361822.013	894.630	0.007	-0.006	-0.015	07/06/17
122	78014.538	1361822.007	894.632	0.002	-0.012	-0.013	12/13/17
123	78073.415	1361710.604	883.386	0.000	0.000	0.000	11/19/15
123	78073.418	1361710.637	883.387	0.003	0.033	0.001	05/18/16
123	78073.417	1361710.610	883.393	0.002	0.006	0.007	12/07/16
123	78073.415	1361710.616	883.380	0.000	0.012	-0.006	07/06/17
123	78073.410	1361710.611	883.388	-0.005	0.007	0.002	12/13/17
126	78195.967	1361403.400	844.504	0.000	0.000	0.000	11/19/15
126	78195.985	1361403.396	844.524	0.018	-0.004	0.020	05/18/16
126	78195.990	1361403.400	844.526	0.023	0.000	0.022	12/07/16
126	78196.005	1361403.409	844.522	0.038	0.009	0.018	07/06/17
126	78195.985	1361403.414	844.518	0.018	0.014	0.014	12/13/17
127	78114.980	1361528.712	866.648	0.000	0.000	0.000	11/19/15
127	78114.971	1361528.739	866.639	-0.009	0.027	-0.009	05/18/16
127	78114.955	1361528.715	866.646	-0.025	0.003	-0.002	12/07/16
127	78114.955	1361528.718	866.636	-0.025	0.006	-0.012	07/06/17
127	78114.944	1361528.713	866.649	-0.036	0.001	0.001	12/13/17
129	77560.703	1361720.849	851.992	0.000	0.000	0.000	11/19/15
129	77560.715	1361720.849	851.985	0.012	0.000	-0.007	05/18/16
129	77560.700	1361720.863	851.985	-0.003	0.014	-0.007	12/07/16
129	77560.725	1361720.866	851.974	0.022	0.017	-0.018	07/06/17
129	77560.713	1361720.864	851.972	0.010	0.015	-0.020	12/13/17
130	77770.441	1361658.516	888.739	0.000	0.000	0.000	11/19/15
130	77770.430	1361658.524	888.709	-0.011	0.008	-0.030	05/18/16
130	77770.429	1361658.532	888.682	-0.012	0.016	-0.057	12/07/16
130	77770.459	1361658.530	888.690	0.018	0.014	-0.049	07/06/17
130	77770.437	1361658.539	888.700	-0.004	0.023	-0.039	12/13/17



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Total 2-Year Settlement Summary

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Summary of 2-Year Settlement

MARKER	Phase of Closure	NORTHING (USF)	EASTING (USF)	BASE ELEV (USF)	ELEVATION CHANGE (USF) ⁽¹⁾		SETTLEMENT (FT)	SETTLEMENT (INCHES)
					11/19/2015	12/13/2017		
68	Phase II	77592.746	1362029.978	850.099	0.00	-0.08	0.083	1.00
69	Phase II	77727.557	1362053.438	862.871	0.00	-0.04	0.040	0.48
70	Phase II	77865.147	1362044.429	868.686	0.00	-0.02	0.020	0.24
71	Phase II	78003.095	1362052.701	869.236	0.00	-0.03	0.030	0.36
72	Phase I	78142.993	1362066.943	861.157	0.00	0.02	-0.020	-0.24
73	Phase I	78281.525	1362066.173	859.321	0.00	0.00	0.000	0.00
74	Phase I	78420.039	1362061.553	858.225	0.00	-0.02	0.020	0.24
75	Phase I	78554.674	1362030.208	847.610	0.00	-0.01	0.010	0.12
76	Phase I	78566.902	1361939.021	837.166	0.00	-0.03	0.030	0.36
77	Phase I	78569.589	1361796.235	826.695	0.00	0.00	0.000	0.00
78	Phase I	78517.386	1361670.304	818.847	0.00	0.00	0.000	0.00
79	Phase I	78452.039	1361560.658	811.039	0.00	-0.02	0.020	0.24
80	Phase I	78349.201	1361457.870	820.178	0.00	-0.01	0.010	0.12
81	Phase I	78248.661	1361350.024	829.886	0.00	-0.01	0.010	0.12
82	Phase I	78141.726	1361341.874	836.005	0.00	0.00	0.000	0.00
83	Phase I	78004.179	1361371.197	837.221	0.00	-0.01	0.010	0.12
84	Phase II	77866.455	1361378.554	840.411	0.00	0.00	0.000	0.00
85	Phase II	77732.411	1361415.991	838.474	0.00	-0.04	0.040	0.48
86	Phase II	77616.606	1361486.726	838.834	0.00	-0.01	0.010	0.12
87	Phase II	77557.075	1361611.920	837.523	0.00	-0.01	0.010	0.12
88	Phase II	77489.133	1361799.320	841.934	0.00	-0.01	0.010	0.12
89	Phase II	77493.878	1361937.878	843.842	0.00	-0.02	0.020	0.24
90	Phase II	77579.292	1361902.528	868.076	0.00	-0.05	0.050	0.60
91	Phase II	77660.646	1361986.510	870.908	0.00	-0.03	0.030	0.36

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Appendix C

Summary of 2-Year Settlement

MARKER	Phase of Closure	NORTHING (USF)	EASTING (USF)	BASE ELEV (USF)	ELEVATION CHANGE (USF) ⁽¹⁾		SETTLEMENT (FT)	SETTLEMENT (INCHES)
					11/19/2015	12/13/2017		
92	Phase II	77730.442	1361983.044	884.414	0.00	-0.05	0.050	0.60
93	Phase II	77968.527	1361985.154	878.437	0.00	0.01	-0.010	-0.12
94	Phase I	78092.353	1361934.124	883.308	0.00	0.00	0.000	0.00
95	Phase I	78234.188	1361930.532	879.035	0.00	-0.01	0.010	0.12
96	Phase I	78374.228	1361928.022	863.471	0.00	0.00	0.000	0.00
97	Phase I	78484.558	1361991.319	853.475	0.00	-0.01	0.010	0.12
98	Phase I	78493.120	1361878.108	844.998	0.00	0.01	-0.010	-0.12
99	Phase I	78431.648	1361751.817	841.025	0.00	-0.02	0.020	0.24
100	Phase I	78364.976	1361793.897	856.853	0.00	0.01	-0.010	-0.12
101	Phase I	78338.564	1361647.587	844.962	0.00	-0.01	0.010	0.12
102	Phase I	78247.589	1361540.869	850.298	0.00	-0.03	0.030	0.36
103	Phase I	78147.485	1361451.694	856.245	0.00	-0.03	0.030	0.36
104	Phase I	78009.384	1361462.111	853.070	0.00	-0.03	0.030	0.36
105	Phase II	77872.842	1361489.469	863.580	0.00	-0.05	0.050	0.60
106	Phase II	77740.205	1361531.685	857.776	0.00	-0.03	0.030	0.36
107	Phase II	77668.610	1361646.870	867.130	0.00	-0.05	0.050	0.60
108	Phase II	77608.632	1361771.539	868.360	0.00	-0.06	0.060	0.72
109	Phase II	77680.830	1361869.619	889.181	0.00	-0.06	0.060	0.72
110	Phase II	77780.865	1361846.295	898.083	0.00	-0.03	0.030	0.36
111	Phase II	77917.595	1361877.792	897.476	0.00	-0.02	0.020	0.24
113	Phase I	78174.619	1361834.754	883.643	0.00	-0.01	0.010	0.12
114	Phase I	78277.811	1361843.705	873.274	0.00	-0.01	0.010	0.12
115	Phase I	78192.825	1361729.564	873.817	0.00	-0.01	0.010	0.12
116	Phase I	78117.111	1361611.867	872.811	0.00	0.00	0.000	0.00

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Summary of 2-Year Settlement

MARKER	Phase of Closure	NORTHING (USF)	EASTING (USF)	BASE ELEV (USF)	ELEVATION CHANGE (USF) ⁽¹⁾		SETTLEMENT (FT)	SETTLEMENT (INCHES)
					11/19/2015	12/13/2017		
117	Phase II	77988.528	1361603.590	880.964	0.00	0.00	0.000	0.00
118	Phase II	77878.656	1361672.504	890.811	0.00	-0.04	0.040	0.48
119	Phase II	77868.670	1361588.963	885.292	0.00	-0.01	0.010	0.12
120	Phase II	77775.312	1361748.266	894.575	0.00	-0.02	0.020	0.24
121	Phase II	77884.641	1361792.687	896.291	0.00	-0.04	0.040	0.48
122	Phase II	78014.536	1361822.019	894.465	0.00	-0.01	0.010	0.12
123	Phase I	78073.415	1361710.604	883.206	0.00	0.00	0.000	0.00
126	Phase I	78195.967	1361403.400	844.324	0.00	0.01	-0.010	-0.12
127	Phase I	78114.980	1361528.712	866.468	0.00	0.00	0.000	0.00
129	Phase II	77560.703	1361720.849	851.812	0.00	-0.02	0.020	0.24
130	Phase II	77770.441	1361658.516	888.559	0.00	-0.04	0.040	0.48
							Minimum	-0.24
							Maximum	1.00
							Mean	0.22
							Median	0.12
							Standard Deviation	0.25

(1) Change in elevation was limited to 0.01 feet (0.12 inches) level of precision based on KC Roads "Monitoring Survey Narrative."

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Phase I Closure Data

Summary of 2-Year Settlement

MARKER	Phase of Closure	NORTHING (USF)	EASTING (USF)	BASE ELEV (USF)	ELEVATION CHANGE (USF) ⁽¹⁾		SETTLEMENT (FT)	SETTLEMENT (INCHES)
					11/19/2015	12/13/2017		
72	Phase I	78142.993	1362066.943	861.157	0.00	0.02	-0.020	-0.24
73	Phase I	78281.525	1362066.173	859.321	0.00	0.00	0.000	0.00
74	Phase I	78420.039	1362061.553	858.225	0.00	-0.02	0.020	0.24
75	Phase I	78554.674	1362030.208	847.610	0.00	-0.01	0.010	0.12
76	Phase I	78566.902	1361939.021	837.166	0.00	-0.03	0.030	0.36
77	Phase I	78569.589	1361796.235	826.695	0.00	0.00	0.000	0.00
78	Phase I	78517.386	1361670.304	818.847	0.00	0.00	0.000	0.00
79	Phase I	78452.039	1361560.658	811.039	0.00	-0.02	0.020	0.24
80	Phase I	78349.201	1361457.870	820.178	0.00	-0.01	0.010	0.12
81	Phase I	78248.661	1361350.024	829.886	0.00	-0.01	0.010	0.12
82	Phase I	78141.726	1361341.874	836.005	0.00	0.00	0.000	0.00
83	Phase I	78004.179	1361371.197	837.221	0.00	-0.01	0.010	0.12
94	Phase I	78092.353	1361934.124	883.308	0.00	0.00	0.000	0.00
95	Phase I	78234.188	1361930.532	879.035	0.00	-0.01	0.010	0.12
96	Phase I	78374.228	1361928.022	863.471	0.00	0.00	0.000	0.00
97	Phase I	78484.558	1361991.319	853.475	0.00	-0.01	0.010	0.12
98	Phase I	78493.120	1361878.108	844.998	0.00	0.01	-0.010	-0.12
99	Phase I	78431.648	1361751.817	841.025	0.00	-0.02	0.020	0.24
100	Phase I	78364.976	1361793.897	856.853	0.00	0.01	-0.010	-0.12
101	Phase I	78338.564	1361647.587	844.962	0.00	-0.01	0.010	0.12
102	Phase I	78247.589	1361540.869	850.298	0.00	-0.03	0.030	0.36
103	Phase I	78147.485	1361451.694	856.245	0.00	-0.03	0.030	0.36
104	Phase I	78009.384	1361462.111	853.070	0.00	-0.03	0.030	0.36

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Phase I Closure Data

Summary of 2-Year Settlement

MARKER	Phase of Closure	NORTHING (USF)	EASTING (USF)	BASE ELEV (USF)	ELEVATION CHANGE (USF) ⁽¹⁾		SETTLEMENT (FT)	SETTLEMENT (INCHES)
					11/19/2015	12/13/2017		
113	Phase I	78174.619	1361834.754	883.643	0.00	-0.01	0.010	0.12
114	Phase I	78277.811	1361843.705	873.274	0.00	-0.01	0.010	0.12
115	Phase I	78192.825	1361729.564	873.817	0.00	-0.01	0.010	0.12
116	Phase I	78117.111	1361611.867	872.811	0.00	0.00	0.000	0.00
123	Phase I	78073.415	1361710.604	883.206	0.00	0.00	0.000	0.00
126	Phase I	78195.967	1361403.400	844.324	0.00	0.01	-0.010	-0.12
127	Phase I	78114.980	1361528.712	866.468	0.00	0.00	0.000	0.00
							Minimum	-0.24
							Maximum	0.36
							Mean	0.09
							Median	0.12
							Standard Deviation	0.15

(1) Change in elevation was limited to 0.01 feet (0.12 inches) level of precision based on KC Roads "Monitoring Survey Narrative."

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Appendix C
Phase II Closure Data
Summary of 2-Year Settlement

MARKER	Phase of Closure	NORTHING (USF)	EASTING (USF)	BASE ELEV (USF)	ELEVATION CHANGE (USF) ⁽¹⁾		SETTLEMENT (FT)	SETTLEMENT (INCHES)
					11/19/2015	12/13/2017		
68	Phase II	77592.746	1362029.978	850.099	0.00	-0.08	0.083	1.00
69	Phase II	77727.557	1362053.438	862.871	0.00	-0.04	0.040	0.48
70	Phase II	77865.147	1362044.429	868.686	0.00	-0.02	0.020	0.24
71	Phase II	78003.095	1362052.701	869.236	0.00	-0.03	0.030	0.36
84	Phase II	77866.455	1361378.554	840.411	0.00	0.00	0.000	0.00
85	Phase II	77732.411	1361415.991	838.474	0.00	-0.04	0.040	0.48
86	Phase II	77616.606	1361486.726	838.834	0.00	-0.01	0.010	0.12
87	Phase II	77557.075	1361611.920	837.523	0.00	-0.01	0.010	0.12
88	Phase II	77489.133	1361799.320	841.934	0.00	-0.01	0.010	0.12
89	Phase II	77493.878	1361937.878	843.842	0.00	-0.02	0.020	0.24
90	Phase II	77579.292	1361902.528	868.076	0.00	-0.05	0.050	0.60
91	Phase II	77660.646	1361986.510	870.908	0.00	-0.03	0.030	0.36
92	Phase II	77730.442	1361983.044	884.414	0.00	-0.05	0.050	0.60
93	Phase II	77968.527	1361985.154	878.437	0.00	0.01	-0.010	-0.12
105	Phase II	77872.842	1361489.469	863.580	0.00	-0.05	0.050	0.60
106	Phase II	77740.205	1361531.685	857.776	0.00	-0.03	0.030	0.36
107	Phase II	77668.610	1361646.870	867.130	0.00	-0.05	0.050	0.60
108	Phase II	77608.632	1361771.539	868.360	0.00	-0.06	0.060	0.72
109	Phase II	77680.830	1361869.619	889.181	0.00	-0.06	0.060	0.72
110	Phase II	77780.865	1361846.295	898.083	0.00	-0.03	0.030	0.36
111	Phase II	77917.595	1361877.792	897.476	0.00	-0.02	0.020	0.24
117	Phase II	77988.528	1361603.590	880.964	0.00	0.00	0.000	0.00
118	Phase II	77878.656	1361672.504	890.811	0.00	-0.04	0.040	0.48

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Appendix C
Phase II Closure Data
Summary of 2-Year Settlement

MARKER	Phase of Closure	NORTHING (USF)	EASTING (USF)	BASE ELEV (USF)	ELEVATION CHANGE (USF) ⁽¹⁾		SETTLEMENT (FT)	SETTLEMENT (INCHES)
					11/19/2015	12/13/2017		
119	Phase II	77868.670	1361588.963	885.292	0.00	-0.01	0.010	0.12
120	Phase II	77775.312	1361748.266	894.575	0.00	-0.02	0.020	0.24
121	Phase II	77884.641	1361792.687	896.291	0.00	-0.04	0.040	0.48
122	Phase II	78014.536	1361822.019	894.465	0.00	-0.01	0.010	0.12
129	Phase II	77560.703	1361720.849	851.812	0.00	-0.02	0.020	0.24
130		77770.441	1361658.516	888.559	0.00	-0.04	0.040	0.48
							Minimum	-0.12
							Maximum	1.00
							Mean	0.36
							Median	0.36
							Standard Deviation	0.25

(1) Change in elevation was limited to 0.01 feet (0.12 inches) level of precision based on KC Roads "Monitoring Survey Narrative."