Weaver Consultants Group

December 16, 2022
Project No. 0771-368-11-123

Eric Clegg
MC-126
Waste Permits Division
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Re: Response to Technical Notice of Deficiency Letter – Type I Major Amendment Application
Turkey Creek Landfill
Alvarado, Johnson County, Texas
MSW Permit No. 1417D
RN100825462/CN601668486
Tracking No. 27341370

Dear Mr. Clegg:

On behalf of Texas Regional Landfill Company, LP, please find enclosed one original and three copies of the replacement pages for the referenced permit amendment application. The attached replacement pages were developed to incorporate comments included in your email dated September 27, 2022.

The enclosed table contains each comment identified by the TCEQ and a response to each below the comment.

During the course of your review, if you need additional information or have any questions, please call.

Sincerely,

Nevzat Turan, P.E.
Principal

Attachments:
Attachment 1: Application Deficiencies Table
Attachment 2: Revised MSW Checklist MRI ID 927-931, and 933
Attachment 3: Revision Pages (RLSO Format)
Attachment 4: Revision Pages (Clean Format)

cc: Gary Bartels, Texas Regional Landfill Company, LP

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ATTACHMENT 1

APPLICATION DEFICIENCIES TABLE

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
NT1	1	45	General	330.55(a)	Acknowledged	NT	Ambiguous	Include required acknowledgement in application. Response: Review of the application (Parts I/II, Table 2.3) confirms that the landfill is operating in compliance with the requirements of Subchapter U of the 30 TAC 330. As shown in the table, the facility currently operates under a Subchapter U Standard Permit, as well as being authorized under a Title V General Operating Permit.
NT2	2	46	General	330.55(a)	Acknowledged	NT	Ambiguous	Include required acknowledgement in application. Response: The management of surface water and wastewater (including contaminated surface or stormwater, and leachate) are presented in Parts I/II, Section 10.2 (related to stormwater discharge permitting) and Part III, Appendix IIIC, Sections 2 - Leachate and Contaminated Water Generation, Section 4 - Leachate and Contaminated Water Storage, and Section 5 - Leachate and Contaminated Water Disposal. Appendix IIIC also includes supporting analyses of the contaminated water management systems incorporated into the application.
NT3	3	90	Part I	330.59(d)(1)(D)		NT	Incomplete	Submit Sheet 2 of Part I/II, Section 13 with surveyor's seal, signature, and date. Response: The referenced survey drawing is Sheet 2 of 3 of the survey drawing package signed and sealed by the licensed surveyor (Byron O. Howell, PLS No. 8048) on Sheet 1 of 3. Sheet 1 of 3 of the survey drawing package also includes the Surveyor Certification statement, the surveyor's project number which consistent with both sheets (200801745-18) included in Section 13, reference to the signed and sealed sheet being Sheet 1 of 3, and the Legal Description of the property. Finally, while the sheets were prepared in 2009, it is reasonable to assume from the above background that the surveyor's seal was applicable to the entire drawing package, and that this licensed surveyor (working under contract to Republic Services) provided a work product consistent with the State of Texas Board of Professional Engineers and Land Surveyors requirements. We propose that the information submitted is adequate, and no additional information is submitted with this response.
T4	4	130	Part II	330.61(b)(1)(C)	Volume 1 - Parts I/II - Section 2.1.2	T	Inconsistent	Explain discrepancies between waste acceptance rates and estimated site life provided in Parts I/II, Section 2.1.2 and Appendix I/IIB, TxDOT Tab, TCEQ Transportation Data and Coordination Report Form for MSW Type I Landfills (Section V). Response: The traffic study was initially developed using slighlty different information than what is included in the application. The waste acceptance rate in the traffic study (which leads to a specific volume) was modified slighlty during the development of the application. However the two numbers were very similar and the resulting difference in landfill traffic is not significant enough to warrant an update of the traffic study to TxDOT. Further, the increase in roadway traffic patterns for the period shown is consistent with previous submittals and discussions with the TXDOT in preparing like studies. Finally, as shown in the study, the roadways maintain excess capacity currently and into the future, and the landfill traffic makes up a small part of the traffic observed on the roadways. Based on this information, we believe that while the referenced waste receipt evaluations may vary, they are each appropriate for the topic of evaluation. No additional information is submitted with this response.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
NT5	5	137	Part II	330.61(h)(4)	Volume 1 - Parts I/II - Section 7 .6	NT	Incomplete	Add text as to if there are any schools, licensed day-care centers, and recreational areas within 1 mile of the proposed permit boundary to Section 7.6. Response: Text has been added to Parts I/II Section 7.6 to indicate that there are no schools, licensed daycare centers, and recreational areas within 1 mile of the proposed permit boundary.
NT6	6	143	Part II	330.61(i)(4)	Volume 1 - Parts I/II - Section 8 and Appendix I/IID	NT	Incomplete	Provide coordination response letter from TxDOT accepting the applicant's conclusions for the traffic study (traffic and location restrictions) and for the determination of no need for public roadway improvements. Response: The coordination response from TXDOT with the determination of no action required is included with this response. Additionally, the response from the North Central Texas Council of Governments has been included in this response, and added to the application as page I/IIB-328a.
NT7	7	145	Part II	330.61(i)(5)	Volume 1 - Appendix I/IIB	NT	Ambiguous	Appx I/IIB indicates FAA coordination will be included later, however several letters from FAA accepting the applicant's conclusions of no adverse impacts are included at the end of the section. Indicate if these letters are the ones shown as pending and revise accordingly. Response: The coordination response from FAA is included in this response. No additional correspondence from FAA associated with the application is pending.
NT8	8	168	Part II	330.61(n)(2)	Volume 1 - Parts I/II - Section 12	NT	Incomplete	Provide response from Texas Parks and Wildlife Dept. once received. Response: The coordination response from the Texas Parks and Wildlife Department is included with this response.
NT9	9	169	Part II	330.61(o)	Volume 1 - Parts I/II - Section 2.3 and Appendix I/IIB	NT	Incomplete	Provide response from Texas Historical Commission once received. Response: The Review Record designating a response of No Action from the Texas Historical Commission is included with this response.
NT10	10	182	Part II	330.61(c)(10)	Volume 1 - Parts I/II - Appendix I/IIC - Section 2	NT	Ambiguous	Revise Drawing I/IIC-1 to use correct symbol for all easements. Response: Drawing I/IIC-1 has been revised to correct the line type designating easements.
NT11	11	213	Part II	330.547(b)		NT	Incomplete	Provide response from FEMA regarding the site's CLOMR request once received. Response: A response from FEMA on the CLOMR has not been received as of the time of this response and will be provided to TCEQ upon receipt.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
NT12	12	218	Part II	330.553(b)(2)(A) - (D)	Acknowledged	NT	Omitted	Provide acknowledgement text required in Section 11.2 of Parts I/II. Response: Title 30 TAC §330.553(b)(2)(A)-(D) is described within the regulation as a demonstration required for landfills or landfill expansions constructed in wetlands. As stated in Parts I/II, Section 11.2 - Wetlands Statement, the landfill or landfill expansion will not be located within jurisdictional wetlands or waters of the US. No additional information is submitted with this response.
T13	13	297	Part III	330.305(d)(2)	Volume 3, Part III, Appendix IIIF-D	T	Incomplete	1) Explain how potential soil loss for all side slopes, typical and longest length, will not exceed permissible soil loss of three tons per acre per year for final cover. Soil Loss Estimation Summary Table of App. IIIF-D, Erosion Layer Evaluation, pg. IIIF-D-8 contains soil loss values greater than three for different ranges of vegetative/ground cover, i.e. 60 - 90%. To address this comment, the target vegetative coverage percent for final cover was increased to 95%. The soil loss for final cover is now below 3 ton/ac/yr fpr all final cover conditions. All tables and text referring to final cover vegetation have been updated, including the calculations in Appendix IIIF-D. 2) Explain how the design performance standard will be met for the final cover. The permissible soil loss for the final cover phase should not exceed three tons per acre per year; from TCEQ Guidance RG-417, "Surface Water Drainage and Erosional Stability Guidelines for a Municipal Solid Waste Landfill," revised May 2018. Response: See above response.
T14	14	298	Part III	330.305(e)	Volume 3, Part III, Appendix IIIF-D	T	Incomplete	Explain how erosion control practices and the drainage features design will minimize soil erosion losses to be below the permissible level of three tons per acre per year for final cover. The performance standard is from TCEQ Guidance RG-417, "Surface Water Drainage and Erosional Stability Guidelines for a Municipal Solid Waste Landfill," revised May 2018. Response: See response to comment MRI ID 297.
T15	15	301	Part III	330.305(f)(1)	Volume 3, Part III, Appendix IIIF	T	Inconsistent	Drainage calculations were provided using the Rational Method for areas 200 acres or less in size and using the HEC model for areas greater than 200 acres in size. The rule intent is to choose one calculation method corresponding to the size of the entire facility. Per TCEQ Guidance RG-417, the 200-acre standard includes the total area of the landfill permit boundary and upland areas. Determine the appropriate size of the facility and use the appropriate calculation method. Response: Modelling for the landfill property and the offsite areas (a total of 391.76 acres) was conducted using HEC-1. Peak flow rates (or design flow) for individual swales (e.g., in Appendix IIIF-C) are calculated using the rational method. This methodology is consistent with TCEQ Guidance RG-417. Text has been added to IIIF-Section 3.1 - Methodology to explain the use of HEC-1 vs. Rational.
T16	16	302	Part III	330.305(f)(2)	Volume 3, Part III, Appendix IIIF - Surface Water Drainage Plan, Appendix IIIF-A	T	Inconsistent	Considering MRI ID Comment 301, if the landfill permit boundary, including upland areas, is greater than 200 acres in size, use the HEC model calculation method. Response: See response to MRI ID Comment 301.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
T17	17	305	Part III	330.63(c)(1)(A)	Volume 3, Part III, Appendix IIIF - Surface Water Drainage Plan	T	Inconsistent	1) Clarify if Unit Hydrograph Data on pg. IIIF-E-19 of App. IIIF-E is for the currently permitted or proposed post-development site condition. Response: Appendix IIIF-E contains information only for the permitted condition. The title for pages IIIF-E-19,63 and 69 have been updated to "Permitted Condition". 2) Clarify if volume calculations are for the currently permitted or proposed post-development site conditions on pg. IIIF-E-63 of App. IIIF-E. Response: See response above. 3) Explain why Drawings IIIF-A-74 and IIIF-E-69 appear to be the same drawing. Clarify if Drawing IIIF-A-74 represents the post-development conditions associated with the proposed changes to the drainage system of the site. Response: Drawing IIIF-A-74 represents the post-development condition velocity sections, and the title has been revised accordingly.
T18	18	309	Part III	330.63(c)(1)(C)	Volume 3, Appendix IIIF - Surface Water Drainage Plan, Section 4.3; Appendix IIIF-A	T	Incomplete	Explain the discrepancies between the Permitted and Post-Development 25-Year Site Drainage Summary of App. IIIF (pg. IIIF-15) and the volume and velocity calculations for the post-development site condition, pgs. IIIF-A-68 through IIIF-A-69 and IIIF-A-71 through IIIF-A-72, respectively. Explain why the velocity for DCP03 and runoff volume for DCP3 increase, respectively from permitted to post-development conditions and how these apparent increases will not adversely alter permitted drainage patterns. Response: Table 4-1 on page IIIF-15 has been updated to be consistent with calculations and model output in appendices IIIF-A and IIIF-E. As shown on Table 4-1, there are no changes to any offsite stormwater run-on (e.g. at discharge point DCPO3) locations. Discharge point DCP3 experiences an increase in runoff volume (8.7%), but a decrease in discharge rate (-1%). An increased volume coupled with a decreased peak flow rate and velocity indicate that the increased volume is being released in a controlled manner and is not an adverse impact, consistent with TCEQ guidance.
T19	19	314	Part III	330.63(c)(1)(D)(iii)	Volume 3, Part III, Appendix IIIF - Surface Water Drainage Plan, Section 4.3.2	T	Incomplete	Considering MRI ID Comments 305 and 309, provide a more detailed discussion and analysis of how the proposed landfill development will not adversely alter existing drainage patterns. Response: As discussed above, the post development condition results in slightly higher flow volume but lower flow rates and velocities. The drainage improvements proposed at the site will result in a more controlled release of stormwater, which is not an adverse impact. This information has been incorporated into IIIF-Table 4-1 Permitted and Post-Development 25-Year Site Drainage Summary.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
T20	20	319	Part III	330.307(a)	Volume 1, Parts I/II, Section 11.1 and Volume 3, Appendix IIIF-G	T	Incomplete	1) It is not clear from the application narrative, Appendix IIIF-G, that the facility will be protected from flooding by suitable levees constructed to provide protection from a 100-year frequency flood - 30 TAC § 330.307. Provide an explanation for why the rule is not applicable to the site, specifically why the project does not require levees; Response: To address this comment, a freeboard drawing has been added to Appendix IIIF-G. As shown, the landfill perimeter berms provide a minimum3 feet of freeboard between the limit of waste and the 100-year water surface elevations. 2) Explain how the discharge points associated with the post-development conditions will be factored into the 100-year floodplain CLOMR. Provide a clarifying statement that the post-development conditions will be accounted for in the CLOMR. Response: A statement was added to page IIIF-G-1 indicating that the CLOMR hydrologic and hydraulic analyses will account for all proposed geometric and hydrologic changes.
T21	21	320	Part III	301.33(a)(1)	NA	T	Omitted	Pursuant to 30 TAC § 330.307 and flood protection of landfills through the use of suitable levees, provide responsive information for the requirements specified in 30 TAC § 301.33. Response: As noted in the response to MRI ID 319, the landfill is protected from flooding by its perimeter berms. No levees are proposed or required for this project.
T22	22	328	Part III	301.34(1)	NA	T	Omitted	Pursuant to 30 TAC § 330.307 and flood protection of landfills through the use of suitable levees, provide responsive information for the requirements specified in 30 TAC § 301.34. Response: See above response.
T23	23	337	Part III	330.63(c)(2)(D)(i)	Volume I - Part I/IIC and Volume 3, Appendix IIIF-G	T	Incomplete	Submit approval letter/document from the governmental entity with jurisdiction under Texas Water Code, §16.236. Response: As noted above, no levees are proposed to be constructed as part of this project. Revisions in and around floodplain areas will be approved by both Johnson County and FEMA. Once approved, those approvals will be submitted to TCEQ.
T24	24	338	Part III	330.63(c)(2)(D)(ii)		T	Incomplete	Discuss if applicable. Response: Johnson County does not issue floodplain development permits, but they are reviewing the submittal. Once their approval is issued, it will be sent to TCEQ.
T25	25	339	Part III	330.63(c)(2)(D)(iii)		T	Incomplete	Discuss if applicable, and considering MRI ID comment 319, explain how conditional letter request will account for post-development conditions of the site. Response: FEMA's approval of the CLOMR will be provided to TCEQ upond receipt.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
T26	26	340	Part III	330.63(c)(2)(D)(iv)		T	Incomplete	Discuss if applicable. Response: Not applicable. As noted in the correspondence with USACE on June 15, 2021 (Appendix I/IIB), the proposed expansion is exempt from Section 404 regulations.
NT27	27	362	Part III	330.331(c)	NA	NT	Omitted	Explain why this item was omitted, and would not be applicable to the overliner design. Response: Section 1.3 Overliner Demonstration Overview has been updated to addresss this comment. The newly added text summirizes the items in Sections 2 through 4 with the aim to present items required by §330.331(c).
NT28	28	366	Part III	330.331(c)		NT	Omitted	Include the required discussion. Response: See response to comment MRI ID 362.
NT29	29	367	Part III	330.331(c)		NT	Omitted	Include the required discussion. Response: See response to comment MRI ID 362.
NT30	30	368	Part III	330.331(c)		NT	Omitted	Include the required discussion. Response: See response to comment MRI ID 362.
T31	31	398	Part III	330.337(j)(2)-(3)	Volume 2, Appendix IIID - Liner Quality Control Plan, Section 5.7	T	Incomplete	Include that the Ballast Evaluation Report will include the signature of facility operator or authorized representative. Response: The requirement that the Ballast Evaluation Report be signed by an authorized site representative has been added to Part III, Appendix IIID, Section 8.3.
T32	32	417	Part III	330.339(c)(5)(A)-(E)	Volume 2, Part III, Appendix IIID - Liner Quality Control Plan, Section 2.4.2 and Table 2-2	T	Incomplete	Update Table 2-2, on pg. App. IIID-22, to include a reference to 30 TAC §330.339(c)(5)(D), similar to how Table 2-1, on pg. App. IIID-10, references all required minimum values verified by testing in a soils laboratory. Response: The testing requirements in Part III, Appendix IIID, Tables 2-1 (for borrow soils) and 2-2 (for constructed soil liner) are consistent with requirements all prepared in accordance with the TCEQ's Regulatory Guidance RG-534. Specifically, the guidance testing requirements are described in Section 2.1 of the guidance document, whereas the constructed liner testing requirements are presented in Appendix B, Table B-1 of the guidance document, and include the analysis of fine particle soils by either hydrometer (ASTM D422) or wash (ASTM D1140) only. No change is proposed.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
T33	33	419	Part III	330.339(c)(6)	Volume 2, Appendix IIID - Liner Quality Control Plan, Section 2.4.2 and Table 2-2	T	Incomplete	Provide a clarifying statement that field quality control will be provided by field density tests, based on predetermined compaction curves, Atterberg limits, and laboratory tests of undisturbed field samples. Response: Part III, Appendix IIID, Section 2.4.1 has been revised to address the regulatory citation.
T34	34	420	Part III	330.339(c)(7)	NA	T	Omitted	Provide a clarifying statement that field permeability testing of constructed soil liners for the floor of an excavation will be in accordance with ASTM D5093. Response: Field permeability test methods and frequencies included in Appendix IIID – Liner Quality Control Plan are consistent with the TCEQ's Regulatory Guidance RG-534. No change is proposed.
T35	35	421	Part III	330.339(c)(7)	NA	T	Omitted	Provide a clarifying statement that field permeability testing of constructed soil liners for a sidewall will be in accordance with a variation of the Boutwell STEI field permeability test, approved by the TCEQ ED for sidewalls. Response: Field permeability test methods and frequencies included in Appendix IIID – Liner Quality Control Plan are consistent with the TCEQ's Regulatory Guidance RG-534. No change is proposed.
T36	36	496	Part III	330.63(e)(4)(G)	Volume 4, Part III, Appendix IIIG-C - Site Geologic Data	T	Ambiguous	1. Revise cross-sections to distinguish between permitted and proposed excavation areas; Response: Permitted and proposed excavation areas are labeled on Drawings IIIG-C-2 through IIIG-C-7 and IIIG-C-9. 2. Show existing waste and Pre-Subtitle D areas on cross-sections; Response: Existing waste and pre-subtitle D areas are labeled on the cross-sections. 3. On cross-sections E-E' and H-H' indicate both sides of Class I unit boundary. Response: The requested revision has been made.
NT37	37	507	Part III	330.63(e)(5)(D)	Volume 4, Part III, Appendix IIIG - Geology Report, Section 4 and accompanying appendices	NT	Incorrect	Revise Pg IIIG-23 to reference Appendix IIIG-D instead of IIG-D. Response: The requested revision has been made.
NT38	38	546	Part III	330.63(f)(7)	Volume 4, Part III, Appendix IIIH - GWSAP, Section 6	NT	Incomplete	State the requirements of 30 TAC §330.63(f)(7)(A) through (E) in Section 6.4. Response: The requested revision has been made.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
T39	39	558	Part III	330.403(a)	Volume 4, Part III, Appendix IIIH - GWSAP, Section 2	T	Incomplete	Add two (2) additional monitoring wells to the network: one to the southwest of MW-34 to better delineate the upgradient area; and one to the west of MW-42 and extend the proposed point of compliance to this new well. Response: Two additional monitoring wells (MW-43 and MW-44) have been added to the groundwater monitoring system design and the proposed POC has been extended to the new MW-43 location. Monitoring well MW-44 has been added as background monitoring well. Both MW-43 and MW-44 are proposed to be installed within 180 days of permit applciation approval and the groundwater gradient is proposed for evaluation within six months of installation. Appendix IIIH, Section 2.1.2, Table 2-1, Figures IIIH-A-1, and Figure IIIH-A-2, and Appendix IIIG, Section 4.3.3 have been revised to reflect the addition of monitoring wells MW-43 and MW-44. If future groundwater data indicates a change in the groundwater flow regime that deviates for, the historical data, the facility will notify TCEQ in writing and propose revisions to the groundwater monitoring system in accordance with §330.403(e)(3). Text has been added to Appendix IIIH, Section 2.1.2.2 to indicate that the groundwater gradient will be evaluated within six months of MW-44 installation and the facility will submit a permit modification to the Site Development Plan if the gradient evaluation indicate that MW-44 is downgradient of the landfill unit. Text has been added to Appendix IIIH, Section 2.3 to indicate that the facility will promptly notify TCEQ in writing of changes in facility construction or operation or changes in adjacent property that affect or are likely to affect the direction and rate of groundwater flow and the potential for detecting groundwater contamination from a solid waste management unit and that may require the installation of additional monitoring wells or sampling points in accordance with §330.403(e)(3).
T40	40	566	Part III	330.403(e)(2)	Volume 2, Part III, Appendix III-B - Overliner Compliance Demonstration, Section 3.1	T	Inconsistent	1) Explain how Appendix IIIB, Section 3.1 addresses how an applicable multi-dimensional fate and transport numerical flow model was used to determine the spacing of groundwater monitoring wells or other sampling points and how site-specific characteristics of groundwater flow were considered; Response: Note that Appendix IIIB, Section 3.1 (or 3.2) has been developed for the purpose of designing approximately 15 acre overliner using "Overliner Point of Compliance Demonstration." The groundwater monitoring system design including well spacing is presented in Appendix IIIH. Groundwater at the site has been monitored for several decades thus existing hydrogeologic data provide clear understanding of the groundwater hydraulic characteristics at the site. Additionally, the groundwater monitoring well spacing along the point of compliance is less than or equal to the regulatory recommended spacing of 600 ft (i.e., no exemption is sought); therefore, no fate and transport modeling was necessary to design the groundwater monitoring system at the site. 2) Explain how the model chosen by the applicant satisfies the requirements of §330.403(e)(2)(A) - (G). Response: The fate and transport model in Appendix IIIB, Section 3.2 has been chosen as the model (EPA's MULTIMED) was developed by the US EPA as the standard model for the purpose of performing point of compliance demonstrations for MSW landfills. This model is conservatively applicable because the uppermost groundwater flow at the site is very well defined, and several conservative assumptions including one dimension, no decay, etc. were made.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
NT41	41	574	Part III	330.403(e)(3)	Volume 4, Part III, Appendix IIIH - GWSAP, Section 2.3	NT	Ambiguous	Acknowledgement not found in referenced Section, please include acknowledgement or state correct location in application. Response: The requested aknowledgment has been added to Appendix IIIH, Section 1.
NT42	42	576	Part III	330.405(b)	Volume 4, Part III, Appendix IIIH - GWSAP	NT	Omitted	Include statement that a copy of the GWSAP will be placed in the SOR once approved. Response: The requested statement has been added to Appendix IIIH, Section 1.
T43	43	583	Part III	330.405(e)	Volume 4, Part III, Appendix IIIH - GWSAP, Section 6	T	Incomplete	Include 30 TAC §330.405 reference in addition to 30 TAC §330.407 and 409 reference in Section 6.1. Response: The requested reference has been added to Appendix IIIH, Section 6.1.
NT44	44	602	Part III	330.409(d)(1)	Volume 4, Part III, Appendix IIIH - GWSAP, Section 6	NT	Incomplete	Indicate that assessment monitoring events will be conducted semiannually in Section 6.3 of the GWSAP when wells are in assessment status. Response: The requested statement has been added to Appendix IIIH, Section 6.3.
NT45	45	604	Part III	330.409(d)(3)	Volume 4, Part III, Appendix IIIH - GWSAP, Section 6	NT	Incomplete	Indicate that assessment monitoring results will be compared to Groundwater Protection Standards to determine if statistically significant in Section 5.6.2 of GWSAP. Response: The requested statement has been added to Appendix IIIH, Section 5.6.2.
NT46	46	605	Part III	330.409(e)	Volume 4, Part III, Appendix IIIH - GWSAP, Section 6	NT	Omitted	Include statements in GWSAP instead of just referencing rule for this comment and MRI IDs 607 through 623. Response: The requested statements have been added to Appendix IIIH, Section 6.3.
NT47	47	636	Part III	330.421(a)	Volume 4, Part III, Appendix IIIH - GWSAP, Section 2.3 and Appendix IIIH-A - Groundwater Monitoring System	NT	Omitted	Include required discussion in GWSAP instead of only referencing rule for this item and MRI IDs 638 through 640, 643, and 650 through 653. Response: The requested discussions have been added to Appendix IIIH, Section 2.2.
NT48	48	637	Part III	330.421(a)(1)(A)	Volume 4, Part III, Appendix IIIH - GWSAP, Section 2.3	NT	Incomplete	Include requirements in GWSAP instead of just referencing rule and revise wording in Section 2.2 of GWSAP to reference all wells installed instead of only replacement wells. Response: The requested statements have been added to Appendix IIIH, Section 2.2.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
NT49	49	667	Part III	330.371(e)	Volume 5, Part III - Appendix III I, Section 1.2	NT	Incomplete	Include additional text required in 30 TAC §330.371(e) related to requirements that must be demonstrated to decrease/end LFG monitoring prior to 30 years post-closure. Response: Section 2.2 in Appendix IIIJ has been update to provide clarification.
NT50	50	668	Part III	330.371(f)	Volume 5, Part III - Appendix III I, Section 3	NT	Incomplete	Include additional text required in 30 TAC §330.371(f) related to post-closure land use not interfering with the LFG systems. Response: As requested, Section 3.1.1 text has been updated based on the language in 30 TAC §330.371(f).
NT51	51	670	Part III	330.371(g)(2)	Volume 5, Part III - Appendix III I, Sections 3 and 6	NT	Incomplete	Revise Volume 5, Part III - Appendix III I, Section 3.1.2 to include a timeline/ criteria for when the new LFG probes will be installed. Response: Section 3.1.2 has been revised to include more clarification on the timeline/criteria of new LFG probes installation. As indicated in the updated text, the 6 new probes along the western side (GMP-1A, GMP-2A, GMP-3A, GMP-4A, GMP-5B, and GMP-14) will be installed prior to the development of Sectors 13 and/or 14 and remaining 7 new probes will be installed within 12 months following the issuance of the permit (MSW-1417D) by TCEQ.
T52	52	687	Part III	330.457(a)	Volume 5, Part III - Appendix IIIJ, Section 2.2	T	Inconsistent	Confirm if the site is demonstrating compliance with 30 TAC § 330.457(a)(1), as opposed to 30 TAC § 330.457(a)(2), for the soil infiltration layer component of the final cover system for the Subtitle D areas which will accept MSW and Class I waste, and the pre-Subtitle D area which will accept MSW. TCEQ staff understand the site to demonstrate compliance with 30 TAC § 330.457(a)(2) and (3) through Table IIIA-5 on pg. IIIA-9 of Appendix IIIA. (And Table IIIJ-1 of pg. IIIJ-3 of Appendix IIIJ.) Response: Section 2.2 in Appendix IIIJ has been update to provide clarification. Note that the alternative final cover system is only for the MSW area (i.e., Class 1 area will not recieve alternative final cover).
T53	53	688	Part III	330.457(a)(1)	Volume 5, Part III - Appendix IIIJ, Section 2.2	T	Inconsistent	Pursuant to MRI ID comment 687, if a landfill cell/sector will have a synthetic bottom liner, provide responsive information for the requirements specified in 30 TAC § 330.457(a)(1), or specify the location of the application where the information can be found. Response: Appendix IIIJ, Section 2.2 has been revised to provide the applicable regulatory citations, and reference to the table presenting the components of the various final cover systems.
T54	54	690	Part III	330.457(a)(2)	NA	T	Inconsistent	Pursuant to MRI ID comment 687, if a landfill cell/sector will have no synthetic bottom liner, provide responsive information for the requirements specified in 30 TAC § 330.457(a)(2), or specify the location of the application where the information can be found. Response: Appendix IIIJ, Section 2.2 has been revised to indicate that final cover consistent with Title 30 TAC 330.457(a)(2) is not proposed for closure of the Class 1 area of the landfill.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
T55	55	694	Part III	330.457(d)(1)	NA	T	Inconsistent	Clarify if an alternative final cover design is requested. The application indicates that an alternative design is not requested; however, a Water Balance Final Cover Design, with two possible options, is found under Appendix IIIJ-A and IIIJ-B, respectively. Appendix IIIJ-B, pg. IIIJ-B-1, reads that a water balance final cover design is presented as an alternative to the Subtitle D composite final cover for the site. Response: An Alternative Final Cover is being requested (Water Balance Alternative Final Cover as presented in Appendices IIIJ-A and IIIJ-B), and as clarified in Appendix IIIJ, Section 2.2.
NT56	56	723	Part III	330.463(a)(1)	Volume 5, Part III - Appendix IIIK, Section 2	NT	Omitted	Include required acknowledgement in application. Response: The referenced regulatory requirement (30 TAC §330.463(a)) is applicable to solid waste landfills that stopped receiving waste prior to October 6, 1991 (30 TAC §330.453) or after October 6, 1991 and prior to October 9, 1993 (30 TAC §330.455). The post-closure requirements for the landfill are presented in 30 TAC §330.463(b), and are specifically addressed in Appendix IIIK, Section 2. No revisions required.
NT57	57	725	Part III	330.463(a)(3)	Volume 5, Part III - Appendix IIIK, Section 2	NT	Omitted	Include required acknowledgement in application. Response: Refer to response to comment T56 above. No revisions required.
T58	58	759	Part III	330.507(b)	Volume 5, Part III - Appendix IIIL, Section 4	T	Incomplete	Add clarifying statement in Appendix IIIL, Section 3 that continuous financial assurance coverage will be provided until the facility is officially released in writing from the TCEQ ED. Appendix IIIL, Section 2 (pg. IIIL-2) has an example "sister" statement concerning continuous financial assurance coverage to demonstrate compliance with §330.503(b) respectively. Response: Appendix IIIL, Section 3 has been revised to address the regulatory requirement of the comment.
NT59	59	765	Part IV	330.121(a)	Volume 6, Part IV - Site Operating Plan, Section 9	NT	Omitted	Include required acknowledgement in application. Response: Part IV – SOP, Section 9 has been revised accordingly.
NT60	60	778	Part IV	330.125(b)(11)	Volume 6, Part IV - Site Operating Plan, Section 9	NT	Omitted	Include required acknowledgement in application. Response: Part IV – SOP, Sections 4.18.6 and 9 have been revised to incorporate records of ADC application.
NT61	61	784	Part IV	330.125(g)	Volume 6, Part IV - Site Operating Plan, Section 9	NT	Omitted	Include the required statement. Response: Part IV – SOP, Sections 4.20.5 and 4.20.7.6 has been revised to state that the ED may set alternative schedules.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
NT62	62	787	Part IV	330.675	Volume 6, Part IV - Site Operating Plan, Section 9	NT	Incomplete	Include that Waste Reports will be done according to 30 TAC §330.675 requirements. Response: Part IV – SOP, Section 9 has been revised accordingly.
NT63	63	788	Part IV	330.125(h)	NA	NT	Omitted	Include the required statement or explain why it is not applicable. Response: Part III, Appendix N, Section 1.1 and Part IV – SOP has been revised to reference the regulatory citation and provide description of required actions in event annual waste acceptance rates are exceeded.
NT64	64	799	Part IV	330.127(5)(D)	Volume 6, Part IV - Site Operating Plan, Section 6.1	NT	Incomplete	Include language that in addition to TCEQ, notification will be provided to any local pollution agency with jurisdiction that has requested to be notified. Response: Part IV – SOP, Section 6.3 has been revised to address reviewers comment.
T65	65	804	Part IV	330.129	Volume 6, Part IV - Site Operating Plan, Section 7	T	Incomplete	Include a discussion of fire protection training that will be performed. Response: Part IV – SOP, (new) Section 7.10 has been added incorporating description of the training requirements for fire safety and protection.
NT66	66	809	Part IV	330.131	Volume 6, Part IV - Site Operating Plan, Section 4.1.1	NT	Incomplete	Include language that in addition to TCEQ, notification will be provided to any local pollution agency with jurisdiction that has requested to be notified. Response: Part IV – SOP, Section 4.1.1 has been revised accordingly.
NT67	67	815	Part IV	330.133(b)		NT	Omitted	Include the required information. Response: Part IV – SOP, Section 4.2.3 addresses the referenced regulatory requirements. The recording keeping requirements are described in Section 9. No revision has been made.
NT68	68	850	Part IV	330.143(b)(7)	Volume 6, Part IV - Site Operating Plan, Section 4.7	NT	Omitted	Include the required statement. Response: Part IV – SOP, Section 4.7 has been revised to incorporate floodplain marker spacing.
NT69	69	894	Part IV	330.165(d)(6)	Volume 6, Part IV - Site Operating Plan, Section 4.18.2	NT	Omitted	Include the required statement. Response: Part IV – SOP, Section 4.18.2 has been revised to incorporate statement regarding ED requiring testing of runoff from ADC areas.

NOD ID	ID	MRI ID	App. Part	Citation	Location	T/NT	1st NOD Type	NOD Description
NT70	70	922	Part IV	330.171(b)(6)	NA	NT	Omitted	Explain why this requirement is not applicable or include the information for this comment and MRI IDs 927 through 931 and 933 through 935. Response: The originally submitted MSW Checklist has been updated, and the applicable sheets provided to include information for MRI IDs 927 through 931, and 933 through 935. Note that the checklist (as provided by TCEQ) is locked, and it was not possible to provide our revisions in redline-strikeout format.
NT71	71	941	Part IV	335.585(b)	NA	NT	Omitted	The site manages Class 1 waste so 30 TAC §330.179(a) requirements must be included for this comment and MRI IDs 942 through 966 and 968 through 987. Response: Refer to Response NT70 above.
T72	72	988	Part IV	330.179(b)	NA	T	Omitted	Explain why containment dikes will not be used for all cells of the landfill unit, i.e. why compliance with 30 TAC §335.590(24)(F)(i) will not be demonstrated for the proposed MSW cells/sectors of the proposed landfill unit expansion, in addition to the proposed Class 1 waste cells/sectors. Section 30 TAC §335.590(24)(F)(i) applies to landfill units where nonhazardous waste may be placed above natural grade, thus including all cells/sectors within the landfill unit. Response: The placement of Class 1 waste both above and below grade at the facility is presented in Part III, Appendix IIIA, Section 6 - Class 1 waste disposal area design. This section addresses above-grade placement of Class 1 waste incorporating either the containment dikes or soil cover options and regulatory compliance of the options. Note that the design for the Class 1 area was approved previously and a significant portion of it has already developed per the approved design.
T73	73	989	Part IV	335.590(24)(F)	NA	T	Omitted	Provide responsive information for plans and designs for remaining containment dikes to be placed for remaining cells/sectors of the landfill unit, unless justification can be provided as to why containment dikes will be unnecessary for remaining cells of landfill unit, pursuant to MRI ID comment 988. Response: The placement of Class 1 waste both above and below grade at the facility is presented in Part III, Appendix IIIA, Section 6 - Class 1 waste disposal area design. This section addresses above-grade placement of Class 1 waste incorporating either the containment dikes or soil cover options and regulatory compliance of the options. The future Class 1 development area is an extension of the currently submitted Class 1 area, thus it will continue to be developed in the same manner.

ATTACHMENT 2

REVISED MSW CHECKLIST MRI ID 927-931, AND 933

ID	App. Part	Checklist Item	Item Type	Citation	Complete?	Location	Applicant Comments	Application Area
924	Part IV	Indicate that used oil filters from internal combustion engines must not be intentionally and knowingly accepted for disposal at landfills permitted under this chapter except as provided in 330.171(d)(1) & (2)	Required	330.171(d)	Yes	Volume 6, Part IV - Site Operating Plan, Section 1.2		Site Operating Plan
925	Part IV	Indicate that Class 1 industrial solid waste shall not be disposed in the landfill	Required	330.173(a)	Yes	NA	Facility accepts non-hazardous Class I industrial waste.	Site Operating Plan
926	Part IV	Indicate that wastes that are Class 1 only because of asbestos content may be accepted at any Type I or Type IAE landfill that is authorized to accept regulated asbestos-containing material (RACM). Authorization to accept this waste is implied in the authorization to accept RACM unless the acceptance of industrial wastes is prohibited by the permit. All Class 1 industrial asbestos wastes will be manifested and the owner or operator of the landfill facility shall comply with the requirements of 30 TAC §330.173(g) & (h)	Required	330.173(c)	Yes	Volume 6, Part IV - Site Operating Plan, Section 4.20.5		Site Operating Plan
927	Part IV	Indicate that the operator may not accept Class 1 without written approval and a manifest per 30 TAC §335.10	Required	330.173(b)	Yes	NA	Facility accepts non-hazardous Class I industrial waste.	Site Operating Plan
928	Part IV	Indicate that requests for authorization to accept Class 1 solid wastes must be submitted in writing to the executive director	Required	330.173(d)	Yes	NA	Facility accepts non-hazardous Class I industrial waste.	Site Operating Plan
929	Part IV	Indicate that a request to accept Class 1 waste must include a description of chemical & physical characteristics of the waste per 30 TAC §335.587, a hazardous waste statement, and the quantity, rate, and frequency of disposal	Required	330.173(d)(1)	Yes	NA	Facility accepts non-hazardous Class I industrial waste.	Site Operating Plan
930	Part IV	Indicate that a request to accept Class 1 waste must include operating plan containing handling procedures, personnel protective & on-site emergency equipment	Required	330.173(d)(2)	Yes	NA	Facility accepts non-hazardous Class I industrial waste.	Site Operating Plan
931	Part IV	Indicate that a request to accept Class 1 waste must include a written contingency plan meeting the requirements of 30 TAC §335.589	Required	330.173(d)(3)	Yes	NA	Facility accepts non-hazardous Class I industrial waste.	Site Operating Plan
932	Part IV	Unless specifically authorized by the facility permit, a Type I or Type IAE landfill facility permitted after October 9, 1993, may not accept Class 1 industrial solid wastes in excess of 20% of the total amount of waste (not including Class 1 wastes) accepted during the current or previous year. The amount of waste may be determined by volume or by weight, but the same unit of measure must be used for each year, unless a variance is authorized by the executive director.	Informational	330.173(e)		NA	Facility accepts non-hazardous Class I industrial waste.	Site Operating Plan
933	Part IV	Indicate that any authorization to accept Class 1 waste is subject to the site operating in compliance with 30 TAC §330.173 and any specific conditions required under any letter(s) of authorization. Failure to operate the site in compliance with 30 TAC §330.173 or any special conditions imposed by the executive director may result in revocation of the authorization to accept a Class 1 waste.	Required If Requested	330.173(f)	Yes	NA	Facility accepts non-hazardous Class I industrial waste.	Site Operating Plan

ATTACHMENT 3

REVISION PAGES
(RLSO FORMAT)

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

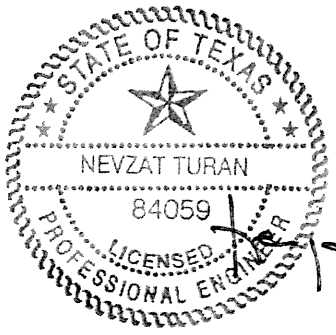
VOLUME 1 OF 6

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

Weaver Consultants Group, LLC
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Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

This document intended for permitting purposes only.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 1 OF 6

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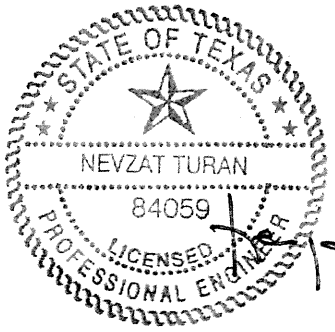

12/16/2022

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PARTS I/II
GENERAL APPLICATION REQUIREMENTS

Prepared for:

Texas Regional Landfill Company, LP

February 2022

Revised November 2022





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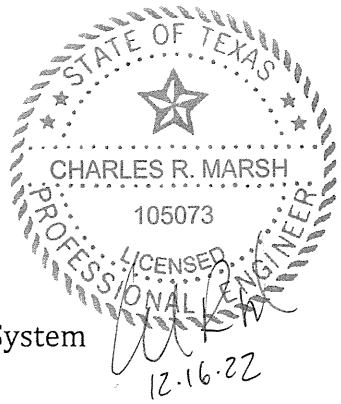

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PERMIT BOUNDARY

BP PIPELINE EASEMENT (GAS)

M.K.J. RAILROAD

LEACHATE STORAGE TANK

CONVENIENCE CENTER

LANDFILL OFFICE

IH35 SERVICE ROAD

SCALEHOUSE

BP PIPELINE EASEMENT (GAS)

SITE ENTRANCE

LIMIT OF WASTE

ACCESS ROAD

SITE EXIT

COUNTY ROAD 107

SOLIDIFICATION FACILITY

LEACHATE STORAGE TANK

CR313

IH35

0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- MW-7 PERMITTED GROUNDWATER MONITORING WELL
- GMP-12 PERMITTED GAS MONITORING PROBE
- EXISTING LFG TRENCH VENT
- EXISTING LEACHATE FORCEMAIN
- EW-A9 EXISTING LFG EXTRACTION WELL
- EXISTING LFG COLLECTION PIPING
- HZ-5 EXISTING HORIZONTAL LFG COLLECTOR WITH CHIMNEY WELLS
- LCR-1 EXISTING LEACHATE CLEANOUT RISER CONNECTION
- CS-3 EXISTING CONDENSATE SUMP
- IV-2 EXISTING ISOLATION VALVE
- EXISTING REMOTE WELLHEAD
- EXISTING ROAD CROSSING
- EXISTING BLIND FLANGE
- EXISTING HDPE CAP
- EXISTING PIPE REDUCER
- EXISTING AIR SUPPLY PIPING
- EXISTING CONDENSATE FORCEMAIN
- EXISTING AIR/FORCEMAIN VALVE
- ⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER
12.16.22

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.

LIST OF REVISIONS:

1. REMOVED PROPOSED MONITORING WELLS AND PROBES

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☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: 3.5-EXISTING GCCS PLAN.DWG

DRAWN BY: JDW
DESIGN BY: JBP
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
EXISTING GCCS PLAN
(TCEQ PERMIT NO. MSW-1417C)

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE I/II-3.5

O:\0771\368\EXPANSION 2021\PARTS I-II\FIG 3.5-EXISTING GCCS PLAN.dwg, rarrington, 1:2

A private, grass field airfield (Luscombe Acres) is located approximately 500 feet south of the landfill property. The airfield includes 2 grass runways used by piston aircraft. The airfield appears to be used primarily by residences that border the runways. Additional information related to the airfield is provided in Section 8.2.

One church was identified as being located within the 1-mile radius of the landfill property. The Greenbriar Baptist Church is located approximately 4,300 feet west of the landfill property, on County Road 313. A previous land use evaluation prepared for the landfill property indicates that a historical marker was placed at the church for educational purposes, but that the church is not a registered historical landmark, as was verified with the Texas Historical Commission. There are no known hospitals, schools, archaeological sites, licensed daycare centers, historical sites, lakes, recreational areas, or sites with exceptional aesthetic qualities located within a 1-mile radius of the landfill permit boundary.

7.7 Land Use Conclusions

The continued development and use of this property as a landfill represents a compatible land use for the following reasons:

- The site is located in a rural area, with ongoing growth within the 1-mile radius of the landfill property appearing to be minimal over the previous 20 plus years (based on review of aerial photography).
- The landfill is designed and operated to have minimal impact on the surrounding areas and land uses. A substantial vegetation screening buffer is provided by wooded vegetation existing along the north, northwest, southwest, and southeast boundaries of the landfill. The wooded vegetation helps to minimize the visual and noise impact of the landfill operations.
- With the nearby development being primarily rural residential, open lands and agricultural, with some distributed commercial and light industrial development, the landfill is a compatible land use.

7.8 Water Wells Within 500 Feet

A search to identify water wells within a 1-mile radius of the landfill permit boundary was completed by GeoSearch (September 2021) and WCG (August 2021), the results of which are provided in Part III, Appendix IIIG, Section 2.5 and Appendix IIIG-A. The water well locations are plotted on the Figure IIIG-A-6 (Water Wells Within One-Mile Radius map). In summary, the only identified water well located within 500 feet of the permit boundary is the on-site water well which provides water to Turkey Creek Landfill. The location of the onsite water well is indicated on Figure I/II-4.3.

8 TRANSPORTATION

8.1 Traffic Information

This section addresses §330.61(i).

8.1.1 Availability and Adequacy of Roads

The Turkey Creek Landfill is located approximately 2.5 miles south of Alvarado, Texas, on Interstate Highway 35 West (IH-35W). The site is easily accessed from principal population centers via IH-35W. In addition to IH-35W, County Roads 107, 204, and 401 as well as Farm to Market road 2415 are utilized to access the landfill. In general, landfill vehicles originating north of the site utilize the IH-35W southbound frontage road to the landfill entrance road; and landfill vehicles originating south of the site use the IH-35W northbound frontage road, cross IH-35W on the FM 107 bridge, then travel north on the IH-35W southbound frontage road to the landfill entrance road. Local hauling vehicles utilize the referenced county and farm-to-market roads to access the IH-35W frontage roads and landfill.

A traffic impact study was prepared by WCG in January 2022 to evaluate the continued development of the Turkey Creek Landfill on local roadways and traffic. The traffic study is included in Parts I/II, Appendix I/IID. Please note that the traffic study was prepared in January 2022 and utilized a different assumption of incoming waste volume (3,000 tons per day) that the rate of 3,497 tons per day included in this application. Due to the availability and adequacy of roads around the facility and the minor increase in truck traffic to the facility that would result from using 3,497 tons per day as a basis of analysis, the traffic study was not updated.

In summary, the traffic study concludes that access roads within 1 mile of the landfill provide adequate access to the site. Coordination with TxDOT regarding traffic and location restrictions is included in Appendix I/IIB (TxDOT Tab).

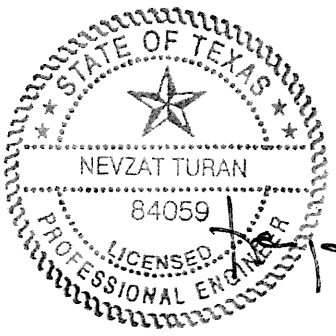
8.2 Airport Safety

TCEQ distance restrictions set forth in Title 30 TAC §330.545 require municipal solid waste disposal facilities seeking vertical expansions located within 10,000 feet of any runway end used by turbojet aircraft or within 5,000 feet of any runway end used by piston-engine aircraft to demonstrate that the units are designed and operated so that the municipal solid waste landfill unit does not pose a bird hazard to aircraft. Title 30 TAC §330.545(d) further requires that landfill facilities within a 6-mile radius of any small general service airport runway or within a five-mile radius of any large general public commercial airport shall be critically evaluated to determine if an incompatibility exists.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

APPENDIX I/IIA
FACILITY LAYOUT MAPS



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Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022

Prepared by
Weaver Consultants Group, LLC
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Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

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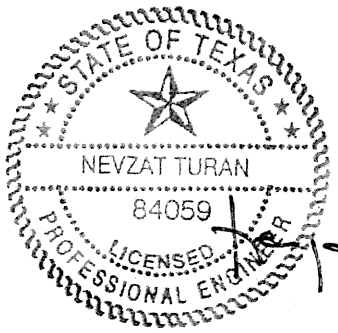
This appendix addresses §330.61(d).



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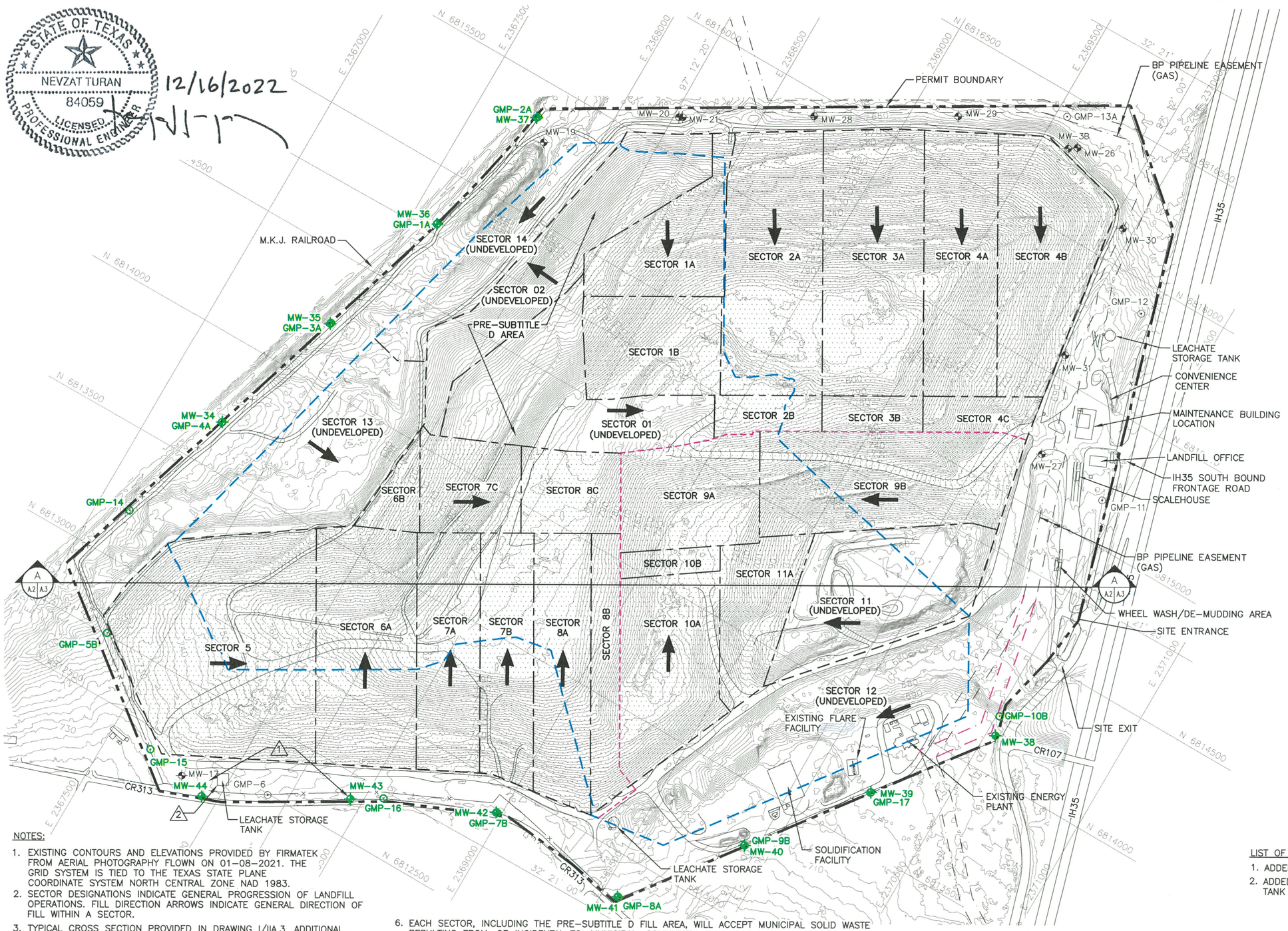

0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- NEWLY PERMITTED AIRSPACE LIMIT OF WASTE
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT (SEE NOTE 8)
- SECTOR BOUNDARY
- EXISTING SUBTITLE D COMPOSITE LINED AREA
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING LFG MONITORING PROBE
- FILL DIRECTION (SEE NOTE 2)
- ⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

CELL SUMMARY			
CELL	MAX LENGTH (FT)	MAX WIDTH (FT)	AREA (ACRES)
SUBTITLE D AREA			
SECTOR 1A/1B	1039	550	9.60
SECTOR 2A/2B	1189	403	10.74
SECTOR 3A/3B	1200	400	11.02
SECTOR 4A/4B/4C	1190	768	16.43
SECTOR 5	930	840	14.59
SECTOR 6A/6B	1346	400	9.91
SECTOR 7A/7B/7C	1370	462	13.65
SECTOR 8A/8B/8C	1439	323	11.46
SECTOR 9A/9B	1550	434	14.17
SECTOR 10A/10B	923	406	7.53
SECTOR 11	1087	658	11.50
SECTOR 12	1635	414	12.36
SECTOR 13	1128	431	8.33
SECTOR 14	1190	198	4.43
PRE-SUBTITLE D AREA			
SECTOR 01	352	430	9.1
SECTOR 02	1402	215	6.7

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. SECTOR DESIGNATIONS INDICATE GENERAL PROGRESSION OF LANDFILL OPERATIONS. FILL DIRECTION ARROWS INDICATE GENERAL DIRECTION OF FILL WITHIN A SECTOR.
3. TYPICAL CROSS SECTION PROVIDED IN DRAWING I/IIA.3. ADDITIONAL SECTION INFORMATION PROVIDED IN APPENDIX IIIA-B – LANDFILL UNIT CROSS SECTIONS.
4. SEE DRAWINGS I/IIA.4 THROUGH I/IIA.7 FOR DETAILED SECTOR DEVELOPMENT PLANS.
5. WIDTH OF THE BUFFER ZONE BETWEEN THE LIMITS OF WASTE AND THE PERMIT BOUNDARY VARIES; HOWEVER, THE BUFFER ZONE IS A MINIMUM OF 50 FEET FOR EXISTING FILL AREAS AND 125 FEET FOR THE NEWLY PERMITTED AIRSPACE. REFER TO APPENDIX I/IIC FOR MORE INFORMATION REGARDING BUFFER ZONES.
6. EACH SECTOR, INCLUDING THE PRE-SUBTITLE D FILL AREA, WILL ACCEPT MUNICIPAL SOLID WASTE RESULTING FROM, OR INCIDENTAL TO, MUNICIPAL, COMMUNITY, COMMERCIAL, INSTITUTIONAL, RECREATIONAL AND INDUSTRIAL ACTIVITIES, INCLUDING GARBAGE, PUTRESCIBLE WASTES, RUBBISH, ASHES, BRUSH, STREET CLEANINGS, DEAD ANIMALS, ABANDONED AUTOMOBILES, CONSTRUCTION-DEMOLITION WASTE, YARD WASTE, CLASS 1 NON-HAZARDOUS INDUSTRIAL SOLID WASTE DESIGNATED AS SUCH DUE TO ASBESTOS CONTENT, CLASS 2 NON-HAZARDOUS INDUSTRIAL SOLID WASTE, CLASS 3 NON-HAZARDOUS INDUSTRIAL SOLID WASTE, AND CERTAIN SPECIAL WASTES.
7. OTHER CLASS 1 NON-HAZARDOUS INDUSTRIAL SOLID WASTE (NOT CLASSIFIED AS SUCH DUE TO ASBESTOS CONTENT) WILL ONLY BE DISPOSED OF IN SECTORS 9A, 9B, 10A, 10B, 11, 11A AND 12.
8. THE PROPOSED EASEMENT SHOWN IS FOR ILLUSTRATION PURPOSES ONLY. THE ACTUAL LOCATION WILL BE DETERMINED AT A LATER DATE IN COORDINATION WITH THE EASEMENT HOLDER.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK LOCATION.

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DESIGN BY: JBP
REVIEWED BY: NT

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TBPE REGISTRATION NO. F-3727

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MAJOR PERMIT AMENDMENT
SECTOR DEVELOPMENT SEQUENCE

TURKEY CREEK LANDFILL
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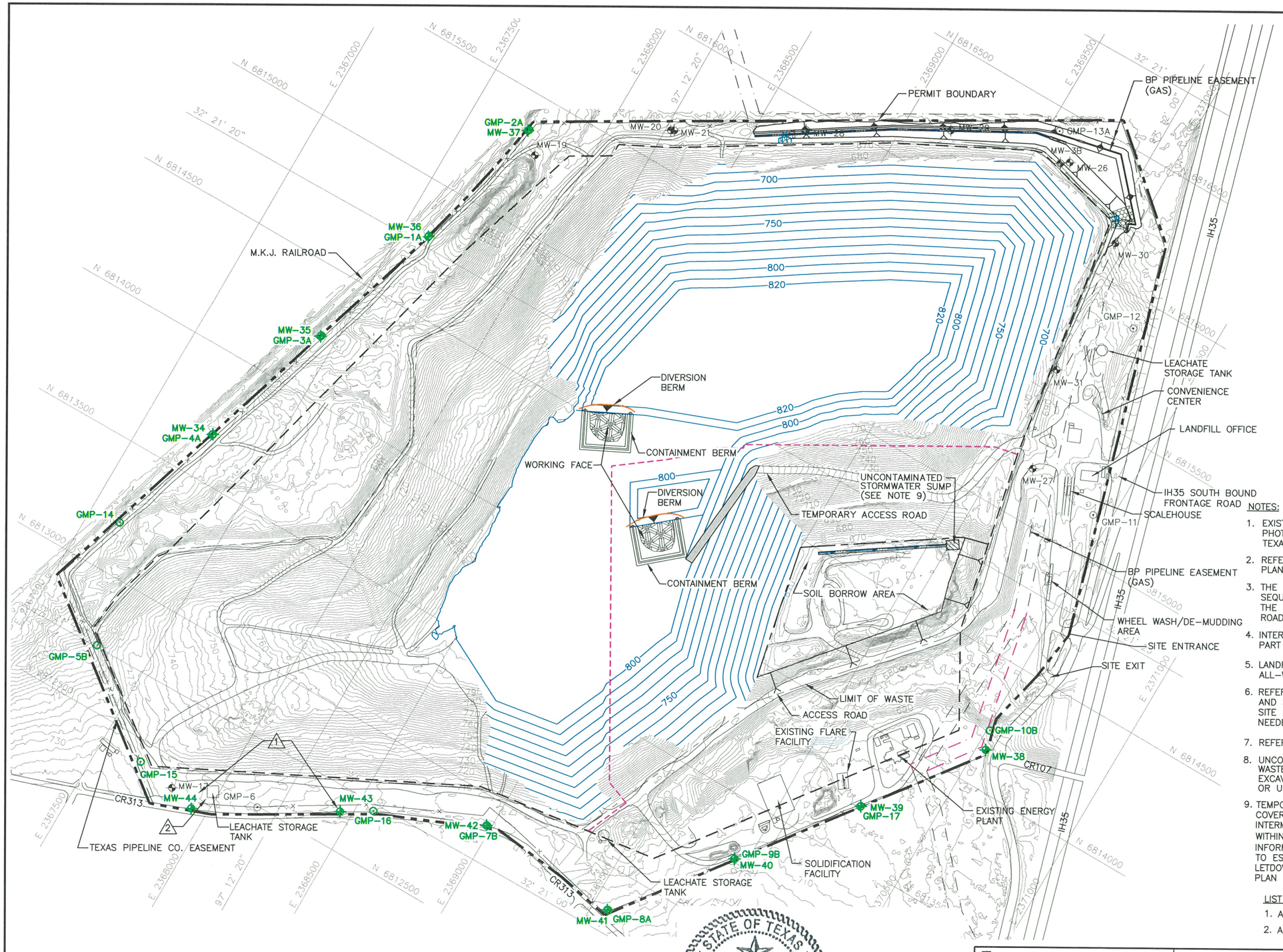
FIGURE I/II-A.2

O:\0771\368\EXPANSION 2021\PARTS I-II\FIG A.2-SECTOR DEVELOPMENT SEQUENCE.dwg, rarrington, 1:2



LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 — INTERMEDIATE CONTOUR
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING LFG MONITORING PROBE
- ⚠ — INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIC-LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN FOR CONTAMINATED WATER RUN-ON/RUN-OFF BERM DESIGN INFORMATION.
3. THE SECTOR DEVELOPMENT SHOWN ON THIS DRAWING SHOWS THE GENERAL SEQUENCE OF FILLING OPERATIONS. ACTUAL LANDFILL DEVELOPMENT MAY VARY. THE LOCATION OF THE ALL-WEATHER ACCESS ROAD FROM THE LANDFILL HAUL ROAD TO THE ACTIVE AREA WILL BE DETERMINED DURING SITE OPERATIONS.
4. INTERMEDIATE COVER CONSISTS OF A 12-INCH THICK SOIL LAYER. REFER TO PART IV - SITE OPERATING PLAN FOR ADDITIONAL SOIL COVER REQUIREMENTS.
5. LANDFILL HAUL ROAD WILL BE SURFACED WITH CRUSHED STONE TO PROVIDE ALL-WEATHER ACCESS.
6. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR THE EROSION AND SEDIMENTATION CONTROL PLAN. DRAINAGE STRUCTURES ARE SHOWN AS THE SITE DEVELOPS. ADDITIONALLY BMPs WILL BE USED TO CONTROL EROSION AS NEEDED.
7. REFER TO APPENDIX IIII FOR LANDFILL GAS MANAGEMENT PLAN.
8. UNCONTAMINATED STORMWATER THAT HAS NOT COME INTO CONTACT WITH WASTE WILL BE COLLECTED IN SUMPS AND PERIODICALLY REMOVED FROM EXCAVATED AREAS BY PUMPING TO PERIMETER DRAINAGE CHANNELS OR USED IN SITE OPERATIONS (E.G., DUST CONTROL, COMPACTING, ETC.).
9. TEMPORARY CHUTES AND SWALES WILL BE PLACED OVER THE INTERMEDIATE COVER AREA TO MINIMIZE EROSION AND HELP ESTABLISH VEGETATION FOR INTERMEDIATE COVER AREAS THAT WILL NOT RECEIVE WASTE OR FINAL COVER WITHIN 180 DAYS AFTER PLACEMENT (REFER TO APPENDIX IIIF-F FOR MORE INFORMATION). MULCH, HYDROSEEDING OR SIMILAR METHODS WILL BE USED TO ESTABLISH VEGETATION OVER THE INTERMEDIATE COVER AREAS. SWALE AND LETDOWN SPACING WILL MEET THE REQUIREMENTS OF THE EROSION CONTROL PLAN INCLUDED IN APPENDIX IIIF-F.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK.

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DRAWN BY: JDW
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REVIEWED BY: NT

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MAJOR PERMIT AMENDMENT SECTOR DEVELOPMENT PLAN I

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FIGURE I/II-A.4

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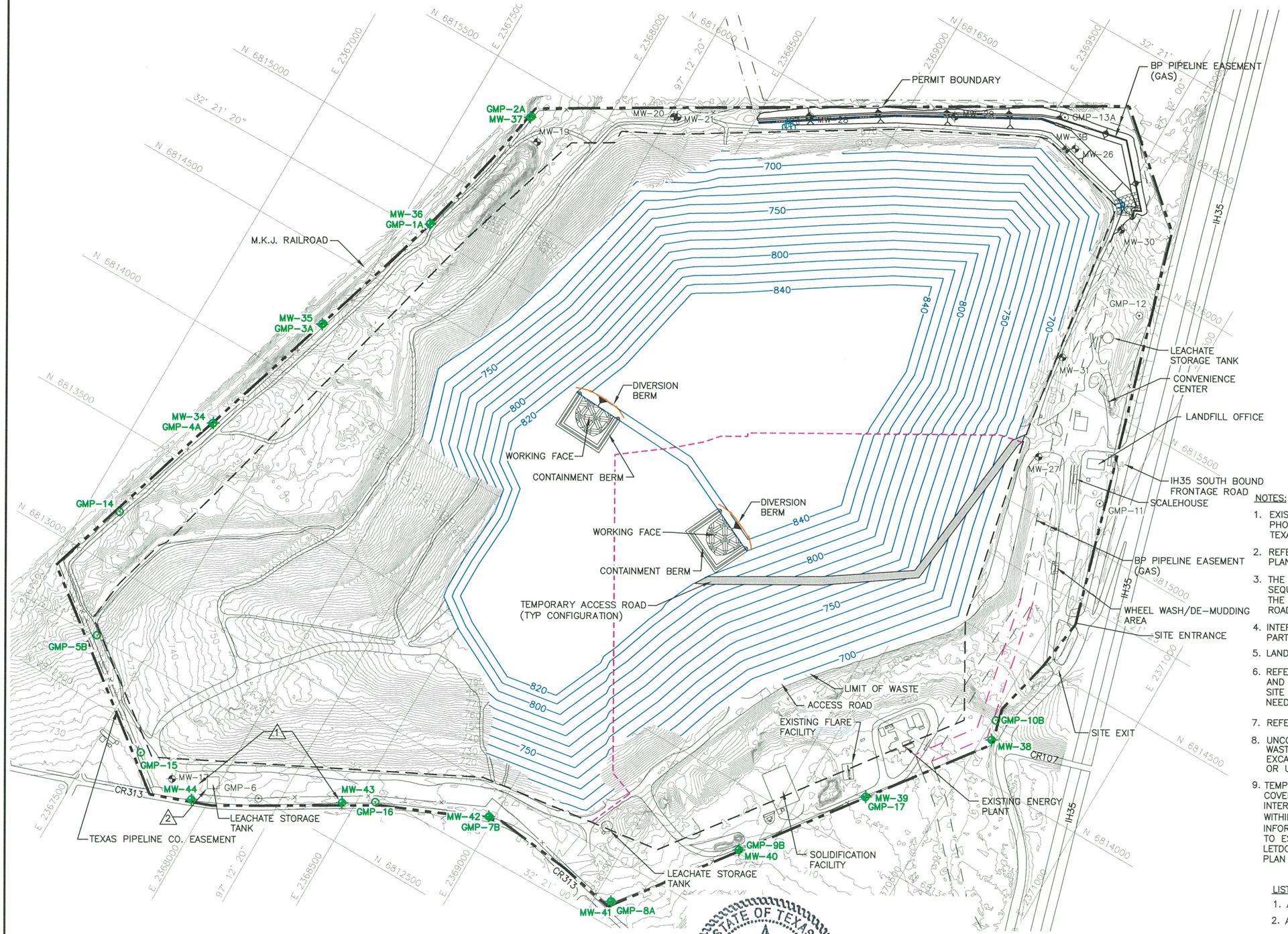
O:\0771\368\EXPANSION 2021\PARTS I-II\FIG A.4-SECTOR DEVELOPMENT PLAN I.dwg, rarrington, 1:2



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 — INTERMEDIATE CONTOUR
- DRAINAGE CHANNEL
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING LFG MONITORING PROBE
- ⚠ — INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIC-LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN FOR CONTAMINATED WATER RUN-ON/RUN-OFF BERM DESIGN INFORMATION.
3. THE SECTOR DEVELOPMENT SHOWN ON THIS DRAWING SHOWS THE GENERAL SEQUENCE OF FILLING OPERATIONS. ACTUAL LANDFILL DEVELOPMENT MAY VARY. THE LOCATION OF THE ALL-WEATHER ACCESS ROAD FROM THE LANDFILL HAUL ROAD TO THE ACTIVE AREA WILL BE DETERMINED DURING SITE OPERATIONS.
4. INTERMEDIATE COVER CONSISTS OF A 12-INCH THICK SOIL LAYER. REFER TO PART IV - SITE OPERATING PLAN FOR ADDITIONAL SOIL COVER REQUIREMENTS.
5. LANDFILL HAUL ROAD WILL BE SURFACED TO PROVIDE ALL-WEATHER ACCESS.
6. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR THE EROSION AND SEDIMENTATION CONTROL PLAN. DRAINAGE STRUCTURES ARE SHOWN AS THE SITE DEVELOPS. ADDITIONALLY BMPs WILL BE USED TO CONTROL EROSION AS NEEDED.
7. REFER TO APPENDIX IIII FOR LANDFILL GAS MANAGEMENT PLAN.
8. UNCONTAMINATED STORMWATER THAT HAS NOT COME INTO CONTACT WITH WASTE WILL BE COLLECTED IN SUMPS AND PERIODICALLY REMOVED FROM EXCAVATED AREAS BY PUMPING TO PERIMETER DRAINAGE CHANNELS OR USED IN SITE OPERATIONS (E.G., DUST CONTROL, COMPACTING, ETC.).
9. TEMPORARY CHUTES AND SWALES WILL BE PLACED OVER THE INTERMEDIATE COVER AREA TO MINIMIZE EROSION AND HELP ESTABLISH VEGETATION FOR INTERMEDIATE COVER AREAS THAT WILL NOT RECEIVE WASTE OR FINAL COVER WITHIN 180 DAYS AFTER PLACEMENT (REFER TO APPENDIX IIIF-F FOR MORE INFORMATION). MULCH, HYDROSEEDING OR SIMILAR METHODS WILL BE USED TO ESTABLISH VEGETATION OVER THE INTERMEDIATE COVER AREAS. SWALE AND LETDOWN SPACING WILL MEET THE REQUIREMENTS OF THE EROSION CONTROL PLAN INCLUDED IN APPENDIX IIIF-F.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK.

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MAJOR PERMIT AMENDMENT
SECTOR DEVELOPMENT PLAN II

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FIGURE I/II-A.5

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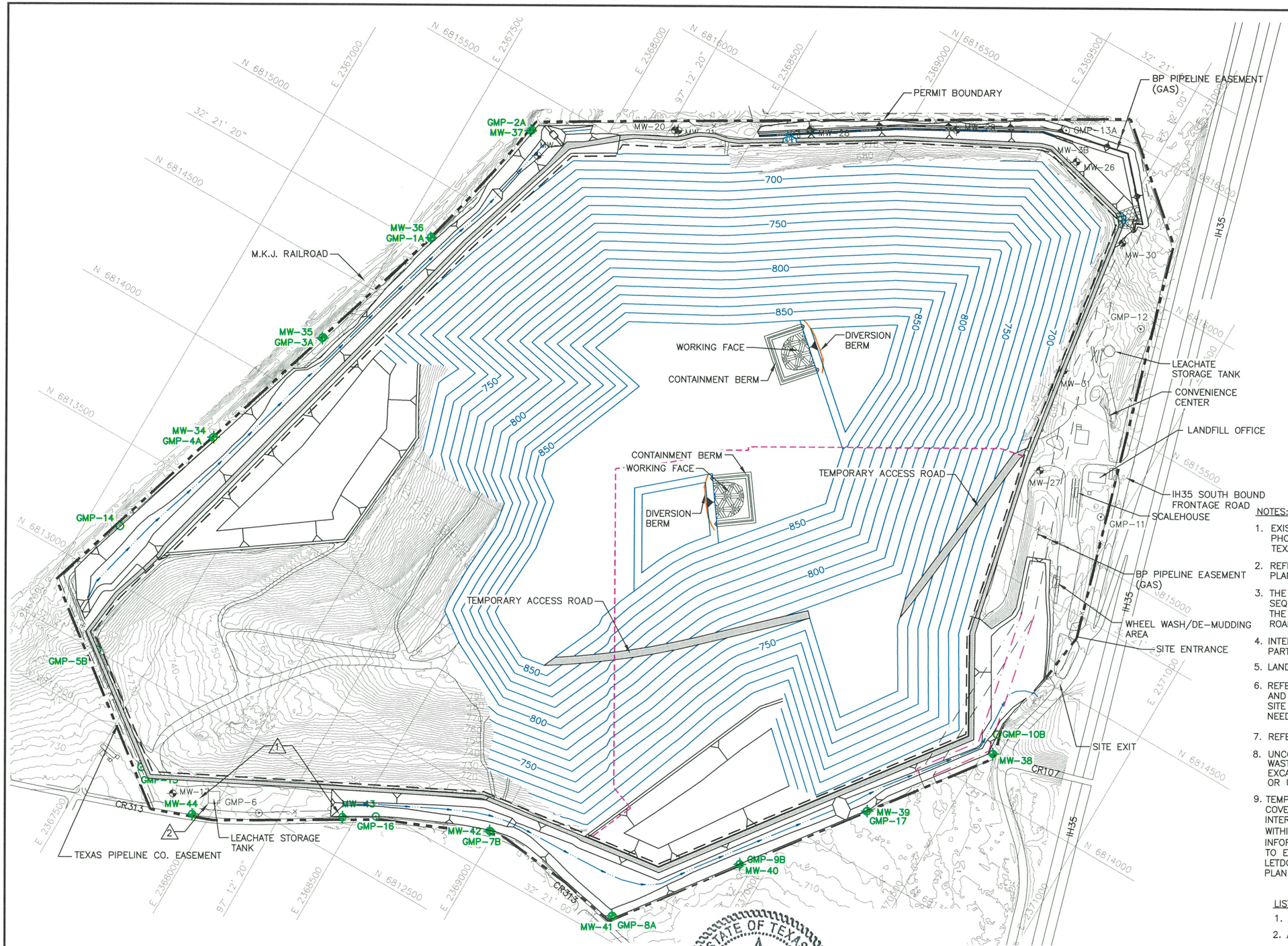
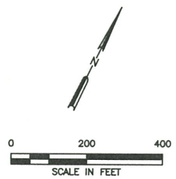
O:\0771\368\EXPANSION 2021\PARTS I-II\FIG A.5-SECTOR DEVELOPMENT PLAN II.dwg, rarrington, 1:2





LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 — INTERMEDIATE CONTOUR
- DRAINAGE CHANNEL
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING LFG MONITORING PROBE
- INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIC-LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN FOR CONTAMINATED WATER RUN-ON/RUN-OFF BERM DESIGN INFORMATION.
3. THE SECTOR DEVELOPMENT SHOWN ON THIS DRAWING SHOWS THE GENERAL SEQUENCE OF FILLING OPERATIONS. ACTUAL LANDFILL DEVELOPMENT MAY VARY. THE LOCATION OF THE ALL-WEATHER ACCESS ROAD FROM THE LANDFILL HAUL ROAD TO THE ACTIVE AREA WILL BE DETERMINED DURING SITE OPERATIONS.
4. INTERMEDIATE COVER CONSISTS OF A 12-INCH THICK SOIL LAYER. REFER TO PART IV - SITE OPERATING PLAN FOR ADDITIONAL SOIL COVER REQUIREMENTS.
5. LANDFILL HAUL ROAD WILL BE SURFACED TO PROVIDE ALL-WEATHER ACCESS.
6. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR THE EROSION AND SEDIMENTATION CONTROL PLAN. DRAINAGE STRUCTURES ARE SHOWN AS THE SITE DEVELOPS. ADDITIONALLY BMPs WILL BE USED TO CONTROL EROSION AS NEEDED.
7. REFER TO APPENDIX IIII FOR LANDFILL GAS MANAGEMENT PLAN.
8. UNCONTAMINATED STORMWATER THAT HAS NOT COME INTO CONTACT WITH WASTE WILL BE COLLECTED IN SUMPS AND PERIODICALLY REMOVED FROM EXCAVATED AREAS BY PUMPING TO PERIMETER DRAINAGE CHANNELS OR USED IN SITE OPERATIONS (E.G., DUST CONTROL, COMPACTING, ETC.).
9. TEMPORARY CHUTES AND SWALES WILL BE PLACED OVER THE INTERMEDIATE COVER AREA TO MINIMIZE EROSION AND HELP ESTABLISH VEGETATION FOR INTERMEDIATE COVER AREAS THAT WILL NOT RECEIVE WASTE OR FINAL COVER WITHIN 180 DAYS AFTER PLACEMENT (REFER TO APPENDIX IIIF-F FOR MORE INFORMATION). MULCH, HYDROSEEDING OR SIMILAR METHODS WILL BE USED TO ESTABLISH VEGETATION OVER THE INTERMEDIATE COVER AREAS. SWALE AND LETDOWN SPACING WILL MEET THE REQUIREMENTS OF THE EROSION CONTROL PLAN INCLUDED IN APPENDIX IIIF-F.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK.

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MAJOR PERMIT AMENDMENT SECTOR DEVELOPMENT PLAN III

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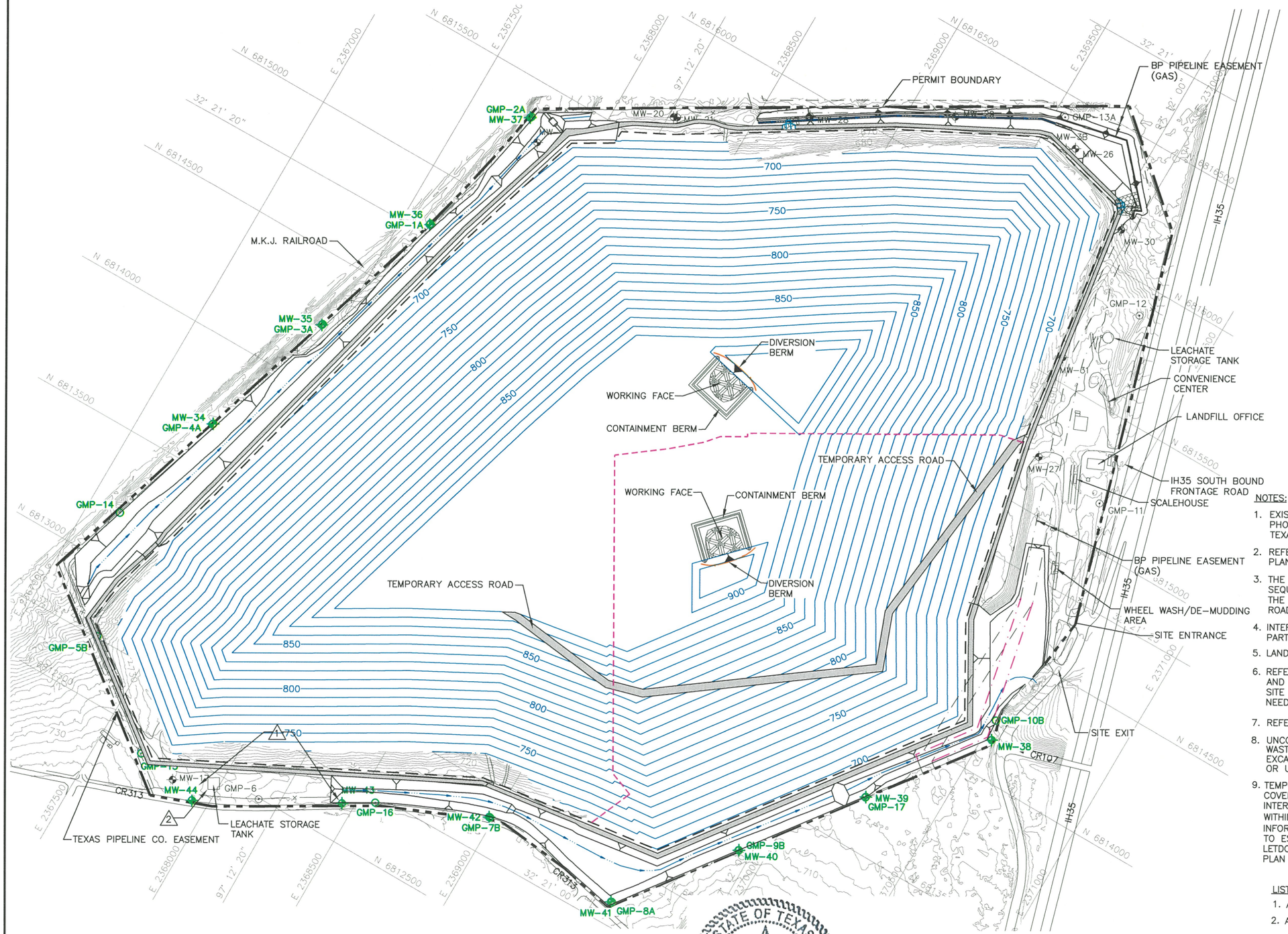
FIGURE I/II-A.6

O:\0771\368\EXPANSION 2021\PARTS I-II\FIG A.6-SECTOR DEVELOPMENT PLAN III.dwg, rarrington, 1:2



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 — INTERMEDIATE CONTOUR
- DRAINAGE CHANNEL
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING LFG MONITORING PROBE
- 1 — INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIC-LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN FOR CONTAMINATED WATER RUN-ON/RUN-OFF BERM DESIGN INFORMATION.
3. THE SECTOR DEVELOPMENT SHOWN ON THIS DRAWING SHOWS THE GENERAL SEQUENCE OF FILLING OPERATIONS. ACTUAL LANDFILL DEVELOPMENT MAY VARY. THE LOCATION OF THE ALL-WEATHER ACCESS ROAD FROM THE LANDFILL HAUL ROAD TO THE ACTIVE AREA WILL BE DETERMINED DURING SITE OPERATIONS.
4. INTERMEDIATE COVER CONSISTS OF A 12-INCH THICK SOIL LAYER. REFER TO PART IV - SITE OPERATING PLAN FOR ADDITIONAL SOIL COVER REQUIREMENTS.
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9. TEMPORARY CHUTES AND SWALES WILL BE PLACED OVER THE INTERMEDIATE COVER AREA TO MINIMIZE EROSION AND HELP ESTABLISH VEGETATION FOR INTERMEDIATE COVER AREAS THAT WILL NOT RECEIVE WASTE OR FINAL COVER WITHIN 180 DAYS AFTER PLACEMENT (REFER TO APPENDIX IIIF-F FOR MORE INFORMATION). MULCH, HYDROSEEDING OR SIMILAR METHODS WILL BE USED TO ESTABLISH VEGETATION OVER THE INTERMEDIATE COVER AREAS. SWALE AND LETDOWN SPACING WILL MEET THE REQUIREMENTS OF THE EROSION CONTROL PLAN INCLUDED IN APPENDIX IIIF-F.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK.

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MAJOR PERMIT AMENDMENT
SECTOR DEVELOPMENT PLAN IV

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FIGURE I/II-A.7

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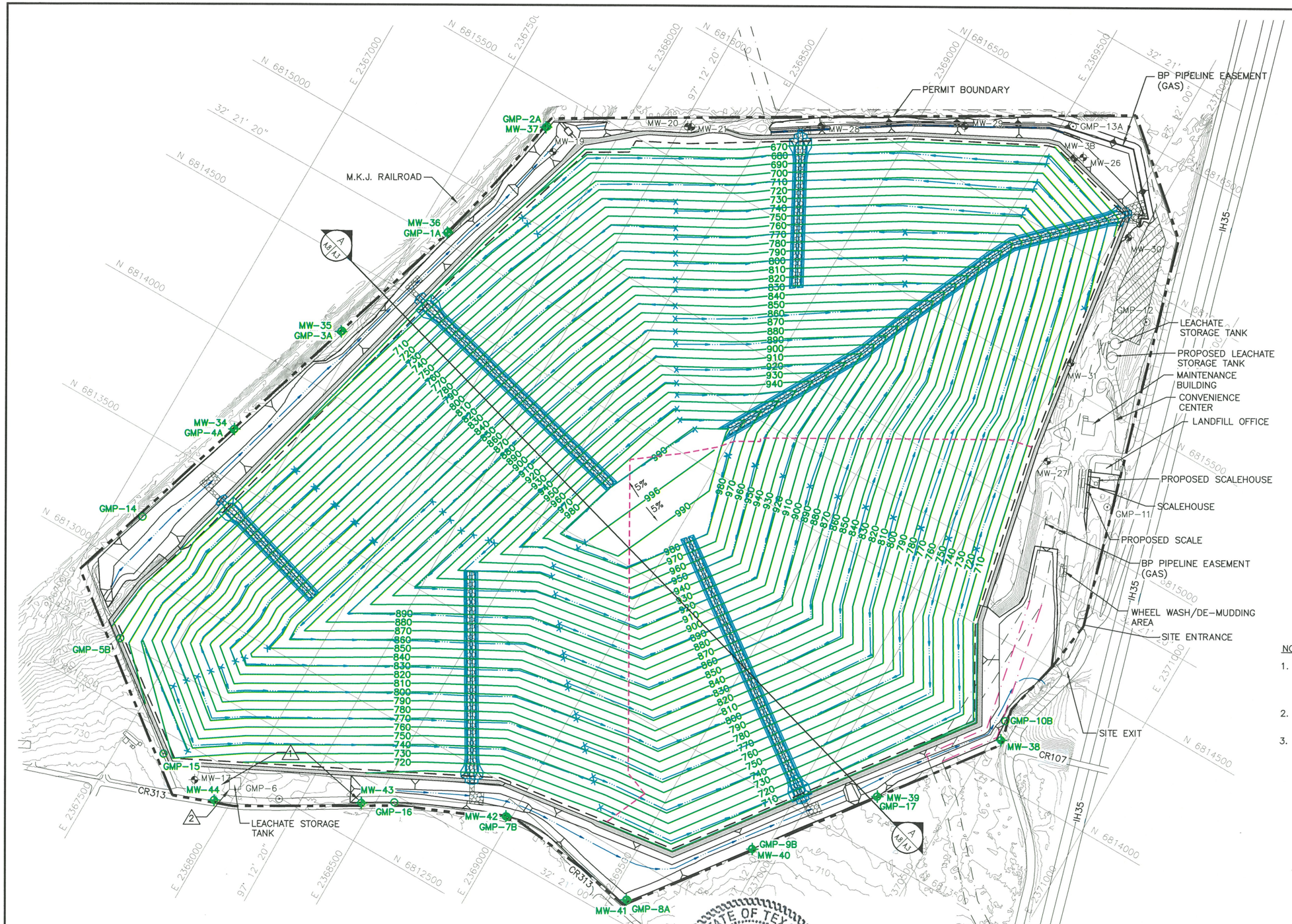
O:\0771\368\EXPANSION 2021\PARTS I-II\FIG A.7-SECTOR DEVELOPMENT PLAN IV.dwg, rarrington, 1:2



LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
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- RELOCATED EASEMENT
- 800 — FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING GAS MONITORING PROBE
- MW-7 — PROPOSED GROUNDWATER MONITORING WELL
- GMP-17 — PROPOSED GAS MONITORING PROBE
- FUTURE LFGTE FACILITY LOCATION
- ⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR DRAINAGE DESIGN INFORMATION.
3. MAXIMUM FINAL COVER ELEVATION IS 996.0 FT-MSL. MAXIMUM TOP OF WASTE ELEVATION IS 992.5 FT-MSL.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK LOCATION.

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER
12/16/2022

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: A.8-LANDFILL COMPLETION PLAN.DWG
DRAWN BY: JDW
DESIGN BY: CAM
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISONS

MAJOR PERMIT AMENDMENT LANDFILL COMPLETION PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE I/II-A.8

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O:\0771\368\EXPANSION 2021\PARTS I-II\FIG A.8-COMPLETION PLAN.dwg, rarrington, 1:2



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- SECTOR BOUNDARY
- 800 OVERLINER CONTOUR
- 670 PERMITTED/EXISTING TOP OF LINER CONTOUR
- 662 PERMITTED/UNDEVELOPED EXCAVATION CONTOUR
- PERMITTED/UNDEVELOPED LEACHATE LINE
- LEACHATE COLLECTION SUMP
- MW-7 EXISTING GROUNDWATER MONITORING WELL
- GMP-12 EXISTING GAS MONITORING PROBE
- PRE SUBTITLE D AREA
- ⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. EXCAVATION SLOPES AND SLOPES OUTSIDE THE LIMIT OF WASTE (e.g., CHANNELS) ARE TYPICALLY 3H:1V.
3. REFER TO APPENDIX IIIC FOR LEACHATE FORCEMAIN AND STORAGE INFORMATION.
4. ELEVATION OF DEEPEST EXCAVATION (EDE) AT SECTOR 1A LCS SUMP IS 648 FT-MSL.
5. SUBTITLE D AREA LCS PIPES SLOPE WITH A MINIMUM OF 0.8% TO SUMPS. LCS LATERAL DRAINAGE SLOPE IS A MINIMUM OF 2.0% ALONG THE FLOW PATH. OVERLINER LCS PIPES SLOPE WITH A MINIMUM 1.0% TO SUMPS.
6. LINER, OVERLINER, AND LEACHATE COLLECTION SYSTEM DETAILS ARE PRESENTED IN APPENDIX IIIA-A-LINER, OVERLINER AND FINAL COVER SYSTEM DETAILS.
7. SEQUENCE OF SITE DEVELOPMENT IS PROVIDED IN PARTS I/II, APPENDIX I/IIA DRAWINGS I/IIA.4 THROUGH I/IIA.7.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK.

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER
12/16/2022

- ☐ DRAFT
- ☒ FOR PERMITTING PURPOSES ONLY
- ☐ ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: A.9-EXCAVATION PLAN.DWG

DRAWN BY: JDW
DESIGN BY: CAM
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
EXCAVATION PLAN/OVERLINER PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE I/II-A.9

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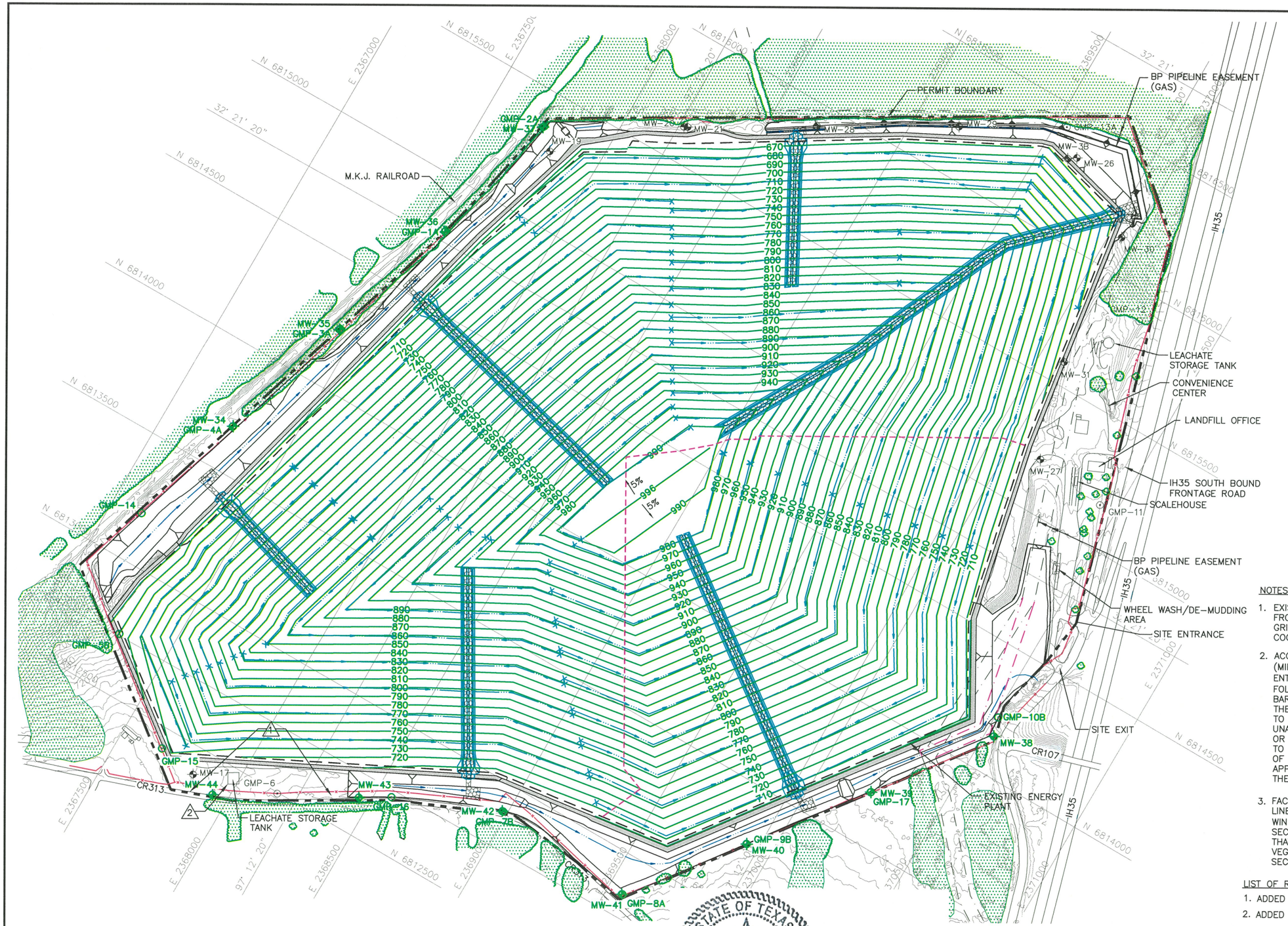
O:\0771\368\EXPANSION 2021\PARTS I-II\FIG A.9-EXCAVATION PLAN.dwg, rarrington, 1:2



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- GABIONS
- MW-7 EXISTING GROUNDWATER MONITORING WELL
- GMP-12 EXISTING GAS MONITORING PROBE
- EXISTING FENCE
- EXISTING BUFFER ZONE WITH TREES AND SHRUBS (SEE NOTE 3)
- ⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. ACCESS TO THE SITE WILL BE CONTROLLED BY PERIMETER FENCING (MINIMUM 4-FEET HIGH, 3-STRAND BARBED WIRE FENCES), A GATED ENTRANCE, AND NATURAL BARRIERS (e.g TURKEY CREEK, DENSE FOLIAGE, AND VEGETATION). ADDITIONALLY, IN AREAS OF NATURAL BARRIERS, THE ACCESS CONTROL PLAN IS PROVIDED TO PREVENT THE ENTRY OF LIVESTOCK, TO PREVENT THE PUBLIC FROM EXPOSURE TO POTENTIAL HEALTH AND SAFETY HAZARDS, AND TO DISCOURAGE UNAUTHORIZED ENTRY OR UNCONTROLLED DISPOSAL OF SOLID WASTE OR HAZARDOUS MATERIALS. NO TRESPASSING SIGNS WILL BE ADDED TO DISCOURAGE UNAUTHORIZED ENTRY OR UNCONTROLLED DISPOSAL OF SOLID WASTE OR HAZARDOUS MATERIALS. SIGNS WILL BE PLACED APPROXIMATELY 300 FEET APART ALONG THE NORTHERN PORTION OF THE SITE.
3. FACILITY IS BOUNDED BY TWO PUBLIC ROADS WITH HIGH-CANOPY TREE LINES. THE EXISTING DENSE TREE LINES FUNCTION AS BOTH WINDBREAKS AND SITE SCREENING. AS SHOWN IN FIGURE I/II-A.2 SECTOR DEVELOPMENT SEQUENCE, THE LANDFILL IS SEQUENCED SUCH THAT THE ACTIVE FILL AREA WILL BE SCREENED BY THE EXISTING VEGETATION. THE FILL SEQUENCE WILL ALSO DEVELOP THE OUTERMOST SECTORS FIRST, WHICH WILL SCREEN SUBSEQUENT OPERATIONS.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK.

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER
12/16/2022

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: A.11-ACCESS PLAN.DWG
DRAWN BY: JDW
DESIGN BY: CAM
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISONS

MAJOR PERMIT AMENDMENT
ACCESS CONTROL PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE I/II-A.11

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O:\0771\368\EXPANSION 2021\PARTS I-II\FIG A.11-ACCESS PLAN.dwg, rarrington, 1:2

APPENDIX I/IIB

DEMONSTRATION OF COORDINATION

- Coordination with Federal Aviation Administration
- Coordination with Texas Historical Commission
- Coordination with Texas Department of Transportation
- Coordination with Texas Parks and Wildlife Department
- Coordination with U.S. Army Corps of Engineers
- Coordination with U.S. Department of the Interior Fish and Wildlife Service
- Coordination with North Central Texas Council of Governments



COORDINATION WITH
FEDERAL AVIATION ADMINISTRATION

- FAA Determination of No Hazard to Air Navigation Letters ~~will be included upon receipt~~.
- January 18, 2022 WCG Request for Review Letter regarding hazards to all navigation and hazards to air traffic due to birds (including copies of FAA's determination of "No Hazard to Air Navigation" for Points A through E at the landfill, dated February 3, 2022).

~~[FAA APPROVAL LETTER TO BE INSERTED.]~~

U.S. Department
of Transportation
**Federal Aviation
Administration**

Federal Aviation Administration
Southwest Region, Airports Division
Safety and Standards Branch

10101 Hillwood Parkway
Fort Worth, Texas 76177

April 13, 2022

Charles R. Marsh, P.E.
Project Director
Weaver Consultant Group
6420 Southwest Boulevard, Suite 206
Fort Worth, TX 76109

Subject: Turkey Creek Landfill Facility – Johnson County
Municipal Solid Waste (MSW) – Permit Amendment
Permit Application (Vertical Site Expansion from 946 feet AMSL to 996 feet AMSL)
FAA File No. 2019-004-TX

Dear Charles Marsh:

This letter is in response to your February 8, 2022 letter advising us of the completed FAA site survey and subsequent FAA Determination of "No Hazard to Air Navigation" letters dated February 3, 2022, regarding the proposed vertical site expansion of the Turkey Creek Landfill Facility in Johnson County, Texas.

Using coordinates 32 21' 00.73" N and 97 12' 31.19" W, we determined there are no public-use fixed wing airports and six private-use airports within 6 statute miles of the proposed site. A 14 CFR Part 77 evaluation revealed no potential conflicts.

We have no objection to the proposed MSW facility. Our position of no objection is based on the application of our guidance for hazardous wildlife attractants on or near airports FAA Advisory Circular 150/5200-33B.

This site has been assigned our file No. 2019-004-TX. Please refer to this number in any future correspondence regarding this site. Thank you for coordinating this project with us. If there are any questions, you can contact me at 817-222-5671 or gary.loftus@faa.gov.

Sincerely,

GARY J LOFTUS

Digitally signed by GARY J LOFTUS
Date: 2022.04.13 09:10:57 -05'00'

Gary J. Loftus, A.A.E.
Airports Compliance Program Manager
Airport Certification Safety Inspector
FAA Southwest Region Airports Division

COORDINATION WITH
TEXAS HISTORICAL COMMISSION

- THC Review Record Dated February 17, 2022. ~~response will be submitted to TCEQ when and if received.~~
- January 18, 2022 Request Letter requesting THC concurrence that no historic properties are affected by the landfill.

~~[THC APPROVAL LETTER TO BE INCLUDED]~~

Review Record

Track: 202205860 **Received:** 1/24/2022 **Due:** 2/23/2022

External Name: **Jurisdiction:** State

Project Name: Turkey Creek Landfill
Description: vertical expansion of municipal solid waste facility
Reviewers: Rebecca Shelton, Caitlin Brashear
Agency: Texas Commission on Environmental Quality
2nd Agency:
Address: **City:** **Zip:**
County: Johnson **Other Counties:** 0 **TAC Permit:**
Submitter: **Submitter Email:** cmarsh@wcgrp.com ☐ **Mapped**

STATUS

Status: No Action Required **Responded:** 2/17/2022 **Parent:**

Route Category: **Review Type:** Section 106/Antiquities Code Consultation

SITES & STRUCTURES

Eligible Sites: **Ineligible Sites:** **Undetermined Sites:**
Eligible Structures **Ineligible Structures** **Acres**

FEDERAL INVOLVEMENT

Contact: **Permit:** **Email:**

STATE INVOLVEMENT

Owner: **Owner Email:**

DESIGNATIONS

☐ **SAL** ☐ **NR** ☐ **NR District** ☐ **RTHL** ☐ **TXDot Review** ☐ **Underwater Review**

Notes:
Note to Client:
Client Notes:

Review Codes

F1	Non-written review	rebecca.shelton@thc.texas.gov	2/17/2022
N1	Non-written review	caitlin.brashear@thc.texas.gov	2/11/2022

COORDINATION WITH
TEXAS DEPARTMENT OF TRANSPORTATION
AND
TCEQ TRANSPORTATION DATA AND COORDINATION REPORT FORM FOR MSW TYPE I LANDFILLS (TCEQ – 20719, 09/27/21)

- TxDOT response letter dated August 17, 2022. ~~will be submitted to TCEQ when and if received.~~
- January 18, 2022 WCG Request for Review Letter (refer to Appendix I/IID – Traffic Study for more information).

~~[TXDOT APPROVAL LETTER TO BE INSERTED]~~

DocuSign Envelope ID: 56C03FE6-2694-46B4-AF0D-7C96499F8223

Texas Department of Transportation

MEMO

August 17, 2022

To: Texas Commission on Environmental Quality
Municipal Solid Waste Section

Through: Weaver Consultants Group, LLC
Charles R. Marsh, P.E.
Project Director

From: Carl L. Johnson, P.E.
Fort Worth District Engineer

DocuSigned by:
Carl L. Johnson, PE
2FE36139F0614C3...

Subject: IESI Turkey Creek Landfill – Johnson County
Municipal Solid Waste – Permit Amendment, TCEQ Application No. 1417D

After the review of the Executive Summary, Engineering Study and Historical Data for the Turkey Creek Landfill, the Texas Department of Transportation, Fort Worth District does not have any objection of the expansion of the Turkey Creek Landfill. The Engineering Study submitted with the request for coordination regarding any potential traffic or location restrictions has demonstrated the infrastructure will provide adequate access to the site now and in the foreseeable future. As a result of the proposed expansion, the volumes of vehicles on the on-system roadway systems and into the facility will not increase, and the existing entrance will not be modified. In addition, based on the engineering study, it is expected that the traffic patterns will remain consistent with the current traffic patterns.

If you have any questions or require any addition information, please contact Matthew Evans, P.E., Fort Worth District Director of Maintenance.

OUR VALUES: *People • Accountability • Trust • Honesty*
OUR MISSION: *Through collaboration and leadership, we deliver a safe, reliable, and integrated transportation system that enables the movement of people and goods.*

An Equal Opportunity Employer

COORDINATION WITH
TEXAS PARKS AND WILDLIFE DEPARTMENT

- TPWD response letter dated May 31, 2022. ~~will be submitted to TCEQ when and if received.~~
- January 18, 2022 WCG Request for Review Letter.

~~[TPWD RESPONSE LETTER TO BE INCDLUED]~~

TEXAS PARKS & WILDLIFE

Life's better outside.®

Commissioners

Arch "Beaver" Aplin, III
Chairman
Lake Jackson

Dick Scott
Vice-Chairman
Wimberley

James E. Abell
Kilgore

Oliver J. Bell
Cleveland

Paul L. Foster
El Paso

Anna B. Galo
Laredo

Jeffery D. Hildebrand
Houston

Robert L. "Bobby" Patton, Jr.
Fort Worth

Travis B. "Blake" Rowling
Dallas

Lee M. Bass
Chairman-Emeritus
Fort Worth

T. Dan Friedkin
Chairman-Emeritus
Houston

Carter P. Smith
Executive Director

May 31, 2022

Mr. Charles R. Marsh, P.E.
Weaver Consultants Group, LLC
6420 Southwest Boulevard, Suite 206
Fort Worth, TX 76109

RE: Turkey Creek Landfill Major Permit Amendment, Johnson County

Dear Mr. Charles R. Marsh:

Texas Parks and Wildlife Department (TPWD) received a review request dated January 18, 2022, for the landfill amendment referenced above.

Under Texas Parks and Wildlife Code (PWC) § 12.0011(b)(2) and (b)(3), TPWD has authority to provide recommendations and informational comments that will protect fish and wildlife resources to local, state, and federal agencies that approve, license, or construct developmental projects or make decisions affecting those resources. TPWD is providing input on this proposed project to facilitate the incorporation of beneficial management practices (BMP) during construction, operation, and maintenance that may assist the project proponent in minimizing impacts to the state's natural resources. Pursuant to PWC § 12.0011(b)(2) and (b)(3), TPWD offers the following comments and recommendations concerning this project. Please be aware that a written response to a TPWD recommendation or informational comment received by a state governmental agency may be required by state law. For further guidance, see Texas Parks and Wildlife Code (PWC) section 12.0011. Please refer to TPWD project number 48096 in return correspondence regarding this project.

Future Project Submittals

Electronic submittal: For greater efficiency, TPWD Wildlife Habitat Assessment Program (WHAB) prefers projects be submitted electronically to WHAB@tpwd.texas.gov. Projects submitted electronically receive a receipt that the project has been received by TPWD.

Project Description

Weaver Consultants Group, LLC (Weaver) is preparing a major permit amendment (Project) application on behalf of Texas Regional Landfill Company, LP. The Project cover letter indicated that the expansion would be limited to the vertical increase in height of the landfill and will not change the permit boundary or limits of waste disposal. On April 6, 2022, Texas Commission on Environmental Quality (TCEQ) provided TPWD with a notice of receipt of the application with a link to access the permit application. Weaver contacted me on May 25, 2022, to ask the status of our review and confirmation that the Project meets TCEQ requirements for compliance with the Endangered Species Act. Upon an additional look at the Project materials provided in the application, the Project will include both a vertical increase in height

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

and a 25.6-acre change in the limits of waste disposal that will relocate and channelize two streams and their associated pond and wetland habitats.

Federal Law: Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits taking, attempting to take, capturing, killing, selling, purchasing, possessing, transporting, and importing of migratory birds, their eggs, parts, or nests, except when specifically authorized by the Department of the Interior. This protection applies to most native bird species, including ground nesting species. The U.S. Fish and Wildlife Service (USFWS) Migratory Bird Office can be contacted at (505) 248-7882 for more information on potential impacts to migratory birds.

Within the Project area, potential impacts to migratory birds may occur during disturbance of existing vegetation and bare ground that may harbor active bird nests, including nests that may occur in grass, shrubs and trees and on bare ground including gravel pads and roads.

> **Recommendation:** TPWD recommends excluding vegetation clearing activities during the general bird nesting season, March 15 through September 15, to avoid adverse impacts to breeding birds. If clearing vegetation during the migratory bird nesting season is unavoidable, TPWD recommends surveying the area proposed for disturbance to ensure that no nests with eggs or young will be disturbed by operations. TPWD generally recommends a 150-foot buffer of vegetation remain around active nests until the eggs have hatched and the young have fledged; however, the size of the buffer zone depends on various factors and can be coordinated with the local or regional USFWS office.

Sky glow because of light pollution can have negative impacts on wildlife and ecosystems by disrupting natural diurnal and nocturnal behaviors such as migration, reproduction, nourishment, rest, and cover from predators.

> **Recommendation:** As bird protection measures, TPWD recommends designing the Project's lighted areas to contain the minimum amount of permanent night-time lighting needed for safety and security. TPWD recommends minimizing the Project's contribution toward skyglow by focusing light downward, with full cutoff luminaries to avoid emitting light above the horizontal, and to use dark-sky friendly lighting that is illuminated only when needed, down-shielded, as bright as needed, and minimizes blue light emissions. Lighting technologies, BMPs, and other dark sky resources can be found at the International Dark-Sky Association and McDonald Observatory websites.

Federal Law: Clean Water Act

Section 404 of the Clean Water Act (CWA) establishes a federal program to regulate the discharge of dredge and fill material into the waters of the U.S., including wetlands. The United States Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) are responsible for regulating water resources under this act.

According to the permit application, ephemeral waterbodies are not considered jurisdictional per the June 22, 2020, Navigable Waters Protection Rule (NWPR). Please note that EPA and USACE have halted implementation of the NWPR, and jurisdictional waters include ephemeral streams. However, the permit application also indicates that the USACE determined that the waterbodies within the expansion area are exempt under the Section 404(f) exemption found at 33 CFR Part 323.4(a)(5), because the waterbodies were determined part of a waste treatment system as a component of TPDES multi-sector storm water general permit No. TXR05AP29.

As a result of this exemption, the Project will provide no avoidance of impacts or mitigation for impacts to the streams and wetlands within the Project area, all of which would be considered Waters of the U.S. if an exemption were not granted. Although isolated wetlands and exempt waters may not be applicable to the USACE Section 404 CWA permitting process, aquatic systems provide an essential role in providing habitat for wildlife and helping to protect water quality.

> **Recommendation:** TPWD recommends avoiding development within streams and wetlands and referring to the recommendations provided in the section below regarding *State Laws: Aquatic Resources*.

Federal Law: Endangered Species Act

Federally listed animal species and their habitat are protected from take on any property by the Endangered Species Act (ESA). Take of a federally listed species can be allowed if it is incidental to an otherwise lawful activity and must be permitted in accordance with Section 7 or 10 of the ESA. Take of a federally listed species or its habitat without allowance from USFWS is a violation of the ESA.

The Project materials and permit application include a list of federal threatened and endangered species that may occur in the Project area obtained August 31, 2021, from the USFWS Information Planning and Consultation (IPaC) website and indicated that no impacts to federally listed species will occur due to the proposed Project.

Please note that species lists generated from USFWS IPaC expire after 90 days.

> **Recommendation:** To be up to date on current listing status and to ensure compliance with ESA, prior to disturbance into natural areas and streams within the Project area, TPWD recommends Weaver and Texas Regional Landfill Company LP refer to the USFWS IPaC periodically to ensure that the Project will not impact newly-listed species that may occur in the Project area.

In December 2020, the USFWS determined that ESA listing for the monarch butterfly (*Danaus plexippus*) was warranted; however, listing was precluded by higher priority listing actions. Currently the monarch butterfly is a candidate species for listing, and the USFWS will review the species status annual until a proposal for listing is developed.

Significant declines in the population of migrating monarch butterflies have led to widespread concern about this species and other native insect pollinator species due to

reductions in native floral resources. To support pollinators and migrating monarchs, TPWD encourages the establishment of native wildflower habitats on private and public lands. Establishing wildflower habitats in land reclamation of landfill sites can contribute to pollinator conservation and can provide habitat for a diverse community of pollinators, providing food, breeding, or nesting opportunities. By acting as refugia for pollinators in otherwise inhospitable landscapes, this habitat can contribute to the maintenance of healthy ecosystems and provide ecological services. Resources regarding pollinators can be found on TPWD's Native Pollinator, Monarch Butterfly, and Pollinator Bioblitz webpages.

Recommendation: To provide pollinator conservation and support migrating monarchs, TPWD encourages Weaver and Texas Regional Landfill Company LP to revegetate landfill areas with vegetation that provides habitat for monarch butterflies and other pollinator species. Species appropriate for the project area can be found by accessing the Lady Bird Johnson Wildflower Center, working with TPWD biologists to develop an appropriate list of species, or utilizing resources found at the Monarch Watch website or the Xerces Society's Guidelines webpage.

State Law: Chapter 64, Birds

PWC section 64.002, regarding protection of nongame birds, provides that no person may catch, kill, injure, pursue, or possess a bird that is not a game bird. PWC section 64.003, regarding destroying nests or eggs, provides that, no person may destroy or take the nests, eggs, or young and any wild game bird, wild bird, or wild fowl.

Recommendation: To minimize potential impacts to avian species, please review the *Migratory Bird Treaty Act* section above for recommendations as they are also applicable for compliance with PWC.

State Law: Aquatic Resources

PWC section 1.011 grants TPWD authority to regulate and conserve aquatic animal life of public waters. Texas Administrative Code (TAC) section 57.157 regulates take of mussels, including mussels that are not state listed. TPWD regulates the introduction and stocking of fish, shellfish, and aquatic plants into public waters of the state under PWC 12.015, 12.019, and 66.015 and TAC 52.101-52.105, 52.202, and 57.251-57.259.

Dewatering activities can impact aquatic resources through stranding fish and mussels. Other harmful construction activities can trample, dredge or fill areas exhibiting stationary aquatic resources such as plants and mussels. Relocating aquatic life to an area of suitable habitat outside the project footprint avoids or reduces impacts to aquatic life. Relocation activities are done under the authority of a TPWD *Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters* with an approved Aquatic Resource Relocation Plans (ARRP). The permit allows for movement (i.e., introduction, stocking, transplant, relocation) of aquatic species in waters of the state. ARRPs are used to plan resource handling activities and assist in the permitting process. If dewatering activities and other project related activities cause mortality to fish and wildlife species, then the responsible party would be subject to investigation

by the TPWD KAST and will be liable for the value of lost resources under the authority of PWC sections 12.0011 (b) (1) and 12.301.

The Project would dewater intermittent streams, ephemeral streams, and on channel perennial ponds in order to accommodate stream relocation and channelization. The Project would impact approximately 921 feet of intermittent stream with a 2.02-acre on-channel beaver pond and 518 feet of ephemeral stream with a 4.25-acre on-channel pond system that appears to be both manmade and manipulated by beaver.

Recommendation: The Project should be coordinated with the TPWD Kills and Spills Team (KAST) for appropriate authorization and to ensure protection of native aquatic wildlife. TPWD recommends that impact avoidance measures for aquatic organisms, including all native fish and freshwater mussel species, regardless of state listing status, be considered during Project planning and construction activities.

Recommendation: When dewatering, excavating, or filling activities are involved with Project activities in streams when water is present, TPWD recommends relocating native aquatic resources, including fish and mussels, in conjunction with a *Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters* and an ARRP. The ARRP should approved by the department 30 days prior to activity within Project waters or resource relocation and submitted with an application for a no-cost permit. ARRPs can be submitted to Travis Tidwell Brown TPWD Region 1 KAST available at Travis.Tidwell@tpwd.texas.gov.

State Law: Aquatic Invasive Species

Per TAC chapter 57, it is an offense for any person to possess, transport, or release into the water of this state any species, hybrid of a species, subspecies, eggs, seeds, or any part of any species defined as a harmful or potentially harmful exotic fish, shellfish, or aquatic plant. This rule applies not only to zebra mussels (*Dreissena polymorpha*) (live or dead) and their larvae but also to any species or fragments thereof designated as harmful or potentially harmful under this subchapter (e.g., giant salvinia, hydrilla, Eurasian watermilfoil). The full list of prohibited species can be found on the TPWD webpage regarding prohibited aquatic species.

Because the proposed Project involves work within a stream, equipment and other vehicles coming in contact with surface waters could transport aquatic invasive species where mud, plant debris, or water accumulate.

Recommendation: TPWD recommends preparing and following an aquatic invasive species (AIS) transfer prevention plan which outlines BMP for preventing inadvertent transfer of aquatic invasive plants and animals on project equipment and materials. To minimize the risk of transporting aquatic invasive species, TPWD recommends reviewing and adhering to the AIS BMP identified in the ARRP guidelines packet and the *TPWD Clean/Drain/Dry Procedures and Zebra Mussel Decontamination Procedures for Contractors Working in Inland Public Waters*.

Species of Greatest Conservation Need

In addition to federal and state listed species, TPWD tracks SGCN and natural plant communities and actively promotes their conservation. TPWD considers it important to evaluate and, if feasible, minimize impacts to SGCN and their habitat to reduce the likelihood of endangerment and preclude the need to list as threatened or endangered in the future.

Although the Project materials presented information regarding state listed species potentially occurring in Johnson County obtained from TPWD online application identifying rare, threatened, and endangered species by county (RTEST), the Project did not consider other SGCN of Johnson County.

RTEST identifies the following SGCN flora and fauna with potential to occur in Johnson County. These species could be impacted due to construction, operation, and maintenance activities if suitable habitat or the species occur at the Project site. General habitat descriptions for these species are included on the RTEST list:

Taxon	Scientific Name	Common Name	GRank[1]	SRank[2]
Amphibians	Anaxyrus woodhousii	Woodhouse's toad	G5	SU
Amphibians	Pseudacris streckeri	Strecker's chorus frog	G5	S3
Birds	Plegadis chihi	white-faced ibis*	G5	S4B
Birds	Haliaeetus leucocephalus	bald eagle	G5	S3B,S3N
Birds	Laterallus jamaicensis	black rail**	G3	S2
Birds	Grus americana	whooping crane**	G1	S1S2N
Birds	Charadrius melodus	piping plover**	G3	S2N
Birds	Charadrius montanus	mountain plover	G3	S2
Birds	Calidris canutus rufa	rufa red knot**	G4T2	S2N
Birds	Leucophaeus pipixcan	Franklin's gull	G5	S2N
Birds	Sternula antillarum athalassos	interior least tern	G4T3Q	S1B
Birds	Athene cunicularia hypugaea	western burrowing owl	G4T4	S2
Birds	Vireo atricapilla	black-capped vireo	G3	S3B
Birds	Setophaga chrysoparia	golden-cheeked warbler**	G2	S2S3B
Birds	Calamospiza melanocorys	lark bunting	G5	S4B
Birds	Calcarius ornatus	chestnut-collared longspur	G5	S3
Fish	Hybognathus nuchalis	Mississippi silvery minnow	G5	S4
Mammals	Myotis velifer	cave myotis bat	G4G5	S2S3
Mammals	Perimyotis subflavus	tricolored bat	G3G4	S2
Mammals	Eptesicus fuscus	big brown bat	G5	S5

Mammals	Lasiurus borealis	eastern red bat	G3G4	S4
Mammals	Lasiurus cinereus	hoary bat	G3G4	S4
Mammals	Sylvilagus aquaticus	swamp rabbit	G5	S5
Mammals	Cynomys ludovicianus	black-tailed prairie dog	G4	S3
Mammals	Ondatra zibethicus	muskrat	G5	S5
Mammals	Mustela frenata	long-tailed weasel	G5	S5
Mammals	Spilogale putorius	eastern spotted skunk	G4	S1S3
Mammals	Conepatus leuconotus	western hog-nosed skunk	G4	S4
Mammals	Puma concolor	mountain lion	G5	S2S3
Reptiles	Terrapene carolina	eastern box turtle	G5	S3
Reptiles	Terrapene ornata	western box turtle	G5	S3
Reptiles	Apalone mutica	smooth softshell	G5	S3
Reptiles	Ophisaurus attenuatus	slender glass lizard	G5	S3
Reptiles	Phrynosoma cornutum	Texas horned lizard*	G4G5	S3
Reptiles	Plestiodon septentrionalis	prairie skink	G5	S5
Reptiles	Nerodia harteri	Brazos water snake*	G1	S1
Reptiles	Thamnophis sirtalis annectens	Texas garter snake	G5T4	S1
Reptiles	Sistrurus tergeminus	western massasauga	G3G4	S3
Insects	Bombus pensylvanicus	American bumblebee	G3G4	SNR
Insects	Neotrichia juani	No accepted common name	G1	S1
Mollusks	Potamilus streckersoni	Brazos heelsplitter*	GNR	SNR
Mollusks	Truncilla macrodon	Texas fawnsfoot*	G1	S2
Plants	Cuscuta exaltata	tree dodder	G3	S3
Plants	Astragalus reflexus	Texas milk vetch	G3	S3
Plants	Dalea hallii	Hall's prairie clover	G3	S2
Plants	Dalea reverchonii	Comanche Peak prairie clover	G2	S2
Plants	Pediomelum reverchonii	Reverchon's scurfpea	G3	S3

[1]GRank is the NatureServe global conservation status rank.
[2]SRank is the NatureServe subnational or state level conservation status rank.
See NatureServe's website for specific global and state ranking definitions.
*State listed threatened or endangered
** Federal and state listed threatened or endangered

The primary native habitats proposed for impact at the Project site include wetlands, ponds, streams, and associated riparian habitats.

Recommendation: TPWD recommends that precautions be taken to avoid impacts to SGCN flora and fauna when planning the Project and if encountered in the Project area during construction or operation activities. TPWD also recommends the implementation of the following BMP to avoid or minimize potential impacts to wildlife resources potentially occurring at the construction site:

1. TPWD recommends informing employees and contractors of the potential for state listed species or SGCN to occur in the Project area. Contractors should be advised to avoid impacts to all wildlife that are encountered.

2. Wildlife, including aquatic wildlife, observed during construction should be allowed to safely leave the site or be translocated by a permitted individual to a nearby area with similar habitat that would not be disturbed during construction. TPWD recommends that any translocations of reptiles be the minimum distance possible no greater than one mile, preferably within 100-200 yards from the initial encounter location. For relocation of aquatic resources, a TPWD permit is required per the Section above regarding *State Law: Aquatic Resources*. For purposes of relocation, surveys, monitoring, and research, terrestrial state listed species may only be handled after obtaining authorization through the TPWD Wildlife Permits Office. TPWD recommends that consultants obtain such authorization and serve as on-site biological monitors if encounters of state listed terrestrial wildlife are likely.

3. Small vertebrates including snakes, lizards, toads, and mice fall into trenches and become trapped. Wildlife unable to escape from trenches are susceptible to loss from backfilling activities, exposure to elements, starvation, dehydration, and predation by other wildlife. Where trenching or other excavation is involved, TPWD recommends minimizing the length of trenches left open at any given time during construction. Trenches left open for more than two daylight hours should be inspected for the presence of trapped wildlife prior to backfilling. If trenches cannot be backfilled the day of initial trenching, then escape ramps, in the form of short lateral trenches or wooden planks sloping to the surface at an angle of less than 45 degrees, should be installed at least every 90 meters.

4. For soil stabilization and revegetation of disturbed areas within the proposed project area, TPWD recommends erosion and seed/mulch stabilization materials that avoid entanglement hazards to snakes and other wildlife species. Because the mesh found in many erosion control blankets or mats pose an entanglement hazard to wildlife, TPWD recommends the use of no-till drilling, hydromulching and/or hydroseeding rather than erosion control blankets or mats due to a reduced risk to wildlife. If erosion control blankets or mats will be used, the product should contain no netting or contain loosely woven, natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Hydromulch containing plastic ingredients and plastic mesh matting should be avoided.

5. To aid in the scientific knowledge of a species' status and current range, TPWD encourages reporting encounters of protected and rare species to the TXNDD according to the data submittal instructions found at the TPWD Texas Natural Diversity Database: Submit Data webpage. An additional method for reporting

observations of species is through the iNaturalist community app where plant and animal observations are uploaded from a smartphone. The observer then selects to add the observation to specific TPWD Texas Nature Tracker Projects appropriate for the taxa observed, including Herps of Texas, Birds of Texas, Texas Eagle Nests, Texas Whooper Watch, Mammals of Texas, Rare Plants of Texas, Bees & Wasps of Texas, Terrestrial Mollusks of Texas, Texas Freshwater Mussels, Fishes of Texas, and All Texas Nature.

TPWD appreciates the opportunity to provide input on the proposed project. Thank you for considering the fish and wildlife resources of Texas. If you have any questions, please contact me at Karen.Hardin@tpwd.texas.gov or (903) 322-5001.

Sincerely,

Karen B. Hardin
Wildlife Habitat Assessment Program
Wildlife Division

kbh/48096 (48397)

COORDINATION WITH
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

- NCTCOG Response Letter Dated May 16, 2022.
- March 3, 2022, NCTCOG Review Request Letter

North Central Texas Council Of Governments

May 16, 2022

Mr. Charles R. Marsh, P.E.
Project Director
Weaver Consultants Group
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109

RE: Major Permit Amendment Application for the Turkey Creek Landfill, Johnson County, Texas
Physical Site Address: 9100 S. Interstate 35W, Alvarado, Texas 76009

Dear Mr. Marsh,

Thank you for your organization's presentation to the Facility Conformance Subcommittee of the Resource Conservation Council (RCC) on May 9, 2022, regarding the Major Permit Amendment Application for the Turkey Creek Landfill in Johnson County.

The North Central Texas Council of Governments (NCTCOG) has been directed by Texas Commission on Environmental Quality to determine the consistency of solid waste permit applications, amendments, and registration applications with the Regional Management Plan, *Planning for Sustainable Materials Management in North Central Texas 2015-2040: North Central Texas Regional Solid Waste Management Plan*.

At its meeting on May 12, 2022, the Resource Conservation Council, the region's solid waste advisory committee, found the major permit amendment application for the Turkey Creek Landfill to be consistent with the goals of the Regional Management Plan. Unless there are significant changes to the application from those outlined in the presentation, this determination should not change.

If you have any questions regarding NCTCOG's conformance review, please contact Elena Berg by phone at (817) 608-2363 or by email at EBerg@nctcog.org.

Sincerely,

Kathy Fonville

Kathy Fonville
Chair, Resource Conservation Council

cc: Mr. Chance Goodin, Texas Commission on Environmental Quality
MC-124, P.O. Box 13087, Austin, Texas 78711-3087

cc: Mr. Gary Bartels, Southern Region Engineer, Texas Regional Landfill Company, LP
3 Waterway Square Place, Suite 550, The Woodlands, Texas 77380

616 Six Flags Drive, Centerpoint Two
P. O. Box 5888, Arlington, Texas 76005-5888
(817) 640-3300 FAX: 817-640-7806 ♻ recycled paper
www.nctcog.org

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT

APPENDIX I/IIC
LOCATION RESTRICTION DEMONSTRATIONS

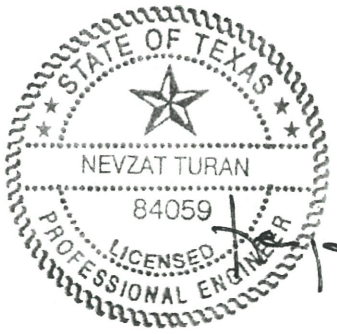
Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022





12/16/2022

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

This document is intended for permitting purposes only.

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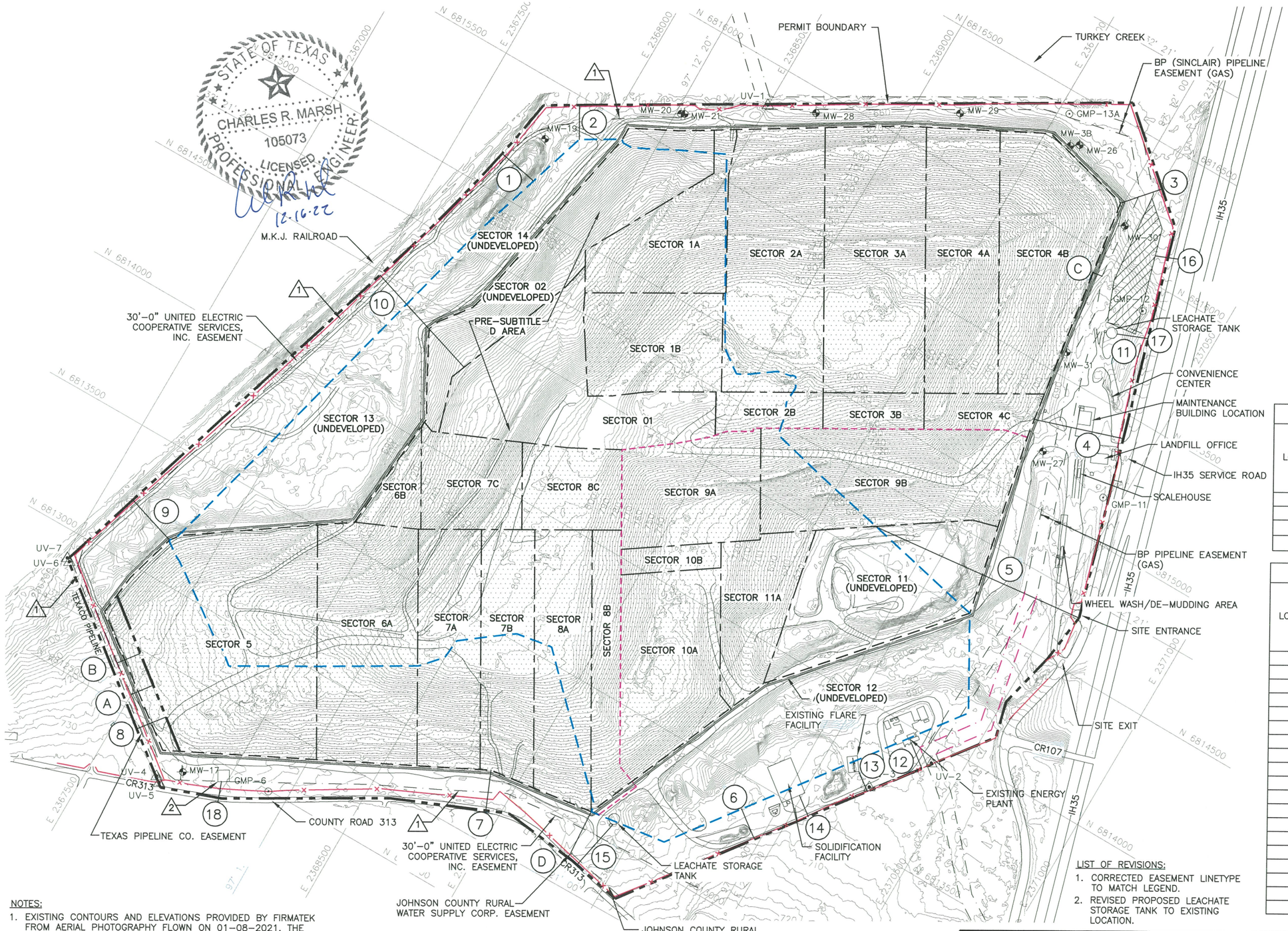

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER
12.16.22

0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- NEWLY PERMITTED AIRSPACE LIMIT OF WASTE
- EXISTING FENCE (SEE NOTE 4)
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- PROPOSED EASEMENT (SEE NOTE 3)
- SECTOR BOUNDARY
- EXISTING SUBTITLE D COMPOSITE LINED AREA
- MW-7 PERMITTED GROUNDWATER MONITORING WELL
- GMP-12 PERMITTED GAS MONITORING PROBE
- 1 INDICATES REVISION (SEE LIST OF REVISIONS)

BUFFER ZONE INFORMATION		
LOCATION	BUFFER ZONE BETWEEN EASEMENT BOUNDARY AND EXISTING/PERMITTED LIMIT OF WASTE	BUFFER ZONE BETWEEN EASEMENT BOUNDARY AND NEWLY PERMITTED AIRSPACE
A	30 FEET	94 FEET
B	32 FEET	99 FEET
C	40 FEET	40 FEET
D	178 FEET	178 FEET

BUFFER ZONE INFORMATION		
LOCATION	BUFFER ZONE BETWEEN PERMIT BOUNDARY AND EXISTING/PERMITTED LIMIT OF WASTE	BUFFER ZONE BETWEEN PERMIT BOUNDARY AND NEWLY PERMITTED AIRSPACE
1	320 FEET	166 FEET
2	90 FEET	137 FEET
3	174 FEET	174 FEET
4	361 FEET	361 FEET
5	419 FEET	879 FEET
6	488 FEET	130 FEET
7	161 FEET	161 FEET
8	62 FEET	125 FEET
9	216 FEET	216 FEET
10	289 FEET	495 FEET
PROCESSING/DISPOSAL UNIT BUFFER ZONE INFORMATION		
11	EXISTING LEACHATE STORAGE TANK	123 FEET
12	EXISTING LFGTE FACILITY	110 FEET
13	EXISTING LFG FLARE	85 FEET
14	EXISTING SOLIDIFICATION FACILITY	91 FEET
15	EXISTING LEACHATE STORAGE TANK	214 FEET
16	PROPOSED LFGTE FACILITY	50 FEET
17	PROPOSED LEACHATE STORAGE TANK	125 FEET
18	LEACHATE STORAGE TANK	65 FEET

LIST OF REVISIONS:

1. CORRECTED EASEMENT LINETYPE TO MATCH LEGEND.
2. REVISED PROPOSED LEACHATE STORAGE TANK TO EXISTING LOCATION.

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. AS SHOWN IN APPENDIX I/IIC, THE BUFFER ZONES VARY AROUND THE PERIMETER OF THE SITE, BUT IN NO CASE ARE THEY LESS THAN 50-FEET FOR EXISTING WASTE. THE BUFFER ZONE BETWEEN THE PERMIT BOUNDARY AND THE NEWLY PERMITTED AIRSPACE (PERMIT NO. 1417C) IS AT LEAST 125-FEET.
3. THE PROPOSED EASEMENT SHOWN IS FOR VISUAL PURPOSES ONLY. THE ACTUAL LOCATION WILL BE DETERMINED AT A LATER DATE IN COORDINATION WITH THE EASEMENT HOLDER.
4. EXISTING FENCE IS SHOWN WHERE IT DOES NOT OVERLAP WITH PERMIT BOUNDARY. EXISTING FENCELINE LOCATED WITHIN HEAVILY VEGETATED AREAS WAS APPROXIMATED.

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SHEET I/IIC-4

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: C-1 BUFFER ZONE.DWG
DRAWN BY: JDW
DESIGN BY: JBP
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
BUFFER ZONE PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

WWW.WCGRP.COM

DRAWING I/IIC-1

O:\0771\368\EXPANSION 2021\PARTS I-II\I-IIC\C-1 BUFFER ZONE.dwg, rarrington, 1:2

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

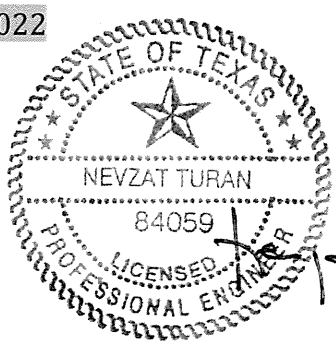
PART III – SITE DEVELOPMENT PLAN
SITE DEVELOPMENT PLAN NARRATIVE

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

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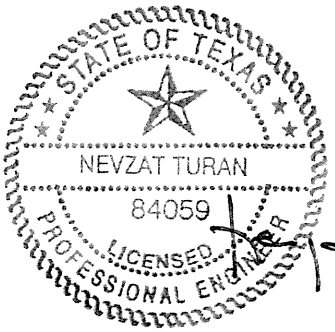

12/16/2022

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Postclosure Care Plan

APPENDIX IIIL
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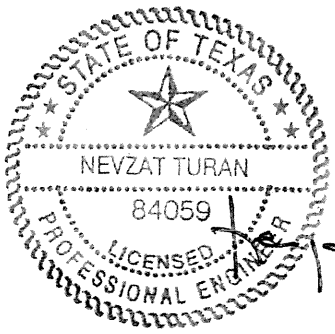

12/16/2022

CONTENTS (Continued)

APPENDIX IIIM
Geotechnical Report

APPENDIX IIIN
Site Life Calculations



12/16/2022

LEGEND

- LANDFILL PERMIT BOUNDARY
- PROPOSED LIMITS OF WASTE
- PERMITTED LIMITS OF WASTE
- 700 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- EASEMENT
- PROPOSED RELOCATED EASEMENT
- MW-16 EXISTING GROUNDWATER MONITORING WELL
- GMP-3 EXISTING LFG MONITORING PROBE
- **MW-16** PROPOSED GROUNDWATER MONITORING WELL
- **GMP-3** PROPOSED LFG MONITORING PROBE
- ⚠1 INDICATES REVISION (SEE LIST OF REVISIONS)

0 200 400
SCALE IN FEET

GMP-2A
MW-37
MW-19
MW-20
MW-21
MW-28
MW-29
GMP-13A
BP PIPELINE EASEMENT (GAS)
MW-3B
MW-26
MW-30
IH35
SITE BOUNDARY/PROPERTY LINE
MW-36
GMP-1A
MW-35
GMP-3A
M.K.J. RAILROAD
GMP-12
LEACHATE STORAGE TANK
MW-31
CONVENIENCE CENTER
MAINTENANCE BUILDING LOCATION
LANDFILL OFFICE
SCALEHOUSE
MW-27
GMP-11
BP PIPELINE EASEMENT (GAS)
BP PIPELINE EASEMENT (GAS)
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GMP-4A
WASTE DISPOSAL AREA
(REFER TO PARTS I/II, APPENDIX I/IIA FOR THE SEQUENCE OF DEVELOPMENT FOR THE WASTE DISPOSAL AREA)
GMP-14
GMP-5B
SITE ENTRANCE
GMP-10B
MW-38
SITE EXIT
CR107
GMP-15
MW-17
MW-44
GMP-6
MW-43
GMP-16
MW-42
GMP-7B
POWERLINES
CR313
LEACHATE STORAGE TANK
MW-39
GMP-17
GMP-9B
MW-40
MW-41
GMP-8A

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021.
2. APPENDIX IIIA INCLUDES INFORMATION ON THE LANDFILL UNIT DESIGN.
3. LANDFILL DISPOSAL OPERATIONS WILL OCCUR IN OPEN AREAS WITHIN THE PERMITTED WASTE DISPOSAL FOOTPRINT; THEREFORE, ADEQUATE VENTILATION WILL BE PROVIDED.
4. THE PROPOSED EASEMENT SHOWN IS FOR ILLUSTRATION PURPOSES ONLY. THE ACTUAL LOCATION WILL BE DETERMINED AT A LATER DATE IN COORDINATION WITH THE EASEMENT HOLDER.

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER
12/16/2022

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK LOCATION.

[ ] DRAFT
[X] FOR PERMITTING PURPOSES ONLY
[ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: III-2 SITE PLAN.DWG

DRAWN BY: JDW
DESIGN BY: DEP
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT SITE PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE III-2

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O:\0771\368\EXPANSION 2021\PART III\III-2-SITE PLAN.dwg, rartington, 1:2

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

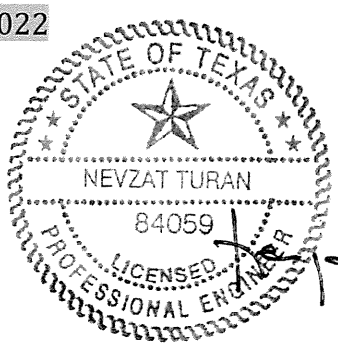
PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIA
LANDFILL UNIT DESIGN INFORMATION

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

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Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

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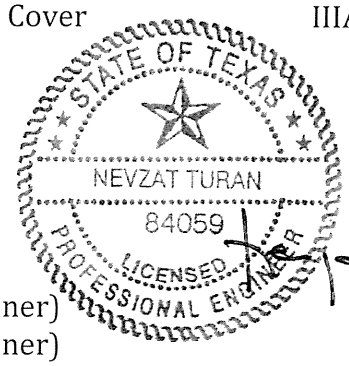

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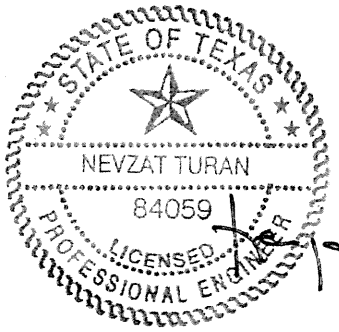

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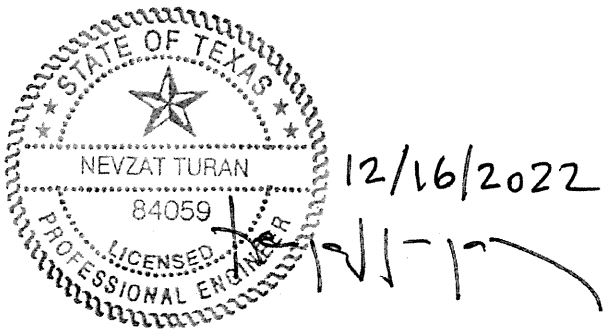

The landfill completion plan is shown on Drawing A.3. Details of the final cover system are presented on Drawings A.15 through A.17. Material specifications along with construction and testing procedures for the final cover system are provided in Appendix IIIE – Final Cover System Quality Control Plan (FCSQCP).

The drainage system is detailed in Appendix IIIF – Surface Water Drainage Plan. Drainage from the landfill is directed through a system of swales, chutes, and perimeter channels to the stormwater detention ponds. The detention ponds and pond outlet structures are detailed in Appendix IIIF – Surface Water Drainage Plan.

Permanent final cover erosion control structures include swales and chutes that will be constructed upon installation of the final cover. The design of the final cover system erosion control structures is provided in Appendix IIIF-B. As part of the final cover construction, an erosion layer capable of sustaining native vegetation will be constructed. Areas that receive final cover will be seeded upon completion of final cover placement. A soil loss and sheet flow velocity demonstration for the erosion layer is included in Appendix IIIF-D. The erosion layer will include a vegetation layer that provides for an ~~90~~ 95 percent ground coverage. If there are areas that do not maintain at least ~~90~~ 95 percent coverage they will be re-seeded until at least ~~90~~ 95 percent coverage is maintained.

The stormwater controls for the landfill have been designed consistent with the TCEQ regulations for Type I MSW landfills. The stormwater runon/runoff controls have been designed for a 25-year frequency storm event. These include drainage controls for the final cover, perimeter drainage channels, culverts, and detention ponds, including pond outfalls. Details for the perimeter drainage system and associated calculations are included in Appendix IIIF – Surface Water Drainage Plan.

5.2 Final Cover Stability Analysis

A stability analysis for the existing and proposed final cover systems is provided in Appendix IIIM – Geotechnical Report and is summarized below.

- **Final Cover Stability.** The stability of the proposed final cover slopes was evaluated at the most critical sections. The final cover slopes were analyzed using drained and undrained strength parameters (effective and total stress, respectively). The minimum factors of safety generated were all greater than the minimum recommended factor of safety of 1.3 (total stress analysis) and 1.5 (effective stress analysis).
- **Final Cover System Stability.** The interfaces of the components of each final cover system were evaluated using infinite slope stability analysis. The minimum factor of safety calculated for the final cover system is greater than the acceptable factor of safety of 1.5 for long-term stability.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIA-A
LINER, OVERLINER, AND FINAL COVER SYSTEM DETAILS

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

Weaver Consultants Group, LLC
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6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

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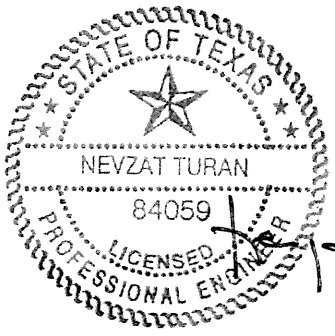

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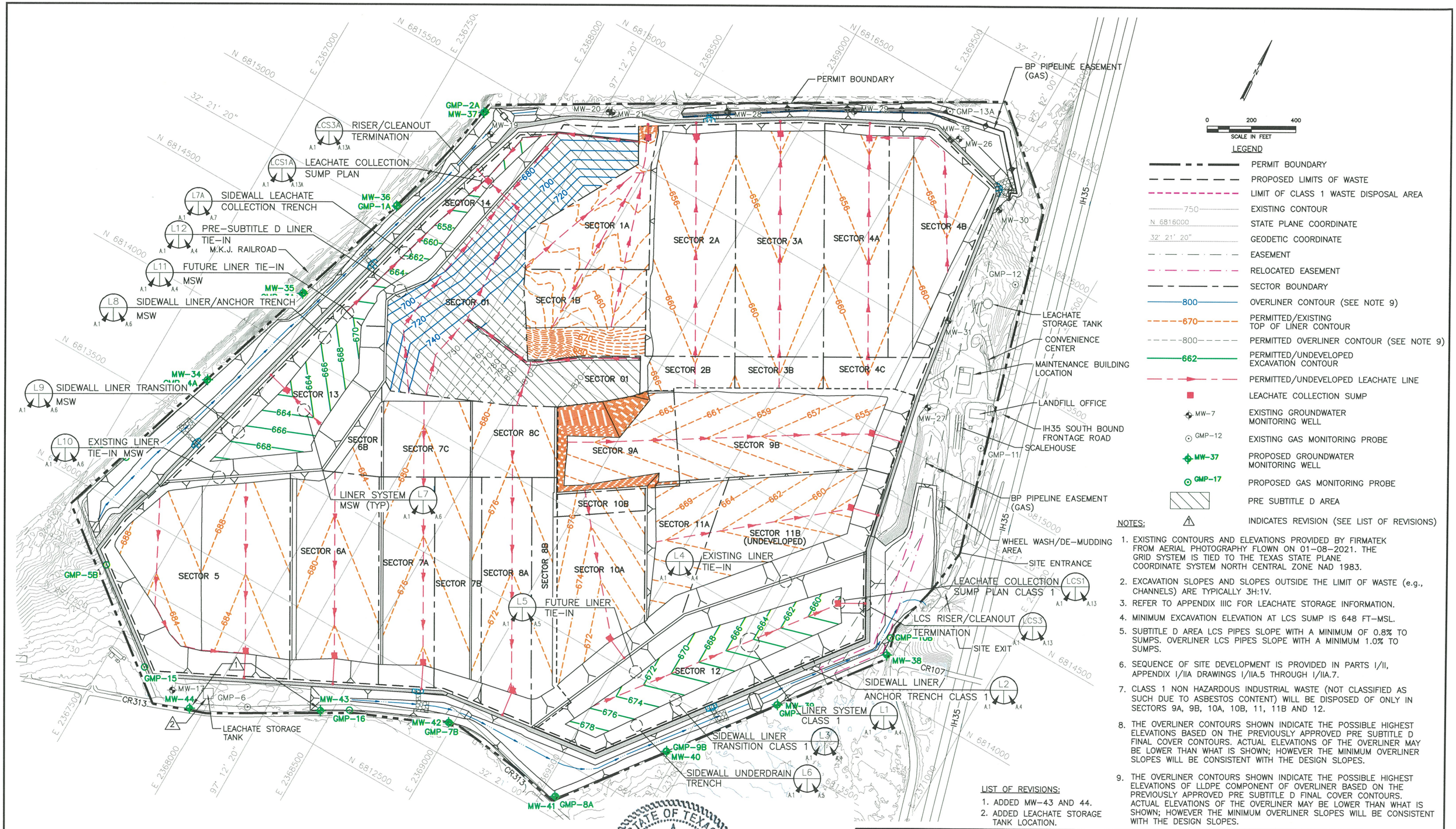

LEGEND

- PERMIT BOUNDARY
- PROPOSED LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- SECTOR BOUNDARY
- 800 — OVERLINER CONTOUR (SEE NOTE 9)
- 670 — PERMITTED/EXISTING TOP OF LINER CONTOUR
- 800 — PERMITTED OVERLINER CONTOUR (SEE NOTE 9)
- 662 — PERMITTED/UNDEVELOPED EXCAVATION CONTOUR
- PERMITTED/UNDEVELOPED LEACHATE LINE
- LEACHATE COLLECTION SUMP
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING GAS MONITORING PROBE
- MW-37 — PROPOSED GROUNDWATER MONITORING WELL
- GMP-17 — PROPOSED GAS MONITORING PROBE
- PRE SUBTITLE D AREA
- ⚠ — INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. EXCAVATION SLOPES AND SLOPES OUTSIDE THE LIMIT OF WASTE (e.g., CHANNELS) ARE TYPICALLY 3H:1V.
3. REFER TO APPENDIX IIIC FOR LEACHATE STORAGE INFORMATION.
4. MINIMUM EXCAVATION ELEVATION AT LCS SUMP IS 648 FT-MSL.
5. SUBTITLE D AREA LCS PIPES SLOPE WITH A MINIMUM OF 0.8% TO SUMPS. OVERLINER LCS PIPES SLOPE WITH A MINIMUM 1.0% TO SUMPS.
6. SEQUENCE OF SITE DEVELOPMENT IS PROVIDED IN PARTS I/II, APPENDIX I/IIA DRAWINGS I/IIA.5 THROUGH I/IIA.7.
7. CLASS 1 NON HAZARDOUS INDUSTRIAL WASTE (NOT CLASSIFIED AS SUCH DUE TO ASBESTOS CONTENT) WILL BE DISPOSED OF ONLY IN SECTORS 9A, 9B, 10A, 10B, 11, 11B AND 12.
8. THE OVERLINER CONTOURS SHOWN INDICATE THE POSSIBLE HIGHEST ELEVATIONS BASED ON THE PREVIOUSLY APPROVED PRE SUBTITLE D FINAL COVER CONTOURS. ACTUAL ELEVATIONS OF THE OVERLINER MAY BE LOWER THAN WHAT IS SHOWN; HOWEVER THE MINIMUM OVERLINER SLOPES WILL BE CONSISTENT WITH THE DESIGN SLOPES.
9. THE OVERLINER CONTOURS SHOWN INDICATE THE POSSIBLE HIGHEST ELEVATIONS OF LLDPE COMPONENT OF OVERLINER BASED ON THE PREVIOUSLY APPROVED PRE SUBTITLE D FINAL COVER CONTOURS. ACTUAL ELEVATIONS OF THE OVERLINER MAY BE LOWER THAN WHAT IS SHOWN; HOWEVER THE MINIMUM OVERLINER SLOPES WILL BE CONSISTENT WITH THE DESIGN SLOPES.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK LOCATION.

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED PROFESSIONAL ENGINEER
12/16/2022

- [ ] DRAFT
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FILE: 0771-368-11
CAD: A.1-EXCAVATION PLAN.DWG
DRAWN BY: JDW
DESIGN BY: DEP
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISONS

MAJOR PERMIT AMENDMENT EXCAVATION PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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DRAWING A.1

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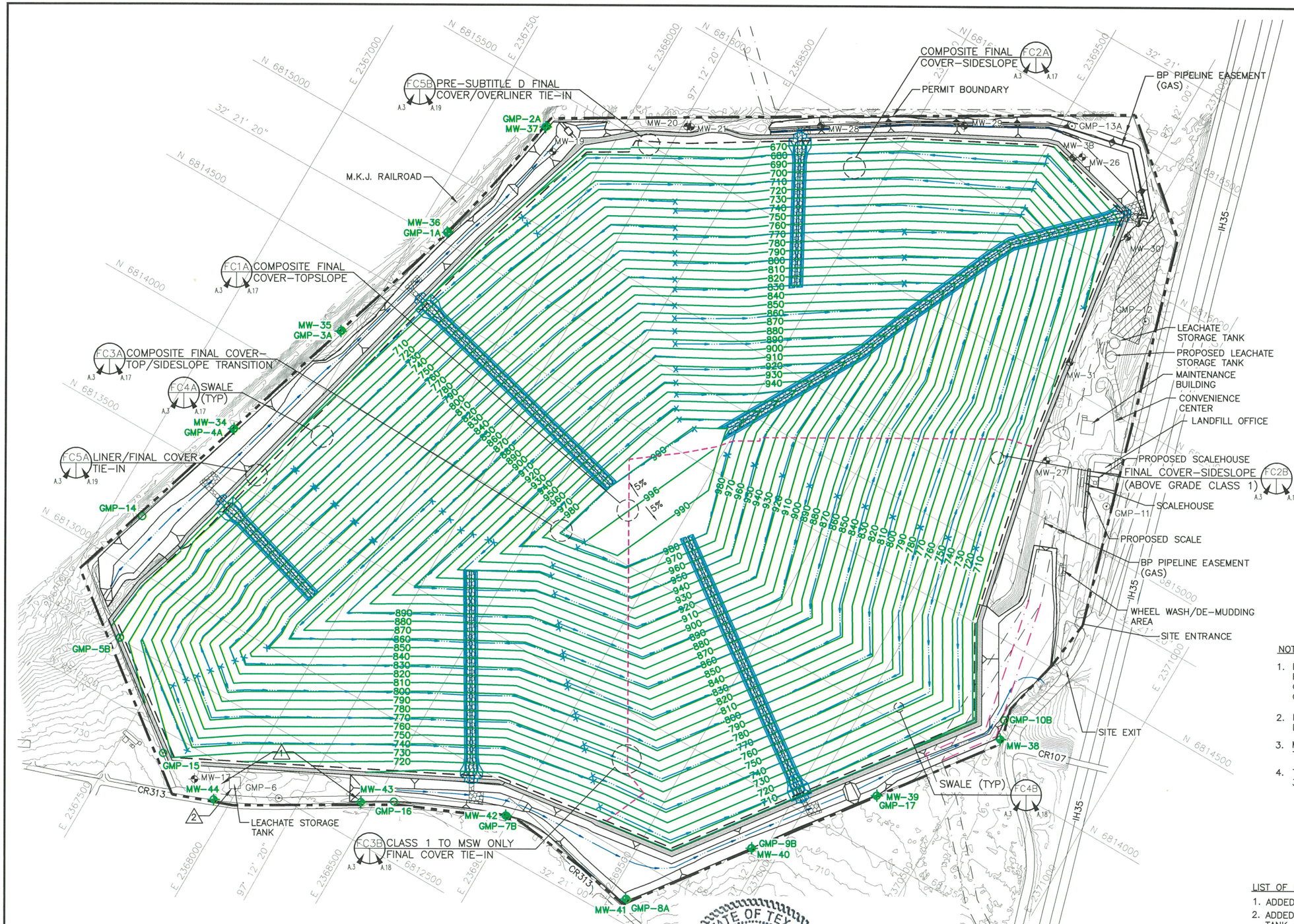

LEGEND

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- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- PROPOSED RELOCATED EASEMENT
- 800 — FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING GAS MONITORING PROBE
- MW-7 — PROPOSED GROUNDWATER MONITORING WELL
- GMP-17 — PROPOSED GAS MONITORING PROBE
- FUTURE LFGTE FACILITY LOCATION
- 1 — INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR DRAINAGE DESIGN INFORMATION.
3. MAXIMUM FINAL COVER ELEVATION IS 946.0 FT-MSL. MAXIMUM TOP OF WASTE ELEVATION IS 942.5 FT-MSL.
4. TYPICAL SIDESLOPES ARE 4H:1V IN THE CLASS 1 AREA AND 3.5H:1V IN THE MSW AREA, TYPICAL TOPSLOPE IS 5%.

LIST OF REVISIONS:

1. ADDED MW-43 AND 44.
2. ADDED LEACHATE STORAGE TANK LOCATION.

STATE OF TEXAS
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84059
LICENSED PROFESSIONAL ENGINEER
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DESIGN BY: DEP
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISONS

MAJOR PERMIT AMENDMENT LANDFILL COMPLETION PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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DRAWING A.3

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TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

VOLUME 2 OF 6

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

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JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 2 OF 6

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12/16/2022

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIB
OVERLINER COMPLIANCE DEMONSTRATION

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IIIB-A-2 Typical Profile – Waste Containment System

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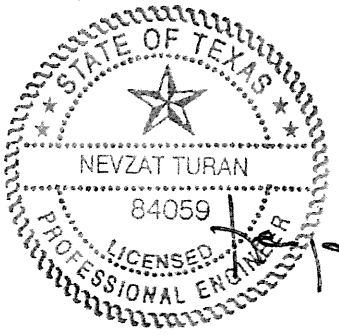
HELP Model Analysis

APPENDIX IIIB-C

MULTIMED Model Analysis



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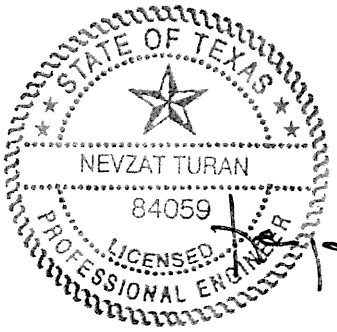

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with 6 oz/sy non-woven geotextile heat-bonded to both sides. A 24-inch-thick protective cover layer will be placed above the leachate collection layer.

Details for the overliner system are provided in Appendix IIIA-A – Liner, Overliner, and Final Cover System Details. Design of the overliner leachate collection is presented in Appendix IIIC – Leachate and Contaminated Water Management Plan. Stability of the overliner system is analyzed in Appendix IIIM-A. Overliner settlement analysis is provided in Appendix IIIM-B.

1.3 Overliner Demonstration Overview

The purpose of the overliner compliance demonstration is to show that the proposed containment system design for the overliner area, which is designed for MSW only, will meet the overliner compliance demonstration requirements set forth in §330.331(a)(1).

The overliner demonstration will show that once the overliner is installed, leachate infiltration into the waste below the overliner will be nearly eliminated. Once the Subtitle D final cover is in place, leachate generation rates will decrease in the entire pre-Subtitle D area. Figure IIIB-A-1 shows the location and extent of the overliner area. Figure IIIB-A-2 shows general section configuration of the pre-Subtitle D area and the overliner.

Section 2 provides a discussion of the site's hydrogeological conditions. As discussed in Section 2 hydrogeology of the provides sound subsurface conditions with highest hydraulic conductivity values in 10^{-4} cm/s levels with no water producing aquifer zone associated with the POC model demonstration. The overliner compliance demonstration method is discussed in Section 3. The HELP model and MULTIMED model input parameters are discussed in Section 4, and the results of the compliance demonstration are provided in Section 5.

In conclusion, the proposed overliner system meets all requirements listed in §330.331(c) by providing significant improvements to both the developments and natural (e.g., subsurface) conditions at the site as isolating the pre-Subtitle D waste from precipitation will practically eliminate water movement into subsurface in the area. Waste Connections is a leading landfill developer in the country that maintains continuous partnership with qualified engineering and construction companies for their development projects.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

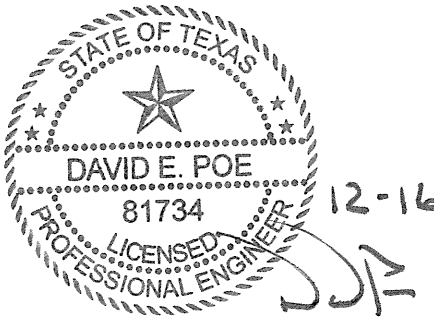
PART III – SITE DEVELOPMENT PLAN
APPENDIX IIID
LINER QUALITY CONTROL PLAN

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



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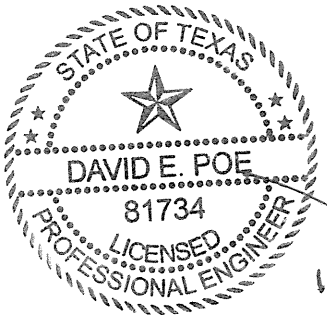

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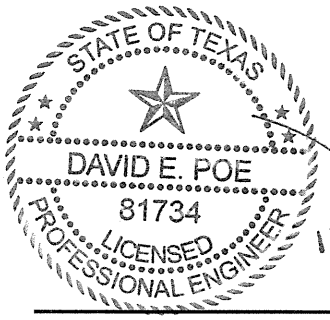

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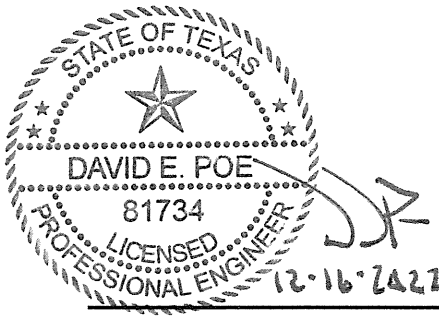

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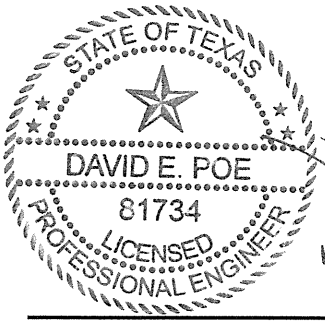

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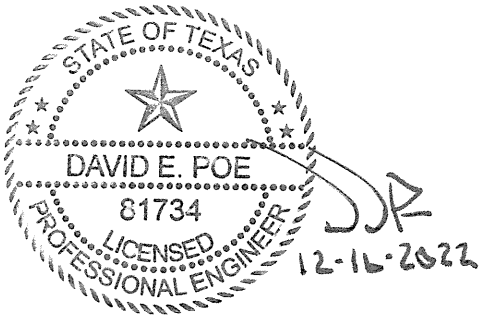

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with gravel and geotextile will be placed into this underdrain trench. Also, a geocomposite drainage layer will be placed on the sideslope above the seasonal high water table elevation to maintain drawdown of the groundwater within the Upper Sand unit. The geocomposite will be anchored into the sideslope at a minimum of two feet and will extend one foot into the underdrain trench. Temporary sumps may be constructed to maintain positive drainage within the underdrain trench. The temporary sumps will consist of drainage stone enveloped in geotextile with an 18-inch-diameter HDPE riser pipe for groundwater removal.

Liner areas that extend below the highest measured potentiometric surface will be designed and constructed to provide protection against long-term uplift from hydrostatic forces by the use of ballast in accordance with Title 30 TAC §330.203. Ballast, if required, will be designed, installed, and verified as described in Section 8.3. Example ballast calculations are provided in Appendix IIID-B.

2.3.10 Liner Tie-In Construction

Newly constructed liners will be tied-in with any adjoining existing liners. Additionally, terminations will be constructed for future tie-ins along edges where the liner will be extended in the future. The tie-ins with existing clay liners will be constructed utilizing a sloped transition a minimum of 10-foot-wide for the 2-foot-thick clay liner and 15 feet wide for the 3-foot-thick clay liner. Terminations for future tie-ins will be constructed by extending the clay liner approximately 10 feet past the limits for the cell under construction. The liner tie-in details are shown in Appendix IIIA – Landfill Unit Design Information. Waste and intermediate cover will not be deposited closer than 10 feet to the edge of any cell or 20 feet from the leading edge of a constructed clay liner (whichever is greater) where a future tie-in will be constructed. Red-colored markers (i.e., SLER markers) will be placed along the limits of the cells with constructed clay liners and tied to the site grid system in accordance with Title 30 TAC §330.143(b)(1).

2.4 Construction Testing

2.4.1 Standard Operating Procedures

As set forth in Title 30 TAC §330.339(c)(6), permeability tests demonstrating the suitability of soils to be used in constructing clay liners shall be performed in the laboratory using the procedures and guidance of Title 30 TAC §330.339(4)(A). Field quality control will be provided by field tests evaluated based on comparison with laboratory results (i.e., moisture-density compaction curves, Atterberg limits, and gradation) as well as permeability testing of undisturbed field samples of compacted liner soils.

CQA monitors with qualified professional experience in geotechnical engineering and/or engineering geology will perform field and laboratory tests in accordance with applicable standards specified in this LQCP. All quality control testing and evaluation of soil liners will be performed during construction of the liner and must be complete before placement of the leachate collection system, except for the testing required for the final constructed lift, verification of liner thickness, or cover material thickness. Standard operating and test procedures will be utilized per the POR's direction. Sampling from the constructed soil liner lifts will be performed in accordance with ASTM D 1587. The sampling holes (e.g., samples for coefficient of

placement, to document the liner did not undergo uplift prior to placement of waste (whether waste ballast is required or not).

- If waste is used for ballast, verification from the Site Manager that the weight of the compaction equipment being used to compact the waste ballast is no less than 40,000 pounds, and that this compaction equipment was utilized during the entire period of placing waste ballast.
- If waste is used for ballast, documentation of the observations that the initial 5 feet of waste used for ballast on the liner system is free of brush and large bulky items, which may not be compacted to the required density.
- A waste-as-ballast placement record (Appendix IIID-A) completed and signed by the Site Manager.
- Survey of the top of waste to document that the required waste ballast thickness has been placed.
- Water-level measurements taken in the site monitor well/piezometer system adjacent to the liner construction area to verify that the groundwater level has not exceeded the design high water level.
- Final ballast thickness calculation using procedures included in Appendix IIID-B and the as-built minimum densities and thicknesses for each component as well as updated groundwater levels.
- A BER will be prepared and signed and sealed by a professional engineer licensed to practice in Texas. The BER will also be signed by an authorized site representative.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIE
FINAL COVER SYSTEM QUALITY CONTROL PLAN
STANDARD SUBTITLE D FINAL COVER

Prepared for

Texas Regional Landfill Company, LP

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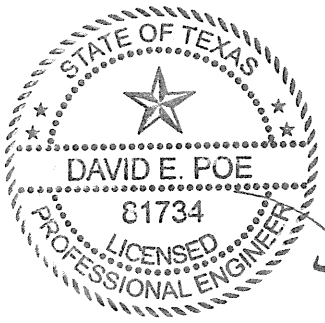

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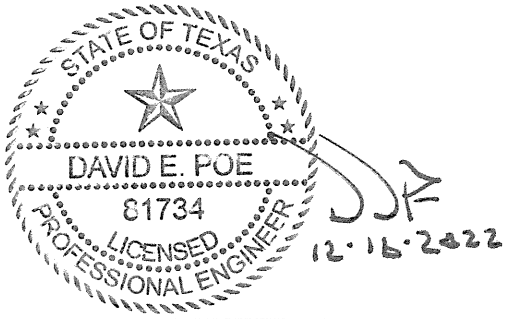

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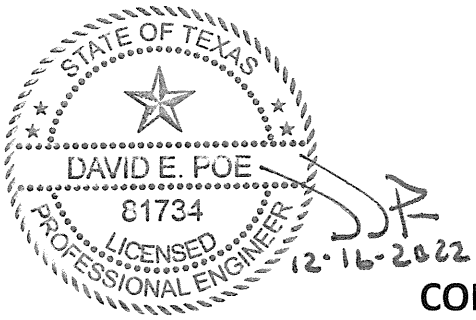

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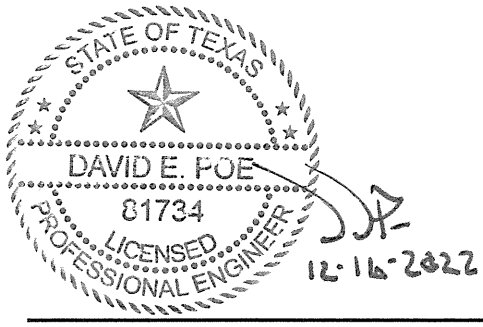

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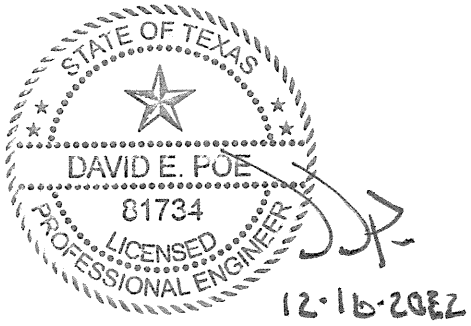
FINAL COVER DRAINAGE LAYER DESIGN

Includes pages IIIE-A-1 through IIIE-A-32



INTRODUCTION

The Hydrologic Evaluation of Landfill Performance (HELP) Model, Version 3.07 was used to estimate the head on final cover geomembrane. This HELP analysis was used to demonstrate that the proposed pipe spacing and single-sided drainage geocomposite are adequate to keep potential uplift forces from adversely impacting the erosion layer.

The closed landfill conditions were modeled for a 30-year period. The evaporative zone depth was selected to be 12 inches and the leaf area index was selected to be 4.5. These parameters are consistent with the parameters shown in Appendix IIIC-A. The curve number for the closed topslope condition is 81.4 and the percent runoff area is 100, which corresponds to "good" ground cover. This is representative of the final cover, which will have a minimum ~~90~~ 95 percent vegetation coverage.

The final cover over the Subtitle D areas consist of a 12-inch erosion layer with the top 6 inches capable of sustaining growth of vegetation, a geocomposite drainage layer, a 40-mil LLDPE geomembrane liner, and an 18-inch infiltration layer. The geomembrane liner was modeled for good installation quality. The infiltration layer consists of compacted soil with a hydraulic conductivity of $1x10^{-5}$ cm/s. Default values for the moisture content, porosity, field capacity, and wilting point for each layer were selected.

The scenario analyzed in the HELP model used a model area of 1.08 acres, which represents the largest estimated topdeck area that would contribute to a particular drainage collection pipe. The maximum pipe spacing for this area is 115 feet.

Refer to page IIIE-A-19 for a summary of the HELP analysis. The HELP model output for the closed 5 percent top slope is included on pages IIIE-A-20 through IIIE-A-26.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIE-B
WATER BALANCE FINAL COVER SYSTEM
QUALITY CONTROL PLAN

Prepared for

Texas Regional Landfill Company, LP

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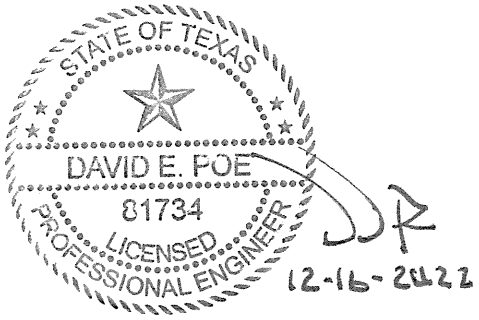

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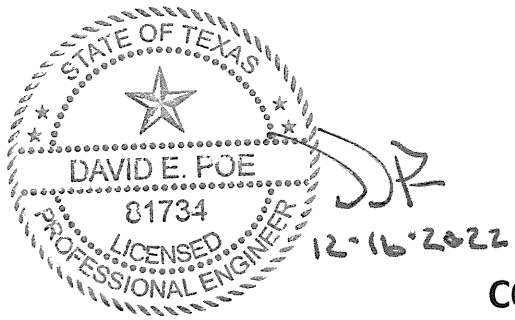

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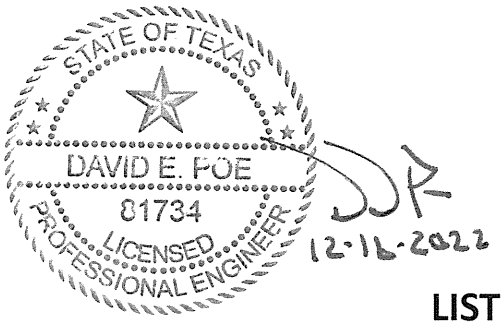

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TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
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MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIE-B-1
PERFORMANCE VERIFICATION PLAN FOR
OPTION 2 WATER BALANCE COVER

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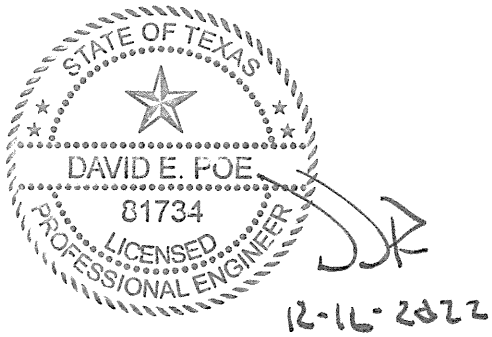

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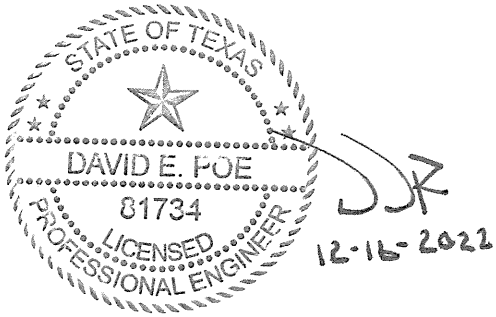

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TURKEY CREEK LANDFILL
JOHNSON, TEXAS
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MAJOR PERMIT AMENDMENT APPLICATION
APPENDIX IIIE-B-1-B

WATER BALANCE FINAL COVER
VEGETATION ESTABLISHMENT VERIFICATION PLAN
FOR OPTION 2 WATER BALANCE FINAL COVER

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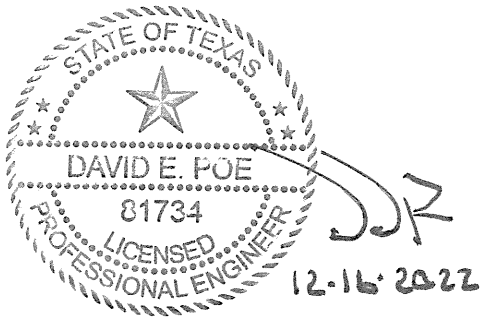

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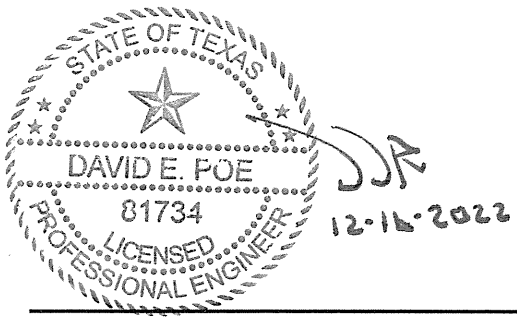

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1.3 Maintenance Activities to be Completed During the Vegetation Establishment Period

The following maintenance activities will be performed to ensure that the vegetation planted during the construction of the final cover system is maintained so that it will meet the vegetation performance specification established for this project.

- The site will irrigate and fertilize the WB Final Cover area to promote vegetation growth.
- Vegetation will be maintained and mowed as appropriate, depending on the season. No mowing will be allowed until grasses establish mature seed.
- Bare areas will be over seeded to facilitate vegetation growth.
- Areas of significant differential settlement will be regraded and re-seeded.
- Areas that experience erosion will be promptly repaired.
- If it is determined that landfill gas is detrimental to any specific area of the established vegetation, the LFG extraction system will be expanded to include additional extraction wells in those areas.
- Vehicles with more than 16 psi ground pressure will not be allowed over the constructed final cover areas during the Vegetation Establishment Period, unless access by a vehicle that does not meet this requirement is required due to a critical maintenance activity or emergency. If a vehicle that does not meet this requirement is used over the cover system, the area disturbed will be evaluated and repaired, if necessary.

1.4 Vegetation Performance Specification

For the vegetation to be considered "established" a professional engineer will complete an evaluation of the vegetation topsoil layer at the end of the vegetation establishment period (typically 2 to 3 years). The performance specification for the vegetation layer is discussed in Section 3 of Appendix IIIJ, Appendix IIIJ-B, and is summarized below.

- Percent Vegetation Cover – 90 percent. This will be based upon the demonstration that a satisfactory stand of turf, defined as 90 percent ground cover and no bare areas larger than one square foot of the established species, exists in the WB final cover area. Final cover will be designed to achieve 95 percent vegetative coverage for erosion prevention.
- Root Penetration – minimum depth of 40 inches. As discussed in Section 3 of Appendix IIIJ, Appendix IIIJ-B, the minimum root depth required is 40 inches based on the UNSAT-H demonstration.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

VOLUME 3 OF 6

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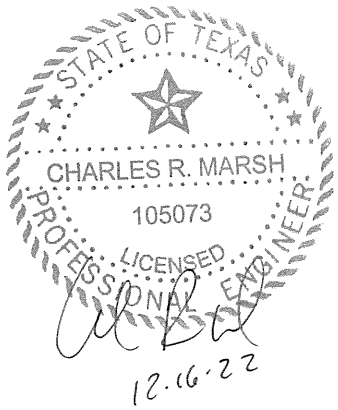
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 3 OF 6

CONTENTS

PART III - SITE DEVELOPMENT PLAN
Appendix IIIF – Surface Water Drainage Report



TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIF
SURFACE WATER DRAINAGE PLAN



Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

This document is intended for permitting purposes only.

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for industrial activity as stipulated under Section 402 of the Clean Water Act and under Chapter 26 of the Texas Water Code, the TPDES program. A copy of the multi-sector permit is included in Parts I/II, Appendix I/IIE. Any stormwater that has become contaminated by contact with the working face or with leachate will be handled in accordance with Appendix IIIC – Leachate and Contaminated Water Management Plan. The facility maintains a current Stormwater Pollution Prevention Plan prepared consistent with TPDES permit requirements.

2.2 Erosion and Sedimentation Control Plan

The Turkey Creek Landfill will use various interim and permanent erosion and sedimentation controls throughout the life of the site. The interim controls will be used around active areas and external embankment sideslopes and top dome surfaces. These controls will include temporary letdown structures, soil berms, and vegetation of intermediate cover areas to minimize the erosion potential from these areas. These interim controls will be used during all phases of landfill development to provide effective erosion stability for the external sideslopes and top dome surfaces. Refer to Appendix IIIF-F – Erosion Control Plan for All Phases of Landfill Operation for more information.

Permanent controls include swales and chutes that will be constructed upon completion of the final cover. As part of the final cover construction, an erosion layer capable of sustaining vegetation will be constructed. Areas that receive final cover will be vegetated in accordance with Appendix IIIJ – Closure Plan upon completion of final cover placement. Final cover vegetation will protect the erosion layer soil against erosive runoff velocities. A soil loss and sheet flow velocity demonstration for the erosion layer is included in Appendix IIIF-D. The erosion layer will include a vegetation layer that provides for a ~~90~~ 95 percent ground coverage, to keep soil loss below the required design values. If there are areas that do not maintain at least 90 percent vegetative coverage, vegetation in these areas will be reestablished to maintain at least 90 percent vegetative cover.

Erosion will be controlled by vegetation in drainage structures with flow velocities less than or equal to 5 feet per second (fps). For drainage structures with flow velocities greater than 5 fps, rock riprap, gabions, or other surface reinforcing materials as designed will be used for surface reinforcement as depicted on the plans.

During site development, measures such as best management practices (BMPs) and sedimentation ponds will be employed to control erosion and sedimentation. BMPs may include the use of temporary rock riprap, silt fences, straw bales, check dams, interceptor swales and berms, temporary and permanent seeding and sodding, surface roughening, matting and mulching, sediment traps, and surface wetting for dust control (refer to Appendix IIIF-F for more information).

3 DRAINAGE SYSTEM DESIGN

3.1 Methodology

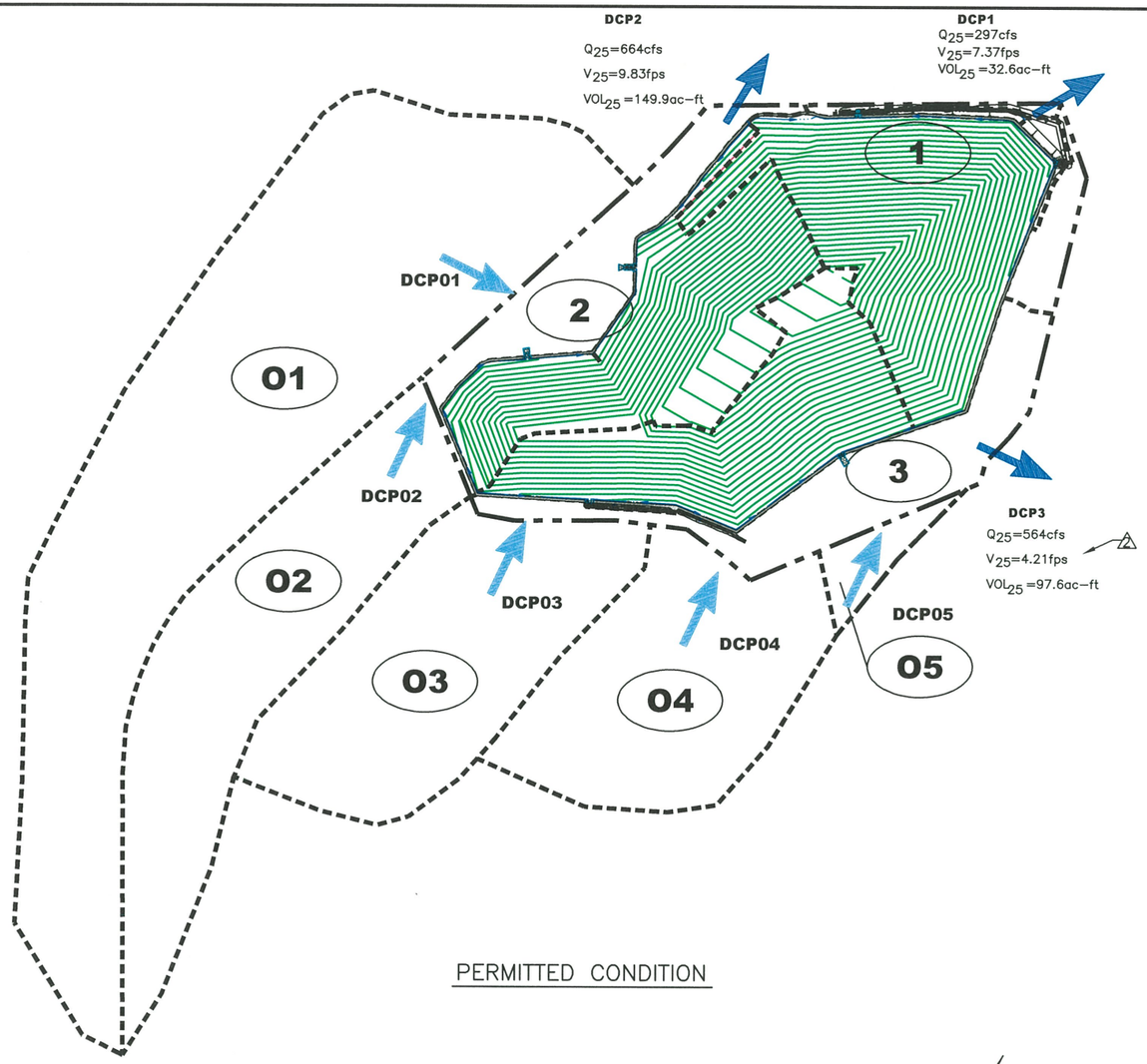
Drainage calculations for the final cover system erosion control structures and perimeter drainage system are based on the peak flow rates resulting from the 25-year frequency rainfall event for the area. The United States Army Corps of Engineers (USACE) HEC-1 computer program was used to compute peak flow rates produced from the design storm for the completion conditions. The hydraulic methods employed in this study are consistent with those presented in the TCEQ *Guidelines for Preparing a Surface Water Drainage Report for Municipal Solid Waste Facility* (RG-417, May 2018) and the TxDOT Bridge Division Hydraulic Design Manual, September 2019. The HEC-1 computer program is used to model the entire landfill (i.e., all drainage areas) even drainage areas less than 200 acres. This method produces a more conservative flow rate for design purposes. Rational method is only used to analyze swale flow rates as the drainage area for swales are less than 200-acres. For comparison purposes the letdowns have been modeled using HEC-1 and rational method. This information can be found on page IIIF-C-9A. As shown on this page rational method results in lower flow rates than HEC-1.

Water surface profiles were determined for the perimeter channels using the Channel Analysis Program (HYDROCALC HYDRAULICS Version 2.0.1 for Windows, Dodson & Associates, 1996-2010) that is based on Manning's formula for uniform flow and HEC-RAS, A river analysis system computer program (version 6.0.0 2021) that is based on the solution of one-dimensional energy equation with energy loss due to friction. The perimeter channels are designed to collect and route runoff from the 25-year frequency storm event to the detention pond. Manning's *"n"* values for the channels and culverts were taken from the TxDOT Bridge Division Hydraulic Design Manual (Table 4-7, page 4-43; and Table 4-9, page 4-46), September 2019.

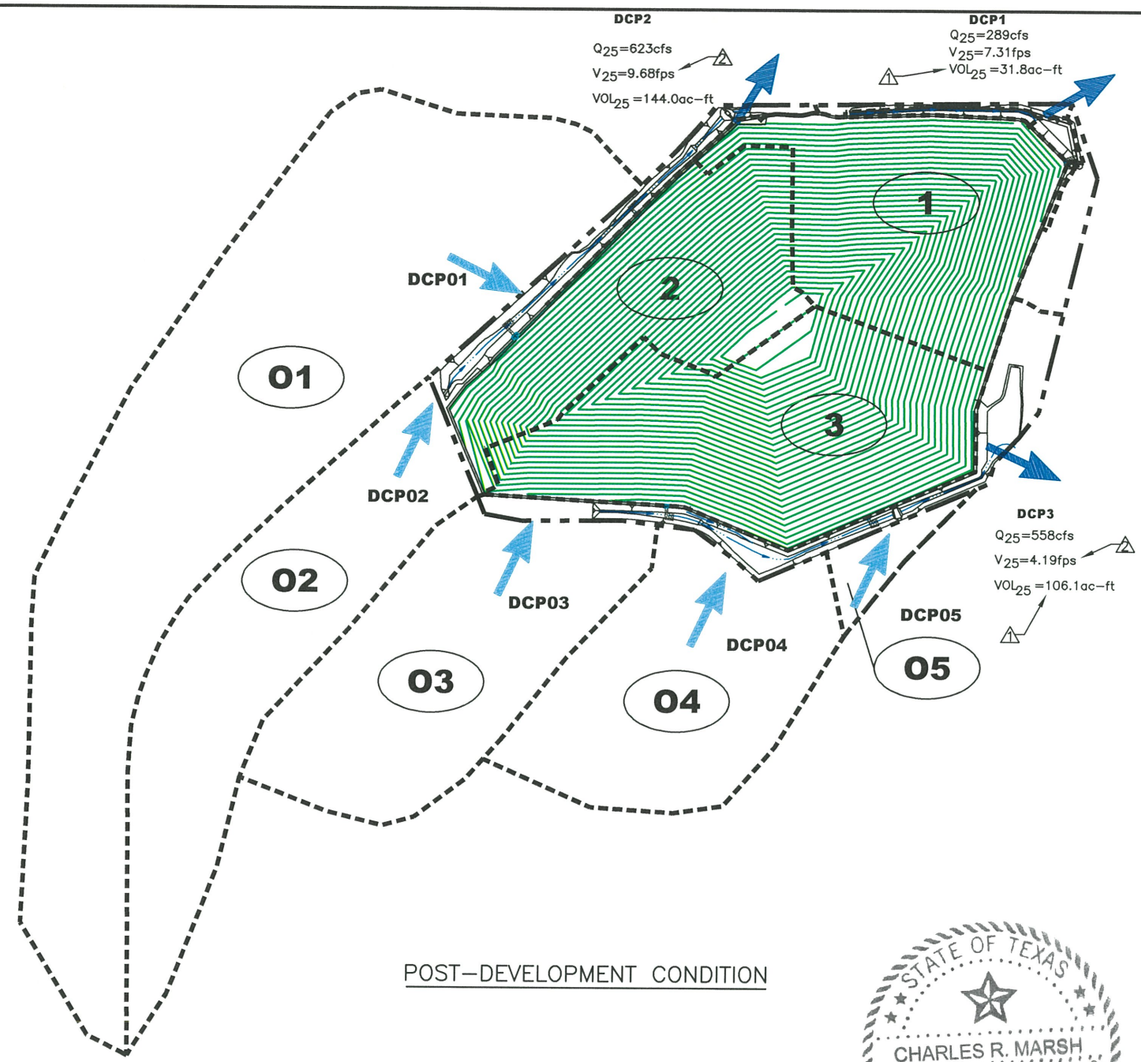
3.2 Hydrologic Analysis

3.2.1 Description of Computer Program

HEC-1 was developed by the USACE Hydrologic Engineering Center to simulate the surface runoff response of a watershed. The HEC-1 model represents a watershed as a network of hydrologic and hydraulic components. The modeling process results in the computation of stream-flow hydrographs at desired locations in the watershed. The hydrologic analysis for the post-development condition is presented in Appendix IIIF-A. The hydrologic analysis for the permitted landfill completion condition is included in Appendix IIIF-E.



PERMITTED CONDITION



POST-DEVELOPMENT CONDITION



LEGEND

- PROPERTY BOUNDARY
- LIMITS OF WASTE
- DRAINAGE DIVIDE
- PERMITTED/PROPOSED FINAL COVER CONTOUR
- O5 — DRAINAGE AREA LABEL
- UPLAND DRAINAGE ENTERING SITE
- STORMWATER DISCHARGE POINT
- ⚠ — INDICATES REVISION (SEE LIST OF REVISIONS)

LIST OF REVISIONS:

1. UPDATED DCP1 AND DCP3 DISCHARGE VOLUMES FOR POST DEVELOPMENT.
2. UPDATED DCP3 DISCHARGE VELOCITY FOR PERMITTED CONDITION AND VELOCITIES FOR DCP2 AND DCP3 FOR POST DEVELOPMENT CONDITION.

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER
12.16.22

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: 4.5 RUNON RUNOFF.DWG

DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
SITE DRAINAGE PATTERNS
RUNON/RUNOFF

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE 4.5

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O:\0771\368\EXPANSION 2021\PART III\IIF\FIGURES\4.5- RUNON RUNOFF.dwg, rarrington, 1:2

Table 4-1
Permitted and Post-Development 25-Year Site Drainage Summary

Stormwater Discharge Point[1]	Permitted Condition					Post-Development Condition				
	Flow Rate (cfs)	Drainage Area (acres)	Time to Peak (hrs)	Runoff Volume[2] (ac-ft)	Velocity at Permit Boundary[2] (fps)	Flow Rate (cfs)	Drainage Area (acres)	Time to Peak (hrs)	Runoff Volume[2] (ac-ft)	Velocity at Permit Boundary[2] (fps)
DCPO1	466	180.49	12.58	82.0	8.38	466	180.49	12.58	82.0	8.38
DCPO2	188	74.63	12.67	33.9	5.34	188	74.63	12.67	33.9	5.34
DCPO3	206	69.25	12.50	31.5	6.47	206	69.25	12.50	31.5	6.47
DCPO4	179	61.05	12.50	27.7	3.93	179	61.05	12.50	27.7	3.93
DCP05	22	6.34	12.42	2.9	1.84	22	6.34	12.42	2.9	1.84
DCP1 (Northeast)	297	69	12.17	32.6	7.37	289	67	12.83	~~34.1~~31.8	7.31
DCP2 (North)[3]	664	330	12.67	149.9	9.83	623	316	12.25	144.0	~~3.35~~9.68
DCP3 (Southeast)[4]	564	213	12.50	97.6	~~14.11~~4.21	558	228	12.33	~~109.2~~106.1[5]	~~1.45~~4.19

[1] Stormwater discharge points are shown on Figure 4.6. The volume shown is the total volume of runoff for the hydrograph duration.
[2] Runoff volume and velocity calculations are provided in Appendix IIIF-A and IIIF-E.
[3] Discharge point DCP2 includes DCP01 and DCP02.
[4] Discharge Point DCP3 includes DCP03, DCP04, and DCP05.
[5] As shown the post-development condition results in a slightly higher runoff volume but a lower flow rate and velocity. The drainage improvements proposed at the site will result in a more controlled release of stormwater, which is not an adverse impact.

APPENDIX IIIF-A

POST-DEVELOPMENT CONDITION HYDROLOGIC CALCULATIONS

Includes pages IIIF-A-1 through IIIF-A-74



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Volume Calculations	IIIF-A-66
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Required: Determine the volume generated by the site and offsite areas using the excess rainfall calculated in the HEC-1 analysis of the post-development condition.

Method: 1. Use the excessive rainfall data generated by the HEC-1 analysis to determine the volume produced by the site for the post-development condition.

1. Post-development Condition

1. a. Total Flow to Unnamed Tributary of Turkey Creek **northeast** of permit boundary (DCP1)

Area No.	Area (sq mi)	Total Excess Rainfall (in)	Area (ac)	Volume (ac-ft)
DA3	**0.0353**	**5.68**	**22.58**	**10.7**
DA4	**0.0520**	**5.68**	**33.25**	**15.7**
S3	**0.0027**	**5.45**	**1.71**	**0.8**
S4	**0.0101**	**5.45**	**6.49**	**2.9**
CH2	**0.0023**	**5.45**	**1.49**	**0.7**
~~**CH5**~~ **CH3**	**0.0006**	**5.45**	**0.37**	**0.2**
P2	**0.0020**	**7.33**	**1.27**	**0.8**

DCP1 Volume = 31.8 ac-ft

1. b. Total volume of flow for areas discharging to the **north** (DCP2)

Area No.	Area (sq mi)	Total Excess Rainfall (in)	Area (ac)	Volume (ac-ft)
DA1	**0.0203**	**5.68**	**12.96**	**6.1**
DA2	**0.0576**	**5.68**	**36.87**	**17.5**
O1	**0.2820**	**5.45**	**180.49**	**82.0**
O2	**0.1166**	**5.45**	**74.63**	**33.9**
S1	**0.0018**	**5.45**	**1.14**	**0.5**
S2	**0.0015**	**5.45**	**0.99**	**0.4**
CH1	**0.0122**	**5.45**	**7.79**	**3.5**

DCP2 Volume = 144.0 ac-ft

TURKEY CREEK LANDFILL
0771-368-11-123
VELOCITY CALCULATIONS
PROPOSED EXPANSION CONDITION

Required: Determine the flow velocities entering and exiting the permit boundary using HYDROCALC HYDRAULICS (Version 2.0, 1996-2010) for the flows calculated for the 25-year and 25- year storm event in the HEC-1 analysis.

Method:

1. Use the flow data generated by the HEC-1 analysis to determine velocity of runoff entering the landfill permit boundary.
2. Use the flow data generated by the HEC-1 analysis to determine velocity of runoff exiting the landfill permit boundary.

1. Flow Velocity entering the landfill permit boundary

O1

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 466 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	466	0.0110	0.03	2.00	2.00	15.00	2.72	8.38

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

~~O2 (Sta. A-4740)~~	O2

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 188 cfs

~~Storm Year~~	~~Flow Rate (cfs)~~	~~Flow Vel. (fps)~~
~~25~~	~~188~~	~~9.37~~

~~Note: Velocites were obtained from HEC-RAS anaysis starting on page IIIF-B-3.~~

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	188	0.0115	0.03	2.00	2.00	30.00	1.09	5.34

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O3

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 206 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	206	0.0182	0.03	2.00	4.00	20.00	1.25	6.95

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

~~O4 (Sta. B-2680)~~	O4

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 179 cfs

~~Storm Year~~	~~Flow Rate (cfs)~~		~~Flow Vel. (fps)~~
~~25~~	~~179~~		~~9.61~~

~~Note: Velocites were obtained from HEC-RAS anaysis starting on page IIIF-B-3.~~

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	179	0.0172	0.03	50.00	50.00	15.00	0.82	3.93

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O5

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 22 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	22	0.0282	0.03	100.00	40.00	100.00	0.11	1.84

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

2.

Flow Velocity exiting the landfill permit boundary

DCP1

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 289 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	289	0.013	0.03	2.50	2.50	17.00	1.83	7.31

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010).

~~DCP2 (Sta. A-1500)~~ DCP2

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 623 cfs

~~Storm Year~~	~~Flow Rate (cfs)~~	~~Flow Vel. (fps)~~
~~25~~	~~623~~	~~3.35~~

~~Note: Velocites were obtained from HEC-RAS anaysis starting on page IIIF-B-3.~~

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	623	0.0180	0.03	5.00	5.00	0.00	3.59	9.68

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

~~DCP3 (Sta. B-520)~~ DCP3

Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

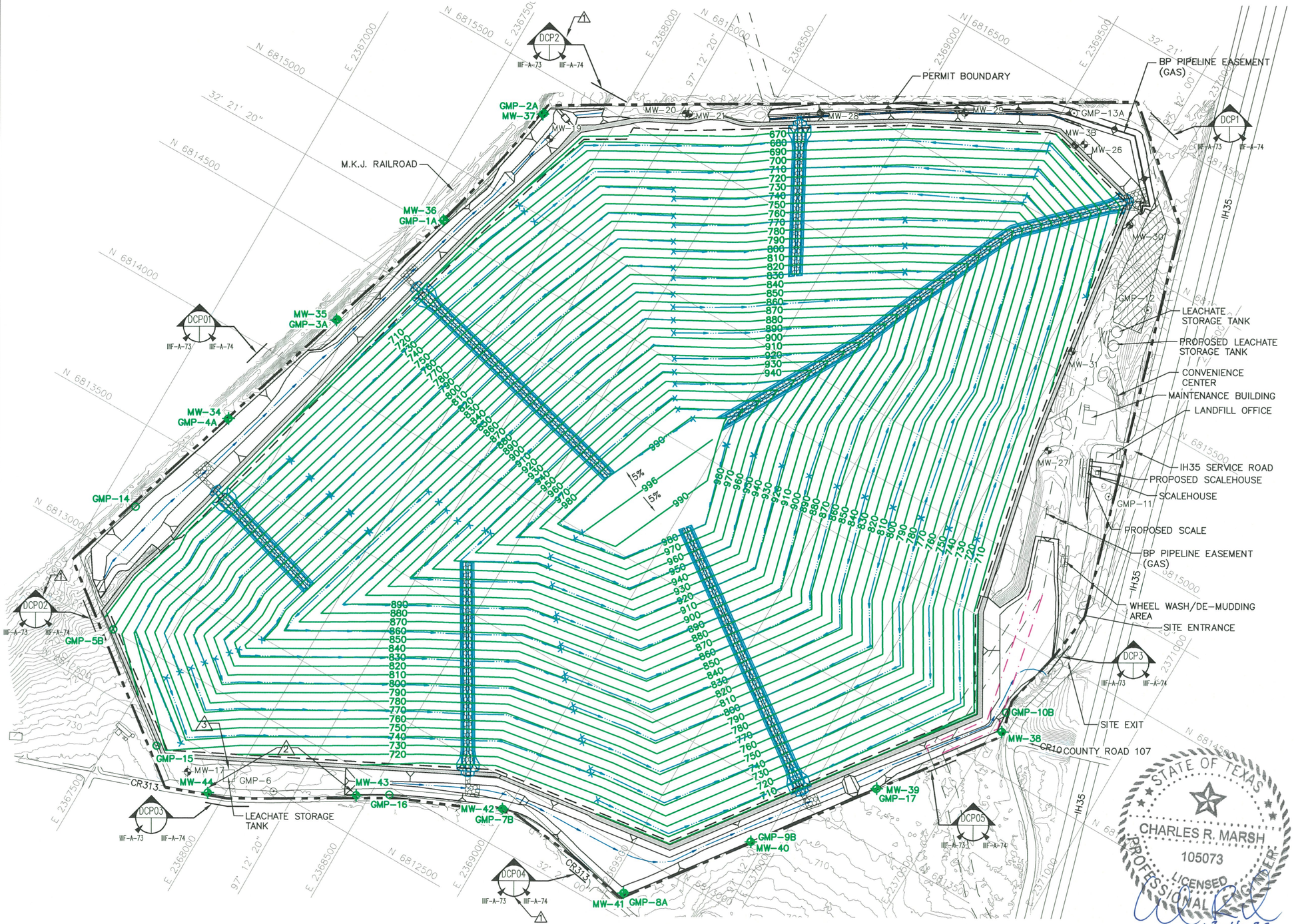
Q_{25} = ~~564~~ 558 cfs

~~Storm Year~~	~~Flow Rate (cfs)~~	~~Flow Vel. (fps)~~
~~25~~	~~564~~	~~1.45~~

~~Note: Velocites were obtained from HEC-RAS anaysis starting on page IIIF-B-3.~~

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	558	0.0025	0.03	2.50	7.00	32.00	2.91	4.19

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)



LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- PROPOSED EASEMENT (SEE NOTE 4)
- 800 — FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- PROPOSED PERIMETER CHANNEL
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING GAS MONITORING PROBE
- MW-37 — PROPOSED GROUNDWATER MONITORING WELL
- GMP-17 — PROPOSED GAS MONITORING PROBE
- FUTURE LFGTE FACILITY LOCATION
- △ INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR DRAINAGE DESIGN INFORMATION.
3. MAXIMUM FINAL COVER ELEVATION IS 996.0 FT-MSL. MAXIMUM TOP OF WASTE ELEVATION IS 992.5 FT-MSL.
4. THE PROPOSED EASEMENT SHOWN IS FOR VISUAL PURPOSES ONLY. THE ACTUAL LOCATION WILL BE DETERMINED AT A LATER DATE IN COORDINATION WITH THE EASEMENT HOLDER.

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER
12.16.22

LIST OF REVISIONS:

1. UPDATED SECTION DCP02, DCP04, AND DCP2 LOCATION.
2. ADDED MW-43 AND MW-44.
3. ADDED LEACHATE STORAGE TANK LOCATION.

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: IIIF-A-73 POST DRAINAGE.DWG

DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
POST DEVELOPMENT DRAINAGE

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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DRAWING IIIF-A-73

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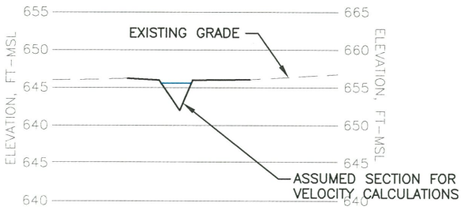
O:\0771\368\EXPANSION 2021\PART III\IIIF\IIIF-A\IIIF-A-73-POST DEV DRNG.dwg, rarrington, 1:2

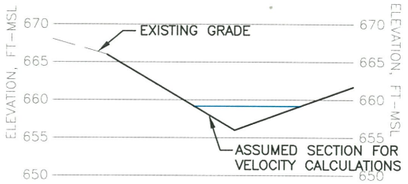


DISCHARGE POINT 1 DCP1

IIIF-A-73 IIIF-A-74

0 40 80
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



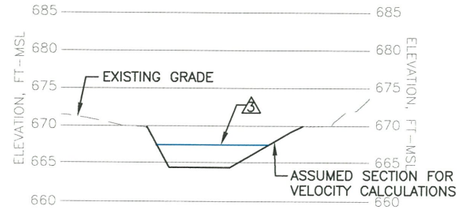
DISCHARGE POINT 2 DCP2

IIIF-A-73 IIIF-A-74

2

0 40 80
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 3 DCP3

IIIF-A-73 IIIF-A-74

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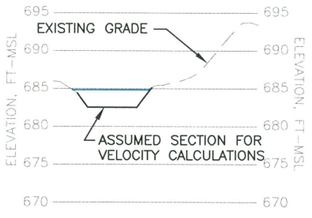
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 01 DCP01

IIIF-A-73 IIIF-A-74

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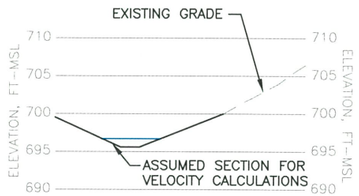
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 02 DCP02

IIIF-A-73 IIIF-A-74

2

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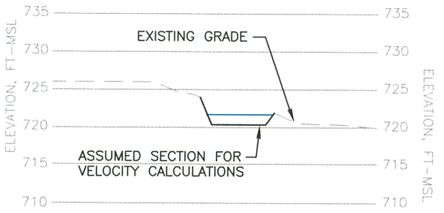
0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 03 DCP03

IIIF-A-73 IIIF-A-74

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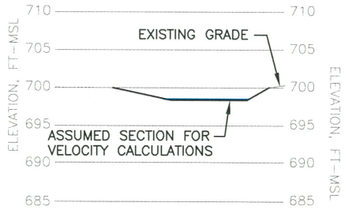
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 05 DCP05

IIIF-A-73 IIIF-A-74

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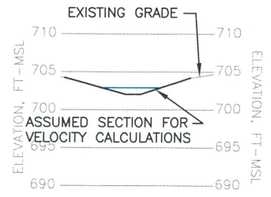
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 04 DCP04

IIIF-A-73 IIIF-A-74

2

0 40 80
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER
12·16·22

2 INDICATES REVISION (SEE LIST OF REVISIONS)

LIST OF REVISIONS:

1. UPDATED TITLE TO POST DEVELOPMENT.
2. UPDATED SECTION LOCATION.
3. REVISED SURFACE WATER ELEVATION.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: IIIF-A-69-DISCHARGE POINT SEC.DWG

DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

1

MAJOR PERMIT AMENDMENT POST DEVELOPMENT DISCHARGE POINT VELOCITY CALCULATIONS

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

WWW.WCGRP.COM

DRAWING IIIF-A-74

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O:\0771\368\EXPANSION 2021\PART III\IIIF\IIIF-A\IIIF-A-74-DISCHARGE POINT SECTIONS.dwg, rarrington, 1:2

APPENDIX IIIF-C

FINAL COVER EROSION CONTROL STRUCTURE DESIGN

Includes pages IIIF-C-1 through IIIF-C-23



CONTENTS

Drainage Swale Design	IIIF-C-1
Drainage Letdown (or Chute) Design	IIIF-C-8



Required: Compare drainage letdown peak flow rates between the Rational Method and HEC-1. for the 25-*year frequency storm.

Method:

1. Determine the 25-year, 24-hour flow rates for the drainge letdown drainage areas by the Rational Method.
2. Obtain the peak flow rates calculated by HEC-1 for the letdown drainage areas, included in Appendix III-F-A.

Reference:

1. State of Texas, Department of Transportation, Bridge Division, Hydraulic Manual, 3rd Edition, September 2019.
2. NOAA Atlas 14 - Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0: Texas (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, and National Weather Service, 2018)

Solution:

1. Determine the 25-year intensity flow rates.

$$Q = CIA$$

Where:
C= 0.7 (runoff coefficient, Ref 1.)
I = intensity in/hr
A= drainage area, ac

$$I = \frac{b}{(t_c + d)^e}$$

b = 83.01
d = 10.65
e = 0.775

From Ref. 2, for Johnson County 25-year storm event

t_c is assumed to be 10 min.

I = 7.95 in/hr

Drainage Letdown	Area (ac)	Rational Flow Rate (cfs)	HEC-1 Flow Rate (cfs)
LD1	12.96	72.2	106
LD2	36.87	205.3	299
LD3	22.58	125.7	178
LD4	33.25	185.1	253
LD5	44.98	250.5	347
LD6	27.53	153.3	233

Conclusion: As shown in the table above, for the same drainage areas (i.e., for drainage letdowns) HEC-1 estimates higher peak flow rates than those calculated using the Rational Method. Therefore, usign the peak flow rates estimated by HEC-1 to design the drainage letdowns provides a more conservative design for these structures.

APPENDIX IIIF-D

EROSION LAYER EVALUATION

Includes pages IIIF-D-1 through IIIF-D-37



EROSION LAYER EVALUATION

This appendix presents the supporting documentation for evaluation of the thickness of the erosion layer for the final cover system at the Turkey Creek Landfill. The evaluation is based on the premise of adding excess soil to increase the time required before maintenance is needed as recommended in the EPA Solid Waste Disposal Facility Criteria Technical Manual (EPA 530-R-93-017, November 1993). The design procedure is as follows:

1. Minimum thickness of the erosion layer at the end of the 30-year postclosure period is evaluated based on the depth of frost penetration or 6 inches, whichever is greater. For Johnson County, the approximate depth of frost penetration is approximately 6 inches (see IIIF-D-10). Therefore, the minimum erosion layer thickness is 6 inches.

2. Soil loss is calculated using the Universal Soil Loss Equation (USLE) by following SCS procedures. The soil loss is adjusted by a safety factor of 2 and is then converted to a thickness. The thickness of the soil loss over a 30-year postclosure period is added to the minimum thickness of the erosion layer (from Step 1) to yield an initial thickness to be placed at closure of the site. According to the USLE, the typical 5 percent topslope and 28.6 percent side slope require a minimum of 6.082 inches and 7.041 inches, respectively, for the erosion layer. These USLE requirements include the 6-inch minimum required by regulations. Conservatively, a 12-inch erosion layer is proposed over final cover. These calculations begin on page IIIF-D-3.

3. Stormwater flows over the final cover system by (1) sheet flow over the topslope and sideslopes and (2) channelized flow in the drainage berms (or swales). As discussed in Section 2.2 and Appendix IIIF-C, flow also occurs in the letdown structures. The letdown structures are lined with gabions or FML to prevent erosion given that the velocities in the letdowns are over 5 ft/sec.

   Sheet flow velocities for the topslope and sideslope cases for a 25-year storm event are calculated to be less than permissible nonerosive velocities. A permissible nonerosive velocity is defined as 5.0 ft/sec or less. Calculated sheet flow velocities range from 0.23 to ~~0.40~~0.43 ft/sec for topslope and sideslope cases. The supporting calculations are presented on pages IIIF-D-20 through IIIF-D-28.

   Channelized flow for drainage swales is also calculated to be less than permissible nonerosive velocities. Calculated channelized flow velocities

range from 2.14 to ~~2.83~~2.76 ft/sec for the drainage swales. The supporting calculations are presented on pages IIIF-C-3 through IIIF-C-7.

4. Vegetation for the site will be native and introduced grasses with root depths of 6 inches to 8 inches. The erosion layer shall also include a mixture of Bermuda, vetch, rye, wheat grass, wild flowers, and flowering plants. The seeding is specified on the attached pages IIIF-D-29 through IIIF-D-37. The seeding included on pages IIIF-D-29 through IIIF-D-37 is specified by TxDOT for temporary and permanent erosion control for Johnson County, Texas (Fort Worth District).

5. Native and introduced grasses will be hydroseeded with fertilizer on the disked (parallel to contours) erosion layer upon final grading. Temporary cold weather vegetation will be established if needed. Irrigation will be employed for 6 to 8 weeks or until vegetation is well established. Erosion control measures such as silt fences and straw bales will be used to minimize erosion until the vegetation is established. Areas that experience erosion or do not readily vegetate after hydroseeding will be reseeded until vegetation is established or the soil will be replaced with soil that will support the grasses.

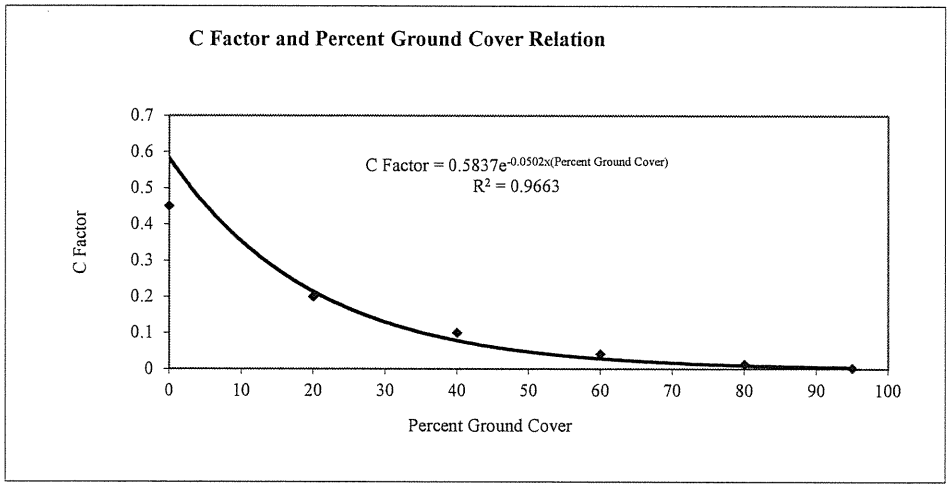
6. Slope stability information is included in Appendix IIIE.

Using the above information and Figure 2 (Ref 2, p.9), the L_s factors are determined.

Case	Slope (%)	Slope Length (ft)	L_s
1. Typical Top Slope	5	119	0.59
2. Longest Top Slope	5	249	0.85
3. Typical Side Slope	28.6	105	7.50
4. Typical Side Slope	25	120	6.50
5. Longest Side Slope (28.6%)	28.6	130	8.10
6. Longest Side Slope (25%)	25	145	7.00

The plant cover or cropping management factor, C, represents the percentage of soil loss that would occur if the surface were partially protected by some combination of cover and management practices. C Factor for Permanent Pasture, Range, and Idle Land with No Appreciable Canopy has the following relation with percent ground cover (GC) (from Ref 2, p.7) .

% GC	C Factor
0	0.45
20	0.2
40	0.1
60	0.042
80	0.013
95	0.003



C Factor= $0.5837e^{(-0.0502x90)}$

C Factor= ~~0.0064~~ 0.003 ~~(for 90% ground cover)~~ (for 95% ground cover)

The erosion control practice factor, P, measures the effect of control practices that reduce the erosion potential of the runoff by influencing drainage patterns, runoff concentration , and runoff velocity. Contouring for this site will be done only to establish vegetation.

P = 1.00

2. Soil loss calculations

Slope Condition	R	K	L_s	C	P	A (tons/ac/yr)
1. Typical Top Slope 5% slope 119 ft length	290	0.25	0.59	~~0.0064~~ 0.003	1.00	~~0.27~~ 0.13
2. Longest Top Slope 5% slope 249 ft length	290	0.25	0.85	~~0.0064~~ 0.003	1.00	~~0.39~~ 0.18
3. Typical Side Slope 28.6% slope ~~120~~ ft length 105	290	0.25	7.50	~~0.0064~~ 0.003	1.00	~~3.46~~ 1.63
4. Typical Side Slope 25.0% slope 120 ft length	290	0.25	6.50	~~0.0064~~ 0.003	1.00	~~3.00~~ 1.41
5. Longest Side Slope 28.6% slope 130 feet length	290	0.25	8.10	~~0.0064~~ 0.003	1.00	~~3.74~~ 1.76
6. Longest Side Slope 25% slope ~~140~~ feet length 145	290	0.25	7.00	~~0.0064~~ 0.003	1.00	~~3.23~~ 1.52

Note: Erosion layer will be maintained to provide 90% ground cover.

3. Erosion layer thickness calculations:

$$T_{el} = 6in + \frac{AYF(2000lb/ton)(12in/ft)}{w(43{,}560sf/ac)}$$

Where:

T_{el} = Erosion layer thickness
A = Soil loss (ton/ac/yr)
Y = Postclosure period (yr)
F = Factor of Safety
w = Specific weight of soil (pcf)

Y =	30	yr
F =	2	
w =	110	pcf

1. Typical Top Slope Thickness:			
T_{el}, Required thickness[1] =	~~6.082~~	6.039	in
Total estimated soil loss =	~~0.082~~	0.039	in
Minimum Specified thickness =		12.000	in
2. Longest Top Slope Thickness:			
T_{el}, Required thickness[1] =	~~6.118~~	6.054	in
Total estimated soil loss =	~~0.118~~	0.054	in
Minimum Specified thickness =		12.000	in
3. Typical Sideslope Thickness:			
T_{el}, Required thickness[1] =	~~7.041~~	6.490	in
Total estimated soil loss =	~~0.041~~	0.490	in
Minimum Specified thickness =		12.000	in
4. Typical Sideslope Thickness:			
T_{el}, Required thickness[1] =	~~6.902~~	6.424	in
Total estimated soil loss =	~~0.902~~	0.424	in
Minimum Specified thickness =		12.000	in
5. Longest Sideslope Thickness (28.6%):			
T_{el}, Required thickness[1] =	~~7.124~~	6.529	in
Total estimated soil loss =	~~1.124~~	0.529	in
Minimum Specified thickness =		12.000	in
6. Longest Sideslope Thickness (25%):			
T_{el}, Required thickness[1] =	~~6.971~~	6.457	in
Total estimated soil loss =	~~0.971~~	0.457	in
Minimum Specified thickness =		12.000	in

Note: [1]Required thicknesses include 6 inch minimum required and estimated soil loss.

4. Summary:

Calculated erosion losses are shown in Step 2 above.
The erosion layer will be a minimum of 12 inches thick.
As shown above, this is a conservative design considering the maximum expected soil loss for a 30 year period is 1.17 inches.

SOIL LOSS ESTIMATE SUMMARY TABLE

Case	Slope (%)	Length (ft)		L_s	Percent Ground Cover	C Factor	A (tons/ac/yr)
Top Slope	5	119		0.59	60	0.042	1.8
Top Slope	5	119		0.59	70	0.017	0.7
Top Slope	5	119		0.59	80	0.013	0.6
Top Slope	5	119		0.59	90	0.0064	0.3
Top Slope	5	119		0.59	95	0.0030	0.1
Top Slope	5	249		0.85	60	0.042	2.6
Top Slope	5	249		0.85	70	0.017	1.0
Top Slope	5	249		0.85	80	0.013	0.8
Top Slope	5	249		0.85	90	0.0064	0.4
Top Slope	5	249		0.85	95	0.0030	0.2
Side Slope	28.6	~~120~~	105	7.50	60	0.042	22.8
Side Slope	28.6	~~120~~	105	7.50	70	0.017	9.2
Side Slope	28.6	~~120~~	105	7.50	80	0.013	7.1
Side Slope	28.6	~~120~~	105	7.50	90	0.0064	3.5
Side Slope	28.6	105		7.50	95	0.003	1.6
Side Slope	25	120		6.50	60	0.042	19.8
Side Slope	25	120		6.50	70	0.017	8.0
Side Slope	25	120		6.50	80	0.013	6.1
Side Slope	25	120		6.50	90	0.0064	3.0
Side Slope	25	120		6.50	95	0.003	1.4
Side Slope	28.6	~~151~~	130	8.10	60	0.042	24.7
Side Slope	28.6	~~151~~	130	8.10	70	0.017	10.0
Side Slope	28.6	~~151~~	130	8.10	80	0.013	7.6
Side Slope	28.6	~~151~~	130	8.10	90	0.0064	3.8
Side Slope	28.6	130		8.10	95	0.0030	1.8
Side Slope	25	~~151~~	145	7.00	60	0.042	21.3
Side Slope	25	~~151~~	145	7.00	70	0.017	8.6
Side Slope	25	~~151~~	145	7.00	80	0.013	6.6
Side Slope	25	~~151~~	145	7.00	90	0.0064	3.2
Side Slope	25	145		7.00	95	0.0030	1.5

Required: Determine the sheet flow velocity for the final cover system design and compare to the permissible non-erodible flow velocity.

Method:

1. Determine the flow using the Rational Method.
2. Calculate flow depth using Kinematic Wave procedures.
3. Compute flow velocity and compare to permissible non-erodibility velocity.

References:

1. Raudkivi, A.J., *Hydrology - An Advanced Introduction to Hydrological Processes and Modeling*, 1979.
2. NOAA Atlas 14 - Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0: Texas
3. United States Soil Conservation Service, *TR-55 Hydrology for Small Watersheds*, December 1989.

Solution: Use the typical case scenarios from the USLE calculation to determine the expected sheet flow velocity.

Case 1. Typical top slope
slope = 0.05 ft/ft
length = 119 ft

Case 2. Longest top slope
slope = 0.05 ft/ft
length = 249 ft

Case 3. Typical side slope
slope = 0.286 ft/ft
length = 105 ft

Case 4. Typical side slope
slope = 0.25 ft/ft
length = 120 ft

Case 5. Longest Side Slope (28.6%)
slope = 0.286 ft/ft
length = 130 ft

Case 6. Longest Side Slope (25%)
slope = 0.25 ft/ft
length = ~~150~~ 145 ft

Time of Concentration:

$$t_c = \frac{0.007(nL)^{0.8}}{(P_{2,24})^{0.5} S^{0.4}}$$

Where:
t_c = time of concentration (hr)
n = Manning's roughness coefficient
L = slope length
$P_{2,24}$ = 2-year, 24-hour rainfall depth (in)
S = slope (ft/ft)

TURKEY CREEK LANDFILL
0771-368-11-123
SHEET FLOW VELOCITY

Determine $P_{2,24}$:

$P_{2,24}$ = 3.98 in (ref 2)

Calculate t_c:

Case 1:

n =	0.24	
L =	119	
$P_{2,24}$ =	4.0	
S =	0.05	
t_c =	0.17	hr
	10.19	min

Case 2:

n =	0.24	
L =	249	
$P_{2,24}$ =	4.0	
S =	0.05	
t_c =	0.31	hr
	18.40	min

Case 3:

n =	0.24	
L =	105	
$P_{2,24}$ =	4.0	
S =	0.286	
t_c =	0.08	hr
	4.59	min

Case 4:

n =	0.24	
L =	120	
$P_{2,24}$ =	4.0	
S =	0.25	
t_c =	0.09	hr
	4.59	min

Case 5:

n =	0.24	
L =	130	
$P_{2,24}$ =	4.0	
S =	0.286	
t_c =	0.09	hr
	5.45	min

Case 6:

n =	0.24		
L =	~~150~~	145	
$P_{2,24}$ =	4.0		
S =	0.25		
t_c =	~~0.11~~	0.10	hr
	~~6.44~~	6.27	min

Calculate the design 25-year frequency for each condition:

$Q = CiA$

Where:
- Q = flow rate (cfs)
- C = runoff coefficient
- i = rainfall intensity (in/hr)
- A = drainage area (ac)

$i = b/(t_c+d)^e$

Where:

i =	rainfall intensity (in/hr)		
b =	constant for Johnson County	=	83.01
d =	constant for Johnson County	=	10.65
e =	constant for Johnson County	=	0.775
t_c =	time of concentration (min)		

For a unit width of final cover, the flow lengths shown on sheet IIIF-D-7 for each case is used.

A=[Length (ft) x Width (ft)] / 43560 sq. ft/acre = A in acres

Case 1:

C =	0.7	
t_c =	10.19	min
i =	7.90	in/hr
Length:	119.00	ft
A	0.0027	ac
Q =	0.015	cfs

Case 2:

C =	0.7	
t_c =	18.40	min
i =	6.11	in/hr
Length:	249.00	ft
A	0.0057	ac
Q =	0.024	cfs

Case 3:

C =	0.7	
t_c =	4.59	min
i =	10.07	in/hr
Length:	105.00	ft
A	0.0024	ac
Q =	0.017	cfs

Case 4:

C =	0.7	
t_c =	4.59	min
i =	10.07	in/hr
Length:	120.00	ft
A	0.0028	ac
Q =	0.017	cfs

Case 5:

C =	0.7	
t_c =	5.45	min
i =	9.65	in/hr
Length:	130.00	ft
A	0.0030	ac
Q =	0.020	cfs

Case 6:

C =	0.7		
t_c =	~~6.44~~	6.27	min
i =	9.65		in/hr
Length:	~~150.00~~	145	ft
A	~~0.0034~~	0.0033	ac
Q =	~~0.023~~	0.022	cfs

Approximate depth of flow:

Using Manning's Equation

$$V = (1.49/n)\, y^{0.67}\, S^{0.5}$$

$Q = VA \quad \Rightarrow \quad V = Q/A$

$A = y \times 1$ (assuming unit width of flow)

substituting for V

$$Q/y = (1.49/n)\, y^{0.67}\, S^{0.5}$$

$$Q = (1.49/n)\, y^{1.67}\, S^{0.5}$$

solve for y

$$y = (Qn/1.49\, S^{0.5})^{1/1.67}$$

$$y = (Qn/1.49 S^{0.5})^{0.6}$$

Case 1:

Q =	0.015	cfs
n =	0.24	
S =	0.05	ft/ft
y =	0.066	ft

Case 2:

Q =	0.024	cfs
n =	0.24	
S =	0.05	ft/ft
y =	0.089	ft

Case 3:

Q =	0.017	cfs
n =	0.24	
S =	0.286	ft/ft
y =	0.042	ft

Case 4:

Q =	0.017	cfs
n =	0.24	
S =	0.25	ft/ft
y =	0.044	ft

Case 5:

Q =	0.020	cfs
n =	0.24	
S =	0.286	ft/ft
y =	0.047	ft

Case 6:

Q =	~~0.023~~ 0.022	cfs
n =	0.24	
S =	0.25	ft/ft
y =	~~0.053~~ 0.052	ft

Determine sheet flow velocity:

V = Q/A (assume unit flow width for the flow area, A)

Case 1:			Case 2:		
Q =	0.015	cfs	Q =	0.024	cfs
A =	0.066	sf	A =	0.089	sf
V =	0.23	ft/s	V =	0.28	ft/s
Case 3:			Case 4:		
Q =	0.017	cfs	Q =	0.017	cfs
A =	0.042	sf	A =	0.044	sf
V =	0.40	ft/s	V =	0.39	ft/s
Case 5:			Case 6:		
Q =	0.020	cfs	Q =	~~0.023~~ 0.022	cfs
A =	0.047	sf	A =	~~0.053~~ 0.052	sf
V =	0.43	ft/s	V =	~~0.44~~ 0.43	ft/s

Permissible non-erodible velocity is 5.0 ft/s. Therefore, expected sheet flow velocity is acceptable on the final cover system top and side slopes.

APPENDIX IIIF-E

PERMITTED LANDFILL CONDITION HYDROLOGIC CALCULATIONS

Includes pages IIIF-E-1 through IIIF-E-69



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TURKEY CREEK LANDFILL
0771-368-11-123
UNIT HYDROGRAPH DATA
PROPOSED EXPANSION CONDITION

Snyder's Hydrograph Coefficients (Espey's 10 Minute Method)

~~Proposed Expansion~~ Permitted Conditions

Area No.	Area (acres)	Max. Flow Length (L) (ft)	S (ft/ft)	I (%)	Manning "n"	Φ[1]	T_r[2] (min)	T_{lag}[3] (min)	T_{lag} (hr)	Area[4] (sq mi)	q_p[5] (cfs/sq mi)	C_p[6]
O1	180.49	6,381	0.0110	10	0.04	0.84	36.1	33.6	0.56	0.2820	716.3	0.63
O2	74.63	4,784	0.0115	5	0.04	0.86	39.3	36.8	0.61	0.1166	678.5	0.65
O3	69.25	3,820	0.0147	10	0.04	0.84	29.8	27.3	0.46	0.1082	912.5	0.65
O4	61.05	2,617	0.0172	5	0.04	0.86	30.9	28.4	0.47	0.0954	883.6	0.65
O5	6.34	1,135	0.0282	2	0.04	0.87	27.1	24.6	0.41	0.0099	1115.0	0.71
S1	13.82	2,309	0.0225	25	0.04	0.79	18.4	15.9	0.26	0.0216	1634.4	0.68
S2	1.74	100	0.0950	2	0.04	0.87	11.4	8.9	0.15	0.0027	2954.4	0.69
S3	6.40	1,184	0.0355	5	0.04	0.86	21.5	19.0	0.32	0.0100	1426.7	0.71
S4	1.93	684	0.0190	5	0.04	0.86	22.1	19.6	0.33	0.0030	1449.8	0.74
S5	21.38	2,043	0.0225	15	0.04	0.82	20.8	18.3	0.30	0.0334	1409.0	0.67
S6	3.78	1,466	0.0164	2	0.04	0.87	32.9	30.4	0.51	0.0059	924.1	0.73
S7	4.10	630	0.0413	2	0.04	0.87	21.5	19.0	0.32	0.0064	1452.1	0.72

[1] Conveyance efficiency coefficient from Dodson & Associates Inc., *ProHec-1 Program Documentation*, 1995, pages 6-19 and 6-20.
[2] $T_r = 3.1(L^{0.23})(S^{-0.25})(I^{-0.18})(\Phi^{1.57})$
[3] $T_{lag} = T_r - \Delta t/2$
[4] From area summary sheet
[5] $q_p = 31600(A^{-0.04})(T_r^{-1.07})$
[6] $C_p = 49.375(A^{-0.04})(T_r^{-1.07})(T_{lag})$

T_r = surface runoff to unit hydrograph peak (min)
L = distance along main channel from study point to watershed boundary (ft)
S = main channel slope (ft/ft)
I = impervious cover within the watershed (%)
T_{lag} = watershed lag time (min)
Δt = computation interval (minutes)
q_p = unit hydrograph peak discharge (cfs/sq mi)
C_p = Snyder's peaking coefficient

Required: Determine the volume generated by the site and offsite areas using the excess rainfall calculated in the HEC-1 analysis of the post-development site conditions.

Method: 1. Use the excessive rainfall data generated by the HEC-1 analysis (see Appendix IIIF-E) to determine the volume produced by the site for the post-development conditions.

1. ~~Post-development Conditions~~ Permitted Conditions

1. a. Total Flow to Unnamed Tributary of Turkey Creek **northeast** of permit boundary (DCP1)

Area No.	Area (sq mi)	Total Excess Rainfall (in)	Area (ac)	Volume (ac-ft)
DA3	**0.0333**	**5.68**	**21.31**	**10.1**
DA4	**0.0566**	**5.68**	**36.22**	**17.1**
S2	**0.0027**	**5.45**	**1.74**	**0.8**
S3	**0.0100**	**5.45**	**6.40**	**2.9**
CH2	**0.0023**	**5.45**	**1.47**	**0.7**
CH5	**0.0007**	**5.45**	**0.45**	**0.2**
P1	**0.0021**	**7.33**	**1.34**	**0.8**

Total Volume of flow discharging from northeast of the Permit Boundary (refer to Figure 4.4 in the Drainage Report for the location) = 32.6 ac-ft

1. b. Total volume of flow for areas discharging to the **north** (DCP2)

Area No.	Area (sq mi)	Total Excess Rainfall (in)	Area (ac)	Volume (ac-ft)
DA1	**0.0232**	**5.68**	**14.83**	**7.0**
DA2	**0.0554**	**5.45**	**35.46**	**16.1**
O1	**0.2820**	**5.45**	**180.49**	**82.0**
O2	**0.1166**	**5.45**	**74.63**	**33.9**
S1	**0.0216**	**5.45**	**13.82**	**6.3**
CH1	**0.0161**	**5.45**	**10.30**	**4.7**

Total Volume of flow discharging from north of the Permit Boundary (refer to Figure 4.4 in the Drainage Report for the location) = 149.9 ac-ft

TURKEY CREEK LANDFILL
0771-368-11-123
VELOCITY CALCULATIONS
EXISTING EXPANSION CONDITION

Required: Determine the flow velocities entering and exiting the permit boundary using HYDROCALC HYDRAULICS (Version 2.0, 1996-2010) for the flows calculated for the 25-year and 25- year storm event in the HEC-1 analysis.

Method:

1. Use the flow data generated by the HEC-1 analysis to determine velocity of runoff entering the landfill permit boundary.
2. Use the flow data generated by the HEC-1 analysis to determine velocity of runoff exiting the landfill permit boundary.

1. Flow Velocity entering the landfill permit boundary

O1

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 466 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	466	0.0110	0.03	2.00	2.00	15.00	2.72	8.38

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O2

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 188 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	188	0.0115	0.03	2.00	2.00	30.00	1.09	5.34

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O3

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 206 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	206	0.0182	0.03	2.00	4.00	20.00	~~1.33~~ 1.25	~~6.47~~ 6.95

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O4

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 179 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	179	0.0172	0.03	50.00	50.00	15.00	0.82	3.93

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O5

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 22 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	22	0.0282	0.03	100.00	40.00	100.00	0.11	1.84

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

2.

Flow Velocity exiting the landfill permit boundary

DCP1

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 297 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	297	0.013	0.03	2.50	2.50	17.00	1.86	7.37

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010).

DCP2

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 664 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	664	0.018	0.03	5.00	5.00	0.00	3.68	9.83

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010).

DCP3

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 564 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	564	~~0.065~~ 0.0025	0.03	~~2.00~~ 2.50	~~2.00~~ 7.00	~~28~~ 32.00	~~1.31~~ 2.92	~~14.11~~ 4.21

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)



LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- 800 — FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING GAS MONITORING PROBE
- ⚠ — INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR DRAINAGE DESIGN INFORMATION.
3. MAXIMUM FINAL COVER ELEVATION IS 946.0 FT-MSL. MAXIMUM TOP OF WASTE ELEVATION IS 942.5 FT-MSL.

STATE OF TEXAS
CHARLES R. MARSH
105073
PROFESSIONAL ENGINEER
LICENSED
12.16.22

LIST OF REVISIONS:

1. UPDATED SECTION DCP3 LOCATION.

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: IIIF-E-68-POST DEV DRAINAGE.DWG

DRAWN BY: RAA
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
PERMITTED LANDFILL DRAINAGE

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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DRAWING IIIF-E-68

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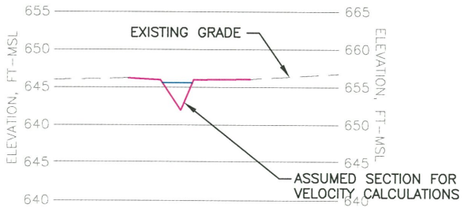
O:\0771\368\EXPANSION 2021\PART III\IIIF\IIIF-E\IIIF-E-68_PERMITTED LANDFILL DRAINAGE.dwg, rarrington, 1:2



DISCHARGE POINT 1 DCP1

IIIF-A-68 IIIF-A-69

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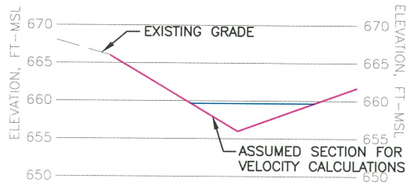
SCALE IN FEET (VERTICAL)



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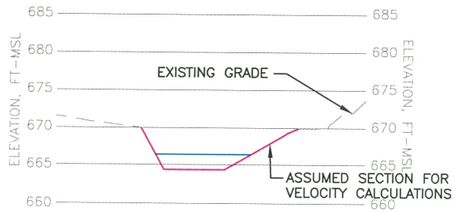

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IIIF-A-68 IIIF-A-69

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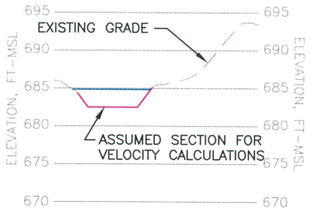
SCALE IN FEET (VERTICAL)



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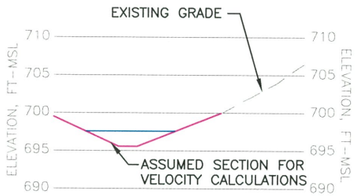

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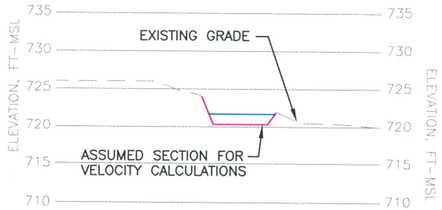

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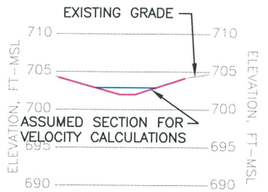

DISCHARGE POINT 04 DCP04

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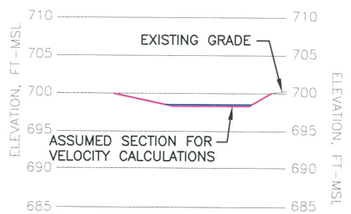

DISCHARGE POINT 05 DCP05

IIIF-A-68 IIIF-A-69

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SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER

12-16-22

⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

LIST OF REVISIONS:

1. UPDATED TITLE TO REMOVE UPDATED.
2. UPDATED DCP3 SECTION.

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: IIIF-E-69-DISCHARGE POINT SEC.DWG

DRAWN BY: RAA
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

⚠1

MAJOR PERMIT AMENDMENT
PERMITTED DISCHARGE POINT VELOCITY CALCULATIONS

TURKEY CREEK LANDFILL
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DRAWING IIIF-E-69

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O:\0771\368\EXPANSION 2021\PART III\IIIF\IIIF-E\IIIF-E-69_DISCHARGE POINT SECTIONS.dwg, rarrington, 1:2

APPENDIX IIIF-G

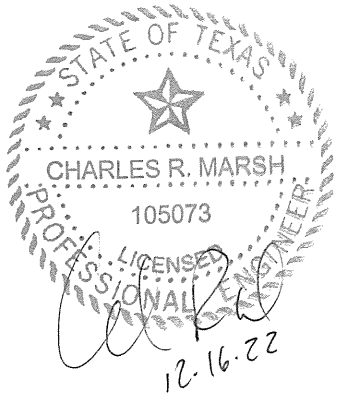
EXCERPTS FROM PROPOSED CLOMR



CONTENTS

FLOODPLAIN SUMMARY **IIIF-G-1**

APPENDIX IIIF-G-A
Excerpts from the Proposed CLOMR Application

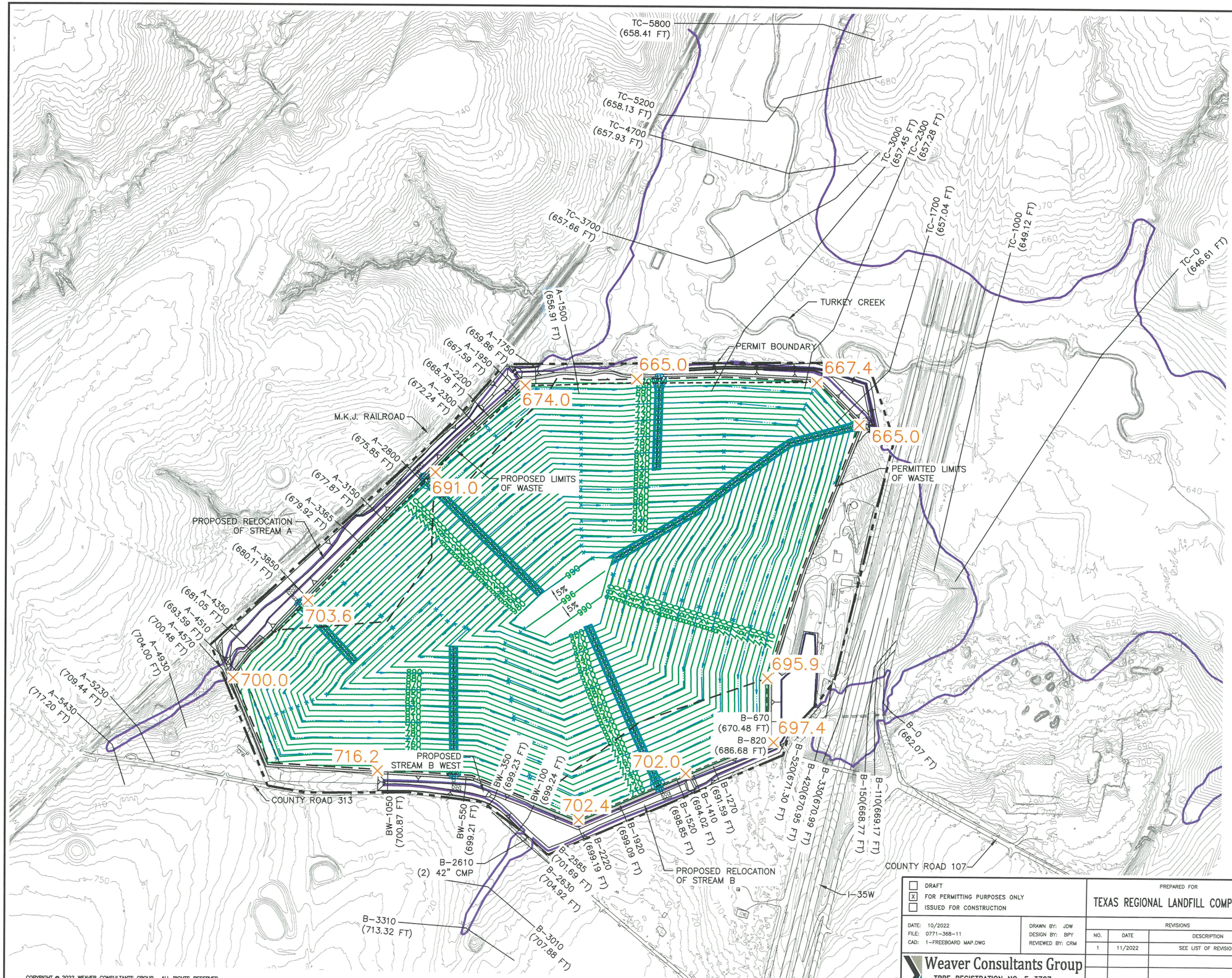


FLOODPLAIN SUMMARY

This appendix addresses §330.61(m).

As discussed in Parts I/II in Section 11, Parts I/II-Appendix I/IIC, and Part III-Appendix IIIF, the floodplain for Turkey Creek is located on the north and west sides of the permit boundary. A Conditional Letter of Map Revision (CLOMR) was developed for the proposed expansion to revise the floodplain limits as a part of the proposed landfill development.

Excerpts from the CLOMR are included in Appendix IIIF-G-A. As shown in Appendix IIIF-G-A, the proposed solid waste fill areas will not be located within the limits of the post-development 100-year floodplain in the proposed CLOMR. Additionally, the post development condition of the landfill is protected from the 100-year floodplain by the proposed perimeter berms. These berms provide a minimum 3 foot freeboard between the 100-year water surface and the limit of waste. Figure 1 illustrates the availability of freeboard at the facility. The CLOMR was developed to account for the geometric and hydrologic changes of the post-development conditions.



0 300 600
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- 750 — EXISTING CONTOUR (SEE NOTE 1)
- 800 — PROPOSED FINAL COVER CONTOUR
- A-4350 (687.71 FT) — HEC-RAS CROSS SECTION AND 100-YEAR FLOODPLAIN ELEVATION
- DRAINAGE SWALE
- POST-PROJECT 100-YEAR FLOODPLAIN
- 665.0 × — ELEVATION OF PERIMETER BERM AT THE LIMITS OF WASTE
- 1 — INDICATES REVISION (SEE LIST OF REVISIONS)

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER
12.16.22

NOTES:

1. COMPOSITE TOPOGRAPHY PROVIDED BY AERIAL PHOTOGRAPHY BY FIRMATEK FLOWN ON 01-08-2021, BY DALLAS AERIAL SURVEYS FLOWN ON 02-25-2017, AND NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS TOPOGRAPHY TAKEN IN 2007.

LIST OF REVISIONS:

1. NEW DRAWING ADDED.

1

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 10/2022
FILE: 0771-368-11
CAD: 1-FREEBOARD MAP.DWG

DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
100-YEAR FREEBOARD MAP

TURKEY CREEK LANDFILL
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FIGURE 1

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O:\0771\368\EXPANSION 2021\PART III\IIF-G\1-FREEBOARD MAP.dwg, rarrington, 1:2

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

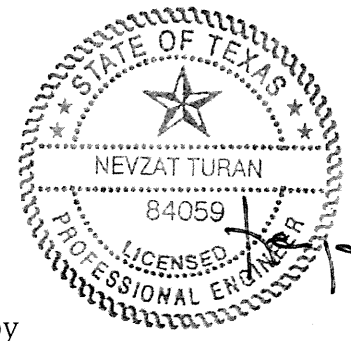
VOLUME 4 OF 6

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

This document is intended for permitting purposes only.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 4 OF 6

CONTENTS

PART III - SITE DEVELOPMENT PLAN

Appendix IIIG – Geology Report

Appendix IIIH – Groundwater Monitoring, Sampling, and Analysis Plan



12/16/2022

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

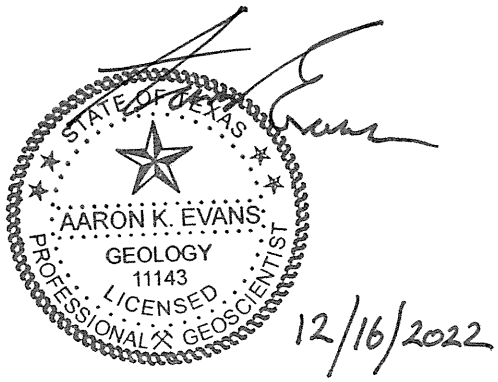
PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIG
GEOLOGY REPORT

Prepared for

Texas Regional Landfill Company, LP

February 2022

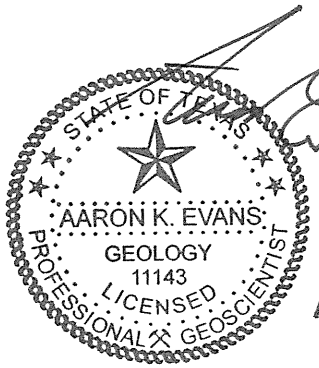
Revised November 2022



Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123



12/16/2022

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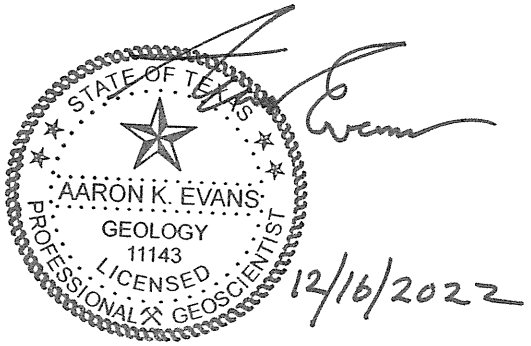

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Site Geologic Data

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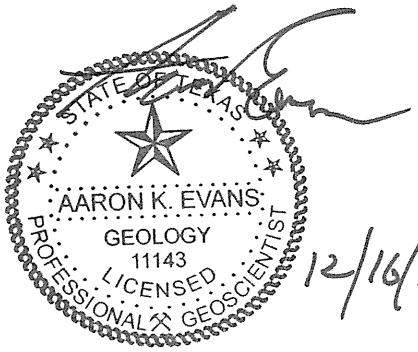
2021 Soil Boring Plan and TCEQ Approval Letter



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GEOLOGY REPORT CERTIFICATION

Site Information

Site: Turkey Creek Landfill

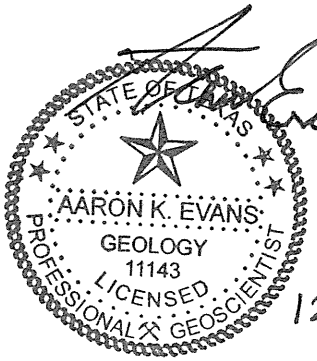
Site Location: Johnson County

MSW Permit No.: 1417D

Qualified Groundwater Scientist Statement

I, Aaron K. Evans, am a Texas-licensed professional geoscientist and a qualified groundwater scientist as defined in Title 30 TAC §330.3(120). I have prepared the Geology Report which constitutes Appendix IIIG of this permit application. In my professional opinion, the Geology Report is in compliance with the requirements specified in Title 30 TAC §§330.63(e). This report has been completed specifically for the Turkey Creek Landfill. The only warranty made by me in connection with this report is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

Firm/Address: Weaver Consultants Group, LLC
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109



12/16/2022

Signature:

Aaron K. Evans, P.G., Texas License No. 11143

Date: 12/16/2022

4 GROUNDWATER INVESTIGATION REPORT

4.1 Water Level Measurements

Groundwater at the facility has been evaluated using historical water-level data from the facility's former piezometers, former groundwater monitoring wells, existing groundwater monitoring wells, and eight piezometers installed in 2021. Groundwater elevations from the currently approved Subtitle D groundwater monitoring wells are provided in Table 4-1 and were measured during monitoring events dating back to November of 1995. These data were obtained from the facility's Subtitle D groundwater database which maintained by The Carel Corporation. In addition, Weaver Consultants Group began conducting water level readings from the facility's existing groundwater monitoring wells and eight newly installed piezometers in September 2021, which are summarized in Table 4-2. Groundwater potentiometric surface contour maps prepared from the March and September 2021 water level data are presented as Figures IIIG-D-1 and IIIG-D-2 in Appendix IIIG-D. These groundwater contour maps indicate a groundwater flow regime that consistent with those depicted historically for the facility. Historical groundwater flow regime and groundwater monitoring system design is further discussed in Appendix IIIH of the SDP.

4.3.2 Lower Confining Unit

The low vertical hydraulic conductivity of the Bounding Shale Unit (arithmetic mean K_v of $2.63x10^{-8}$ cm/sec) and contrasting higher horizontal conductivity of the Lower Sand unit (arithmetic mean K_h of $1.10x10^{-3}$ cm/sec) and Bounding Shale Unit (arithmetic mean K_h of $3.6x10^{-6}$ cm/sec) indicate a directional permeability differential of 2 to 3 orders of magnitude between sediments of the uppermost aquifer and the confining shale sediments. Under these conditions, perched groundwater flows horizontally within the confining low permeability sediments of the Bounding Shale Unit and downgradient toward Turkey Creek and the northernmost areas of the site. Evidence of this confined perched condition is also indicated by approximately 60 feet of potentiometric head separation between the uppermost aquifer and the regional Woodbine Aquifer as illustrated in the expanded cross section on Figure IIIG-C-13.

4.3.3 Groundwater Monitoring System

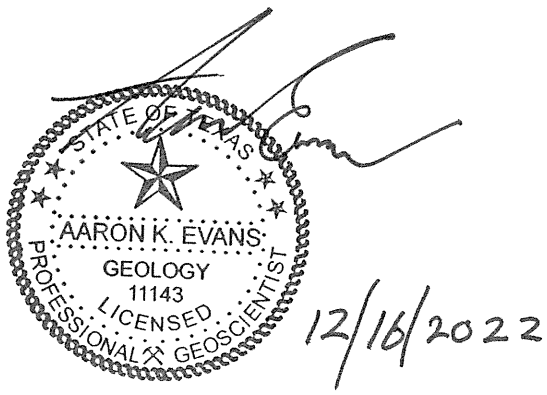
The existing groundwater monitoring system design includes 13 point of compliance (POC) monitoring wells screened within Lower Sand and Bounding Shale unit sediments of the uppermost aquifer. Two additional existing POC monitoring wells (MW-3B and MW-20) are screened at shallower depths within the Upper Sand Unit (spanning the Upper Sand and Bounding Shale unit contact). These two Upper Sand wells are located strategically near the lowest point of the landfill unit (MW-3B) and the lowest point immediately downgradient of the pre-Subtitle D fill area (MW-20). The current groundwater monitoring system utilizes two background monitoring wells located hydraulically upgradient of the landfill unit (MW-17 and MW-18). The proposed groundwater monitoring system network buildout is illustrated on Figure IIIH-A-1 in Appendix IIH of the SDP and includes ~~18~~19 POC monitoring wells and ~~two~~ three background monitoring wells. The groundwater monitoring system design is further discussed in the Groundwater Sampling and Analysis Plan provided in Appendix IIIH of the SDP.

4.4 Class 1 Waste Disposal Area Location Restrictions

The site's permitted Class 1 Waste disposal areas are shown on Figure IIIG-D-4 and include Sectors 9 through 11. The Class 1 waste disposal area was permitted in 2012 following TCEQ-acceptance of the Limited Scope Permit Amendment application (LSPA) by Geosyntec Consultants. This LSPA included a subsurface characterization performed by The Carel Corporation in 2012 to assess hydrogeologic conditions beneath the then-proposed Class 1 waste disposal footprint pursuant to the location restrictions defined in Title 30 TAC §335.584(b)(1 and 2), which was made a part of the site's existing permit (MSN-1417B) as Attachment 11E. A complete copy of the 2012 Subsurface Characterization report (obtained from Permit No. MSW-1417B) is provided in Appendix IIIG-D. The 2012 investigation included six geotechnical borings (B9-1, B9-2, B10-1, B10-2, B11-1, and B12-1) advanced to assess the composition, saturation, and permeability of soils beneath the Class 1 waste disposal footprint. The results of this investigation were documented in

APPENDIX IIIG-C

SITE GEOLOGIC DATA



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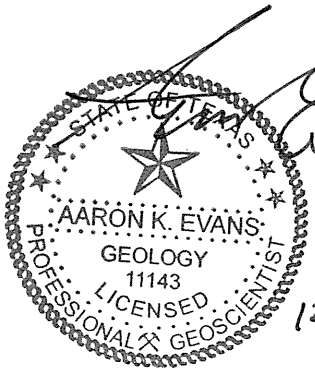

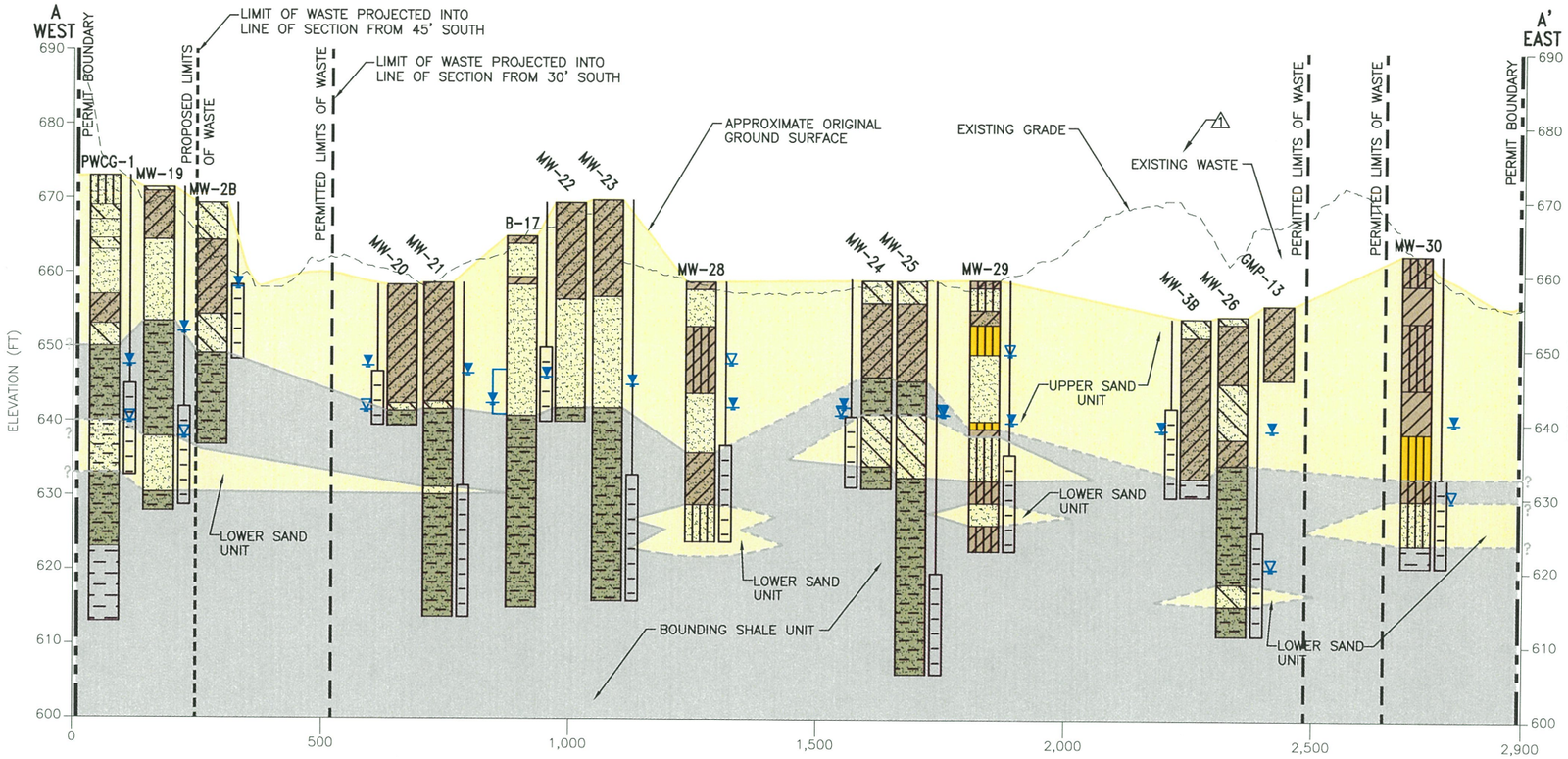

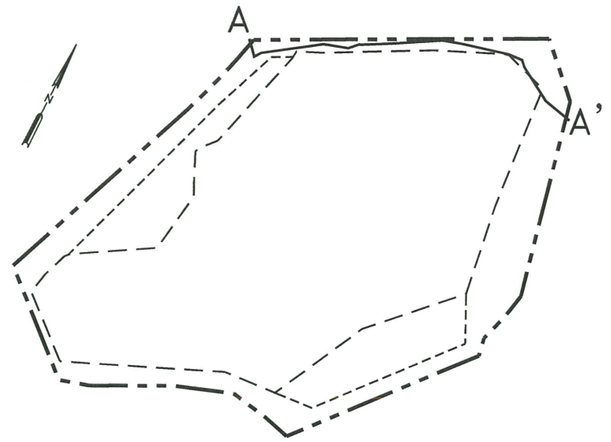

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE

- SANDY CLAY
- CLAYEY SAND
- SHALE or SILTY SHALE
- SILTY CLAY
- SANDY SHALE
- SILTY SAND OR SILTY SANDSTONE
- SAND or SANDSTONE
- SILT OR SILTSTONE
- CLAY
- SHALY SAND or SHALY SANDSTONE

- MONITORING WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- STATIC GROUNDWATER ELEVATION (FT-MSL) (SEE NOTES 2 AND 3)
- GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)
- RANGE OF STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER PIEZOMETER GAUGING DATA (SEE NOTE 3)
- ⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

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NOTES:

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3. STATIC GROUNDWATER ELEVATIONS FOR PIEZOMETERS OBTAINED FROM PREVIOUS SUBSURFACE INVESTIGATION DATA SUMMARY TABLES AND AS-BUILT SURVEY REPORTS OR GAUGING COMPLETED BY WCG IN SEPTEMBER 2021.
4. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
5. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE DEPICTED.
6. BORING GRAPHICS ARE HORIZONTALLY EXAGGERATED FOR ILLUSTRATION PURPOSES AND MAY BE OFFSET FROM ONE ANOTHER TO PREVENT OVERLAP IN SECTION SPACE.

LIST OF REVISIONS:

1. ADDED EXISTING WASTE INFORMATION.

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FIGURE IIIG-C-2

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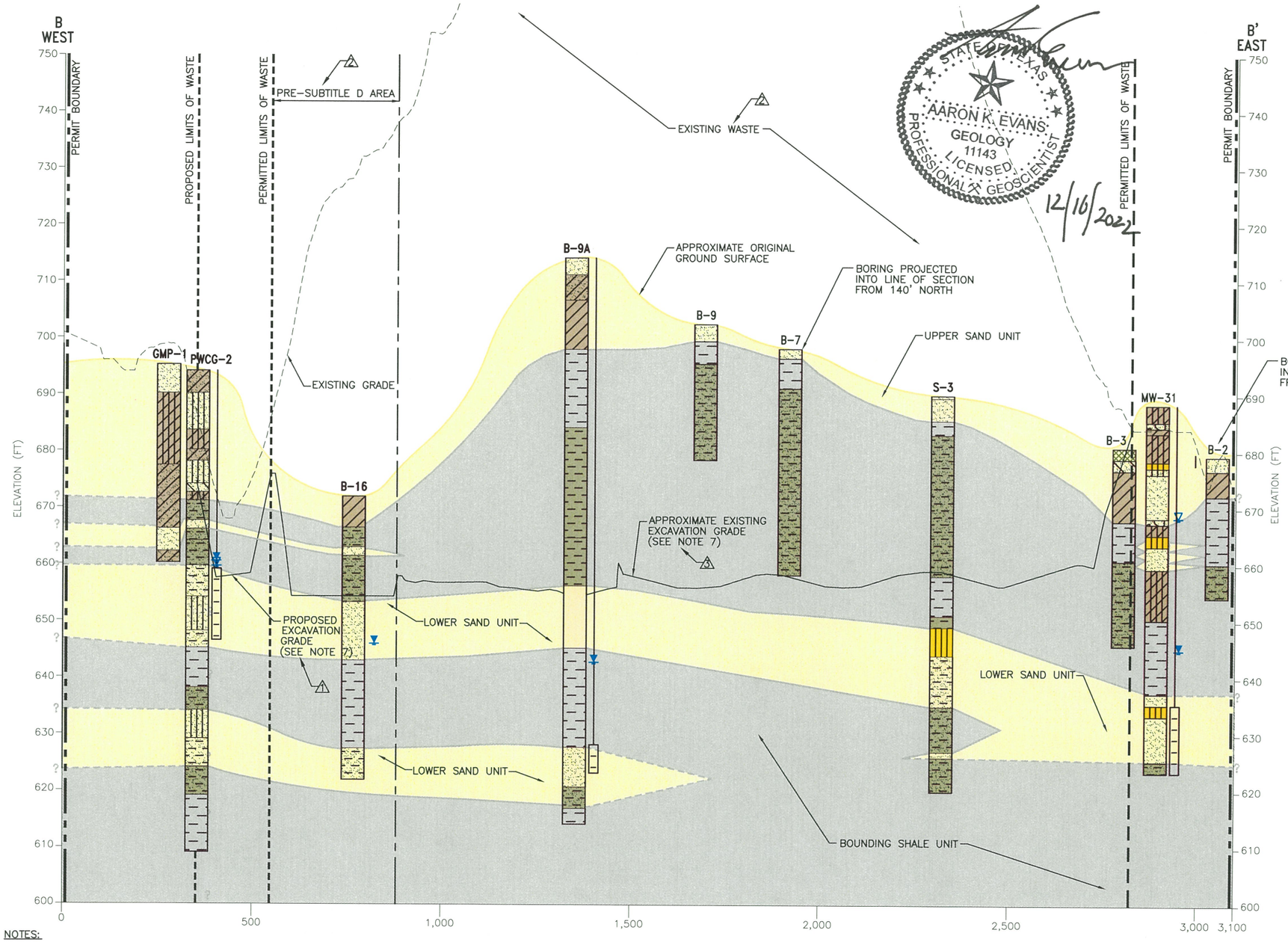

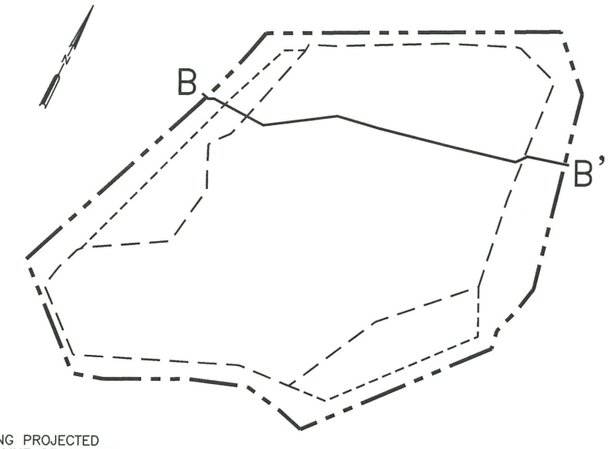

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE

- SANDY CLAY
- CLAYEY SAND
- GRAVEL or SANDY GRAVEL
- SHALE or SILTY SHALE
- SILTY CLAY
- SHALY SAND or SHALY SANDSTONE
- SAND or SANDSTONE
- SILTY SAND OR SILTY SANDSTONE
- EARTHEN FILL
- CLAY
- SILT OR SILTSTONE
- SANDY SHALE

- MONITORING WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- STATIC GROUNDWATER ELEVATION (FT-MSL) (SEE NOTES 2 AND 3)
- GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)
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7. EXISTING EXCAVATION GRADES SHOWN ARE WITHIN THE PERMITTED LIMITS OF WASTE. PROPOSED EXCAVATION GRADES ARE SHOWN BETWEEN THE PERMITTED AND PROPOSED LIMITS OF WASTE. ⚠2

0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

LIST OF REVISIONS:

1. ADDED PROPOSED AND EXISTING EXCAVATION GRADE INFORMATION.
2. ADDED EXISTING WASTE INFORMATION AND PRE-SUBTITLE D AREA INFORMATION.
3. ADDED NOTE 7.

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FIGURE IIIG-C-3

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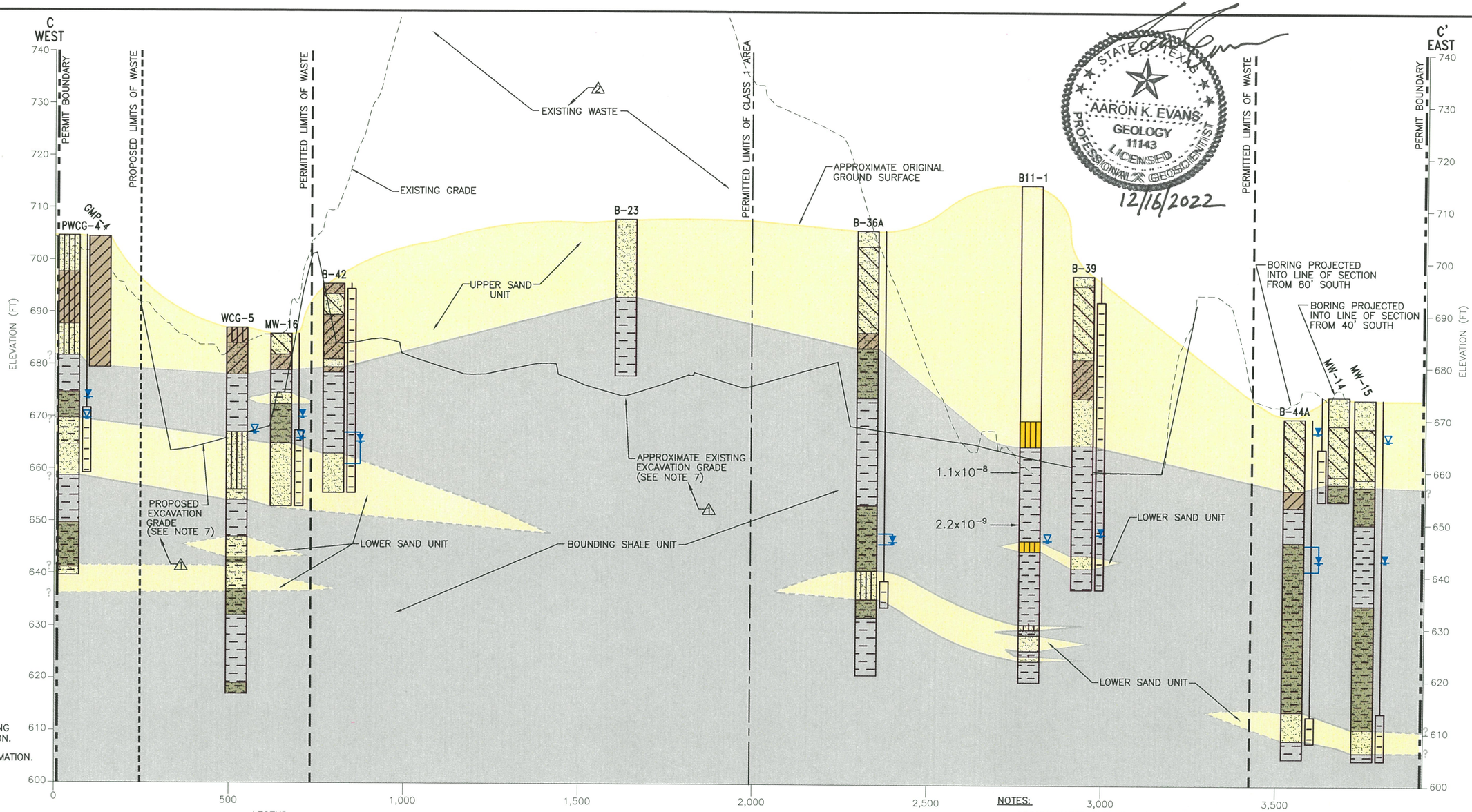

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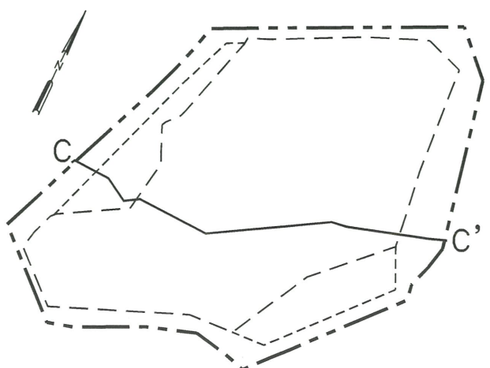

SECTION LOCATION MAP
NTS

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- PERMITTED LIMITS OF WASTE
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- MONITORING WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- STATIC GROUNDWATER ELEVATION (FT-MSL) (SEE NOTES 2 AND 3)
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- RANGE OF STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER PIEZOMETER GAUGING DATA (SEE NOTE 3)
- 2.2x10-9 LABORATORY VERTICAL PERMEABILITY (cm/sec) FROM APRIL 2012 SUBSURFACE INVESTIGATION BY THE CAREL CORPORATION.
- ⚠1 INDICATES REVISION (SEE LIST OF REVISIONS)

- SANDY CLAY
- SHALE or SILTY SHALE
- SAND or SANDSTONE
- CLAY
- CLAYEY SAND
- SILTY CLAY
- SILTY SAND
- SILT OR SILTSTONE
- SANDY SHALE
- NOT LOGGED
- SHALY SAND or SHALY SANDSTONE

0 10 20
VERTICAL SCALE IN FEET
0 150 300
HORIZONTAL SCALE IN FEET

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FIGURE IIIG-C-4

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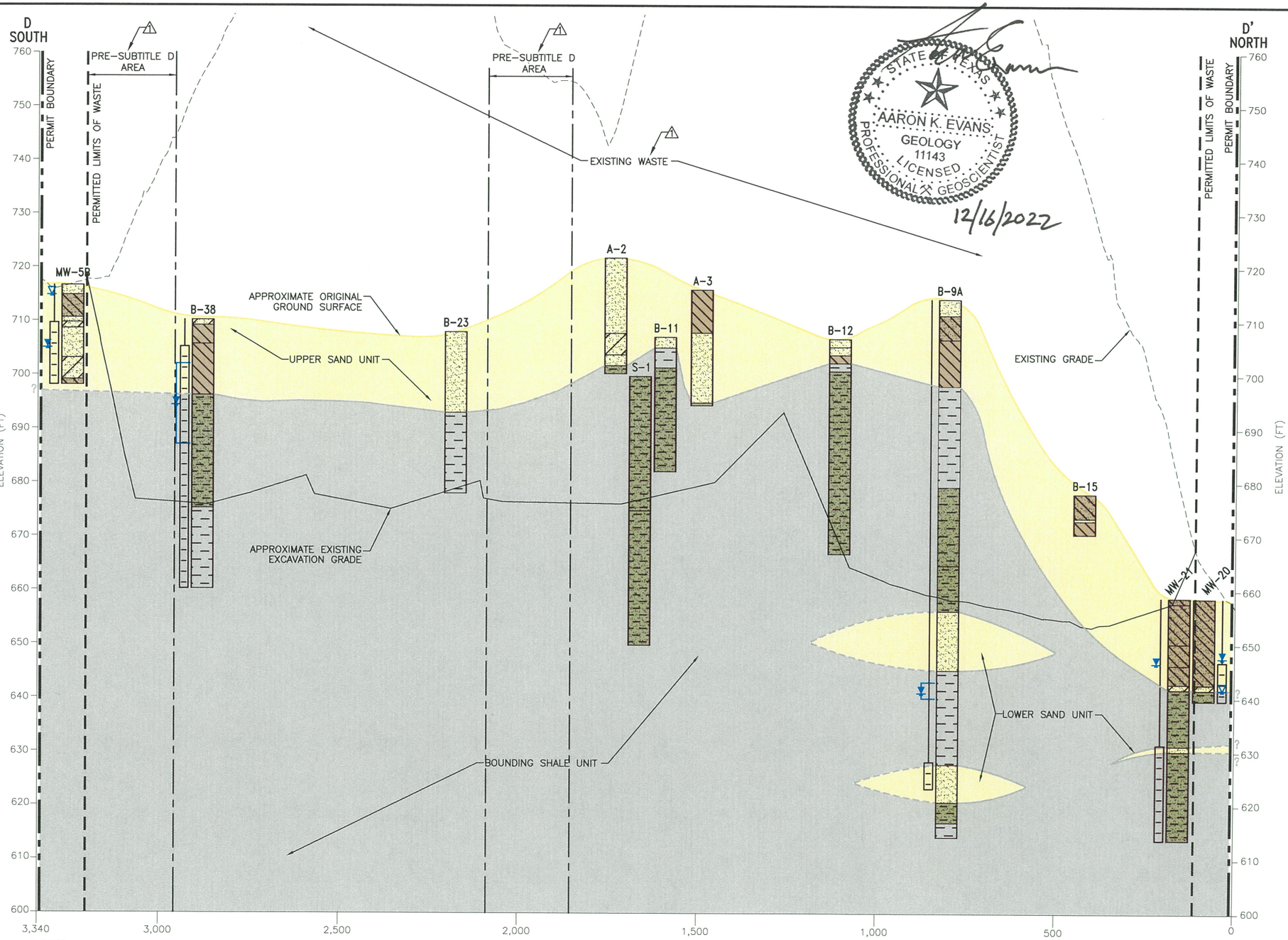

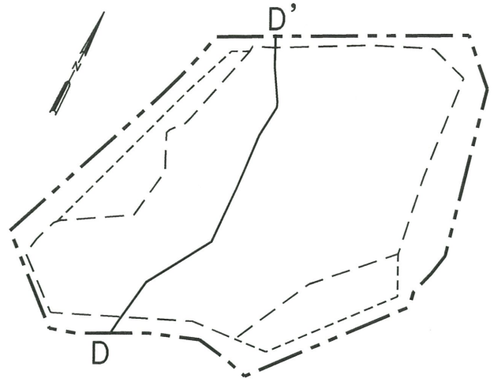

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NTS

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- CLAY
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0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

LIST OF REVISIONS:

1. ADDED EXISTING WASTE INFORMATION AND PRE-SUBTITLE D AREA INFORMATION.

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MAJOR PERMIT AMENDMENT
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TURKEY CREEK LANDFILL
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FIGURE IIIG-C-5

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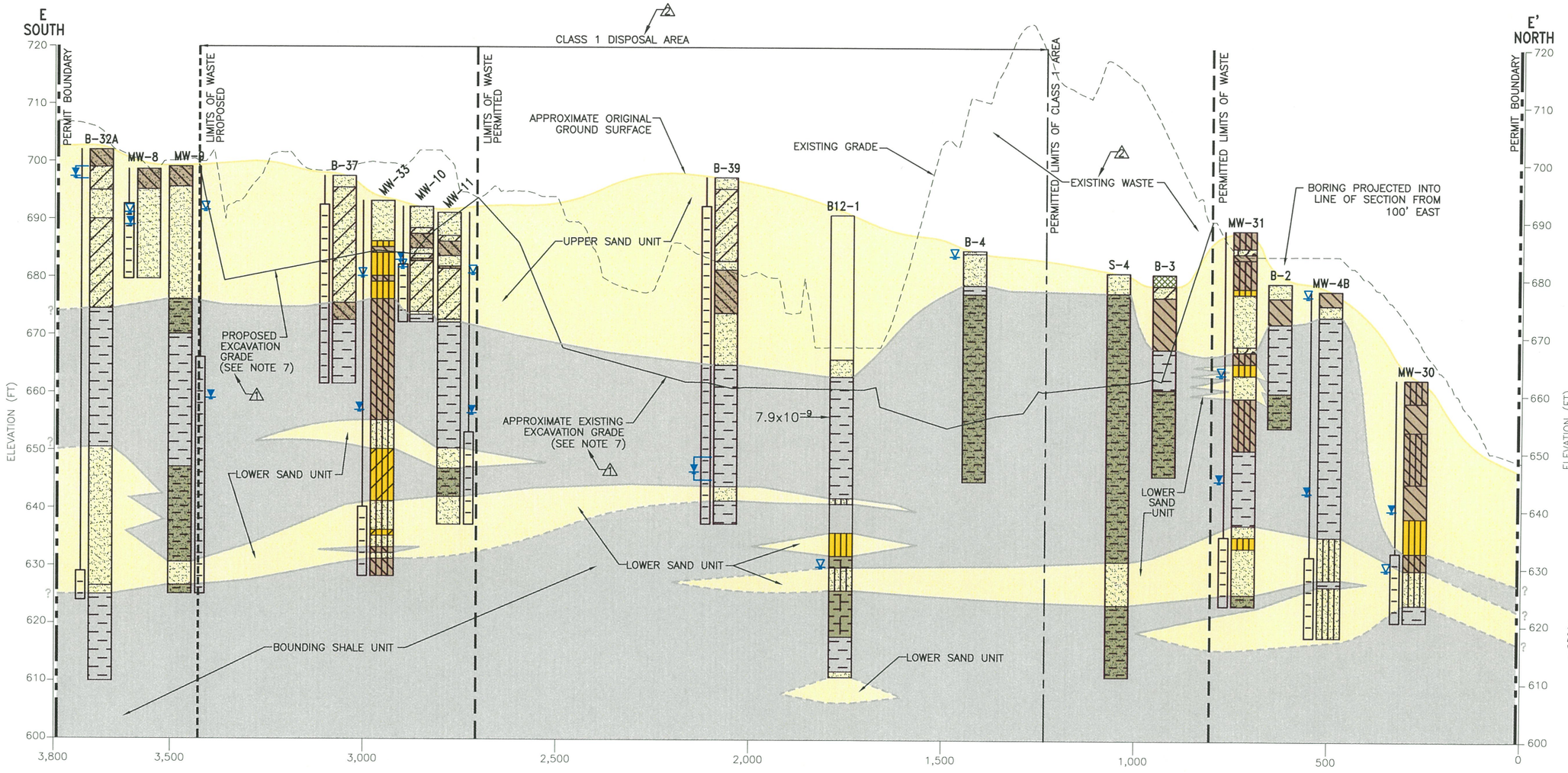

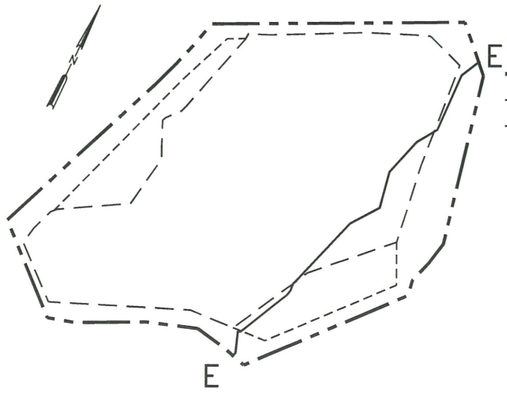

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- MONITORING WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- STATIC GROUNDWATER ELEVATION (FT-MSL) (SEE NOTES 2 AND 3)
- GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)
- RANGE OF STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER PIEZOMETER GAUGING DATA (SEE NOTE 3)
- $7.9x10^{-9}$ LABORATORY VERTICAL PERMEABILITY (cm/sec) FROM APRIL 2012 SUBSURFACE INVESTIGATION BY THE CAREL CORPORATION.
- ⚠1 INDICATES REVISION (SEE LIST OF REVISIONS)

0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

- SANDY CLAY
- CLAYEY SAND
- SHALY SAND or SHALY SANDSTONE
- SHALE or SILTY SHALE
- SILTY CLAY
- GRAVEL or SANDY GRAVEL
- SAND or SANDSTONE
- SILTY SAND
- SANDY SHALE
- CLAY
- SILT or SILTSTONE
- NOT LOGGED
- CLAYEY SILT
- EARTHEN FILL

LIST OF REVISIONS:

1. ADDED PROPOSED AND EXISTING EXCAVATION GRADE INFORMATION.
2. ADDED EXISTING WASTE INFORMATION AND CLASS 1 DISPOSAL AREA INFORMATION.
3. ADDED NOTE 7.

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING OBTAINED FROM LITHOLOGIC BOREHOLE LOGS.
2. STATIC GROUNDWATER ELEVATIONS FOR GROUNDWATER MONITORING WELLS OBTAINED FROM AUGUST 2010 GROUNDWATER SAMPLING EVENT GAUGING DATA COLLECTED BY THE CAREL CORPORATION.
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4. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
5. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE DEPICTED.
6. BORING GRAPHICS ARE HORIZONTALLY EXAGGERATED FOR ILLUSTRATION PURPOSES AND MAY BE OFFSET FROM ONE ANOTHER TO PREVENT OVERLAP IN SECTION SPACE.
7. EXISTING EXCAVATION GRADES SHOWN ARE WITHIN THE PERMITTED LIMITS OF WASTE. PROPOSED EXCAVATION GRADES ARE SHOWN BETWEEN THE PERMITTED AND PROPOSED LIMITS OF WASTE. ⚠2

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PROFESSIONAL GEOSCIENTIST
12/16/2022

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DESIGN BY: AKE
REVIEWED BY: NT

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FIGURE IIIG-C-6

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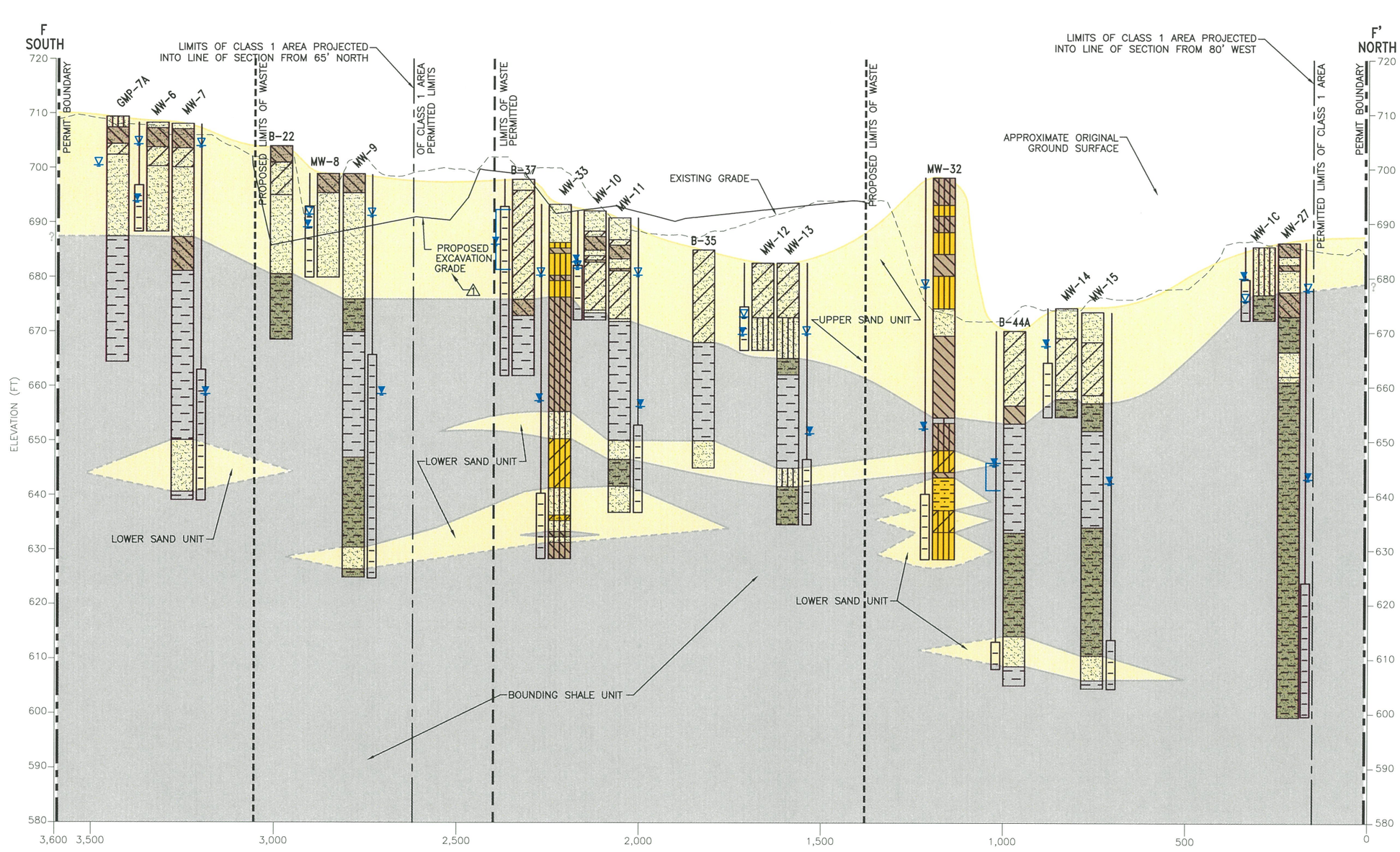

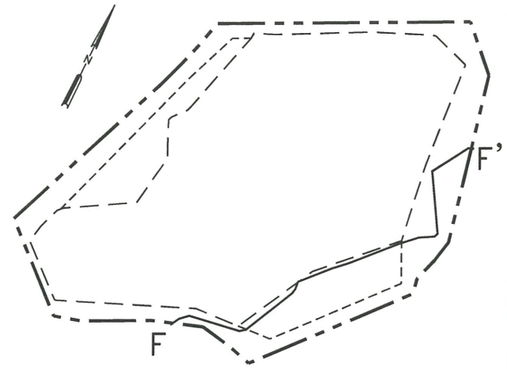

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
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- RANGE OF STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER PIEZOMETER GAUGING DATA (SEE NOTE 3)
- 1 INDICATES REVISION (SEE LIST OF REVISIONS)

- SANDY CLAY
- CLAYEY SAND
- SHALY SAND or SHALY SANDSTONE
- SHALE or SILTY SHALE
- SILTY CLAY
- CLAYEY SILT
- SAND or SANDSTONE
- SILTY SAND
- SANDY SHALE
- CLAY
- SILT or SILTSTONE
- LIMESTONE

NOTES:

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0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

LIST OF REVISIONS:

1. ADDED PROPOSED EXCAVATION GRADE INFORMATION.

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FIGURE IIIG-C-7

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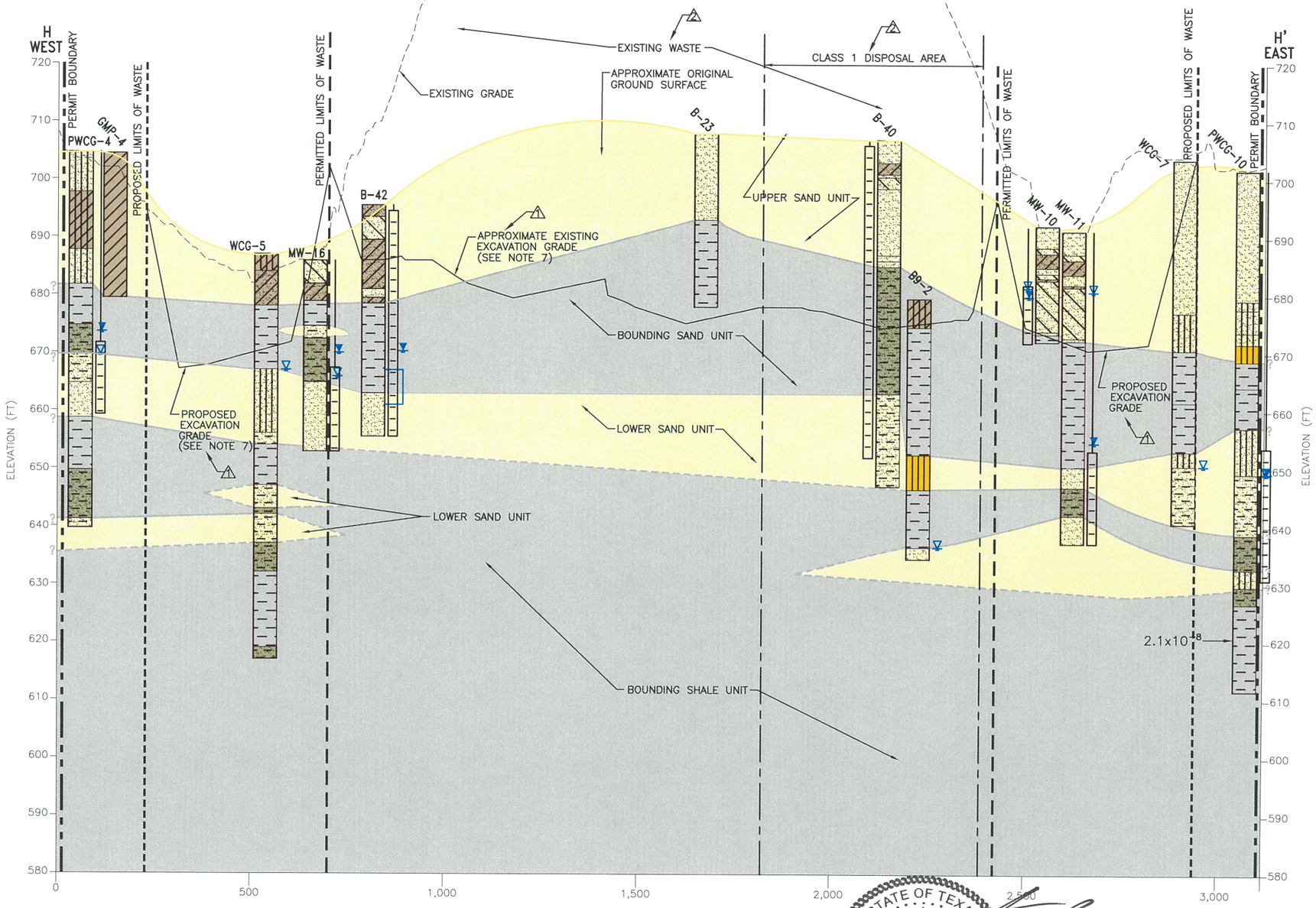

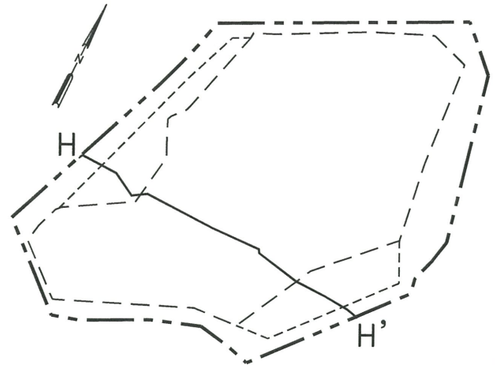

SECTION LOCATION MAP
NTS

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- SANDY CLAY
- CLAYEY SAND
- SHALE or SILTY SHALE
- SILTY CLAY
- SANDY SHALE
- SILTY SAND OR SILTY SANDSTONE
- SAND or SANDSTONE
- SILT OR SILTSTONE
- CLAY
- SHALY SAND or SHALY SANDSTONE

NOTES:

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0 10 20
VERTICAL SCALE IN FEET
0 150 300
HORIZONTAL SCALE IN FEET

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PROFESSIONAL GEOSCIENTIST
12/16/2022

LIST OF REVISIONS:

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2. ADDED EXISTING WASTE INFORMATION AND CLASS 1 DISPOSAL AREA INFORMATION.
3. ADDED NOTE 7.

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REVIEWED BY: NT

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FIGURE IIIG-C-9

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TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

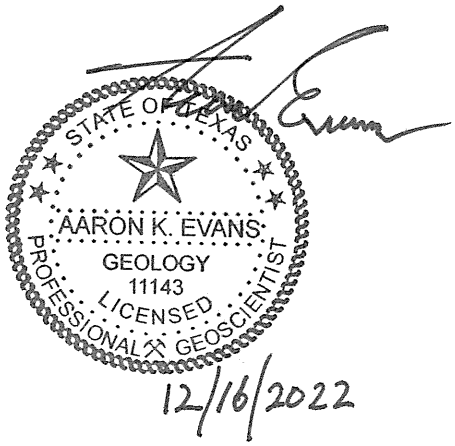
PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIH
GROUNDWATER SAMPLING AND ANALYSIS PLAN

Prepared for

Texas Regional Landfill Company, LP

February 2022

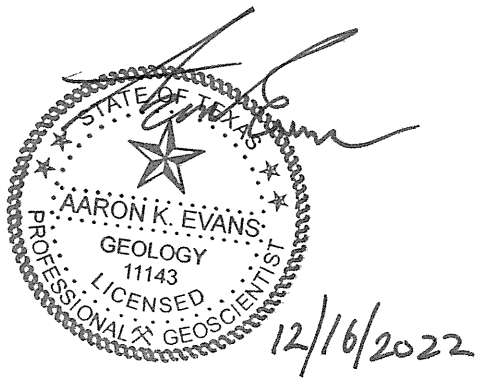
Revised November 2022



Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123



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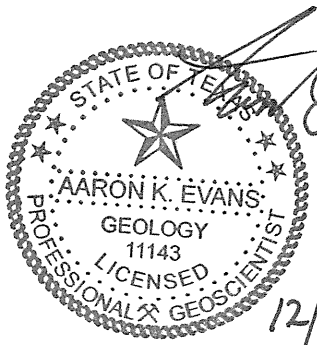

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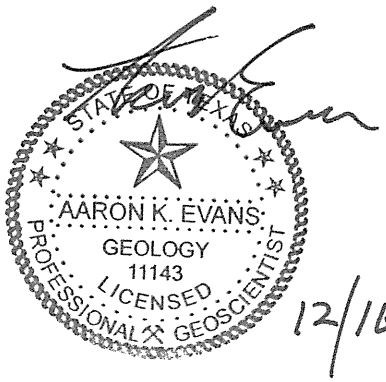

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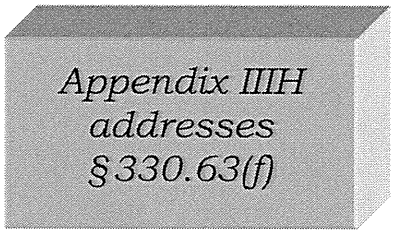
1 INTRODUCTION



This groundwater sampling and analysis plan (GWSAP) has been prepared for the Turkey Creek Landfill (Municipal Solid Waste [MSW] Permit No. 1417D). This plan incorporates the GWSAP procedures and methodology from the previous permit (MSW Permit No. 1417C). The following plan contains the groundwater monitoring system design aspects, system engineering report, the procedures for collecting representative samples from groundwater monitoring wells, and the basic laboratory requirements for obtaining representative data. The plan also includes monitoring well placement, design and construction, and well development procedures. This GWSAP has been prepared, and will be followed, in accordance with Title 30 TAC §330.401 through §330.415, §330.419 and §330.421. Groundwater monitoring will be conducted through the active life of the site and post-closure care period, pursuant to Title 30 TAC §330.401(f). Once approved, a copy of this GWSAP will be placed in the Site Operating Record.

wells, convert five existing piezometers to monitoring wells, install ~~four~~five new monitoring wells, and plug and abandon seven existing monitoring wells to accommodate the development of the lateral expansion areas and future perimeter drainage buildout.

As illustrated on Figure IIIH-A-1, and in accordance with Title 30 TAC §330.403, the proposed groundwater monitoring system network is designed with POC detection monitoring wells spaced less than 600-feet apart along a continuous approximately 8,100-foot-long point of compliance. A Groundwater Monitoring System Certification for the proposed network design is provided on page IIIH-A-4 in Appendix IIIH-A.

2.1.2.1 Point of Compliance Monitoring Wells

The existing system utilizes 16 POC monitoring wells which are located hydraulically downgradient of the permitted limits of waste (MW-3B, 7, 9, 13, 15, 19, 20, 21, 26, 27, 28, 29, 30, 31, 32 and 33). These existing POC monitoring wells are screened within Lower Sand unit and Bounding Shale unit sediments; except for MW-3B and MW-20 which are screened at shallower depths within the Upper Sand unit (spanning the Upper Sand and Bounding Shale unit contact). These two Upper Sand unit screened wells are strategically located near the lowest point of the landfill unit (MW-3B) and the lowest point immediately downgradient of the pre-Subtitle D fill area (MW-20). Monitoring wells MW-3B and MW-20 are paired with Lower Sand unit screened POC monitoring wells MW-26 and MW-21; respectively.

The proposed system network utilizes ~~18~~19 POC monitoring wells by retaining 10 existing POC monitoring wells (MW-3B, MW-15, MW-20, MW-21, MW-26, MW27, MW-28, MW-29, MW-30, MW-31), converting four existing piezometers to POC monitoring wells (MW-35[PWCG-3], MW-37[PWCG-1], MW-38[PWCG-9], MW-41[PWCG-12]), and installing ~~four~~five new POC monitoring wells (MW-36, MW-39, MW-40, ~~and~~ MW-42, and MW-43) as shown on Figure IIIH-A-1 in Appendix IIIH-A.

At least two years prior to waste placement in Sector 13 or Sector 14, monitoring wells MW-34, MW-35, and MW-37 will be converted from their former piezometer designations, new monitoring well MW-36 will be installed, and the wells will begin quarterly background data collection monitoring in accordance with Section 5.3. Existing monitoring wells MW-18 and MW-19 will be plugged and abandoned following background data collection completion and TCEQ acceptance of the background data statistical for monitoring wells MW-34 through MW-37.

At least two years prior to the development of Sector 12, monitoring wells MW-38 and MW-40 will be converted from their former piezometer designations, new monitoring wells MW-39, MW-40, and MW-42 will be installed, and the wells will begin quarterly background data collection monitoring in accordance with Section 5.3. Existing POC monitoring wells MW-7, MW-9, MW-13, MW-32, and MW-33 will be plugged and abandoned following the completion of background data collection and TCEQ acceptance of the background data statistical evaluation for monitoring wells MW-38 through MW-4~~3~~2.

Within 180 days of permit application approval, monitoring well MW-43 will be installed and the well will begin quarterly background data collection monitoring in accordance with Section 5.3.

2.1.2.2 Background Monitoring Wells

The existing system utilizes two background monitoring wells (MW-17 and MW-18) which are located hydraulically upgradient from the permitted limits of waste. Monitoring well MW-18 is screened within Lower Sand unit and Bounding Shale unit sediments and monitoring well MW-17 is screened at shallower depths within the Upper Sand unit.

The proposed system network utilizes ~~two~~three background monitoring wells (MW-17, ~~and~~ MW-34, and MW-44) by retaining existing Upper Sand unit screened background monitoring well MW-17, ~~and~~ converting existing Lower Sand unit screened piezometer PWCG-4 to background monitoring well MW-34, and installing new monitoring well MW-44, as shown on Figure IIIH-A-1 in Appendix IIIH-A.

At least two years prior to waste placement in Sector 13 or 14, replacement background monitoring well MW-34 will be converted from piezometer PWCG- and will begin quarterly background data collection monitoring in accordance with Section 5.3. Monitoring well MW-18 will be plugged and abandoned following the completion of background data collection and TCEQ acceptance of the background data statistical evaluation for monitoring well MW-34.

Collectively, background monitoring wells MW-17 and MW-34 will provide representative background groundwater quality data applicative to all POC detection monitoring wells in accordance with Title 30 TAC §330.403(a)(1). Monitoring well MW-17 will continue to provide background data which serves to support statistical analysis for comparably screened POC monitoring wells MW-3B and MW-20. Monitoring wells MW-34 and MW-44 will provide background data which serves to support statistical analysis for the facility's 16 comparably screened POC detection monitoring wells.

Within 180 days of permit application approval, monitoring well MW-44 will be installed and the well will begin quarterly background data collection monitoring in accordance with Section 5.3. Within six months of installation, the facility will evaluate the hydraulic gradient in the vicinity of MW-44. If it is determined that MW-44 is downgradient of the landfill unit, the facility will notify TCEQ and submit a permit modification to the Site Development Plan, in accordance with Title 30 TAC §305.70(j), to revise the designation of monitoring well MW-44 from background to POC monitoring well.

Table 2-1
Groundwater Monitoring Well Network

Well Name	Gradient Position	Current Condition	System Status
MW-3B	POC	Existing MW	Retained in system
MW-7	POC	Existing MW	To be removed from system
MW-9	POC	Existing MW	To be removed from system
MW-13	POC	Existing MW	To be removed from system
MW-15	POC	Existing MW	Retained in system
MW-17	BG	Existing MW	Retained in system
MW-18	BG	Existing MW	To be removed from system
MW-19	POC	Existing MW	To be removed from system
MW-20	POC	Existing MW	Retained in system
MW-21	POC	Existing MW	Retained in system
MW-26	POC	Existing MW	Retained in system
MW-27	POC	Existing MW	Retained in system
MW-28	POC	Existing MW	Retained in system
MW-29	POC	Existing MW	Retained in system
MW-30	POC	Existing MW	Retained in system
MW-31	POC	Existing MW	Retained in system
MW-32	POC	Existing MW	To be removed from system
MW-33	POC	Existing MW	To be removed from system
MW-34	BG	Existing Piezometer PWCG-4	To be converted to MW (Replacement for MW-18)
MW-35	POC	Existing Piezometer PWCG-3	To be converted to MW
MW-36	POC	Future MW	To be installed as new MW
MW-37	POC	Existing Piezometer PWCG-1	To be converted to MW
MW-38	POC	Existing Piezometer PWCG-9	To be converted to MW
MW-39	POC	Future MW	To be installed as new MW
MW-40	POC	Future MW	To be installed as new MW
MW-41	POC	Existing Piezometer PWCG-12	To be converted to MW
MW-42	POC	Future MW	To be installed as new MW
MW-43	POC	Future MW	To be installed as new MW
MW-44	BG	Future MW	To be installed as new MW

MW = Groundwater Monitoring Well.
POC = Point of compliance monitoring well located hydraulically downgradient from waste.
BG = Background monitoring well located hydraulically upgradient from waste.

2.2 Monitoring Well Design and Maintenance

Well location coordinates, nearest ground elevations, and top of casing elevations and well construction details for the facility's existing groundwater monitoring wells and future piezometer to monitoring well conversions were obtained from WCG asbuilt survey reports, lithologic borehole logs, and monitor well data sheets (provided in Appendix IIIG of the SDP). Construction details for the facility's five new monitoring

wells installations (MW-36, MW-28, MW-39, MW-42, ~~and~~ MW-43, and MW-44) are estimated from the existing subsurface and topographic data. These data are summarized in Figure IIIH-A-2 (Groundwater Monitoring Well Details). Typical groundwater monitoring well specifications are depicted in Figure IIIH-A-3. Review of monitoring well installation records indicate that the facility's existing monitoring wells, and the existing piezometers scheduled for future conversion to monitoring wells, are constructed in accordance with the requirements of Title 30 TAC §330.421.

All parts of the groundwater monitoring system will be operated and maintained so that they perform to design specifications throughout the life of the monitoring program. Any monitoring well that is damaged to the extent that it is no longer suitable for sampling will be reported to the TCEQ who may make a determination about whether to repair or replace the well. Well plugging and abandonment will be performed by a Texas-licensed monitoring well driller in accordance with TCEQ and any other applicable regulatory requirements. No monitoring well will be plugged and abandoned without prior written authorization from TCEQ. Any new or replacement monitoring well installation will be performed in accordance with Title 30 TAC §330.421 by a Texas-licensed monitoring well driller. Monitoring well construction will provide for the maintenance of the integrity of the borehole, collection of representative groundwater samples from the uppermost aquifer, and prevention of migration of groundwater and surface water within the borehole in accordance with Title 30 TAC §330.421(a).

2.3 Groundwater Monitoring Program

Facility detection monitoring wells will be sampled semi-annually for the detection monitoring parameters listed in 40 Code of Federal Regulations (CFR), Part 258, Appendix I, which are also listed in Table 5-1 in Section 5.1. Details regarding groundwater sampling, analyses, and statistical comparison procedures are discussed in the following sections of Appendix IIIH.

In accordance with Title 30 TAC §403(e)(3), Texas Regional Landfill Company, LP will promptly notify the executive director, and any local pollution agency with jurisdiction that has requested to be notified, in writing of changes in facility construction or operation or changes in adjacent property that affect or are likely to affect the direction and rate of groundwater flow and the potential for detecting groundwater contamination and that may require the installation of additional monitoring wells or sampling points. Such additional wells or sampling points require a modification of the site development plan which will be requested in accordance with Title 30 TAC §305.70(j).

facility will submit an application for a permit amendment or modification to make appropriate changes within 90 days of this determination.

5.6.2 Semiannual Assessment Monitoring Reporting

If there are one or more facility wells in assessment monitoring status, then the facility will submit a semiannual assessment monitoring report within 60 days after completion of each semiannual groundwater assessment monitoring event. The semiannual groundwater assessment monitoring report will include the same data and information required in the facility's semiannual detection monitoring report (as defined in Section 5.6.1), but will be specific to the facility's assessment monitoring wells, constituents, and statistics. The assessment monitoring statistical results will be compared to Groundwater Protection Standard concentrations to determine if the results are statistically significant.

The required semiannual groundwater assessment monitoring information may be provided either within the facility's semiannual detection monitoring report or submitted in an assessment-specific semiannual groundwater report. If the required detection and assessment monitoring information are combined into a single semiannual report submittal, then the combined report will be submitted to TCEQ within 60 days after completion of the semiannual groundwater monitoring event.

6 STATISTICAL METHODOLOGY – GROUNDWATER DATA ANALYSES

6.1 Statistical Methodology

Statistical analyses of groundwater analytical data will be performed in accordance with Title 30 TAC §330.405, §330.407, and §330.409, and EPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance (March, 2009). Statistical comparisons will be performed using Sanitas™, a commercial software program developed by Sanitas Technologies, Inc. or other equivalent statistical program. Flow charts depicting statistical analyses protocols for control charts, prediction limits, and 95 percent confidence intervals are included in Appendix IIIH-F. It is not possible to predict all future potential circumstances. Therefore, alternate statistical methods may be used as deemed appropriate for the data distribution of the constituents being evaluated, providing that they conform to the requirements and guidelines set forth in Title 30 TAC §330.407 and §330.409, and EPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance (March, 2009).

6.2 Exceedances, Resampling, ASDs, and Assessment Monitoring

Detection monitoring for the constituents listed in Table 5-1 of Section 5.1 and referenced in Title 30 TAC §330.419(a) will be conducted in accordance with Sections 5.3 and 5.5. An Initial Statistical Exceedance (ISE) of any constituent will be based on a detected concentration that exceeds the constituent's statistical limit. If an ISE of any constituent is indicated at any detection monitoring well, a notice will be made to the TCEQ (and any other pollution control agency with jurisdiction that has requested to be notified) within 14 days.

6.2.1 Verification Resampling

Verification re-sampling is an integral part of the statistical methodology that is required to verify if an actual SSI has occurred. In the event that an ISE is indicated for any constituent listed in Table 5-1 (Section 5.1), verification resampling will be completed to either confirm or disconfirm the ISE. The verification resampling results will be submitted to TCEQ within the appropriate regulatory timeframe. If the ISE is verified through resampling then the verified exceedance constitutes a Statistically Significant Increase (SSI) and the facility will either:

(1) Notify the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) in writing of the verified SSI within 14 days and begin assessment monitoring within 90 days of the written notice (Title 30 TAC §330.407(b)(1)), or

(2) Within 14 days of the verified SSI determination date, notify the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) in writing of the facility's intent to submit an alternative source demonstration (ASD) report; and

(3) Within 90 days of the verified SSI determination, submit an ASD report to the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) that demonstrates that a source other than the facility caused the contamination or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Title 30 TAC §330.407(b)(3)(B)). The report must be prepared and certified by a qualified groundwater scientist. If the report does not sufficiently demonstrate an alternative contamination source to the TCEQ, then the facility must begin assessment monitoring with 90 days of the written ASD intent notification.

If the ASD is accepted by TCEQ then the monitoring well may remain in detection monitoring status. If the owner/operator does not make a demonstration satisfactory to the executive director within 90 days of the date of the SSI notice, as made evident by a letter of denial from TCEQ, then the owner/operator will initiate an assessment monitoring program meeting the requirements of Title 30 TAC §330.409.

6.3 Assessment Monitoring

Assessment monitoring will be conducted at least semiannually in accordance with Title 30 TAC §330.409. The landfill will sample and analyze the groundwater monitoring system for the full list of constituents in 40 CFR, Part 258, Appendix II. Analyses for these constituents will also be conducted for the each well located on either side of the well exhibiting the verified SSI, unless an alternative subset of wells is designated by the TCEQ.

For any new constituent detected in the point of compliance wells as a result of the completed Appendix II analysis, a minimum of four statistically independent samples from each background well will be collected and analyzed to establish background levels for the additional constituent, unless an alternative subset of Appendix II background constituent analyses is designated by the TCEQ. After sampling the assessment monitoring wells for Appendix II constituents, the TCEQ may specify an appropriate subset of wells to be sampled and analyzed for the Appendix II constituents during assessment monitoring and may delete any of the Appendix II

constituents if the landfill demonstrates that the constituents are not reasonably expected to be in or derived from the waste contained in the unit.

If the concentrations of all 40 CFR Part 258, Appendix II constituents are shown to be at or below background values, using the statistical procedures in §330.405(f), for two consecutive sampling events, the owner or operator will notify the Executive Director in writing and return to detection monitoring if approved.

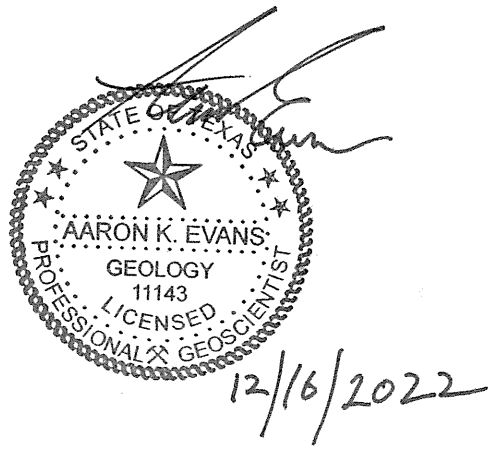
6.4 Corrective Action Monitoring

Detection of assessment monitoring constituents at statistically significant levels, as defined in Title 30 TAC §330.409, could result in corrective action monitoring. Groundwater monitoring for the purpose of corrective action assessment and remediation will be conducted in accordance with Title 30 TAC §330.411 through §330.415, and in consultation with TCEQ. At a minimum, the assessment will address the following:

- a characterization of the contaminated groundwater, including concentrations of assessment constituents as defined in 30 TAC §330.409;
- the concentration limit for each constituent found in the groundwater;
- detailed plans and an engineering report describing the corrective action to be taken;
- a description of how the groundwater monitoring program will demonstrate the adequacy of the corrective action; and
- a schedule for submittal of the above information provided the owner or operator obtains written authorization from the executive director prior to submittal of the complete permit application.

APPENDIX IIIH-A

GROUNDWATER MONITORING SYSTEM



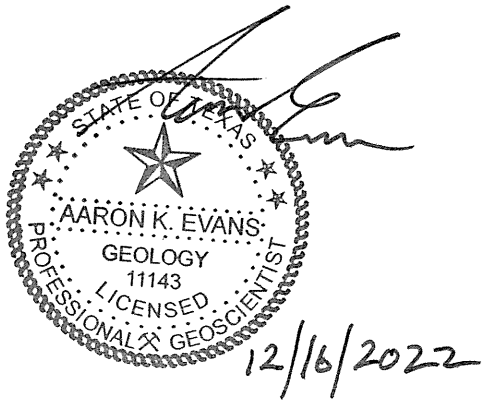
CONTENTS

FIGURE IIIH-A-1 – Groundwater Monitoring System Layout
FIGURE IIIH-A-2 – Groundwater Monitoring Well Details
FIGURE IIIH-A-3 – Typical Monitoring Well Details

Groundwater Monitoring System Certification IIIH-A-4

WCG Groundwater Monitoring Well and Piezometer Asbuilt Survey Reports IIIH-A-5

Carel Corporation Groundwater Potentiometric Surface Maps IIIH-A-10



STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST

12/16/2022

TURKEY CREEK

BP PIPELINE EASEMENT (GAS)

576' 520' 569' 499' 577' 580' 381' 540' 551' 404' 581' 583' 543' 590'

MW-20 (646.82)
MW-21 (646.18)
MW-19 (651.34)
MW-37 (PWCG-1) (651.39)
MW-28 (641.42)
MW-29 (639.65)
MW-3B (640.14)
MW-26 (639.44)
MW-30 (639.82)
MW-36
MW-35 (PWCG-3) (669.89)
MW-18 (674.01)
MW-34 (PWCG-4) (673.58)
MW-3 (645.50)
MW-27 (643.66)
MW-15 (642.86)
MW-32 (653.25)
MW-13 (653.71)
MW-33 (658.32)
MW-38 (PWCG-9) (643.34)
MW-17 (711.54)
MW-44
MW-43
MW-42
MW-7 (660.72)
MW-9 (660.61)
MW-39
MW-40
MW-41 (PWCG-12) (658.40)

SECTOR 1A
SECTOR 1B
SECTOR 2A
SECTOR 2B
SECTOR 3A
SECTOR 3B
SECTOR 4A
SECTOR 4B
SECTOR 4C
SECTOR 5
SECTOR 6A
SECTOR 6B
SECTOR 7A
SECTOR 7B
SECTOR 7C
SECTOR 8A
SECTOR 8B
SECTOR 8C
SECTOR 9A
SECTOR 9B
SECTOR 10A
SECTOR 10B
SECTOR 11A
SECTOR 11 (UNDEVELOPED)
SECTOR 12
SECTOR 13
SECTOR 14
PRE-SUBTITLE D AREA

645 650 655 660 665 670

M.K.J. RAILROAD
LEACHATE STORAGE TANK
MAINTENANCE BUILDING LOCATION
LANDFILL OFFICE
IH35 SERVICE ROAD
SCALEHOUSE
BP PIPELINE EASEMENT (GAS)
WHEEL WASH/DE-MUDDING AREA
SITE ENTRANCE
ACCESS ROAD
CR313
CR107
IH35

N 6816000 N 6815500 N 6815000 N 6814500 N 6814000 N 6813500 N 6813000 N 6812500
E 2366500 E 2367000 E 2367500 E 2368000 E 2368500 E 2369000 E 2369500 E 2370000 E 2370500 E 2371000
32° 21' 20" 97° 12' 20"

0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EXISITNG EASEMENT
- PROPOSED EASEMENT RELOCATION
- SECTOR BOUNDARY
- PRE-SUBTITLE D AREA
- MW-7 (660.72) EXISTING GROUNDWATER MONITORING WELL (TO REMAIN) WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (660.61) EXISTING GROUNDWATER MONITORING WELL (TO BE REMOVED) WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-34 (PWCG-4) (673.58) PROPOSED GROUNDWATER MONITORING WELL (TO BE CONVERTED FROM EXISTING PIEZOMETER) WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-34 PROPOSED GROUNDWATER MONITORING WELL (TO BE INSTALLED)
- 670 UPPERMOST AQUIFER GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION CONTOUR IN FT-MSL
- EXISTING POINT OF COMPLIANCE
- PROPOSED POINT OF COMPLIANCE
- ⚠ INDICATES REVISION (SEE LIST OF REVISIONS)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. EXISTING MONITORING WELL AND PIEZOMETER LOCATION COORDINATES OBTAINED FROM AS-BUILT SURVEYS PERFORMED BY WEAVER CONSULTANTS GROUP IN 2020 AND 2021.
3. GROUNDWATER ELEVATIONS GAUGED BY WCG ON SEPTEMBER 15, 2021 AND POSTED IN FT-MSL BY EACH MONITORING WELL AND PIEZOMETER LOCATION.
4. MONITORING WELLS MW-3B, MW-17, AND MW-20 ARE SCREENED IN UPPER SAND UNIT SEDIMENTS AND HAVE NOT BEEN CONTOURED.
5. PROPOSED MONITORING WELLS WILL BE INSTALLED, OR CONVERTED FROM EXISTING PIEZOMETERS, AS LANDFILL IS DEVELOPED IN ACCORDANCE WITH SECTION 2.0, FIGURE IIIH-A-2, AND FIGURE IIIH-A-3 OF THE FACILITY'S GWSAP.
6. ⚠3 PROPOSED MONITORING WELL MW-44 PROJECTED AS BACKGROUND WELL, BUT MAY BE CONVERTED TO POC WELL IF THE HYDRAULIC GRADIENT INDICATE THE WELL TO BE DOWNGRADIENT OF THE LANDFILL UNIT FOLLOWING INSTALLATION.

LIST OF REVISIONS:

1. MW-43 AND MW-44 ADDED TO PROPOSED SYSTEM DESIGN.
2. POINT OF COMPLIANCE EXTENDED TO MW-43.
3. NOTE ADDED TO CLARIFY THE ADDITION OF MW-44.

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: IIIH-A-1-GW SYSTEM LAYOUT.DWG
DRAWN BY: JDW
DESIGN BY: AKE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT GROUNDWATER MONITORING SYSTEM LAYOUT

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

WWW.WCGRP.COM

FIGURE IIIH-A-1

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O:\0771\368\EXPANSION 2021\PART III\IIIH\IIIH-A-1-GW SYSTEM LAYOUT.dwg, jwilson, 1:2

MONITORING WELL NAME	BACKGROUND (BG) OR POINT OF COMPLAINCE (POC) WELL?	INSTALL DATE	NAD 83 STATE PLANE COORDINATES		TOP OF CASING ELEVATION	GROUND ELEVATION	MONITORING WELL CONSTRUCTION DEPTHS				MONITORING WELL CONSTRUCTION ELEVATIONS				GROUNDWATER ELEVATION[4]
			NORTHING	EASTING			TOP OF FILTER PACK	TOP OF SCREEN	BOTTOM OF SCREEN	BOTTOM OF FILTER PACK	TOP OF FILTER PACK	TOP OF SCREEN	BOTTOM OF SCREEN	BOTTOM OF FILTER PACK	
EXISTING MONITORING WELLS - TO REMAIN IN SYSTEM															
MW-3B[5]	POC	Oct-90	6816304.53	2369610.69	671.04	670.0	27.6	29.6	39.6	39.9	642.4	640.4	630.4	630.1	640.14
MW-15	POC	Dec-93	6814727.75	2370465.60	676.80	674.4	60.0	63.0	68.0	69.0	614.4	611.4	606.4	605.4	642.86
MW-17	BG	May-95	6812392.27	2367830.51	729.55	727.6	16.5	17.7	22.7	23.5	711.1	709.9	704.9	704.1	711.54
MW-20	POC	May-95	6815639.26	2368219.11	660.96	659.1	11.8	13.5	18.5	19.0	647.3	645.6	640.6	640.1	646.82
MW-21	POC	May-95	6815645.65	2368231.68	660.84	659.1	27.3	33.8	43.8	45.0	631.8	625.3	615.3	614.1	646.18
MW-26[5]	POC	May-95	6816325.71	2369640.88	663.95	661.4	36.0	39.5	49.5	50.0	625.4	621.9	611.9	611.4	639.44
MW-27	POC	May-95	6815204.53	2370131.83	688.64	686.7	62.5	70.2	80.2	83.0	624.2	616.5	606.5	603.7	643.66
MW-28	POC	Oct-09	6815911.12	2368678.84	661.55	658.6	22.0	25.0	35.0	35.0	636.6	633.6	623.6	623.6	641.42
MW-29	POC	Oct-09	6816196.93	2369170.59	662.04	658.7	23.5	26.5	36.5	36.5	635.2	632.2	622.2	622.2	639.65
MW-30	POC	Oct-09	6816139.27	2369958.22	665.53	663.1	30.0	32.0	42.0	42.0	633.1	631.1	621.1	621.1	639.82
MW-31	POC	Oct-09	6815590.54	2370014.49	690.95	688.1	53.0	55.0	65.0	65.0	635.1	633.1	623.1	623.1	645.50
EXISTING MONITORING WELLS - TO BE REMOVED FROM SYSTEM															
MW-7	POC	Dec-93	6812923.65	2368851.92	710.96	709.1	45.0	58.0	68.0	69.0	664.1	651.1	641.1	640.1	660.72
MW-9	POC	Dec-92	6813054.66	2369368.04	702.20	700.3	33.0	49.0	74.0	74.0	667.3	651.3	626.3	626.3	660.61
MW-13[5]	POC	Dec-92	6814103.66	2369908.98	691.84	688.9	42.1	44.1	54.1	54.1	646.8	644.8	634.8	634.8	653.71
MW-18	BG	May-95	6813938.76	2367556.26	688.85	686.8	21.0	23.5	33.5	34.0	665.8	663.3	653.3	652.8	674.01
MW-19	POC	May-95	6815283.03	2367805.84	673.17	670.8	29.5	32.2	42.2	43.5	641.3	638.6	628.6	627.3	651.34
MW-32	POC	Oct-09	6814466.96	2370203.86	698.03	695.1	58.0	60.0	70.0	70.0	637.1	635.1	625.1	625.1	653.25
MW-33[5]	POC	Sep-09	6813628.83	2369587.47	705.73	702.0	61.6	63.6	73.6	73.6	640.4	638.4	628.4	628.4	658.32
PROPOSED MONITORING WELLS - TO BE ADDED TO SYSTEM															
MW-34 (PWCG-4)[6]	BG	Jul-21	6813684.57	2367265.44	704.65	704.6	33.0	35.4	45.4	50.0	671.6	669.3	659.3	654.6	673.60
MW-35 (PWCG-3)[6]	POC	Aug-21	6814236.20	2367438.65	692.71	689.6	28.0	30.9	40.9	50.0	661.6	658.7	648.7	639.6	669.90
MW-36[7]	POC	TBD	6814790.87	2367605.97	697.00	694.0	35.0	37.0	47.0	48.0	659.0	657.0	647.0	646.0	663.81
MW-37 (PWCG-1)[6]	POC	Aug-21	6815354.23	2367733.98	676.85	673.8	28.0	30.3	40.3	42.0	645.8	643.5	633.5	631.8	651.40
MW-38 (PWCG-9)[6]	POC	May-21	6814149.29	2370537.73	699.98	697.1	52.0	56.4	66.4	70.0	645.1	640.7	630.7	627.1	643.30
MW-39[7]	POC	TBD	6814727.75	2370465.60	702.00	705.0	48.0	51.0	66.0	67.0	657.0	654.0	639.0	638.0	652.52
MW-40[7]	POC	TBD	6813273.49	2369897.49	707.00	710.0	58.0	61.0	76.0	77.0	652.0	649.0	634.0	633.0	657.10
MW-41 (PWCG-12)[6]	POC	May-21	6812843.77	2369563.48	708.29	705.1	59.0	64.2	79.2	81.0	646.1	640.9	625.9	624.1	658.40
MW-42[7]	POC	TBD	6812890.50	2368980.40	709.00	711.0	45.0	55.0	70.0	71.0	666.0	656.0	641.0	640.0	660.70
⚠1 MW-43[7]	POC	TBD	6812646.58	2368453.79	717.00	714.0	53.0	58.0	73.0	74.0	661.0	656.0	641.0	640.0	662.00
⚠1 MW-44[7]	TBD[9]	TBD	6812360.39	2367938.64	739.00	736.0	75.0	80.0	95.0	96.0	661.0	656.0	641.0	640.0	670.00

NOTES:

1. ALL ELEVATIONS LISTED IN FEET ABOVE MEAN SEA LEVEL (FT-MSL); ALL DEPTHS LISTED IN FEET BELOW GROUND SURFACE (FT-BGS).
2. EXISTING MONITORING WELL COORDINATES, TOP OF CASING ELEVATIONS, AND GROUND ELEVATIONS OBTAINED FROM ASBUILT SURVEY CONDUCTED BY WEAVER CONSULTANTS GROUP IN JANUARY 2020.
3. MONITORING WELL COMPLETION DETAILS FOR EXISTING WELLS AND PROPOSED PIEZOMETER TO WELL CONVERSIONS OBTAINED FROM MONITOR WELL DATA SHEETS AND/OR LITHOLOGIC LOGS AND REFLECT ASBUILT CONDITION.
4. GROUNDWATER ELEVATIONS GAUGED BY WEAVER CONSULTANTS GROUP IN SEPTEMBER 2021.
5. EXISTING MONITORING WELLS MW-3B, MW-13, MW-26, AND MW-33 HAVE BEEN RAISED SINCE INITIAL INSTALLATION; LISTED INFORMATION REFLECTS ASBUILT CONDITION AS SURVEYED IN JANUARY 2020.
6. DETAILS FOR MONITORING WELLS PROPOSED FOR CONVERSION FROM EXISTING PIEZOMETERS OBTAINED FROM ASBUILT SURVEY CONDUCTED BY WCG IN SEPTEMBER 2021 WITH FORMER PIEZOMETER NAME LISTED IN PARENTHESIS.
7. ⚠2 DETAILS FOR PROPOSED FUTURE MONITORING WELL INSTALALTIONS ESTIMATED FROM EXISTING SUBSURFACE INVESTIGATION DATA; ACTUAL DETAILS TO BE DETERMINED AT TIME OF INSTALLATION BASED ON SUBSURFACE CONDITIONS ENCOUNTERED.
8. TBD = TO BE DETERMINED.
9. ⚠2 FUTURE MONITORING WELL MW-44 PROJECTED AS BACKGROUND WELL; BUT MAY BE CONVERTED TO POC WELL IF THE HYDRAULIC GRADIENT INDICATE THE WELL TO BE DOWNGRADIENT OF THE LANDFILL UNIT FOLLOWING INSTALLATION.

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST
12/16/2022

⚠1 INDICATES REVISION (SEE LIST OF REVISIONS)

LIST OF REVISIONS:

1. MW-43 AND MW-44 ADDED TO PROPOSED SYSTEM.
2. NOTES REVISED TO ACCOMODATE ADDITION OF MW-43 AND MW-44.

☐ DRAFT
☒ FOR PERMITTING PURPOSES ONLY
☐ ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: IIIH-A-2-WELL DETAILS.DWG
DRAWN BY: JDW
DESIGN BY: AKE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2022	SEE LIST OF REVISIONS

MAJOR PERMIT AMENDMENT
GROUNDWATER MONITORING WELL DETAILS

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE IIIH-A-2

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O:\0771\368\EXPANSION 2021\PART III\IIIH\IIIH-A-2-WELL DETAILS.dwg, jwilson, 1:2

GROUNDWATER MONITORING SYSTEM CERTIFICATION

General Site Information

Site: Turkey Creek Landfill

Site Location: Johnson County

MSW Permit No.: 1417D

Qualified Groundwater Scientist Statement

I, Aaron K. Evans, am a registered professional geoscientist in the State of Texas and a qualified groundwater scientist as defined in Title 30 TAC §330.3(120). I have reviewed the groundwater monitoring system and supporting details contained herein. In my professional opinion, the groundwater monitoring system design and construction details are in compliance with the groundwater monitoring requirements specified in Title 30 TAC §§330.401, 330.403, 330.405, 330.407, 330.409, 330.419, and 330.421. This system has been designed for the Turkey Creek Landfill. The only warranty made by me in connection with this document is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

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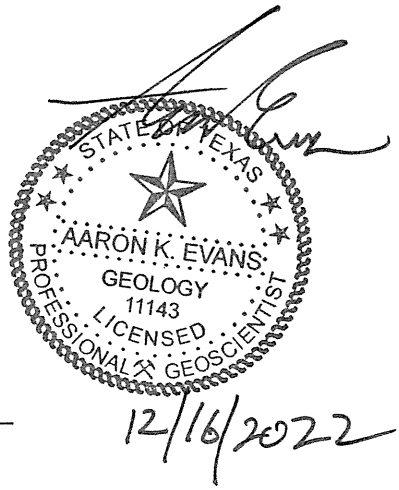

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Aaron K. Evans, P.G., Texas License No. 11143

Date: 12/16/2022

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TCEQ PERMIT NO. MSW-1417D

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VOLUME 5 OF 6

Prepared for

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February 2022

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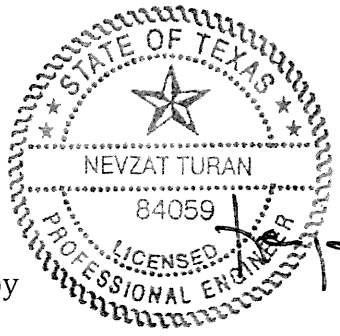

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MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 5 OF 6

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TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

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APPENDIX III I
LANDFILL GAS MANAGEMENT PLAN

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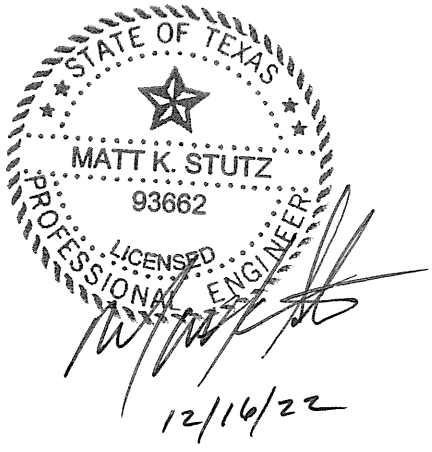

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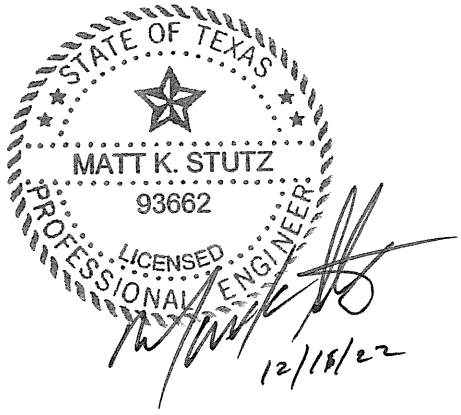

The LFG monitoring (postclosure care period) program will continue for a period of 30 years after final closure of the facility or until the owner or operator receives written authorization from TCEQ to revise or discontinue the program. The request to revise or discontinue LFG monitoring program will be based on a demonstration along with collected data by the owner or operator that there is no potential for gas migration along the property boundary or into on-site structures.

3 MONITORING

3.1 Perimeter Monitoring

3.1.1 Existing Perimeter Monitoring Network

The site currently has thirteen permanent existing LFG monitoring probes and seven utility trench vents to monitor the concentration of methane gas in accordance with Title 30 TAC §330.371(a)(2). The locations of the existing perimeter monitoring probes/vents are shown on Figure III I-A-1 in Appendix III I-A. The boring logs for the existing LFG monitoring probes are included in Appendix III I-C.

Currently, there are no LFG monitoring probes installed along the northern perimeter of the permit boundary due to the presence of Turkey Creek, which act as a natural barrier to any potential LFG migration in this area. However, a utility trench vent has been installed to serve the gas pipeline along the northern permit boundary shown on Figure III I-A-1 in Appendix III I-A. Given that there are no changes to the permit boundary or the waste placement along the northern boundary and Turkey Creek runs along the vicinity which acts as a natural barrier for gas migration, the northern trench vent will continue to be monitored concurrent with other perimeter probes/vents monitoring events along the northern permit boundary. In addition, the post-closure land use will not interfere with the gas monitoring and control system.

As a result of the proposed landfill expansion as listed in Table III I-1, 9 of the existing LFG monitoring probes will be abandoned and re-drilled, 4 new probes will be added, and 4 of the existing LFG monitoring probes will remain. At landfill completion, the monitoring network will consist of 17 LFG monitoring probes as shown on Figure III I-A-1 in Appendix III I-A. The existing probes will be abandoned and re-drilled to allow for future filling and site operations. The abandonment will include removing the surface completion material, attempting to pull the probe casing materials, and grouting the borehole with bentonite grout from the total depth to surface. The probes will be abandoned and plugged in accordance with applicable rules in Title 16 TAC Chapter 76.

3.1.2 Proposed Landfill Gas Monitoring Network

As part of the proposed landfill expansion, 9 existing probes will be abandoned and 13 new probes will be installed as the site develops. The proposed perimeter landfill gas monitoring network will consist of seventeen (17) LFG monitoring probes. The 6 new probes along the western side (GMP-1A, GMP-2A, GMP-3A, GMP-4A, GMP-5B, and GMP-14) will be installed prior to the development of Sectors 13 and/or 14 and remaining 7 new probes will be installed within 12 months following the issuance of the permit (MSW-1417D) by TCEQ. The proposed probes will be installed ~~prior to abandoning the existing probes and installed~~ in accordance with applicable rules in Title 16 TAC Chapter 76.

The location of the proposed new probes, the existing probes that will be abandoned, and the existing probes that will be remain in-place are shown on Figure III I-A-1 in Appendix III I-A. The proposed probe is designed to be single tube probe and will be installed similar to the detail shown on Figure III I-A-2 in Appendix III I-A. The depth of the new probe will be dependent on the field conditions at the time of installation, however at a minimum; the depth of the probe will extend down to the lowest bottom of waste placement elevation within 1,000 feet of the proposed probe location. Data regarding the new probes is summarized in Table III I-2 below.

Table III I-2
Proposed LFG Monitoring Probe Data[1]

Probe ID	Probe Ground Surface Elevation[2] (ft msl)	Lowest Bottom of Waste within 1,000 ft[3] (ft msl)	Proposed Probe Bottom Elevation (ft msl)	Proposed Boring Depth (ft bgs)
GMP-1A	693	656	654	39
GMP-2A	673	653	651	22
GMP-3A	689	656	654	35
GMP-4A	704	665	663	41
GMP-5B	711	667	665	46
GMP-7B	708	672	670	38
GMP-8A	705	670	668	37
GMP-9B	710	662	660	50
GMP-10B	692	655	653	39
GMP-14	700	665	663	37
GMP-15	730	674	672	58
GMP-16	712	672	670	42
GMP-17	702	659	657	45

[1] The data given is approximate. Actual probe ground elevation, bottom elevation, and depth will be determined prior to and/or at the time of installation.
[2] Probe ground surface elevation based on aerial topographic survey flown on January 8, 2021.
[3] Lowest bottom of waste elevation within 1,000 feet of the proposed probe based on Drawing I/IIA.9 – Excavation/Overliner Plan included in Parts I/II, Appendix A.

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JOHNSON COUNTY, TEXAS
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MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIJ
CLOSURE PLAN

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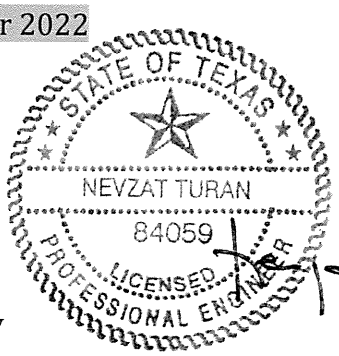

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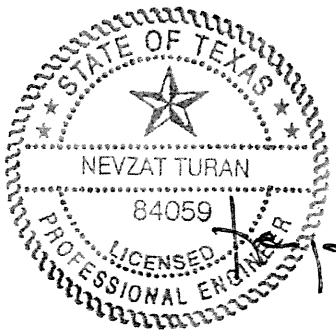

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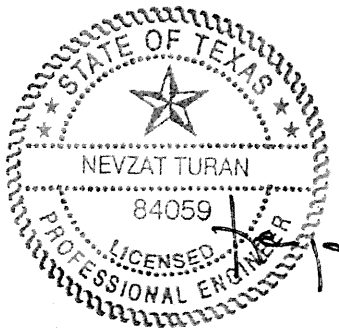

2 FINAL COVER SYSTEM

2.1 Introduction

The final cover system for the Turkey Creek Landfill has been developed to incorporate the requirements of Title 30 TAC §330.457(f)(4). The rules state that the owner or operator of an MSW landfill unit shall complete closure activities for the unit in accordance with the approved closure plan within 180 days following the initiation of closure activities (closure activities for MSW landfill units shall begin no later than 30 days after the date on which the unit receives the known final receipt of wastes, or, if the unit has remaining capacity and there is a reasonable likelihood that the unit will receive additional wastes, no later than one year after the most receipt of wastes). Such a system will include installation of a multi-layer cover system and a storm water runoff control system. The storm water runoff controls are addressed in Appendix IIIF – Surface Water Drainage Plan. The surface drainage and erosion control measures include in Appendix IIIF are applicable to all final cover options. The final cover system design is discussed below. Final cover system design drawings are included in Appendix IIIA-A.

2.2 Cover System Design

Final cover for MSW (only) areas, including areas with both pre-Subtitle D or Subtitle D bottom liners will be constructed consistent with the requirements of Title 30 TAC §330.457(a)(1) or (d), as presented in Table IIIJ-1 below. Pre-Subtitle D and Subtitle D MSW disposal areas may be closed with a Water Balance (WB) cover consistent with the Alternative Final Cover requirements of 30 TAC §330.457(d) and TCEQ Guidance for Requesting a Water Balance (WB) Alternative Final Cover for a Municipal Solid Waste Landfill, March 2017 (RG-494), as demonstrated in Appendices IIIJ-A and IIIJ-B of this appendix and presented in Table IIIJ-1. Appendix IIIJ-B includes a demonstration of equivalency of the proposed WB Final Cover Daily Option 2 (as labeled in R6-494), and the cover system described in Title 30 TAC §330.457(a)(1). Final cover for Class 1 areas will be constructed consistent with the requirements of Title 30 TAC 330.457(b), as presented in Table IIIJ-1 of this appendix.

Both standard Subtitle D and alternative final cover systems will be available for the closure of the MSW only portions of the site (i.e., alternative WB final cover system is not applicable to Class 1 areas). The final cover system will provide a low maintenance

cover, protect against erosion, reduce rainfall percolation through the cover system and subsequently minimize leachate generation within the landfill. As depicted on Figure IIIJ-1 (and Drawing A.3 – Landfill Completion Plan in Appendix IIIA-A), a maximum slope of 6 percent is provided for the top slopes. Typical sideslopes 3.5H:1V for the MSW only area and 4H:1V for the Class 1 area are provided to minimize erosion and facilitate drainage of the landfill.

2.2.1 Final Cover System Options

The final cover system options that are applicable for both composite liner (Class 1 and MSW areas) and overliner areas, as well as pre-Subtitle D areas that currently do not have final cover, are shown in Table IIIJ-1 and as depicted in Figure IIIJ-2. To date, no final cover has been placed at the site.

- Engineering plans will be developed to address site closure at the time of discontinued waste filling.
- The final waste received will be placed and properly compacted.
- Excavations will be filled with suitable material, and the site will be graded to promote runoff and prevent ponding.
- The final cover system will be constructed according to specifications.
- The top of the landfill will be regraded and reshaped as needed to provide the proper slope for positive drainage.
- As noted above (first bullet), a revised final closure plan will be developed and submitted to the TCEQ for approval.
- Following application of final cover, the site will be vegetated with appropriate grasses to minimize erosion. The established grasses will provide a minimum of ~~90~~ 95 percent coverage of the final cover system.
- A surface water management system will be constructed to minimize erosion.
- A closure certification will be prepared by an independent licensed professional engineer and submitted to TCEQ for approval.
- All proper notices and documentation will be filed with the appropriate agencies.

3.2.1 Estimate of Largest Active Disposal Area

Consistent with Title 30 TAC §330.503(a), the largest area that could be open within the next year is shown on Figure IIIL-1 in Appendix IIIL. Consistent with this rule and TCEQ guidelines for financial assurance to complete closure and postclosure activities, financial assurance will be posted for the current active area as discussed in Appendix IIIL – Cost Estimate for Closure and Postclosure Care. As additional liner areas developed, Appendix IIIL will be updated (closure plan does not need to be updated) per §305.70(j) to ensure continued compliance with financial assurance requirements. The entire 219.6-acre site will also need to be administratively closed.

Supporting calculations are presented in Appendix IIIL – Cost Estimate for Closure and Postclosure Care.

3.2.2 Estimate of Maximum Inventory of Waste Ever On Site

The estimate of maximum inventory of waste (defined as waste and daily cover) ever on site over the active life of the facility is approximately 37.7 million cubic yards. The site life calculations (Appendix IIIN – Site Life Calculations) show that

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PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIJ-A
WATER BALANCE FINAL COVER DESIGN – OPTION 1

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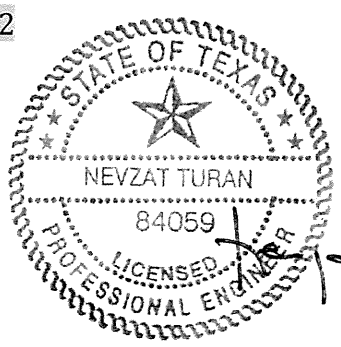

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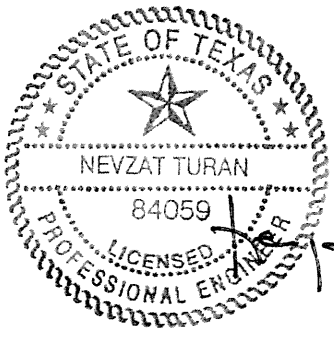
1 WB FINAL COVER DESIGN – OPTION 1 **IIIJ-A-1**



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1 WB FINAL COVER DESIGN – OPTION 1

This option has been developed based on Section 4.1 Option 1 – Statewide Design Table included in the TCEQ Guidance for Requesting a Water Balance (WB) Alternative Final Cover for a Municipal Solid Waste Landfill, March 2017 (RG-494). Any changes related to Option 1 in the referenced guidance document will be adapted to this design per §305.70(j). A typical detail describing both Option 1 and Option 1 is shown on Figure IIIJ-A-1.

Based on the TCEQ Guidance document, the site is located in the Geoclimatic Region 7-Dallas which allows for a 3 ft. 10 inches thick minimum storage layer thickness that will be overlain by a 6-inch thick erosion layer. The following final cover description is based on the TCEQ Guidance document:

- Final cover storage layer thickness = 3 feet 10 inches
- Erosion layer thickness = 6 inches
- Hydraulic conductivity of final cover storage layer at construction = 1×10^{-8} cm/s
- Hydraulic conductivity of final cover storage layer at service = 1×10^{-6} cm/s

Vegetation will be established to cover a minimum of ~~90~~ 95 percent. The erosion layer will be capable of sustaining vegetative growth. The final cover will be constructed in accordance with Appendix IIIE-B – Water Balance Final Cover System which includes the provision of Section 9 of the TCEQ Guidance document.

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PART III – SITE DEVELOPMENT PLAN
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WATER BALANCE FINAL COVER DESIGN- OPTION 2

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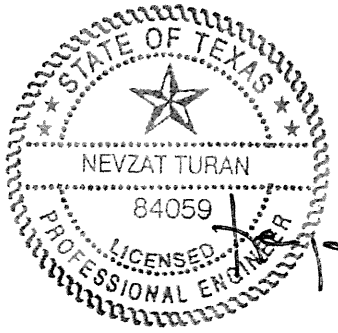

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- Suction Head. UNSAT-H utilizes the initial suction head of the soil layers for initial hydraulic conditions. An initial matric suction of 15,000 cm has been used. The impact of initial suction head for each year on the multi-year program is insignificant to represent low water content. The values of initial suction head for each year were adjusted by the program for subsequent years based on results from previous years when the program is run for multiple years (i.e., program uses the soil suction head estimated for the ending day of the year as the initial suction head for the next year automatically).

The UNSAT-H Version 3.01 model allows for the ability to consider hysteresis in the water retention function. The tolerance limit on entrapped air content below which volumetric air content is considered zero was $1x10^{-10}$ cm. The tolerance limit on head changes below which a change in head does not trigger a path reversal was also $1x10^{-10}$ cm. The maximum head value for all materials above which hysteresis does not occur was considered 1000 cm. In this particular simulation, there is a maximum of 7 hysteretic paths with a maximum of 0.25 entrapped air content. The factor relating the imbibition α_i to the desorption of α_d is 2.0. The soil-specific maximum suction head above which hysteresis is not operable is 1000 cm.

3.4 Vegetation

The establishment of vegetation is a key component of the WB cover. The critical parameters are the percent ground cover and root penetration. For modeling purposed, ~~A~~ a percent ground cover of 90 percent was used for the WB soil final cover. This is a very conservative assumption given that the WB cover will support a denser ground cover and because the final cover will be designed to achieve 95 percent ground coverage. Table 3-3 provides a summary of how the vegetation performance specification was developed to verify that the WB cover will meet or exceed the selected input value in the UNSAT-H model. In addition, Table 3-3 provides a summary of how characteristics of the seed mix used for the vegetation establishment will meet the performance specification included in Appendix IIIE-B-1-B.

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COST ESTIMATE FOR CLOSURE AND POSTCLOSURE CARE



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3 POSTCLOSURE CARE COST ESTIMATE

The postclosure care period has been established by TCEQ regulations to be 30 years. During this period, continuous maintenance must be ongoing to assure the integrity and effectiveness of the final cover system, monitoring systems, leachate collection system, drainage system, and landfill gas system. A summary of postclosure costs is presented in Table 2. The costs will be adjusted annually as indicated in Section 4.

Engineering postclosure estimates include the cost of annual site inspections, corrective plans and specifications, and site compliance monitoring. Site inspections will be performed annually and will include identification of areas experiencing settlement or subsidence, identification of erosion or other drainage-related problems, and inspection of the leachate collection system, gas control and monitoring system, and the groundwater monitoring system. Correctional plans and specifications include the costs for an engineering consultant to prepare construction plans and specifications to correct problems identified during the site inspections. Gas monitoring and groundwater sampling and analysis will be performed as outlined in the postclosure plan.

Postclosure construction/maintenance estimates include the costs to correct problems identified during the engineering site inspections and as specified by the engineer's correctional plans and specifications. These costs will also include any ongoing site maintenance that is needed throughout the postclosure period. These costs include cover and drainage maintenance and annual seeding and mowing costs. The leachate disposal costs include trucking, treatment and disposal costs from areas contributing to leachate generation (approximately 122.6 acres).

In accordance with Title 30 TAC §330.507(b), continuous financial assurance coverage for post-closure care shall be provided until the facility is released in writing by the executive director from the post-closure care period in accordance with the requirements of the post-closure care plan.

3.1 Engineering Costs

As shown on Table 2, engineering postclosure estimates include the cost of annual site inspections, corrective plans and specifications, and site compliance monitoring. The estimates are based on the largest area with waste in-place which is 138.4 acres. Site inspections will be performed annually and will include identification of areas experiencing settlement or subsidence, identification of erosion or other drainage-related problems, and inspection of the leachate collection system, gas control and monitoring system, and the groundwater monitoring system. Correctional plans and specifications include the costs for an engineering consultant to prepare construction plans and specifications to correct problems identified

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

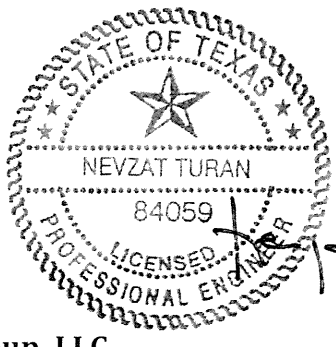
VOLUME 6 OF 6

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



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WCG Project No. 0771-368-11-123

This document is intended for permitting purposes only.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

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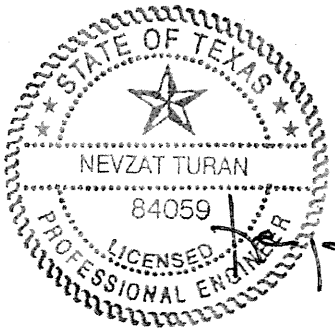

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TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIN
SITE LIFE CALCULATIONS



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volume of incoming waste is projected to be approximately 3,877 tons per day (1,108,822 tons per year based on a 286-day operating schedule).

Site life calculations based on the Turkey Creek Landfill projections are shown on pages IIIN-3 and IIIN-4.

In the event the annual waste acceptance rate exceeds the maximum annual rate set forth in the application and the exceedance is not associated with a temporary occurrence, a permit modification will be submitted to the TCEQ consistent with Title 30 TAC §330.125(h), and include the revised estimated waste acceptance rate, and any needed changes in the SOP to manage the increased waste acceptance rate and protect public health and the environment. Note that this requirement is not intended to make the estimated waste acceptance rate a limiting factor of the landfill permit or operations.

1.2 Population Equivalent

Using the average waste inflow rate of 1,108,822 tons per year discussed in Section 1.1 (an average daily volume of 3,877 tons per day based on a 286-day operating schedule) and assuming 5 pounds of waste is generated per capita per day, the population equivalent is:

$$\frac{(1{,}108{,}822 \text{ tons per year}) \times (2{,}000 \text{ pounds/ton})}{(5 \text{ pounds/person/day}) \times (365 \text{ days/year})} = 1{,}215{,}147 \text{ persons}$$

1.3 Landfill Capacity

The estimated total capacity of waste (defined as waste and daily cover) ever on site over the active life of the facility is approximately 37.7 million cubic yards. The total volume available for solid waste and daily cover after January 8, 2021 (date of topographic information) is estimated to be 20,950,000 cubic yards. This airspace estimate includes the remaining available volume in the existing permitted area. The current volume of waste (defined as waste and daily cover) in-place as of January 8, 2021, is approximately 16.75 million cubic yards.

1.4 Site Life Calculations

The site life calculations are presented on pages IIIN-3 and IIIN-4. In summary, the site life is projected to be approximately 12.9 years, which would result in the site's closure during the year 2033.

TURKEY CREEK LANDFILL
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PART IV – SITE OPERATING PLAN

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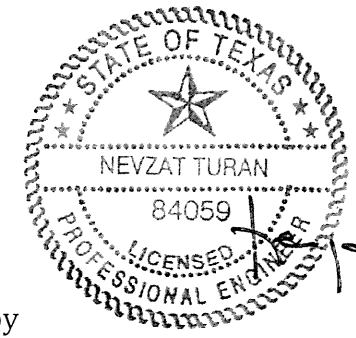

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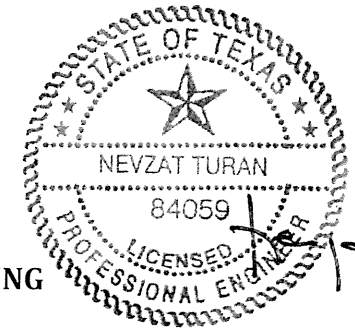

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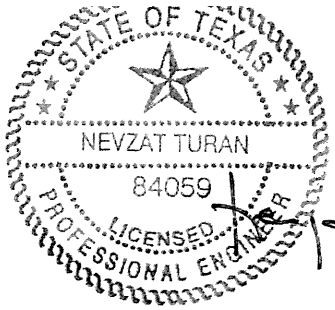

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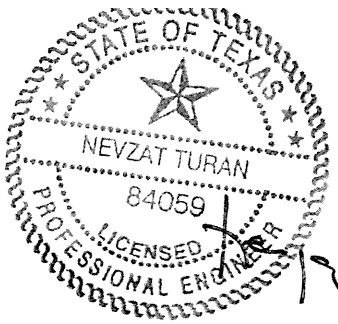

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2.2 Training

The Landfill Manager and the Turkey Creek Landfill management team will train the Equipment Operators, Scale Operators, Laborers, and Spotters in the contents of this SOP, as described in Table 2.1. Site personnel will receive training in the applicable sections of this SOP within 6 months after the date of their employment or assignment to the facility (or to a new position at the facility) and must take part in an annual review of the initial SOP training.

Records of training procedures, dates, topics covered, and personnel attending will be placed in the Site Operating Record. Records will include a written description of the type and amount of both introductory and continuing training that is provided to each employee. Personnel may also receive training at TCEQ-sponsored or other appropriate training courses, as deemed appropriate by the Landfill Manager.

In addition to the above, training also will be provided related to Class 1 waste as set forth in Title 30 TAC §335.586. Training will be targeted to personnel specifically designated to participate in the handling, management and disposal of Class 1 waste. Topics of training will include (but not limited to (1) use, inspection and repair of facility emergency and monitoring equipment; (2) communications and alarm systems; (3) response to fires, explosions or groundwater contamination events; (3) contingency plan implementation; and (4) shutdown operations. Facility personnel designated for this training will receive initial training within 6 months of employment, and participate in an annual review of this information on an annual basis. Record of all personnel training will be maintained in the site operating record.

4 OPERATIONAL PROCEDURES

4.1 Access Control

Public access to the waste fill area is controlled by the entrance facility, which houses the Scale Operators, located in the southeast portion of the facility. The site entrance facilities are staffed during hours of operation. The Scale Operators control access and monitor all vehicles entering and exiting the site.

4.1.1 Site Security

Site security measures are designed to prevent unauthorized persons from entering the site, to protect the facility and its equipment from possible damage caused by trespassers, and to prevent disruption of facility operations caused by unauthorized site entry.

Unauthorized access to the site is minimized by controlling access with perimeter fencing, gated entrance, gated construction entrance, natural barriers (e.g., M.K.T. Railroad, Turkey Creek and its tributaries, and heavily-wooded vegetation), and a closed circuit television system that monitors the entrance and exit. The perimeter fence and gate will be inspected as indicated in Section 4.24. Repairs and maintenance will be performed as necessary. Refer to Section 4.24 of this SOP for site inspection and maintenance schedule.

In the event of a breach of the access controls (i.e., a portion of a fence is impacted in a way that it no longer prevents access to the site), the TCEQ Regional Office and any local pollution agency with jurisdiction that has requested to be notified will be notified within 24 hours of detection of the breach. The breached area will be temporarily repaired within 24 hours of detection and will be permanently repaired by the time specified to the TCEQ Regional Office when it was reported in the initial breach report. In this case, the TCEQ Regional Office will also be notified when the permanent repair is completed. If a permanent repair can be made within 8 hours of detection, no notification to the TCEQ Regional Office is required. Temporary repairs may consist of a barbed wire fence, a 3-foot-high earthen berm, equipment, a security guard posted in the area of the breach or other barriers.

Entry to the active portion of the site will be restricted to designated personnel, approved waste haulers, and properly identified persons whose entry is authorized by Turkey Creek Landfill management. Visitors will be allowed on the active area

The site boundary markers will be placed at each corner of the site and along each boundary line at intervals no greater than 300 feet apart. The buffer zone markers will be placed along each buffer zone boundary at all corners and between corners at intervals of 300 feet.

The easement and right-of-way markers will be placed along the centerline of an easement and along the boundary of right-of-way at each corner within the site and at the intersection of the site boundary. The easement and right-of-way markers will also be placed at intervals no greater than 300 feet along the centerline of the area. The current site coordinate based grid system will be used as shown on the Site Layout Plans. The grid system markers will be spaced no greater than 100 feet apart measured along perpendicular lines. Intermediate markers will be installed in the case where markers cannot be seen from opposite boundaries. The grid system markers will be maintained during the active life of the site. The SLER/GLER markers will be placed so that all areas for which a SLER/GLER has been submitted and approved the TCEQ are readily determinable. Such markers are to provide site workers immediate knowledge of the extent of approved disposal areas. These markers will be located so that they are not destroyed during operations until operations extend into the next SLER/GLER. The location of these markers will be tied into the landfill grid system. SLER/GLER markers will not be placed inside the evaluated areas.

A permanent benchmark has been established at the site in an area that is readily accessible and will not be used for disposal. The benchmark elevation has been surveyed from a known United Stated Coast and Geodetic Survey Benchmark. The benchmark is a bronze survey marker stamped with elevation and survey date and set in concrete.

Floodplain protection markers will be placed along the floodplain boundary at spacing not exceeding 300 feet in accordance with the requirements of this section.

4.8 Control of Waste Spilled on Route to the Site

The Landfill Manager or his designee will take steps to encourage that vehicles hauling waste to the working face or other unloading areas arrive on-site with a tarpaulin, net, or other means to properly secure the load (as discussed in Section 4.5). These steps are necessary to prevent the escape of any part of the load by blowing or spilling. A sign will be posted at the entrance indicating that improperly covered or contained vehicles shall be covered and/or are subject to a surcharge.

The Landfill Manager will be responsible for the cleanup of waste materials spilled along and within the right-of-way of all public access roads serving the site for a distance of two miles in either direction from the entrance to the site. For days that the landfill is open, cleanup for the spilled solid waste materials will be performed as described in Table 2-24. Laborers performing litter and spilled solid waste materials collection will be required to wear appropriate safety equipment. A log will be maintained to document the date and time the roads are checked.

4.18 Soil Management, Placement, and Compaction of Daily, Intermediate, and Final Cover

4.18.1 Soil Management

The earthen material that will be used for daily cover, intermediate cover, final cover, and other uses will be obtained from onsite and offsite soil borrow sources.

The earthen material will consist of soil that has not previously come in contact with waste and will be of sufficient volume to meet the fire protection requirements specified in Section 7.7. As this earthen material is used, it will be replenished and/or located as soon as practical but will at all times be maintained to meet the fire protection requirements specified in Section 7.7. Both the volume of earthen material required to be maintained within 1,000 feet of each working face and the volume of the earthen material to cover each working face with at least a 1 day application of 6 inches of daily cover will be documented on the Cover Application Log (refer to Section 4.18.5 and Section 7.7.4 for an example earthen material calculation).

4.18.2 Daily Cover

Daily cover of waste is used to control disease vectors, windblown waste, odors, fires, and scavenging and to promote runoff from the fill area. At least once every 24 hours, the exposed solid waste fill area(s) will be covered by (1) at least 6 inches of soil cover material that has not been previously mixed with garbage, rubbish, or other solid waste, or (2) an approved Alternate Daily Cover (ADC) material. An ADC Operating Plan (ADCOP) is included in Appendix IVB of this SOP. The plan addresses the following items.

- Description and thickness of the alternative cover material
- Effect of ADC on vectors, fires, odors, and windblown litter
- Application and operational methods to be utilized at the site when using the ADC
- Chemical composition of the material and the MSDS(s) for the ADC

ADC is used to cover waste in areas that will be filled again within a 24-hour period. The executive director may require testing of runoff from areas of ADC for compliance with TPDES discharge limits, or require the runoff from ADC areas be managed as contaminated water.

The remaining portion of this section details the procedures to be used if soil daily cover is utilized. To ensure that the soil daily cover soil will be adequate (i.e., minimize vectors, prevent contaminated stormwater runoff, prevent odors, etc.) the following procedures will be followed:

infiltration into the filled areas and to minimize contact with solid waste. Erosion of final or intermediate cover will be repaired within 5 days after the initial inspection by restoring the cover material, grading, compacting, and seeding unless the TCEQ Regional Office approves otherwise, based on the extent of the damage requiring more time to repair, or the repairs are delayed because of weather conditions. The date of detection of erosion and date of completion of repairs, including reasons for any delays, must be documented in the Cover Application Log (refer to Section 4.18.5). Such periodic inspections and restorations are required during the entire operational life and for the postclosure maintenance period. Refer to Section 4.24 of this SOP for a Site Inspection and Maintenance List.

The final cover system, including the erosion control structures (drainage swales and chutes) will be maintained during and after construction. During the active life of the site, the Landfill Manager or his designee will inspect the final cover system consistent with the schedule and requirements listed in Section 4.24 of this SOP (Site Inspection and Maintenance List). This includes the inspection of final cover following significant rainfall events as described in Section 4.24.

Postclosure care inspection procedures are outlined in the Postclosure Care Plan (Appendix IIIK).

4.18.5 Temporary Waiver

The executive director may grant a temporary waiver from the daily cover, ADC, and intermediate cover requirements if the operator demonstrates that there are extreme seasonal climatic conditions that make meeting such requirements impractical.

4.18.6 Cover Application Log

Throughout the landfill operation, a Cover Application Log will be maintained by the Landfill Manager or his designee and be readily available for inspection in accordance with Title 30 §330.165(h). For intermediate cover and daily cover, the log will specify the date cover (no exposed waste) was accomplished, the area covered (by use of the grid system), how it was placed, when it was completed, and the last area covered. For ADC, the Cover Application Log will include the application rate and total amount of ADC applied to the working face on days ADC is applied. For final cover, the log will show the final cover area, specify the area covered, the date cover was applied, the thickness applied that date, and reference the final cover certification report for each area. The signature of the Landfill Manager or his designee will certify that the work was accomplished as stated in the log. Repairs will be documented in the log. The date of detection of erosion, or other repair issues, the date of completion of repair (including reasons for any delays) will be included to document the repair.

concerning measurements and analyses performed at the site, will be retained in the Site Operating Record.

Additionally, the TCEQ Monthly Waste Receipt Summary Report will be prepared by the Landfill Manager or his designee and submitted to the TCEQ no later than the 25th day of the month following the month that waste was received. The executive director may set alternative schedules for recordkeeping and notification requirements. This report will be submitted consistent with TCEQ requirements. Reports will be on forms provided by the TCEQ.

A Quarterly Municipal Solid Waste Fee Report will be submitted to the TCEQ on a form provided by the TCEQ. In addition to a statement of the amount of Class 1 RACM received for processing or disposal, the report will contain other information requested on the form. The required quarterly report will be submitted to the TCEQ within the timeframe required by the TCEQ.

In the event that bags or containers that contain RACM rupture, they will be immediately contained by spraying the area with water to prevent the spread of RACM. Also, earthen dikes, berms or by other appropriate measures will be constructed to contain the spill. The Landfill Manager or his designee will be promptly notified of the spill and will coordinate the collection and disposal of the spilled RACM. The spilled RACM will be picked up mechanically or by employees wearing proper protective equipment and re-packaged for disposal.

Upon closure of the facility, a notation indicating that the site accepted RACM will be placed in the real property records of Johnson County. This notation will indicate where the RACM was disposed of on the property by showing its location on a site diagram. A copy of this documentation will be provided to the TCEQ.

4.20.6 Class 2 and Class 3 Non-Hazardous Industrial Waste

Class 2 and Class 3 non-hazardous industrial solid wastes will be accepted for disposal at the facility in accordance with the SWAP presented in Appendix IVC of this SOP and the acceptance of such wastes will not interfere with the operation of the Turkey Creek Landfill.

4.20.7 Class 1 Non-Hazardous Industrial Waste

The following sections describe the acceptance and management criteria for Class 1 waste received at the facility. In accordance with Title 30 TAC §330.173(f), authorization for the facility to accept Class 1 waste is subject to the facility operating in compliance with the MSW regulations and other specification conditions under the permit. Failure to operate the site in compliance with the conditions imposed by the executive director may result in revocation of the Class 1 waste authorization.

4.20.7.1 Class 1 Non-Hazardous Waste Disposal Locations and Quantity

Class 1 non-hazardous industrial waste, other than asbestos-containing waste, will be placed only in designated waste disposal sectors that meet the requirements of Title 30 TAC §330.331(e) (relating to Design Criteria for MSW Landfills that Accept Class 1 Waste). Industrial Solid Waste that is defined as a Class 1 only because of its asbestos content will be accepted and handled in accordance with the procedures listed in Section 4.20.5. The site will not accept Class 1 industrial solid waste in an amount in excess of 20 percent of the total amount of waste (not including Class 1 waste) accepted during the current or previous year (measured on a consistently applied weight or volume basis, unless a variance is authorized by the executive director).

4.20.7.2 Class 1 Waste Liner Design, Waste Placement, and Cover

Waste placement, daily cover placement, and intermediate cover placement for Class 1 waste will be accomplished consistent with the procedures for other wastes that are accepted at the landfill (refer to Section 4.18 of this SOP). The design of Class 1 waste areas is consistent with the requirements of Title 30 TAC §330.331(e), and is included in Part III, Appendix IIIC – Leachate and Contaminated Water Management Plan.

Each truck will stop at the scale house where directions to the appropriate working face will be provided. The Scale Attendant will direct waste haulers to follow the signs as they enter the facility. Access roadways will be clearly marked with portable signs directing Class 1 haulers to the Class 1 working face, and MSW haulers to the MSW working face. Spotters (or Equipment Operators) will verify waste cargo with haulers before unloading.

4.20.7.3 Manifesting of Class 1 Wastes

Shipments of Class 1 wastes must be accompanied by a waste manifest document. The waste manifest is to be completed by the generator and transporter and will accompany each waste load. Turkey Creek Landfill will verify pre-authorization for disposal and complete the destination section of each manifest and return one copy of the completed manifest to the driver. One copy of the completed waste manifest will also be returned to the waste generator within 30 days after receipt of the waste. Manifests are prepared in triplicate, and the remaining copy will be filed and maintained in the Site Operating Record for a period of not less than 3 years.

The Scale Operator, Landfill Manager or his designee, or the Special Waste Department will attempt to resolve any Class 1 waste discrepancies. If the discrepancy can be resolved, the waste may be accepted. If the discrepancy cannot be resolved, the waste shipment will be rejected and documented.

4.20.7.4 Random Inspection of Class 1 Waste Shipments

Shipments of Class 1 wastes are subject to the random waste inspections for identifying unauthorized wastes as described in Section 6.2 of this SOP. The Landfill Manager or his designee will notify the transporter and/or generator of the identification of any unauthorized waste. The transporter and/or generator will be required to take all necessary steps to determine the origin and to assure that in the future such wastes are either not collected or are taken to a facility approved to accept such waste. The TCEQ may also be contacted to provide the name and contact information of the transporter/generator and to report measures taken to resolve the arrival of unauthorized waste (i.e., returned for disposal at an approved facility). Instances of unauthorized waste presented by a transporter or generator may result in Turkey Creek Landfill refusing to accept waste from that transporter or generator.

4.20.7.5 Additional Class 1 Waste Verifications

The Class 1 waste delivered to the Turkey Creek Landfill for disposal will receive a visual inspection to observe the contents and nature of waste. Additional waste verifications may be performed, as determined by the Landfill Manager or his designee, or the Special Waste Department, and may include pH testing, water reactivity testing, and ignitability testing. Class 1 wastes, except excluded loads, are subject to random screening, as well as spot checking and testing as described in Section 6.2 of this SOP.

4.20.7.6 Class 1 Waste Recordkeeping and Reporting

All information and documents pertaining to Class 1 waste profiled for disposal and delivered to the landfill for disposal in the Class 1 cell including, but not limited to, all records concerning measurements and analyses performed at the site will be retained at the site in accordance with the provisions in Section 9 of this SOP, unless otherwise indicated.

Additionally, the TCEQ Monthly Waste Receipt Summary Report will be prepared by the Landfill Manager or his designee and submitted to the TCEQ no later than the 25th day of the month following the month that waste was received. The executive director may set alternative schedules for recordkeeping and notification requirements. This report will be submitted consistent with TCEQ requirements. Reports will be on forms provided by the TCEQ.

A Quarterly Municipal Solid Waste Fee Report will be submitted to the TCEQ on a form provided by the TCEQ. In addition to a statement of the amount of Class 1 waste received for processing or disposal, the report will contain other information requested on the form. The required quarterly report will be submitted to the TCEQ within the time frame required by the TCEQ.

4.20.7.7 Class 1 Waste-Related Inspection Requirements

Section 4.24 of this SOP presents a Site Inspection and Maintenance List with inspection items and frequencies that will be followed at the facility, including certain items which specifically pertain to Class 1 waste operations.

4.20.7.8 Class 1 Waste Contingency Plan

Introduction

This Class 1 waste contingency plan has been developed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of Class 1 waste or constituents of such waste to air, soil, or surface water. The provisions of the plan must be carried out immediately whenever there is a fire, explosion, or release of waste or constituents of such waste that could threaten human health or the environment.

A copy of this Class 1 waste contingency plan and all revisions to the plan must be maintained at the facility and submitted to the local providers that may be called upon to provide emergency services (as identified subsequently in this plan).

This Class 1 waste contingency plan must be reviewed and updated, if necessary, whenever: (1) the facility permit affecting Class 1 waste operations is revised; (2) the plan fails in an emergency; (3) the facility changes in its Class 1 waste design, construction, operation, maintenance, or other circumstances in a way that materially increases the potential for fires, explosions, or releases of Class 1 waste or constituents of such waste, or changes the response necessary in an emergency; or (4) the list of emergency equipment materially changes.

Emergency Contacts

The Landfill Manager or his designee will maintain a list of names, addresses, and phone numbers (office and home) of persons qualified to act as Emergency Coordinator (as discussed subsequently in this plan), and this list must be kept up-to-date and at the facility. Where more than one person is listed as the Emergency Coordinator, one must be named as primary Emergency Coordinator and others must be listed in the order in which they will assume responsibility as alternates.

The facility is within the coverage area of the following emergency services providers:

- City of Alvarado Police and Fire Department
- Texas Health Resources Burleson (Hospital)
- Texas Department of Public Safety (Emergency Spill Response)

Emergency Equipment

Class 1 waste related emergencies at the facility could potentially involve spills or fires. Accordingly, the emergency equipment related to Class 1 waste and its location on-site is listed below.

Item	Location	Capabilities
Class A/B/C Fire Extinguishers	One per piece of heavy equipment involved in Class 1 waste operations (e.g., excavator, bulldozer).	Extinguish small combustion fires.
Site Two-Way Telecommunication Radios or Cellular Phones	One per site personnel assigned to Class 1 waste operations, including Landfill Manager or his designee.	Maintain contact among site personnel; inform personnel or emergency situations.

This list of emergency equipment must be kept up to date. Equipment required for emergency response (including monitoring, communications, fire and explosion response, groundwater contamination and other emergency mitigation efforts) will be inspected, maintained and replaced on a periodic basis as needed to maintain availability.

Evacuation Plan

In the event the facility needs to be evacuated, the following actions will be taken:

- The Emergency Coordinator (discussed subsequently in this contingency plan) will designate emergency response team leaders, who will notify all personnel at the facility to evacuate the site immediately.
- The scale house located in the southeastern portion of the site near the main entrance/exit will be the primary evacuation rally point for facility personnel to gather during the evacuation. The evacuation routes to reach this rally point are via the main site haul roads and perimeter roads.
- Emergency response team leaders will take a head count of facility personnel once they arrive at the designated rally point, and will each report back to the Emergency Coordinator of whether their personnel are accounted for.

Emergency Coordinator

The Landfill Manager or his designee will serve as the primary Emergency Coordinator, so that there is an Emergency Coordinator either on the facility premises or on call (i.e., available to respond to an emergency by reaching the facility within a short period of time) with the responsibility for coordinating all emergency response measures. The Emergency Coordinator will be thoroughly familiar with this Class 1 Waste Contingency Plan, operations and activities at the facility, the location of records within the facility, and the facility layout. In addition, this person has the authority to commit the resources needed to carry out this Class 1 Waste Contingency Plan.

Emergency Procedures

Whenever there is an imminent or actual emergency situation such as a release, fire, or explosion that could threaten human health or the environment, the Emergency Coordinator will immediately:

- Notify appropriate facility personnel in person or by phone (two-way site telecommunications).
- Assess the situation by identifying the character, exact source, amount, and areal extent of any released materials. The Emergency Coordinator may do this by observation or review of facility records or manifests, and, if necessary, by chemical analysis. This assessment will consider possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment must consider both direct and indirect effects of the release, fire, or explosion (e.g., the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any surface run-off from water or chemical agents used to control fire and heat-induced explosions).
- If help is needed, notify appropriate state or local agencies with designated response roles. If the Emergency Coordinator determines that the facility has had a release, fire, or explosion that could threaten human health or the environment outside the facility, the following applies:
    - If the Emergency Coordinator's assessment indicates that evacuation of local areas may be advisable, the Emergency Coordinator will immediately notify appropriate local authorities, and must be available to help appropriate officials decide whether local areas should be evacuated. This includes an immediate notification of the National Response Center (using their 24-hour toll free number 1-800-424-8802). The report must include:
        - name and telephone number of person making report
        - name and address of facility
        - time and type of incident (e.g., release, fire)
        - name and quantity of material(s) involved, to the extent known
        - the extent of injuries, if any
        - the possible hazards to human health, or the environment, outside the facility
- During an emergency, the Emergency Coordinator will take reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other waste at the facility. These measures must include, where applicable, stopping operations, collecting and containing released waste, and removing or isolating containers. Further details are presented in the bullets that follow.

- Should any accidental spill of Class 1 wastes occur at the facility, it will be immediately contained by earthen dikes, berms or by other appropriate measures. The Landfill Manager or his designee will be promptly notified of the spill and will coordinate the collection and disposal of the spilled material. The spilled wastes will be picked up mechanically or by employees wearing proper protective equipment and managed according to procedures for handling the special waste.

- For larger spills, or where there is potential for the waste to impact waters of the state, the Emergency Coordinator will assess the situation and determine the appropriate means to contain and collect the material. If spilled material threatens to impact storm water discharge from the site, the Landfill Manager or his designee will use booms or diversionary dikes, or excavate holes or pits as needed to contain the spilled material. Equipment typically available for spill response includes excavators, backhoes, dozers, pumps, and haul trucks. In the event of a spill that cannot be picked up using hand-held tools, this equipment will be used as needed to contain and collect spilled material. For larger spills of liquid wastes that cannot be adequately cleaned up with on-site equipment, a qualified emergency cleanup contractor or vacuum truck company will be contacted to assist with cleaning up the spill. Once the liquids are removed, a visual inspection of the spill area will be made, and soils observed to be potentially impacted will be over-excavated and disposed with the collected material as described below.

- Should an incident occur where hazardous wastes, radioactive waste, or other prohibited wastes are suspected or discovered, the waste will not be authorized for disposal but instead will be isolated until the material can be adequately identified to determine the proper disposition/remediation of the material and the appropriate handling procedures. During this identification process, the generator's representative will be contacted to determine the identity of the material, and the planned disposition/ remediation of the material. The proper disposition/remediation of the prohibited waste will be specific to the waste and will be implemented.

- Immediately after an emergency incident, the Emergency Coordinator will provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility. The owner or operator will classify all recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility in accordance with TCEQ rules.

- The Emergency Coordinator will ensure that in the affected area(s) of the facility:

    - no waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed; and

    - emergency equipment listed in this Contingency Plan is cleaned and fit for its intended use before operations are resumed.

4.21 Prevention of Discharge of Contaminated Water

The Landfill Manager will implement necessary steps to control and prevent the discharge of contaminated water from the facility. No discharge of contaminated water will occur without obtaining specific written authorization from the TCEQ prior to the discharge. All water contacting waste or contaminated soils will be treated as contaminated water. Runon and runoff for the 25-year, 24-hour storm event will be controlled following the procedures set forth in the Groundwater and Surface Water Protection Plan and the Leachate and Contaminated Water Management Plan. The landfill will be operated consistent with Title 30 TAC §330.15(h) regarding discharge of solid wastes or pollutants into waters of the United States.

4.22 Leachate and Contaminated Water Management Plan

Leachate and contaminated water will be controlled at the Turkey Creek Landfill as specified in the Leachate and Contaminated Water Management Plan. Consistent with Title 30 TAC §330.177, recirculation of leachate or gas condensate will only occur over the areas underlain by a Subtitle D liner system (i.e., composite liner system with a leachate collection system). Leachate will be recirculated from a water truck or other comparable equipment using a spray bar or hose to distribute leachate back to the working face (i.e., within the active waste fill area that is contained by the containment berm).

The following performance standards will govern the application rate of leachate recirculation.

- The rate of leachate recirculation will not exceed the moisture holding capacity of the landfill. For example, the application rate will be applied so that no seeps or ponding is observed in the vicinity of the recirculation area. In addition, leachate recirculation over a specific phase will cease if the leachate flow rate to a sump approaches the capacity of the pump within the sump. If this occurs, recirculation activities will move to another phase.
- Leachate recirculation will not occur immediately before, during, or immediately after rainfall events, or during freezing temperatures that could affect the holding-capacity of the waste.
- Leachate recirculation will not occur during high wind events.

The leachate generated from the landfill will be recirculated to the landfill working face, and excess quantities of leachate will be directed to the leachate storage facilities where it will be transported to the liquid waste bulking facility using a tanker truck or other compatible equipment, a properly permitted privately-owned off-site facility, or a POTW for treatment using third party trucks. Per Title 30 TAC §330.991(a)(7) leachate recirculation will not exceed 100,000 gallons per day.

4.23 Waste-for-Ballast Verification

In the areas of the landfill excavation which have been identified to extend below the groundwater table, the liner system itself and the waste placed above the liner system will provide ballast (weight) to protect the liner system from uplift forces due to inward and upward seepage forces of the groundwater. Soil or compacted waste may be used as ballast. The areas of landfill excavation requiring ballast are identified in the Site Layout Plans.

As discussed in the Liner Quality Control Plan (LQCP), the Construction Quality Assurance Professional of Record (POR) will verify that short-term and long-term uplift of the liner system has been controlled by the ballast. The verification will be documented in the Ballast Evaluation Report (BER) which will be submitted to the TCEQ for approval. As discussed in the LQCP, the BER will contain the signature and seal of the POR performing the evaluation and the signature of the site operator.

4.23.1 First Lift Considerations

As specified in Section 4.9 of this SOP, appropriate personnel will be on-site full time during the placement of the first 5 feet of waste over the liner system to verify that this lower 5 feet of waste does not contain large bulky items which could damage the liner system or which cannot be compacted to the required density.

4.23.2 Documentation

The calculations for the height of waste required to ballast the liner system will be submitted with the SLER/GLER for TCEQ approval. Once the compacted waste ballast is in place, the "Waste-For-Ballast Placement Record" and the engineer's survey elevations of the top of the waste documentation will be provided in the BER. As discussed in the currently permitted SLQCP, the BER will contain the documentation substantiating that the appropriate depth of ballast has been placed over the liner system. The BER will contain the signature and seal of the POR performing the evaluation and the signature of the Landfill Manager.

implements. Inspectors will observe the waste materials as the waste discharged from the truck is spread and separated. The waste will be sufficiently spread to determine its character and composition. Inspectors will wear appropriate personal protective equipment during the inspection which includes, at a minimum, the following:

- Gloves
- Work boots
- Clothing which minimizes contact with waste
- High visibility clothing
- Hardhat

Additional personal protective equipment will be used if regulated hazardous waste or PCB waste is identified. In the event that regulated hazardous waste or PCB waste is identified during an inspection, waste inspection activities will cease until inspection personnel obtain sufficient protective equipment, if needed. This additional equipment may include:

- Respirator with appropriate cartridge filters (i.e., organic vapor or particulate)
- Tyvek suit or coveralls
- Eye protection

6.3 Managing Prohibited Wastes

Unknown wastes undergoing inspection by Turkey Creek Landfill personnel must be properly segregated and protected against the elements, secured against unauthorized removal, and isolated from other waste and activities.

Known prohibited wastes detected during an inspection will be returned immediately to the transporter and generator. If the transporter is not available, the waste will be safely stored until provisions for removal can be arranged.

If regulated hazardous waste or PCB wastes are detected, the TCEQ and any local pollution agency with jurisdiction that has requested to be notified, will be notified. As soon as is practical, the transporter will be required to remove the regulated hazardous waste or PCB waste from the site. Prior to removal, the transporter must obtain an EPA identification number, package the waste in accordance with TxDOT regulations, and properly manifest the waste designating a permitted facility to treat, store, or dispose of the hazardous waste.

7.8 Liquid Waste Solidification Area Fire

The fire protection procedure for the liquid waste solidification area is described in Appendix IVE of this SOP.

7.9 Contacting Fire Department and TCEQ

If firefighting assistance is needed from the local fire department, the Landfill Manager or his designee will call 911, or the local fire department, and report the fire. The Landfill Manager will also notify Scale Operators, who will direct the fire department personnel to the scene of the fire.

If a fire occurs that is not extinguished within 10 minutes of detection, the TCEQ's Regional Office will be contacted immediately by telephone, but not later than four hours, and in writing within 14 days with a description of the fire and the resulting response.

7.10 Training

As described in Section 2.2 and Table 2-1 of this SOP, employees will receive training in all aspects of this SOP and this section, including but not limited to the following fire safety and protection topics:

- Fire safety rules and regulations
- Hot load management
- Fire prevention procedures
- Vehicle and equipment fires
- Working face fire protection and fire fighting, including water truck/storage tank and soil stockpile requirements
- Convenience Center and Wood Waste Processing Area fires
- Liquid Waste Solidification Area fires
- Contacting Fire Department and TCEQ

Training will be conducted by site employees or contract personnel experienced in fire safety and protection. Training will be scheduled and attendance will be recorded and maintained in the site operating record.

9 RECORDKEEPING REQUIREMENTS

The Landfill Manager will maintain a copy of the current permit (including any permit modifications); the approved SDP, SOP, Groundwater Sampling and Analysis Plan, Final Closure Plan, Postclosure Care Plan, Landfill Gas Management Plan, and Leachate and Contaminated Water Management Plan; and any other TCEQ required plans or documents onsite (or an alternate location approved by the executive director) at all times during the active life of the facility. Deviation from the permit and incorporated plans or related permit documents (except as allowed by the permit, plans or related permit documents) is a violation of TCEQ's MSW regulations. The landfill will maintain the Site Operating Record in an organized format which allows the information to be easily located and retrieved. Additionally, all information contained in the Site Operating Record will be furnished upon request to the executive director and will be made available for inspection by the executive director. As required by the TCEQ, the Site Operating Record will be maintained at the site.

The Landfill Manager is responsible for recording and retaining in the Site Operating Record the information listed below:

- All location restriction demonstrations
- Inspection logs and records, training procedures, and notification procedures relating to excluding the receipt of prohibited waste
- Inspection records and training procedures relating to fire prevention and site safety
- All inspection documentation noted on Table 4.24 – Site Inspection and Maintenance List
- Fire Occurrence Notices
- Personnel training records and operator licenses. Training records (including operator licenses) for current personnel will be kept until closure and training records on former employees will be kept for at least three years from the date the employee last worked at the facility. Records may accompany personnel transferred within the company.
- Landfill Gas Management Plan
- Cover Application Logs including application rate and total amount of ADC applied to the working face on days ADC is applied.

- Results from gas monitoring events and any remediation plans relating to explosive and other gases
- Unit design documentation for the placement of leachate or gas condensate in the landfill
- Remediation plans for explosive and other gases, if applicable
- All inspection logs and reports and all demonstrations, certifications, findings, monitoring, testing, and analytical data relating to groundwater monitoring and corrective action
- Closure plans and monitoring, testing, or analytical data relating to closure requirements
- Postclosure care plans and monitoring, testing, or analytical data relating to postclosure requirements
- Cost estimates and financial assurance documentation relating to financial assurance for closure and postclosure care
- Copies of all correspondence and responses relating to the operation of the facility, modifications to the permit, approvals, and other matters pertaining to technical assistance
- Any and all documents, manifests, scale tickets, generator waste profile sheets, etc., involving special waste
- RACM Acceptance Records
- Class 1 non-hazardous industrial waste profile and acceptance records
- A record of each unauthorized material removal event
- Annual waste acceptance rate documentation including Quarterly and Annual Solid Waste Summary Reports. Waste reports will be prepared and submitted in accordance with the site-applicable requirements of Title 30 TAC §330.675.
- A record of alternate operations hours
- Access control breach and repair notices
- Other documents as specified by the approved permit or by the executive director of the TCEQ

The Landfill Manager will retain all information contained within the Site Operating Record and all plans required for the facility for the life of the facility including the postclosure care period. The above listed items will be incorporated into the Site Operating Record within seven working days of the completion of the item/record or receipts of the analytical data. Physical space limitations may warrant the offsite storage of non-electronic (paper) records older than five years at a nearby records storage facility or corporate office.

In addition to the above, the permittee will provide written notice in the form of a Soils and Liner Evaluation Report (SLER), Geomembrane Liner Evaluation Report (GLER), and/or Geosynthetic Clay Liner Evaluation Report (GCLER) detailing the final construction and lining of a new disposal cell. The reports will be submitted to the TCEQ for review 14 days prior to the placement of any waste in the new cell. If verbal or written response from the TCEQ is not provided by the end of the 14th day following TCEQ receipt of the report(s), placement of solid waste may begin. All SLER, GLER, and GCLER approvals will be maintained in the Site Operating Record.

ATTACHMENT 4

REVISION PAGES
(CLEAN FORMAT)

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

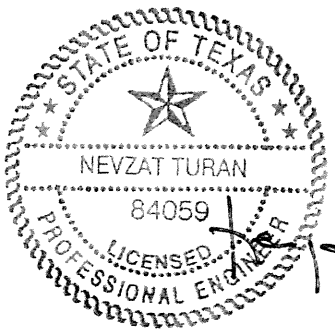
VOLUME 1 OF 6

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

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6420 Southwest Boulevard, Suite 206
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WCG Project No. 0771-368-11-123

This document intended for permitting purposes only.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 1 OF 6

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12/16/2022

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PARTS I/II
GENERAL APPLICATION REQUIREMENTS

Prepared for:

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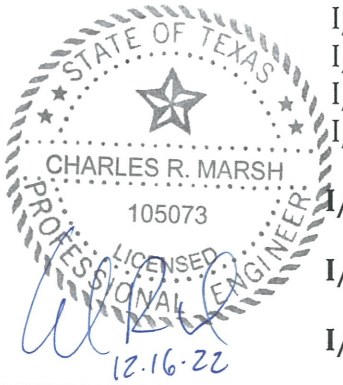

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PERMIT BOUNDARY

BP PIPELINE EASEMENT (GAS)

M.K.J. RAILROAD

LEACHATE STORAGE TANK

CONVENIENCE CENTER

LANDFILL OFFICE

IH35 SERVICE ROAD

SCALEHOUSE

BP PIPELINE EASEMENT (GAS)

SITE ENTRANCE

LIMIT OF WASTE ACCESS ROAD

SITE EXIT

CR10 COUNTY ROAD 107

CR313

SOLIDIFICATION FACILITY

LEACHATE STORAGE TANK

IH35

0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- MW-7 PERMITTED GROUNDWATER MONITORING WELL
- GMP-12 PERMITTED GAS MONITORING PROBE
- EXISTING LFG TRENCH VENT
- EXISTING LEACHATE FORCEMAIN
- EW-A9 EXISTING LFG EXTRACTION WELL
- EXISTING LFG COLLECTION PIPING
- HZ-5 EXISTING HORIZONTAL LFG COLLECTOR WITH CHIMNEY WELLS
- LCR-1 EXISTING LEACHATE CLEANOUT RISER CONNECTION
- CS-3 EXISTING CONDENSATE SUMP
- IV-2 EXISTING ISOLATION VALVE
- EXISTING REMOTE WELLHEAD
- EXISTING ROAD CROSSING
- EXISTING BLIND FLANGE
- EXISTING HDPE CAP
- EXISTING PIPE REDUCER
- EXISTING AIR SUPPLY PIPING
- EXISTING CONDENSATE FORCEMAIN
- EXISTING AIR/FORCEMAIN VALVE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.

STATE OF TEXAS
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12.16.22

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DATE: 02/2022
FILE: 0771-368-11
CAD: 3.5-EXISTING GCCS PLAN.DWG

DRAWN BY: JDW
DESIGN BY: JBP
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
EXISTING GCCS PLAN
(TCEQ PERMIT NO. MSW-1417C)

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE I/II-3.5

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O:\0771\368\EXPANSION 2021\PARTS I-II\CLEAN\FIG 3.5-EXISTING GCCS PLAN.dwg, rarrington, 1:2

A private, grass field airfield (Luscombe Acres) is located approximately 500 feet south of the landfill property. The airfield includes 2 grass runways used by piston aircraft. The airfield appears to be used primarily by residences that border the runways. Additional information related to the airfield is provided in Section 8.2.

One church was identified as being located within the 1-mile radius of the landfill property. The Greenbriar Baptist Church is located approximately 4,300 feet west of the landfill property, on County Road 313. A previous land use evaluation prepared for the landfill property indicates that a historical marker was placed at the church for educational purposes, but that the church is not a registered historical landmark, as was verified with the Texas Historical Commission. There are no known hospitals, schools, archaeological sites, licensed daycare centers, historical sites, lakes, recreational areas, or sites with exceptional aesthetic qualities located within a 1-mile radius of the landfill permit boundary.

7.7 Land Use Conclusions

The continued development and use of this property as a landfill represents a compatible land use for the following reasons:

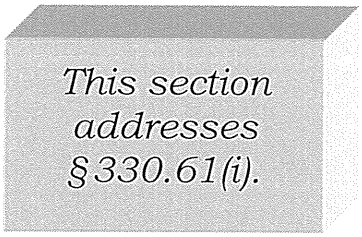
- The site is located in a rural area, with ongoing growth within the 1-mile radius of the landfill property appearing to be minimal over the previous 20 plus years (based on review of aerial photography).
- The landfill is designed and operated to have minimal impact on the surrounding areas and land uses. A substantial vegetation screening buffer is provided by wooded vegetation existing along the north, northwest, southwest, and southeast boundaries of the landfill. The wooded vegetation helps to minimize the visual and noise impact of the landfill operations.
- With the nearby development being primarily rural residential, open lands and agricultural, with some distributed commercial and light industrial development, the landfill is a compatible land use.

7.8 Water Wells Within 500 Feet

A search to identify water wells within a 1-mile radius of the landfill permit boundary was completed by GeoSearch (September 2021) and WCG (August 2021), the results of which are provided in Part III, Appendix IIIG, Section 2.5 and Appendix IIIG-A. The water well locations are plotted on the Figure IIIG-A-6 (Water Wells Within One-Mile Radius map). In summary, the only identified water well located within 500 feet of the permit boundary is the on-site water well which provides water to Turkey Creek Landfill. The location of the onsite water well is indicated on Figure I/II-4.3.

8 TRANSPORTATION

8.1 Traffic Information



8.1.1 Availability and Adequacy of Roads

The Turkey Creek Landfill is located approximately 2.5 miles south of Alvarado, Texas, on Interstate Highway 35 West (IH-35W). The site is easily accessed from principal population centers via IH-35W. In addition to IH-35W, County Roads 107, 204, and 401 as well as Farm to Market road 2415 are utilized to access the landfill. In general, landfill vehicles originating north of the site utilize the IH-35W southbound frontage road to the landfill entrance road; and landfill vehicles originating south of the site use the IH-35W northbound frontage road, cross IH-35W on the FM 107 bridge, then travel north on the IH-35W southbound frontage road to the landfill entrance road. Local hauling vehicles utilize the referenced county and farm-to-market roads to access the IH-35W frontage roads and landfill.

A traffic impact study was prepared by WCG in January 2022 to evaluate the continued development of the Turkey Creek Landfill on local roadways and traffic. The traffic study is included in Parts I/II, Appendix I/IID. Please note that the traffic study was prepared in January 2022 and utilized a different assumption of incoming waste volume (3,000 tons per day) that the rate of 3,497 tons per day included in this application. Due to the availability and adequacy of roads around the facility and the minor increase in truck traffic to the facility that would result from using 3,497 tons per day as a basis of analysis, the traffic study was not updated.

In summary, the traffic study concludes that access roads within 1 mile of the landfill provide adequate access to the site. Coordination with TxDOT regarding traffic and location restrictions is included in Appendix I/IIB (TxDOT Tab).

8.2 Airport Safety

TCEQ distance restrictions set forth in Title 30 TAC §330.545 require municipal solid waste disposal facilities seeking vertical expansions located within 10,000 feet of any runway end used by turbojet aircraft or within 5,000 feet of any runway end used by piston-engine aircraft to demonstrate that the units are designed and operated so that the municipal solid waste landfill unit does not pose a bird hazard to aircraft. Title 30 TAC §330.545(d) further requires that landfill facilities within a 6-mile radius of any small general service airport runway or within a five-mile radius of any large general public commercial airport shall be critically evaluated to determine if an incompatibility exists.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

APPENDIX I/IIA
FACILITY LAYOUT MAPS

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by
Weaver Consultants Group, LLC
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817-735-9770

WCG Project No. 0771-368-11-123

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FIGURE I/II-A.5	Sector Development Plan II
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This appendix addresses §330.61(d).



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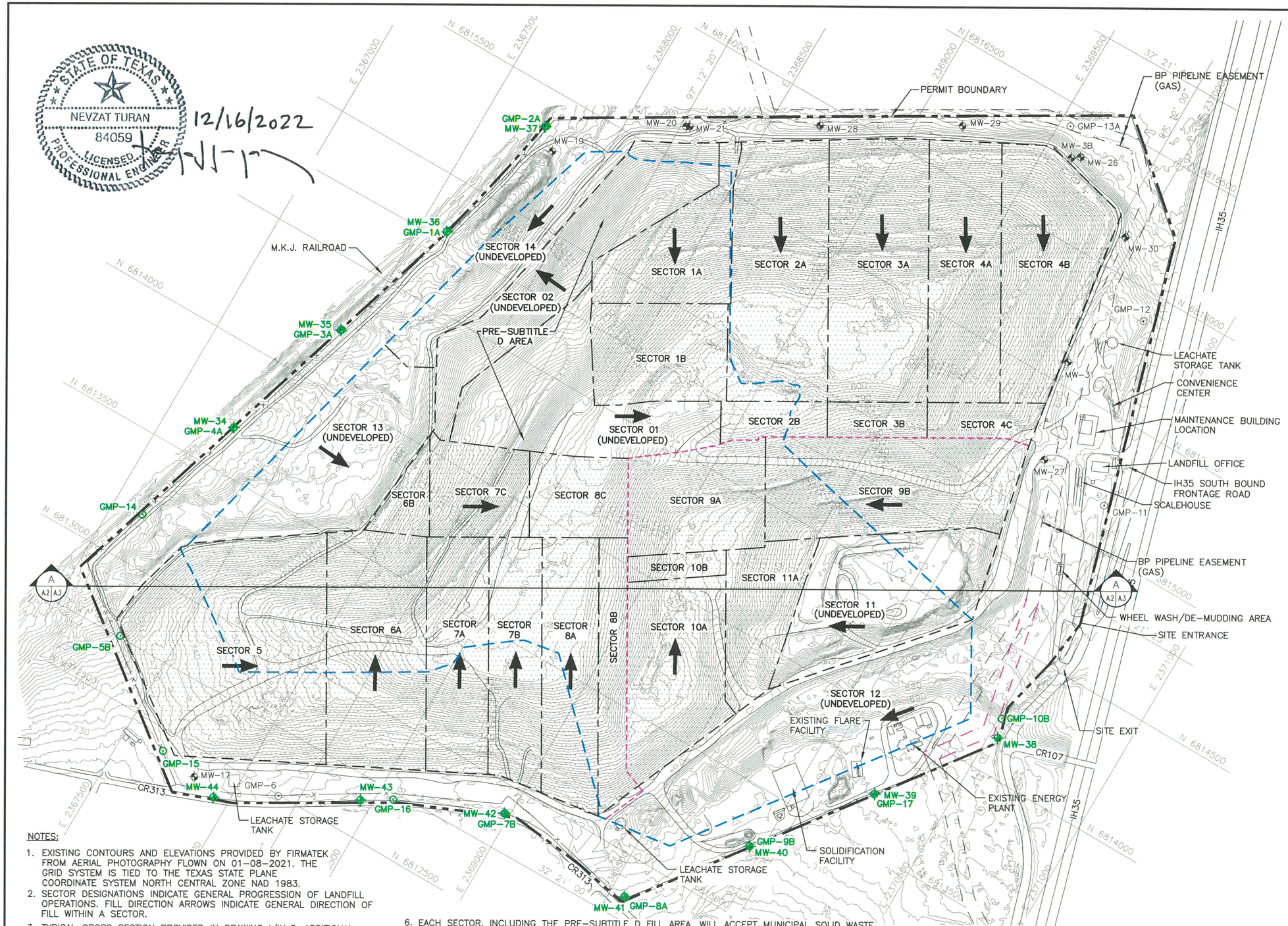
12/16/2022



LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- NEWLY PERMITTED AIRSPACE LIMIT OF WASTE
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT (SEE NOTE 8)
- SECTOR BOUNDARY
- EXISTING SUBTITLE D COMPOSITE LINED AREA
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING LFG MONITORING PROBE
- FILL DIRECTION (SEE NOTE 2)

CELL SUMMARY			
CELL	MAX LENGTH (FT)	MAX WIDTH (FT)	AREA (ACRES)
SUBTITLE D AREA			
SECTOR 1A/1B	1039	550	9.60
SECTOR 2A/2B	1189	403	10.74
SECTOR 3A/3B	1200	400	11.02
SECTOR 4A/4B/4C	1190	768	16.43
SECTOR 5	930	840	14.59
SECTOR 6A/6B	1346	400	9.91
SECTOR 7A/7B/7C	1370	462	13.65
SECTOR 8A/8B/8C	1439	323	11.46
SECTOR 9A/9B	1550	434	14.17
SECTOR 10A/10B	923	406	7.53
SECTOR 11	1087	658	11.50
SECTOR 12	1635	414	12.36
SECTOR 13	1128	431	8.33
SECTOR 14	1190	198	4.43
PRE-SUBTITLE D AREA			
SECTOR 01	352	430	9.1
SECTOR 02	1402	215	6.7

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. SECTOR DESIGNATIONS INDICATE GENERAL PROGRESSION OF LANDFILL OPERATIONS. FILL DIRECTION ARROWS INDICATE GENERAL DIRECTION OF FILL WITHIN A SECTOR.
3. TYPICAL CROSS SECTION PROVIDED IN DRAWING I/IIA.3. ADDITIONAL SECTION INFORMATION PROVIDED IN APPENDIX IIIA-B – LANDFILL UNIT CROSS SECTIONS.
4. SEE DRAWINGS I/IIA.4 THROUGH I/IIA.7 FOR DETAILED SECTOR DEVELOPMENT PLANS.
5. WIDTH OF THE BUFFER ZONE BETWEEN THE LIMITS OF WASTE AND THE PERMIT BOUNDARY VARIES; HOWEVER, THE BUFFER ZONE IS A MINIMUM OF 50 FEET FOR EXISTING FILL AREAS AND 125 FEET FOR THE NEWLY PERMITTED AIRSPACE. REFER TO APPENDIX I/IIC FOR MORE INFORMATION REGARDING BUFFER ZONES.
6. EACH SECTOR, INCLUDING THE PRE-SUBTITLE D FILL AREA, WILL ACCEPT MUNICIPAL SOLID WASTE RESULTING FROM, OR INCIDENTAL TO, MUNICIPAL, COMMUNITY, COMMERCIAL, INSTITUTIONAL, RECREATIONAL AND INDUSTRIAL ACTIVITIES, INCLUDING GARBAGE, PUTRESCIBLE WASTES, RUBBISH, ASHES, BRUSH, STREET CLEANINGS, DEAD ANIMALS, ABANDONED AUTOMOBILES, CONSTRUCTION-DEMOLITION WASTE, YARD WASTE, CLASS 1 NON-HAZARDOUS INDUSTRIAL SOLID WASTE DESIGNATED AS SUCH DUE TO ASBESTOS CONTENT, CLASS 2 NON-HAZARDOUS INDUSTRIAL SOLID WASTE, CLASS 3 NON-HAZARDOUS INDUSTRIAL SOLID WASTE, AND CERTAIN SPECIAL WASTES.
7. OTHER CLASS 1 NON-HAZARDOUS INDUSTRIAL SOLID WASTE (NOT CLASSIFIED AS SUCH DUE TO ASBESTOS CONTENT) WILL ONLY BE DISPOSED OF IN SECTORS 9A, 9B, 10A, 10B, 11, 11A AND 12.
8. THE PROPOSED EASEMENT SHOWN IS FOR ILLUSTRATION PURPOSES ONLY. THE ACTUAL LOCATION WILL BE DETERMINED AT A LATER DATE IN COORDINATION WITH THE EASEMENT HOLDER.

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DESIGN BY: JBP
REVIEWED BY: NT

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PREPARED FOR
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REVISIONS		
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MAJOR PERMIT AMENDMENT SECTOR DEVELOPMENT SEQUENCE

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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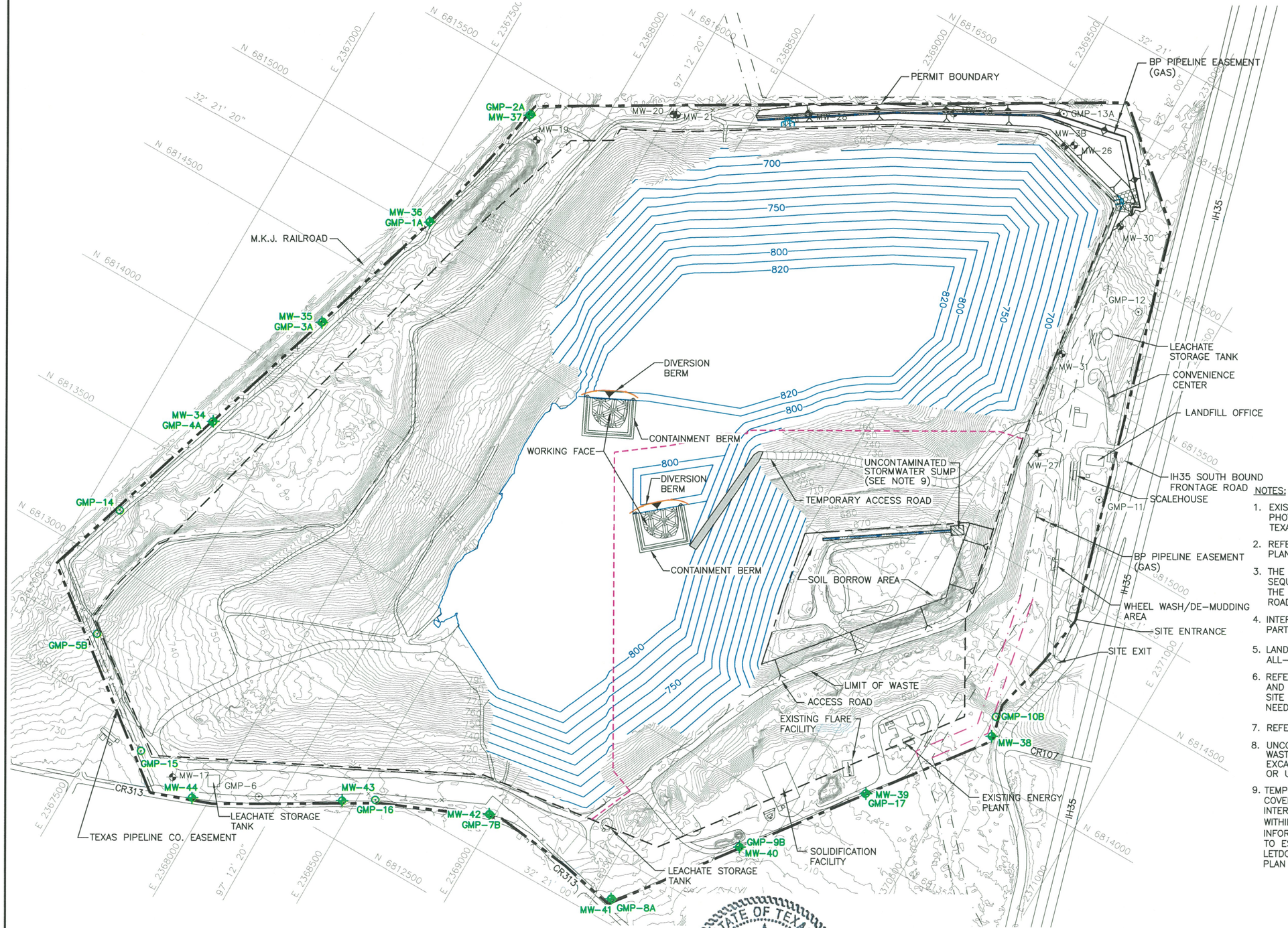
FIGURE I/II-A.2

O:\0771\368\EXPANSION 2021\PARTS I-II\CLEAN\FIG A.2-SECTOR DEVELOPMENT SEQUENCE.dwg, rarrington, 1:2



LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 — INTERMEDIATE CONTOUR
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING LFG MONITORING PROBE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIC-LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN FOR CONTAMINATED WATER RUN-ON/RUN-OFF BERM DESIGN INFORMATION.
3. THE SECTOR DEVELOPMENT SHOWN ON THIS DRAWING SHOWS THE GENERAL SEQUENCE OF FILLING OPERATIONS. ACTUAL LANDFILL DEVELOPMENT MAY VARY. THE LOCATION OF THE ALL-WEATHER ACCESS ROAD FROM THE LANDFILL HAUL ROAD TO THE ACTIVE AREA WILL BE DETERMINED DURING SITE OPERATIONS.
4. INTERMEDIATE COVER CONSISTS OF A 12-INCH THICK SOIL LAYER. REFER TO PART IV - SITE OPERATING PLAN FOR ADDITIONAL SOIL COVER REQUIREMENTS.
5. LANDFILL HAUL ROAD WILL BE SURFACED WITH CRUSHED STONE TO PROVIDE ALL-WEATHER ACCESS.
6. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR THE EROSION AND SEDIMENTATION CONTROL PLAN. DRAINAGE STRUCTURES ARE SHOWN AS THE SITE DEVELOPS. ADDITIONALLY BMPs WILL BE USED TO CONTROL EROSION AS NEEDED.
7. REFER TO APPENDIX IIII FOR LANDFILL GAS MANAGEMENT PLAN.
8. UNCONTAMINATED STORMWATER THAT HAS NOT COME INTO CONTACT WITH WASTE WILL BE COLLECTED IN SUMPS AND PERIODICALLY REMOVED FROM EXCAVATED AREAS BY PUMPING TO PERIMETER DRAINAGE CHANNELS OR USED IN SITE OPERATIONS (E.G., DUST CONTROL, COMPACTING, ETC.).
9. TEMPORARY CHUTES AND SWALES WILL BE PLACED OVER THE INTERMEDIATE COVER AREA TO MINIMIZE EROSION AND HELP ESTABLISH VEGETATION FOR INTERMEDIATE COVER AREAS THAT WILL NOT RECEIVE WASTE OR FINAL COVER WITHIN 180 DAYS AFTER PLACEMENT (REFER TO APPENDIX IIIF-F FOR MORE INFORMATION). MULCH, HYDROSEEDING OR SIMILAR METHODS WILL BE USED TO ESTABLISH VEGETATION OVER THE INTERMEDIATE COVER AREAS. SWALE AND LETDOWN SPACING WILL MEET THE REQUIREMENTS OF THE EROSION CONTROL PLAN INCLUDED IN APPENDIX IIIF-F.

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DESIGN BY: CAM
REVIEWED BY: NT

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PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

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MAJOR PERMIT AMENDMENT
SECTOR DEVELOPMENT PLAN I

TURKEY CREEK LANDFILL
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FIGURE I/II-A.4

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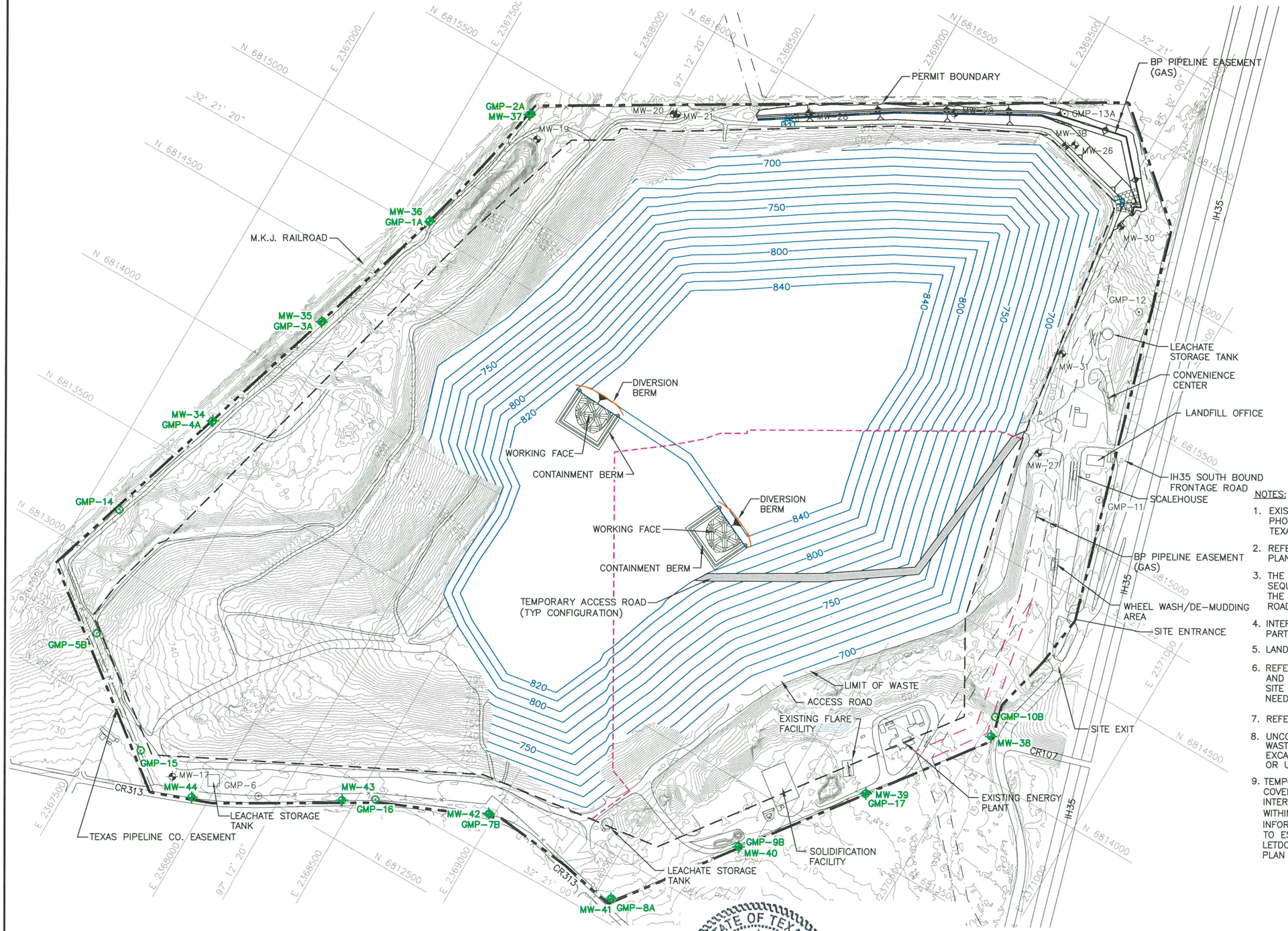
O:\0771\368\EXPANSION 2021\PARTS I-II\CLEAN\FIG A.4-SECTOR DEVELOPMENT PLAN I.dwg, rarrington, 1:2



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 — INTERMEDIATE CONTOUR
- DRAINAGE CHANNEL
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
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2. REFER TO APPENDIX IIIC-LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN FOR CONTAMINATED WATER RUN-ON/RUN-OFF BERM DESIGN INFORMATION.
3. THE SECTOR DEVELOPMENT SHOWN ON THIS DRAWING SHOWS THE GENERAL SEQUENCE OF FILLING OPERATIONS. ACTUAL LANDFILL DEVELOPMENT MAY VARY. THE LOCATION OF THE ALL-WEATHER ACCESS ROAD FROM THE LANDFILL HAUL ROAD TO THE ACTIVE AREA WILL BE DETERMINED DURING SITE OPERATIONS.
4. INTERMEDIATE COVER CONSISTS OF A 12-INCH THICK SOIL LAYER. REFER TO PART IV - SITE OPERATING PLAN FOR ADDITIONAL SOIL COVER REQUIREMENTS.
5. LANDFILL HAUL ROAD WILL BE SURFACED TO PROVIDE ALL-WEATHER ACCESS.
6. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR THE EROSION AND SEDIMENTATION CONTROL PLAN. DRAINAGE STRUCTURES ARE SHOWN AS THE SITE DEVELOPS. ADDITIONALLY BMPs WILL BE USED TO CONTROL EROSION AS NEEDED.
7. REFER TO APPENDIX IIII FOR LANDFILL GAS MANAGEMENT PLAN.
8. UNCONTAMINATED STORMWATER THAT HAS NOT COME INTO CONTACT WITH WASTE WILL BE COLLECTED IN SUMPS AND PERIODICALLY REMOVED FROM EXCAVATED AREAS BY PUMPING TO PERIMETER DRAINAGE CHANNELS OR USED IN SITE OPERATIONS (E.G., DUST CONTROL, COMPACTING, ETC.).
9. TEMPORARY CHUTES AND SWALES WILL BE PLACED OVER THE INTERMEDIATE COVER AREA TO MINIMIZE EROSION AND HELP ESTABLISH VEGETATION FOR INTERMEDIATE COVER AREAS THAT WILL NOT RECEIVE WASTE OR FINAL COVER WITHIN 180 DAYS AFTER PLACEMENT (REFER TO APPENDIX IIIF-F FOR MORE INFORMATION). MULCH, HYDROSEEDING OR SIMILAR METHODS WILL BE USED TO ESTABLISH VEGETATION OVER THE INTERMEDIATE COVER AREAS. SWALE AND LETDOWN SPACING WILL MEET THE REQUIREMENTS OF THE EROSION CONTROL PLAN INCLUDED IN APPENDIX IIIF-F.

STATE OF TEXAS
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DESIGN BY: CAM
REVIEWED BY: NT

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TEXAS REGIONAL LANDFILL COMPANY, LP

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NO.	DATE	DESCRIPTION
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MAJOR PERMIT AMENDMENT
SECTOR DEVELOPMENT PLAN II

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE I/II-A.5

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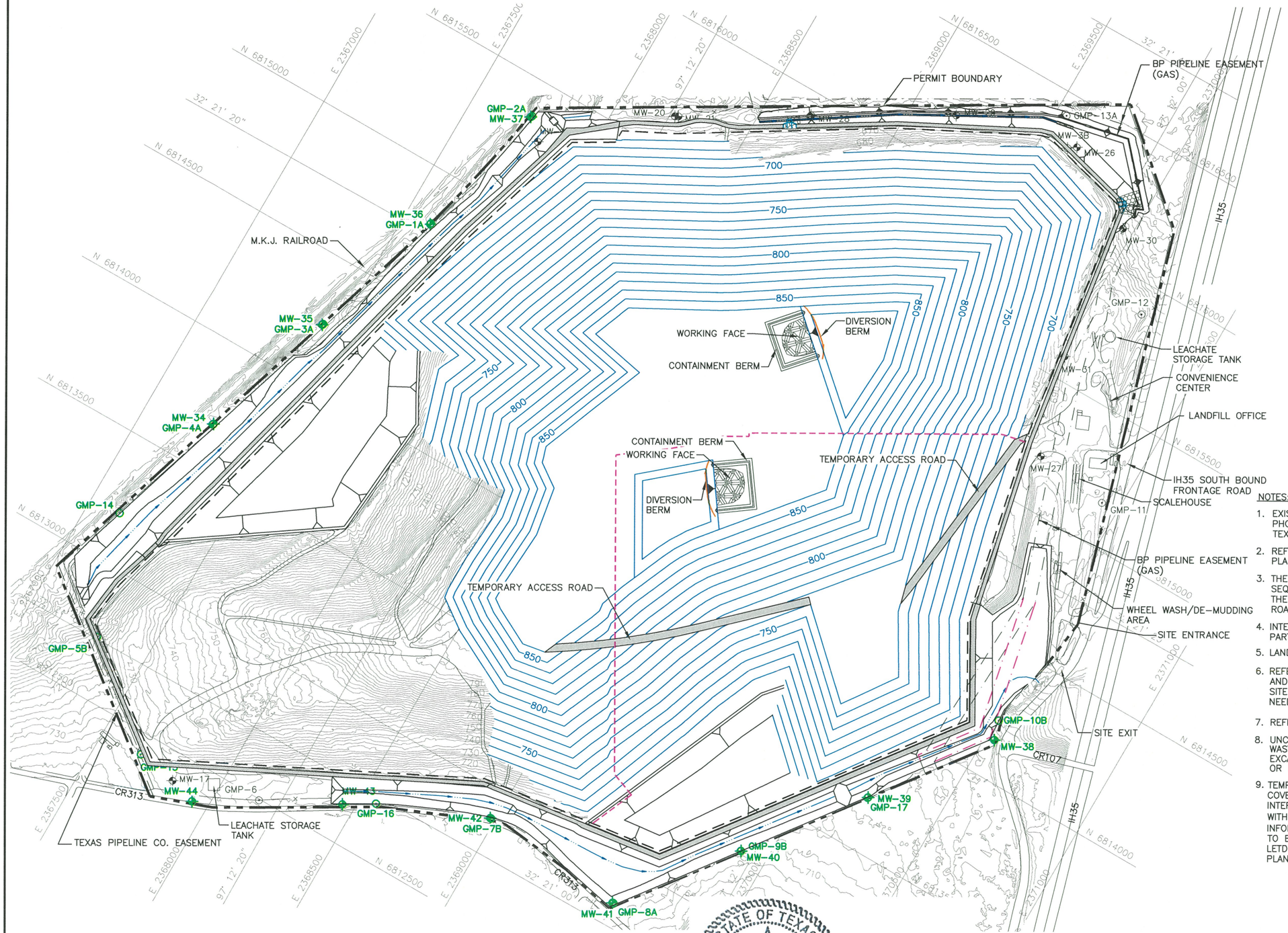
O:\0771\368\EXPANSION 2021\PARTS I-II\CLEAN\FIG A.5-SECTOR DEVELOPMENT PLAN II.dwg, rarrington, 1:2



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
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2. REFER TO APPENDIX IIIC-LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN FOR CONTAMINATED WATER RUN-ON/RUN-OFF BERM DESIGN INFORMATION.
3. THE SECTOR DEVELOPMENT SHOWN ON THIS DRAWING SHOWS THE GENERAL SEQUENCE OF FILLING OPERATIONS. ACTUAL LANDFILL DEVELOPMENT MAY VARY. THE LOCATION OF THE ALL-WEATHER ACCESS ROAD FROM THE LANDFILL HAUL ROAD TO THE ACTIVE AREA WILL BE DETERMINED DURING SITE OPERATIONS.
4. INTERMEDIATE COVER CONSISTS OF A 12-INCH THICK SOIL LAYER. REFER TO PART IV - SITE OPERATING PLAN FOR ADDITIONAL SOIL COVER REQUIREMENTS.
5. LANDFILL HAUL ROAD WILL BE SURFACED TO PROVIDE ALL-WEATHER ACCESS.
6. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR THE EROSION AND SEDIMENTATION CONTROL PLAN. DRAINAGE STRUCTURES ARE SHOWN AS THE SITE DEVELOPS. ADDITIONALLY BMPs WILL BE USED TO CONTROL EROSION AS NEEDED.
7. REFER TO APPENDIX IIII FOR LANDFILL GAS MANAGEMENT PLAN.
8. UNCONTAMINATED STORMWATER THAT HAS NOT COME INTO CONTACT WITH WASTE WILL BE COLLECTED IN SUMPS AND PERIODICALLY REMOVED FROM EXCAVATED AREAS BY PUMPING TO PERIMETER DRAINAGE CHANNELS OR USED IN SITE OPERATIONS (E.G., DUST CONTROL, COMPACTING, ETC.).
9. TEMPORARY CHUTES AND SWALES WILL BE PLACED OVER THE INTERMEDIATE COVER AREA TO MINIMIZE EROSION AND HELP ESTABLISH VEGETATION FOR INTERMEDIATE COVER AREAS THAT WILL NOT RECEIVE WASTE OR FINAL COVER WITHIN 180 DAYS AFTER PLACEMENT (REFER TO APPENDIX IIIF-F FOR MORE INFORMATION). MULCH, HYDROSEEDING OR SIMILAR METHODS WILL BE USED TO ESTABLISH VEGETATION OVER THE INTERMEDIATE COVER AREAS. SWALE AND LETDOWN SPACING WILL MEET THE REQUIREMENTS OF THE EROSION CONTROL PLAN INCLUDED IN APPENDIX IIIF-F.

STATE OF TEXAS
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12/16/2022

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PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

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MAJOR PERMIT AMENDMENT
SECTOR DEVELOPMENT PLAN III

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE I/II-A.6

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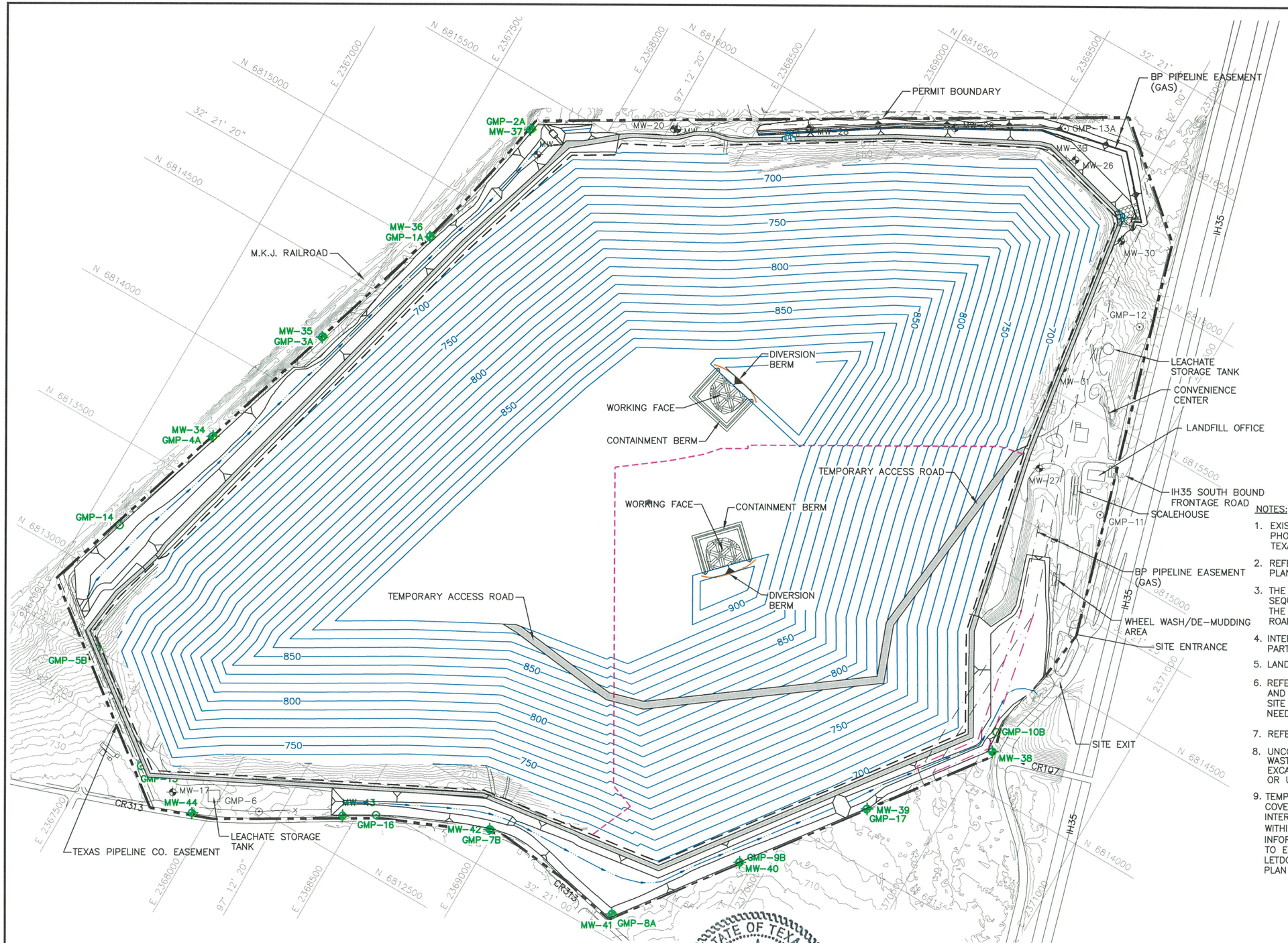
O:\0771\368\EXPANSION 2021\PARTS I-II\CLEAN\FIG A.6-SECTOR DEVELOPMENT PLAN III.dwg, rarrington, 1:2



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 — INTERMEDIATE CONTOUR
- DRAINAGE CHANNEL
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING LFG MONITORING PROBE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIC-LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN FOR CONTAMINATED WATER RUN-ON/RUN-OFF BERM DESIGN INFORMATION.
3. THE SECTOR DEVELOPMENT SHOWN ON THIS DRAWING SHOWS THE GENERAL SEQUENCE OF FILLING OPERATIONS. ACTUAL LANDFILL DEVELOPMENT MAY VARY. THE LOCATION OF THE ALL-WEATHER ACCESS ROAD FROM THE LANDFILL HAUL ROAD TO THE ACTIVE AREA WILL BE DETERMINED DURING SITE OPERATIONS.
4. INTERMEDIATE COVER CONSISTS OF A 12-INCH THICK SOIL LAYER. REFER TO PART IV – SITE OPERATING PLAN FOR ADDITIONAL SOIL COVER REQUIREMENTS.
5. LANDFILL HAUL ROAD WILL BE SURFACED TO PROVIDE ALL-WEATHER ACCESS.
6. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR THE EROSION AND SEDIMENTATION CONTROL PLAN. DRAINAGE STRUCTURES ARE SHOWN AS THE SITE DEVELOPS. ADDITIONALLY BMPs WILL BE USED TO CONTROL EROSION AS NEEDED.
7. REFER TO APPENDIX IIII FOR LANDFILL GAS MANAGEMENT PLAN.
8. UNCONTAMINATED STORMWATER THAT HAS NOT COME INTO CONTACT WITH WASTE WILL BE COLLECTED IN SUMPS AND PERIODICALLY REMOVED FROM EXCAVATED AREAS BY PUMPING TO PERIMETER DRAINAGE CHANNELS OR USED IN SITE OPERATIONS (E.G., DUST CONTROL, COMPACTING, ETC.).
9. TEMPORARY CHUTES AND SWALES WILL BE PLACED OVER THE INTERMEDIATE COVER AREA TO MINIMIZE EROSION AND HELP ESTABLISH VEGETATION FOR INTERMEDIATE COVER AREAS THAT WILL NOT RECEIVE WASTE OR FINAL COVER WITHIN 180 DAYS AFTER PLACEMENT (REFER TO APPENDIX IIIF-F FOR MORE INFORMATION). MULCH, HYDROSEEDING OR SIMILAR METHODS WILL BE USED TO ESTABLISH VEGETATION OVER THE INTERMEDIATE COVER AREAS. SWALE AND LETDOWN SPACING WILL MEET THE REQUIREMENTS OF THE EROSION CONTROL PLAN INCLUDED IN APPENDIX IIIF-F.

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CAD: A.7-SECTOR DEVELOPMENT III.DWG

DRAWN BY: JDW
DESIGN BY: CAM
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT SECTOR DEVELOPMENT PLAN IV

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE I/II-A.7

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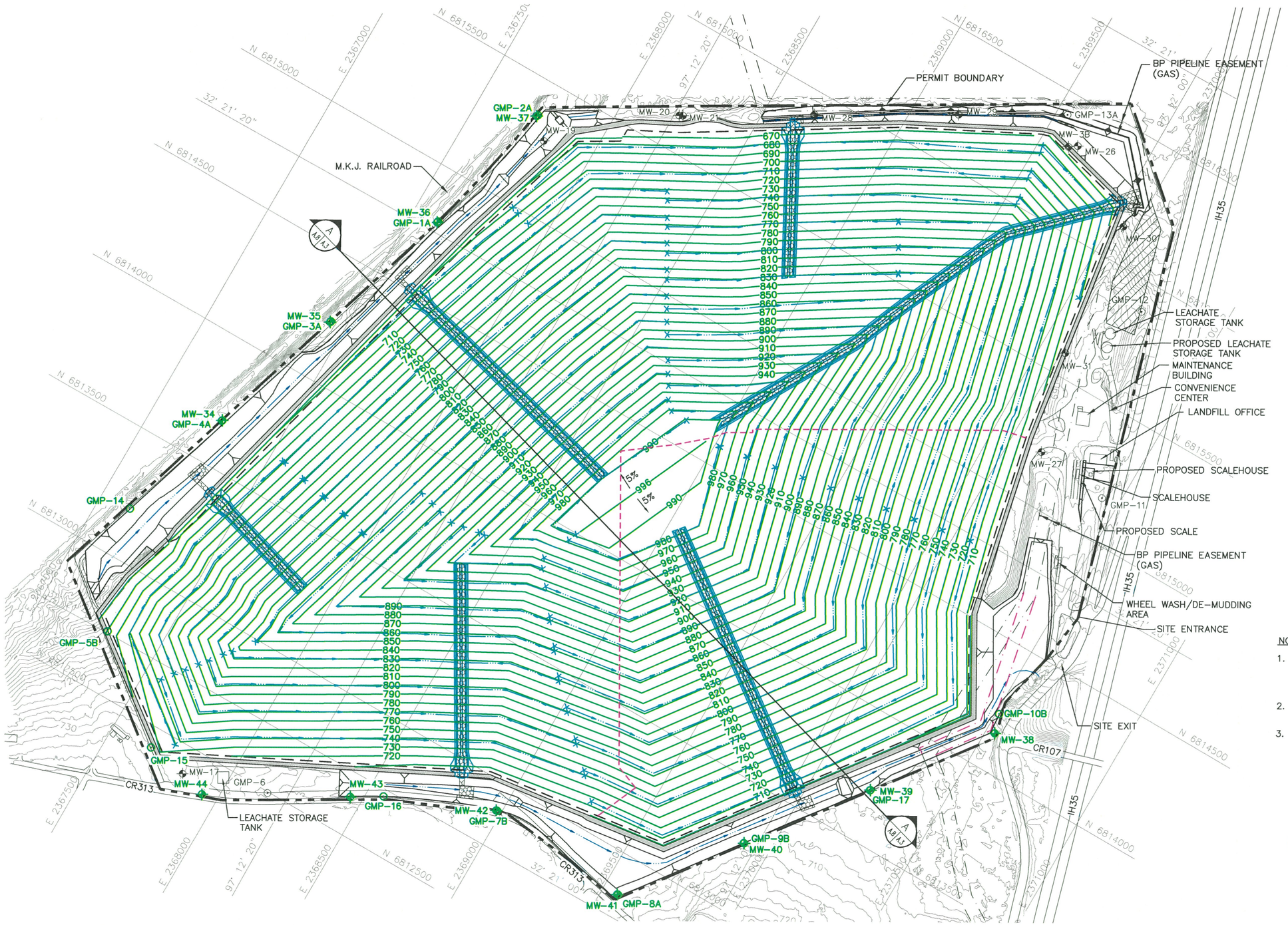
O:\0771\368\EXPANSION 2021\PARTS I-II\CLEAN\FIG A.7-SECTOR DEVELOPMENT PLAN IV.dwg, rarrington, 1:2



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- GABIONS
- MW-7 EXISTING GROUNDWATER MONITORING WELL
- GMP-12 EXISTING GAS MONITORING PROBE
- MW-7 PROPOSED GROUNDWATER MONITORING WELL
- GMP-17 PROPOSED GAS MONITORING PROBE
- FUTURE LFGTE FACILITY LOCATION

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR DRAINAGE DESIGN INFORMATION.
3. MAXIMUM FINAL COVER ELEVATION IS 996.0 FT-MSL. MAXIMUM TOP OF WASTE ELEVATION IS 992.5 FT-MSL.

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PROFESSIONAL ENGINEER

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DATE: 02/2022
FILE: 0771-368-11
CAD: A.8-LANDFILL COMPLETION PLAN.DWG

DRAWN BY: JDW
DESIGN BY: CAM
REVIEWED BY: NT

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REVISIONS

NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
LANDFILL COMPLETION PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE I/II-A.8

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O:\0771\368\EXPANSION 2021\PARTS I-II\CLEAN\FIG A.8-COMPLETION PLAN.dwg, rarrington, 1:2



0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- SECTOR BOUNDARY
- 800 OVERLINER CONTOUR
- 670 PERMITTED/EXISTING TOP OF LINER CONTOUR
- 662 PERMITTED/UNDEVELOPED EXCAVATION CONTOUR
- PERMITTED/UNDEVELOPED LEACHATE LINE
- LEACHATE COLLECTION SUMP
- MW-7 EXISTING GROUNDWATER MONITORING WELL
- GMP-12 EXISTING GAS MONITORING PROBE
- PRE SUBTITLE D AREA

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. EXCAVATION SLOPES AND SLOPES OUTSIDE THE LIMIT OF WASTE (e.g., CHANNELS) ARE TYPICALLY 3H:1V.
3. REFER TO APPENDIX IIIC FOR LEACHATE FORCEMAIN AND STORAGE INFORMATION.
4. ELEVATION OF DEEPEST EXCAVATION (EDE) AT SECTOR 1A LCS SUMP IS 648 FT-MSL.
5. SUBTITLE D AREA LCS PIPES SLOPE WITH A MINIMUM OF 0.8% TO SUMPS. LCS LATERAL DRAINAGE SLOPE IS A MINIMUM OF 2.0% ALONG THE FLOW PATH. OVERLINER LCS PIPES SLOPE WITH A MINIMUM 1.0% TO SUMPS.
6. LINER, OVERLINER, AND LEACHATE COLLECTION SYSTEM DETAILS ARE PRESENTED IN APPENDIX IIIA-A-LINER, OVERLINER AND FINAL COVER SYSTEM DETAILS.
7. SEQUENCE OF SITE DEVELOPMENT IS PROVIDED IN PARTS I/II, APPENDIX I/IIA DRAWINGS I/IIA.4 THROUGH I/IIA.7.

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DATE: 02/2022
FILE: 0771-368-11
CAD: A.9-EXCAVATION PLAN.DWG

DRAWN BY: JDW
DESIGN BY: CAM
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
EXCAVATION PLAN/OVERLINER PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE I/II-A.9

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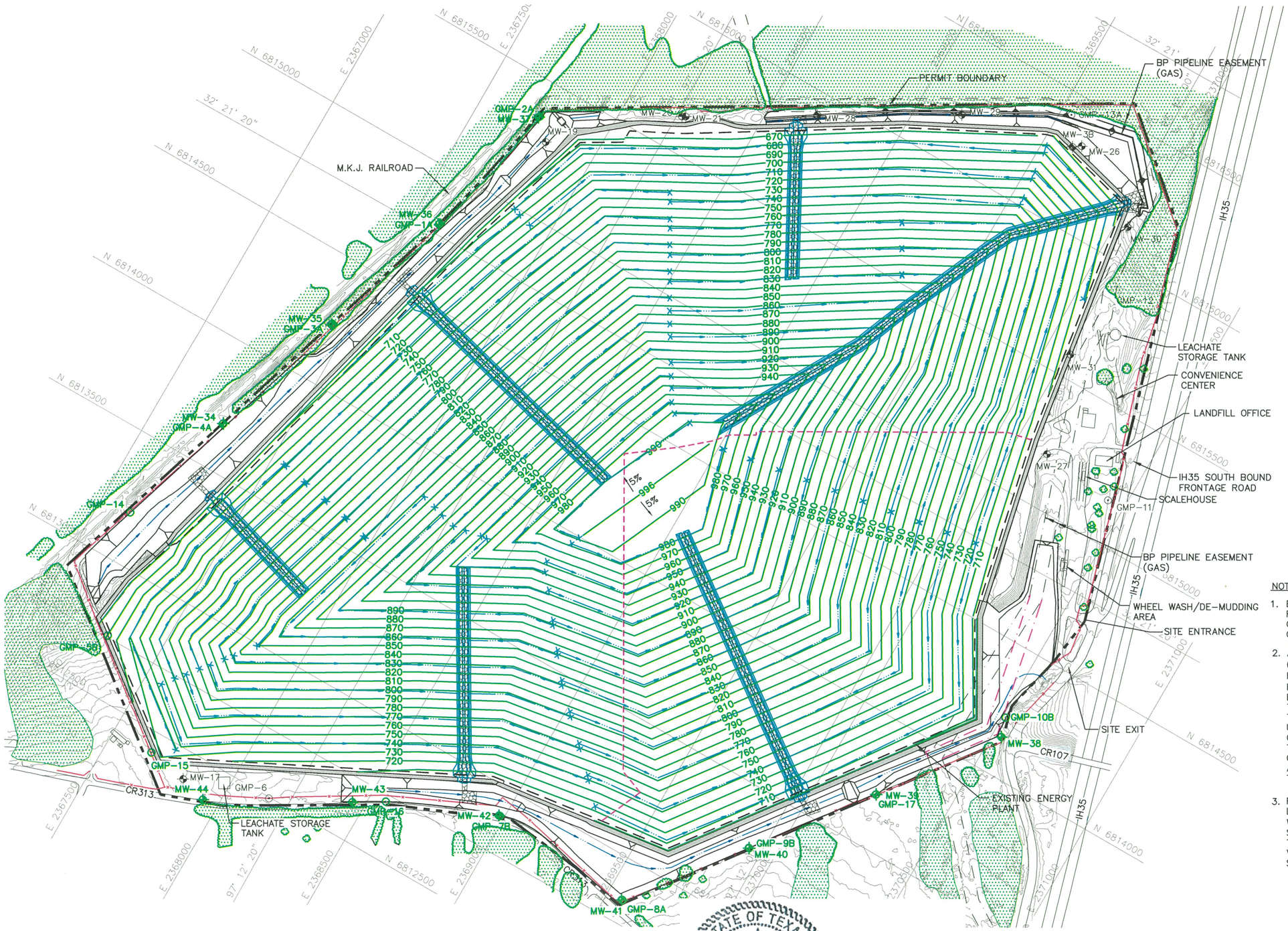
O:\0771\368\EXPANSION 2021\PARTS I-II\CLEAN\FIG A.9-EXCAVATION PLAN.dwg, rarrington, 1:2



LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- RELOCATED EASEMENT
- 800 FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- GABIONS
- MW-7 EXISTING GROUNDWATER MONITORING WELL
- GMP-12 EXISTING GAS MONITORING PROBE
- EXISTING FENCE
- EXISTING BUFFER ZONE WITH TREES AND SHRUBS (SEE NOTE 3)

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. ACCESS TO THE SITE WILL BE CONTROLLED BY PERIMETER FENCING (MINIMUM 4-FEET HIGH, 3-STRAND BARBED WIRE FENCES), A GATED ENTRANCE, AND NATURAL BARRIERS (e.g TURKEY CREEK, DENSE FOLIAGE, AND VEGETATION). ADDITIONALLY, IN AREAS OF NATURAL BARRIERS, THE ACCESS CONTROL PLAN IS PROVIDED TO PREVENT THE ENTRY OF LIVESTOCK, TO PREVENT THE PUBLIC FROM EXPOSURE TO POTENTIAL HEALTH AND SAFETY HAZARDS, AND TO DISCOURAGE UNAUTHORIZED ENTRY OR UNCONTROLLED DISPOSAL OF SOLID WASTE OR HAZARDOUS MATERIALS. NO TRESPASSING SIGNS WILL BE ADDED TO DISCOURAGE UNAUTHORIZED ENTRY OR UNCONTROLLED DISPOSAL OF SOLID WASTE OR HAZARDOUS MATERIALS. SIGNS WILL BE PLACED APPROXIMATELY 300 FEET APART ALONG THE NORTHERN PORTION OF THE SITE.
3. FACILITY IS BOUNDED BY TWO PUBLIC ROADS WITH HIGH-CANOPY TREE LINES. THE EXISTING DENSE TREE LINES FUNCTION AS BOTH WINDBREAKS AND SITE SCREENING. AS SHOWN IN FIGURE I/II-A.2 SECTOR DEVELOPMENT SEQUENCE, THE LANDFILL IS SEQUENCED SUCH THAT THE ACTIVE FILL AREA WILL BE SCREENED BY THE EXISTING VEGETATION. THE FILL SEQUENCE WILL ALSO DEVELOP THE OUTERMOST SECTORS FIRST, WHICH WILL SCREEN SUBSEQUENT OPERATIONS.

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CAD: A.11-ACCESS PLAN.DWG
DRAWN BY: JDW
DESIGN BY: CAM
REVIEWED BY: NT

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PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
ACCESS CONTROL PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE I/II-A.11

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O:\0771\368\EXPANSION 2021\PARTS I-II\CLEAN\FIG A.11-ACCESS PLAN.dwg, rarrington, 1:2

APPENDIX I/IIB

DEMONSTRATION OF COORDINATION

- Coordination with Federal Aviation Administration
- Coordination with Texas Historical Commission
- Coordination with Texas Department of Transportation
- Coordination with Texas Parks and Wildlife Department
- Coordination with U.S. Army Corps of Engineers
- Coordination with U.S. Department of the Interior Fish and Wildlife Service
- Coordination with North Central Texas Council of Governments



COORDINATION WITH
FEDERAL AVIATION ADMINISTRATION

- FAA Determination of No Hazard to Air Navigation Letter.
- January 18, 2022 WCG Request for Review Letter regarding hazards to all navigation and hazards to air traffic due to birds (including copies of FAA's determination of "No Hazard to Air Navigation" for Points A through E at the landfill, dated February 3, 2022).

U.S. Department
of Transportation
**Federal Aviation
Administration**

Federal Aviation Administration
Southwest Region, Airports Division
Safety and Standards Branch

10101 Hillwood Parkway
Fort Worth, Texas 76177

April 13, 2022

Charles R. Marsh, P.E.
Project Director
Weaver Consultant Group
6420 Southwest Boulevard, Suite 206
Fort Worth, TX 76109

Subject: Turkey Creek Landfill Facility – Johnson County
Municipal Solid Waste (MSW) – Permit Amendment
Permit Application (Vertical Site Expansion from 946 feet AMSL to 996 feet AMSL)
FAA File No. 2019-004-TX

Dear Charles Marsh:

This letter is in response to your February 8, 2022 letter advising us of the completed FAA site survey and subsequent FAA Determination of "No Hazard to Air Navigation" letters dated February 3, 2022, regarding the proposed vertical site expansion of the Turkey Creek Landfill Facility in Johnson County, Texas.

Using coordinates 32 21' 00.73" N and 97 12' 31.19" W, we determined there are no public-use fixed wing airports and six private-use airports within 6 statute miles of the proposed site. A 14 CFR Part 77 evaluation revealed no potential conflicts.

We have no objection to the proposed MSW facility. Our position of no objection is based on the application of our guidance for hazardous wildlife attractants on or near airports FAA Advisory Circular 150/5200-33B.

This site has been assigned our file No. 2019-004-TX. Please refer to this number in any future correspondence regarding this site. Thank you for coordinating this project with us. If there are any questions, you can contact me at 817-222-5671 or gary.loftus@faa.gov.

Sincerely,

GARY J LOFTUS

Digitally signed by GARY J LOFTUS
Date: 2022.04.13 09:10:57 -05'00'

Gary J. Loftus, A.A.E.
Airports Compliance Program Manager
Airport Certification Safety Inspector
FAA Southwest Region Airports Division

COORDINATION WITH
TEXAS HISTORICAL COMMISSION

- THC Review Record Dated February 17, 2022.
- January 18, 2022 Request Letter requesting THC concurrence that no historic properties are affected by the landfill.

Review Record

Track: 202205860 **Received:** 1/24/2022 **Due:** 2/23/2022
External Name: **Jurisdiction:** State
Project Name: Turkey Creek Landfill
Description: vertical expansion of municipal solid waste facility
Reviewers: Rebecca Shelton, Caitlin Brashear
Agency: Texas Commission on Environmental Quality
2nd Agency:
Address: **City:** **Zip:**
County: Johnson **Other Counties:** 0 **TAC Permit:**
Submitter: **Submitter Email:** cmarsh@wcgrp.com ☐ **Mapped**

STATUS

Status: No Action Required **Responded:** 2/17/2022 **Parent:**
Route Category: **Review Type:** Section 106/Antiquities Code Consultation

SITES & STRUCTURES

Eligible Sites: **Ineligible Sites:** **Undetermined Sites:**
Eligible Structures **Ineligible Structures** **Acres**

FEDERAL INVOLVEMENT

Contact: **Permit:** **Email:**

STATE INVOLVEMENT

Owner: **Owner Email:**

DESIGNATIONS

☐ **SAL** ☐ **NR** ☐ **NR District** ☐ **RTHL** ☐ **TXDot Review** ☐ **Underwater Review**

Notes:
Note to Client:
Client Notes:

Review Codes

F1	Non-written review	rebecca.shelton@thc.texas.gov	2/17/2022
N1	Non-written review	caitlin.brashear@thc.texas.gov	2/11/2022

COORDINATION WITH
TEXAS DEPARTMENT OF TRANSPORTATION
AND
TCEQ TRANSPORTATION DATA AND COORDINATION REPORT FORM FOR MSW TYPE I LANDFILLS (TCEQ – 20719, 09/27/21)

- TxDOT response letter dated August 17, 2022.
- January 18, 2022 WCG Request for Review Letter (refer to Appendix I/IID – Traffic Study for more information).

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Texas Department of Transportation

MEMO

August 17, 2022

To: Texas Commission on Environmental Quality
Municipal Solid Waste Section

Through: Weaver Consultants Group, LLC
Charles R. Marsh, P.E.
Project Director

From: Carl L. Johnson, P.E.
Fort Worth District Engineer

DocuSigned by:
Carl L. Johnson, PE
2FE36139F0614C3...

Subject: IESI Turkey Creek Landfill – Johnson County
Municipal Solid Waste – Permit Amendment, TCEQ Application No. 1417D

After the review of the Executive Summary, Engineering Study and Historical Data for the Turkey Creek Landfill, the Texas Department of Transportation, Fort Worth District does not have any objection of the expansion of the Turkey Creek Landfill. The Engineering Study submitted with the request for coordination regarding any potential traffic or location restrictions has demonstrated the infrastructure will provide adequate access to the site now and in the foreseeable future. As a result of the proposed expansion, the volumes of vehicles on the on-system roadway systems and into the facility will not increase, and the existing entrance will not be modified. In addition, based on the engineering study, it is expected that the traffic patterns will remain consistent with the current traffic patterns.

If you have any questions or require any addition information, please contact Matthew Evans, P.E., Fort Worth District Director of Maintenance.

OUR VALUES: *People • Accountability • Trust • Honesty*
OUR MISSION: *Through collaboration and leadership, we deliver a safe, reliable, and integrated transportation system that enables the movement of people and goods.*

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COORDINATION WITH
TEXAS PARKS AND WILDLIFE DEPARTMENT

- TPWD response letter dated May 31, 2022.
- January 18, 2022 WCG Request for Review Letter.

TEXAS PARKS & WILDLIFE

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Chairman
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Dick Scott
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Fort Worth

T. Dan Friedkin
Chairman-Emeritus
Houston

Carter P. Smith
Executive Director

May 31, 2022

Mr. Charles R. Marsh, P.E.
Weaver Consultants Group, LLC
6420 Southwest Boulevard, Suite 206
Fort Worth, TX 76109

RE: Turkey Creek Landfill Major Permit Amendment, Johnson County

Dear Mr. Charles R. Marsh:

Texas Parks and Wildlife Department (TPWD) received a review request dated January 18, 2022, for the landfill amendment referenced above.

Under Texas Parks and Wildlife Code (PWC) § 12.0011(b)(2) and (b)(3), TPWD has authority to provide recommendations and informational comments that will protect fish and wildlife resources to local, state, and federal agencies that approve, license, or construct developmental projects or make decisions affecting those resources. TPWD is providing input on this proposed project to facilitate the incorporation of beneficial management practices (BMP) during construction, operation, and maintenance that may assist the project proponent in minimizing impacts to the state's natural resources. Pursuant to PWC § 12.0011(b)(2) and (b)(3), TPWD offers the following comments and recommendations concerning this project. Please be aware that a written response to a TPWD recommendation or informational comment received by a state governmental agency may be required by state law. For further guidance, see Texas Parks and Wildlife Code (PWC) section 12.0011. Please refer to TPWD project number 48096 in return correspondence regarding this project.

Future Project Submittals

Electronic submittal: For greater efficiency, TPWD Wildlife Habitat Assessment Program (WHAB) prefers projects be submitted electronically to WHAB@tpwd.texas.gov. Projects submitted electronically receive a receipt that the project has been received by TPWD.

Project Description

Weaver Consultants Group, LLC (Weaver) is preparing a major permit amendment (Project) application on behalf of Texas Regional Landfill Company, LP. The Project cover letter indicated that the expansion would be limited to the vertical increase in height of the landfill and will not change the permit boundary or limits of waste disposal. On April 6, 2022, Texas Commission on Environmental Quality (TCEQ) provided TPWD with a notice of receipt of the application with a link to access the permit application. Weaver contacted me on May 25, 2022, to ask the status of our review and confirmation that the Project meets TCEQ requirements for compliance with the Endangered Species Act. Upon an additional look at the Project materials provided in the application, the Project will include both a vertical increase in height

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

and a 25.6-acre change in the limits of waste disposal that will relocate and channelize two streams and their associated pond and wetland habitats.

Federal Law: Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits taking, attempting to take, capturing, killing, selling, purchasing, possessing, transporting, and importing of migratory birds, their eggs, parts, or nests, except when specifically authorized by the Department of the Interior. This protection applies to most native bird species, including ground nesting species. The U.S. Fish and Wildlife Service (USFWS) Migratory Bird Office can be contacted at (505) 248-7882 for more information on potential impacts to migratory birds.

Within the Project area, potential impacts to migratory birds may occur during disturbance of existing vegetation and bare ground that may harbor active bird nests, including nests that may occur in grass, shrubs and trees and on bare ground including gravel pads and roads.

> **Recommendation:** TPWD recommends excluding vegetation clearing activities during the general bird nesting season, March 15 through September 15, to avoid adverse impacts to breeding birds. If clearing vegetation during the migratory bird nesting season is unavoidable, TPWD recommends surveying the area proposed for disturbance to ensure that no nests with eggs or young will be disturbed by operations. TPWD generally recommends a 150-foot buffer of vegetation remain around active nests until the eggs have hatched and the young have fledged; however, the size of the buffer zone depends on various factors and can be coordinated with the local or regional USFWS office.

Sky glow because of light pollution can have negative impacts on wildlife and ecosystems by disrupting natural diurnal and nocturnal behaviors such as migration, reproduction, nourishment, rest, and cover from predators.

> **Recommendation:** As bird protection measures, TPWD recommends designing the Project's lighted areas to contain the minimum amount of permanent night-time lighting needed for safety and security. TPWD recommends minimizing the Project's contribution toward skyglow by focusing light downward, with full cutoff luminaries to avoid emitting light above the horizontal, and to use dark-sky friendly lighting that is illuminated only when needed, down-shielded, as bright as needed, and minimizes blue light emissions. Lighting technologies, BMPs, and other dark sky resources can be found at the International Dark-Sky Association and McDonald Observatory websites.

Federal Law: Clean Water Act

Section 404 of the Clean Water Act (CWA) establishes a federal program to regulate the discharge of dredge and fill material into the waters of the U.S., including wetlands. The United States Army Corps of Engineers (USACE) and the Environmental Protection Agency (EPA) are responsible for regulating water resources under this act.

According to the permit application, ephemeral waterbodies are not considered jurisdictional per the June 22, 2020, Navigable Waters Protection Rule (NWPR). Please note that EPA and USACE have halted implementation of the NWPR, and jurisdictional waters include ephemeral streams. However, the permit application also indicates that the USACE determined that the waterbodies within the expansion area are exempt under the Section 404(f) exemption found at 33 CFR Part 323.4(a)(5), because the waterbodies were determined part of a waste treatment system as a component of TPDES multi-sector storm water general permit No. TXR05AP29.

As a result of this exemption, the Project will provide no avoidance of impacts or mitigation for impacts to the streams and wetlands within the Project area, all of which would be considered Waters of the U.S. if an exemption were not granted. Although isolated wetlands and exempt waters may not be applicable to the USACE Section 404 CWA permitting process, aquatic systems provide an essential role in providing habitat for wildlife and helping to protect water quality.

> **Recommendation:** TPWD recommends avoiding development within streams and wetlands and referring to the recommendations provided in the section below regarding *State Laws: Aquatic Resources*.

Federal Law: Endangered Species Act

Federally listed animal species and their habitat are protected from take on any property by the Endangered Species Act (ESA). Take of a federally listed species can be allowed if it is incidental to an otherwise lawful activity and must be permitted in accordance with Section 7 or 10 of the ESA. Take of a federally listed species or its habitat without allowance from USFWS is a violation of the ESA.

The Project materials and permit application include a list of federal threatened and endangered species that may occur in the Project area obtained August 31, 2021, from the USFWS Information Planning and Consultation (IPaC) website and indicated that no impacts to federally listed species will occur due to the proposed Project.

Please note that species lists generated from USFWS IPaC expire after 90 days.

> **Recommendation:** To be up to date on current listing status and to ensure compliance with ESA, prior to disturbance into natural areas and streams within the Project area, TPWD recommends Weaver and Texas Regional Landfill Company LP refer to the USFWS IPaC periodically to ensure that the Project will not impact newly-listed species that may occur in the Project area.

In December 2020, the USFWS determined that ESA listing for the monarch butterfly (*Danaus plexippus*) was warranted; however, listing was precluded by higher priority listing actions. Currently the monarch butterfly is a candidate species for listing, and the USFWS will review the species status annual until a proposal for listing is developed.

Significant declines in the population of migrating monarch butterflies have led to widespread concern about this species and other native insect pollinator species due to

reductions in native floral resources. To support pollinators and migrating monarchs, TPWD encourages the establishment of native wildflower habitats on private and public lands. Establishing wildflower habitats in land reclamation of landfill sites can contribute to pollinator conservation and can provide habitat for a diverse community of pollinators, providing food, breeding, or nesting opportunities. By acting as refugia for pollinators in otherwise inhospitable landscapes, this habitat can contribute to the maintenance of healthy ecosystems and provide ecological services. Resources regarding pollinators can be found on TPWD's Native Pollinator, Monarch Butterfly, and Pollinator Bioblitz webpages.

Recommendation: To provide pollinator conservation and support migrating monarchs, TPWD encourages Weaver and Texas Regional Landfill Company LP to revegetate landfill areas with vegetation that provides habitat for monarch butterflies and other pollinator species. Species appropriate for the project area can be found by accessing the Lady Bird Johnson Wildflower Center, working with TPWD biologists to develop an appropriate list of species, or utilizing resources found at the Monarch Watch website or the Xerces Society's Guidelines webpage.

State Law: Chapter 64, Birds

PWC section 64.002, regarding protection of nongame birds, provides that no person may catch, kill, injure, pursue, or possess a bird that is not a game bird. PWC section 64.003, regarding destroying nests or eggs, provides that, no person may destroy or take the nests, eggs, or young and any wild game bird, wild bird, or wild fowl.

Recommendation: To minimize potential impacts to avian species, please review the *Migratory Bird Treaty Act* section above for recommendations as they are also applicable for compliance with PWC.

State Law: Aquatic Resources

PWC section 1.011 grants TPWD authority to regulate and conserve aquatic animal life of public waters. Texas Administrative Code (TAC) section 57.157 regulates take of mussels, including mussels that are not state listed. TPWD regulates the introduction and stocking of fish, shellfish, and aquatic plants into public waters of the state under PWC 12.015, 12.019, and 66.015 and TAC 52.101-52.105, 52.202, and 57.251-57.259.

Dewatering activities can impact aquatic resources through stranding fish and mussels. Other harmful construction activities can trample, dredge or fill areas exhibiting stationary aquatic resources such as plants and mussels. Relocating aquatic life to an area of suitable habitat outside the project footprint avoids or reduces impacts to aquatic life. Relocation activities are done under the authority of a TPWD *Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters* with an approved Aquatic Resource Relocation Plans (ARRP). The permit allows for movement (i.e., introduction, stocking, transplant, relocation) of aquatic species in waters of the state. ARRPs are used to plan resource handling activities and assist in the permitting process. If dewatering activities and other project related activities cause mortality to fish and wildlife species, then the responsible party would be subject to investigation

by the TPWD KAST and will be liable for the value of lost resources under the authority of PWC sections 12.0011 (b) (1) and 12.301.

The Project would dewater intermittent streams, ephemeral streams, and on channel perennial ponds in order to accommodate stream relocation and channelization. The Project would impact approximately 921 feet of intermittent stream with a 2.02-acre on-channel beaver pond and 518 feet of ephemeral stream with a 4.25-acre on-channel pond system that appears to be both manmade and manipulated by beaver.

Recommendation: The Project should be coordinated with the TPWD Kills and Spills Team (KAST) for appropriate authorization and to ensure protection of native aquatic wildlife. TPWD recommends that impact avoidance measures for aquatic organisms, including all native fish and freshwater mussel species, regardless of state listing status, be considered during Project planning and construction activities.

Recommendation: When dewatering, excavating, or filling activities are involved with Project activities in streams when water is present, TPWD recommends relocating native aquatic resources, including fish and mussels, in conjunction with a *Permit to Introduce Fish, Shellfish or Aquatic Plants into Public Waters* and an ARRP. The ARRP should approved by the department 30 days prior to activity within Project waters or resource relocation and submitted with an application for a no-cost permit. ARRPs can be submitted to Travis Tidwell Brown TPWD Region 1 KAST available at Travis.Tidwell@tpwd.texas.gov.

State Law: Aquatic Invasive Species

Per TAC chapter 57, it is an offense for any person to possess, transport, or release into the water of this state any species, hybrid of a species, subspecies, eggs, seeds, or any part of any species defined as a harmful or potentially harmful exotic fish, shellfish, or aquatic plant. This rule applies not only to zebra mussels (*Dreissena polymorpha*) (live or dead) and their larvae but also to any species or fragments thereof designated as harmful or potentially harmful under this subchapter (e.g., giant salvinia, hydrilla, Eurasian watermilfoil). The full list of prohibited species can be found on the TPWD webpage regarding prohibited aquatic species.

Because the proposed Project involves work within a stream, equipment and other vehicles coming in contact with surface waters could transport aquatic invasive species where mud, plant debris, or water accumulate.

Recommendation: TPWD recommends preparing and following an aquatic invasive species (AIS) transfer prevention plan which outlines BMP for preventing inadvertent transfer of aquatic invasive plants and animals on project equipment and materials. To minimize the risk of transporting aquatic invasive species, TPWD recommends reviewing and adhering to the AIS BMP identified in the ARRP guidelines packet and the *TPWD Clean/Drain/Dry Procedures and Zebra Mussel Decontamination Procedures for Contractors Working in Inland Public Waters*.

Species of Greatest Conservation Need

In addition to federal and state listed species, TPWD tracks SGCN and natural plant communities and actively promotes their conservation. TPWD considers it important to evaluate and, if feasible, minimize impacts to SGCN and their habitat to reduce the likelihood of endangerment and preclude the need to list as threatened or endangered in the future.

Although the Project materials presented information regarding state listed species potentially occurring in Johnson County obtained from TPWD online application identifying rare, threatened, and endangered species by county (RTEST), the Project did not consider other SGCN of Johnson County.

RTEST identifies the following SGCN flora and fauna with potential to occur in Johnson County. These species could be impacted due to construction, operation, and maintenance activities if suitable habitat or the species occur at the Project site. General habitat descriptions for these species are included on the RTEST list:

Taxon	Scientific Name	Common Name	GRank[1]	SRank[2]
Amphibians	Anaxyrus woodhousii	Woodhouse's toad	G5	SU
Amphibians	Pseudacris streckeri	Strecker's chorus frog	G5	S3
Birds	Plegadis chihi	white-faced ibis*	G5	S4B
Birds	Haliaeetus leucocephalus	bald eagle	G5	S3B,S3N
Birds	Laterallus jamaicensis	black rail**	G3	S2
Birds	Grus americana	whooping crane**	G1	S1S2N
Birds	Charadrius melodus	piping plover**	G3	S2N
Birds	Charadrius montanus	mountain plover	G3	S2
Birds	Calidris canutus rufa	rufa red knot**	G4T2	S2N
Birds	Leucophaeus pipixcan	Franklin's gull	G5	S2N
Birds	Sternula antillarum athalassos	interior least tern	G4T3Q	S1B
Birds	Athene cunicularia hypugaea	western burrowing owl	G4T4	S2
Birds	Vireo atricapilla	black-capped vireo	G3	S3B
Birds	Setophaga chrysoparia	golden-cheeked warbler**	G2	S2S3B
Birds	Calamospiza melanocorys	lark bunting	G5	S4B
Birds	Calcarius ornatus	chestnut-collared longspur	G5	S3
Fish	Hybognathus nuchalis	Mississippi silvery minnow	G5	S4
Mammals	Myotis velifer	cave myotis bat	G4G5	S2S3
Mammals	Perimyotis subflavus	tricolored bat	G3G4	S2
Mammals	Eptesicus fuscus	big brown bat	G5	S5

Mammals	Lasiurus borealis	eastern red bat	G3G4	S4
Mammals	Lasiurus cinereus	hoary bat	G3G4	S4
Mammals	Sylvilagus aquaticus	swamp rabbit	G5	S5
Mammals	Cynomys ludovicianus	black-tailed prairie dog	G4	S3
Mammals	Ondatra zibethicus	muskrat	G5	S5
Mammals	Mustela frenata	long-tailed weasel	G5	S5
Mammals	Spilogale putorius	eastern spotted skunk	G4	S1S3
Mammals	Conepatus leuconotus	western hog-nosed skunk	G4	S4
Mammals	Puma concolor	mountain lion	G5	S2S3
Reptiles	Terrapene carolina	eastern box turtle	G5	S3
Reptiles	Terrapene ornata	western box turtle	G5	S3
Reptiles	Apalone mutica	smooth softshell	G5	S3
Reptiles	Ophisaurus attenuatus	slender glass lizard	G5	S3
Reptiles	Phrynosoma cornutum	Texas horned lizard*	G4G5	S3
Reptiles	Plestiodon septentrionalis	prairie skink	G5	S5
Reptiles	Nerodia harteri	Brazos water snake*	G1	S1
Reptiles	Thamnophis sirtalis annectens	Texas garter snake	G5T4	S1
Reptiles	Sistrurus tergeminus	western massasauga	G3G4	S3
Insects	Bombus pensylvanicus	American bumblebee	G3G4	SNR
Insects	Neotrichia juani	No accepted common name	G1	S1
Mollusks	Potamilus streckersoni	Brazos heelsplitter*	GNR	SNR
Mollusks	Truncilla macrodon	Texas fawnsfoot*	G1	S2
Plants	Cuscuta exaltata	tree dodder	G3	S3
Plants	Astragalus reflexus	Texas milk vetch	G3	S3
Plants	Dalea hallii	Hall's prairie clover	G3	S2
Plants	Dalea reverchonii	Comanche Peak prairie clover	G2	S2
Plants	Pediomelum reverchonii	Reverchon's scurfpea	G3	S3

[1]GRank is the NatureServe global conservation status rank.
[2]SRank is the NatureServe subnational or state level conservation status rank.
See NatureServe's website for specific global and state ranking definitions.
*State listed threatened or endangered
** Federal and state listed threatened or endangered

The primary native habitats proposed for impact at the Project site include wetlands, ponds, streams, and associated riparian habitats.

Recommendation: TPWD recommends that precautions be taken to avoid impacts to SGCN flora and fauna when planning the Project and if encountered in the Project area during construction or operation activities. TPWD also recommends the implementation of the following BMP to avoid or minimize potential impacts to wildlife resources potentially occurring at the construction site:

1. TPWD recommends informing employees and contractors of the potential for state listed species or SGCN to occur in the Project area. Contractors should be advised to avoid impacts to all wildlife that are encountered.

2. Wildlife, including aquatic wildlife, observed during construction should be allowed to safely leave the site or be translocated by a permitted individual to a nearby area with similar habitat that would not be disturbed during construction. TPWD recommends that any translocations of reptiles be the minimum distance possible no greater than one mile, preferably within 100-200 yards from the initial encounter location. For relocation of aquatic resources, a TPWD permit is required per the Section above regarding *State Law: Aquatic Resources*. For purposes of relocation, surveys, monitoring, and research, terrestrial state listed species may only be handled after obtaining authorization through the TPWD Wildlife Permits Office. TPWD recommends that consultants obtain such authorization and serve as on-site biological monitors if encounters of state listed terrestrial wildlife are likely.

3. Small vertebrates including snakes, lizards, toads, and mice fall into trenches and become trapped. Wildlife unable to escape from trenches are susceptible to loss from backfilling activities, exposure to elements, starvation, dehydration, and predation by other wildlife. Where trenching or other excavation is involved, TPWD recommends minimizing the length of trenches left open at any given time during construction. Trenches left open for more than two daylight hours should be inspected for the presence of trapped wildlife prior to backfilling. If trenches cannot be backfilled the day of initial trenching, then escape ramps, in the form of short lateral trenches or wooden planks sloping to the surface at an angle of less than 45 degrees, should be installed at least every 90 meters.

4. For soil stabilization and revegetation of disturbed areas within the proposed project area, TPWD recommends erosion and seed/mulch stabilization materials that avoid entanglement hazards to snakes and other wildlife species. Because the mesh found in many erosion control blankets or mats pose an entanglement hazard to wildlife, TPWD recommends the use of no-till drilling, hydromulching and/or hydroseeding rather than erosion control blankets or mats due to a reduced risk to wildlife. If erosion control blankets or mats will be used, the product should contain no netting or contain loosely woven, natural fiber netting in which the mesh design allows the threads to move, therefore allowing expansion of the mesh openings. Hydromulch containing plastic ingredients and plastic mesh matting should be avoided.

5. To aid in the scientific knowledge of a species' status and current range, TPWD encourages reporting encounters of protected and rare species to the TXNDD according to the data submittal instructions found at the TPWD Texas Natural Diversity Database: Submit Data webpage. An additional method for reporting

observations of species is through the iNaturalist community app where plant and animal observations are uploaded from a smartphone. The observer then selects to add the observation to specific TPWD Texas Nature Tracker Projects appropriate for the taxa observed, including Herps of Texas, Birds of Texas, Texas Eagle Nests, Texas Whooper Watch, Mammals of Texas, Rare Plants of Texas, Bees & Wasps of Texas, Terrestrial Mollusks of Texas, Texas Freshwater Mussels, Fishes of Texas, and All Texas Nature.

TPWD appreciates the opportunity to provide input on the proposed project. Thank you for considering the fish and wildlife resources of Texas. If you have any questions, please contact me at Karen.Hardin@tpwd.texas.gov or (903) 322-5001.

Sincerely,

Karen B. Hardin
Wildlife Habitat Assessment Program
Wildlife Division

kbh/48096 (48397)

COORDINATION WITH
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

- NCTCOG Response Letter Dated May 16, 2022.
- March 3, 2022, NCTCOG Review Request Letter

North Central Texas Council Of Governments

May 16, 2022

Mr. Charles R. Marsh, P.E.
Project Director
Weaver Consultants Group
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109

RE: Major Permit Amendment Application for the Turkey Creek Landfill, Johnson County, Texas
Physical Site Address: 9100 S. Interstate 35W, Alvarado, Texas 76009

Dear Mr. Marsh,

Thank you for your organization's presentation to the Facility Conformance Subcommittee of the Resource Conservation Council (RCC) on May 9, 2022, regarding the Major Permit Amendment Application for the Turkey Creek Landfill in Johnson County.

The North Central Texas Council of Governments (NCTCOG) has been directed by Texas Commission on Environmental Quality to determine the consistency of solid waste permit applications, amendments, and registration applications with the Regional Management Plan, *Planning for Sustainable Materials Management in North Central Texas 2015-2040: North Central Texas Regional Solid Waste Management Plan*.

At its meeting on May 12, 2022, the Resource Conservation Council, the region's solid waste advisory committee, found the major permit amendment application for the Turkey Creek Landfill to be consistent with the goals of the Regional Management Plan. Unless there are significant changes to the application from those outlined in the presentation, this determination should not change.

If you have any questions regarding NCTCOG's conformance review, please contact Elena Berg by phone at (817) 608-2363 or by email at EBerg@nctcog.org.

Sincerely,

Kathy Fonville

Kathy Fonville
Chair, Resource Conservation Council

cc: Mr. Chance Goodin, Texas Commission on Environmental Quality
MC-124, P.O. Box 13087, Austin, Texas 78711-3087

cc: Mr. Gary Bartels, Southern Region Engineer, Texas Regional Landfill Company, LP
3 Waterway Square Place, Suite 550, The Woodlands, Texas 77380

616 Six Flags Drive, Centerpoint Two
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(817) 640-3300 FAX: 817-640-7806 ♻ recycled paper
www.nctcog.org

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT

APPENDIX I/IIC
LOCATION RESTRICTION DEMONSTRATIONS

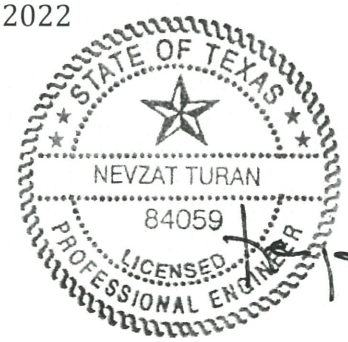
Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022





Prepared by

Weaver Consultants Group, LLC
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6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

This document is intended for permitting purposes only.

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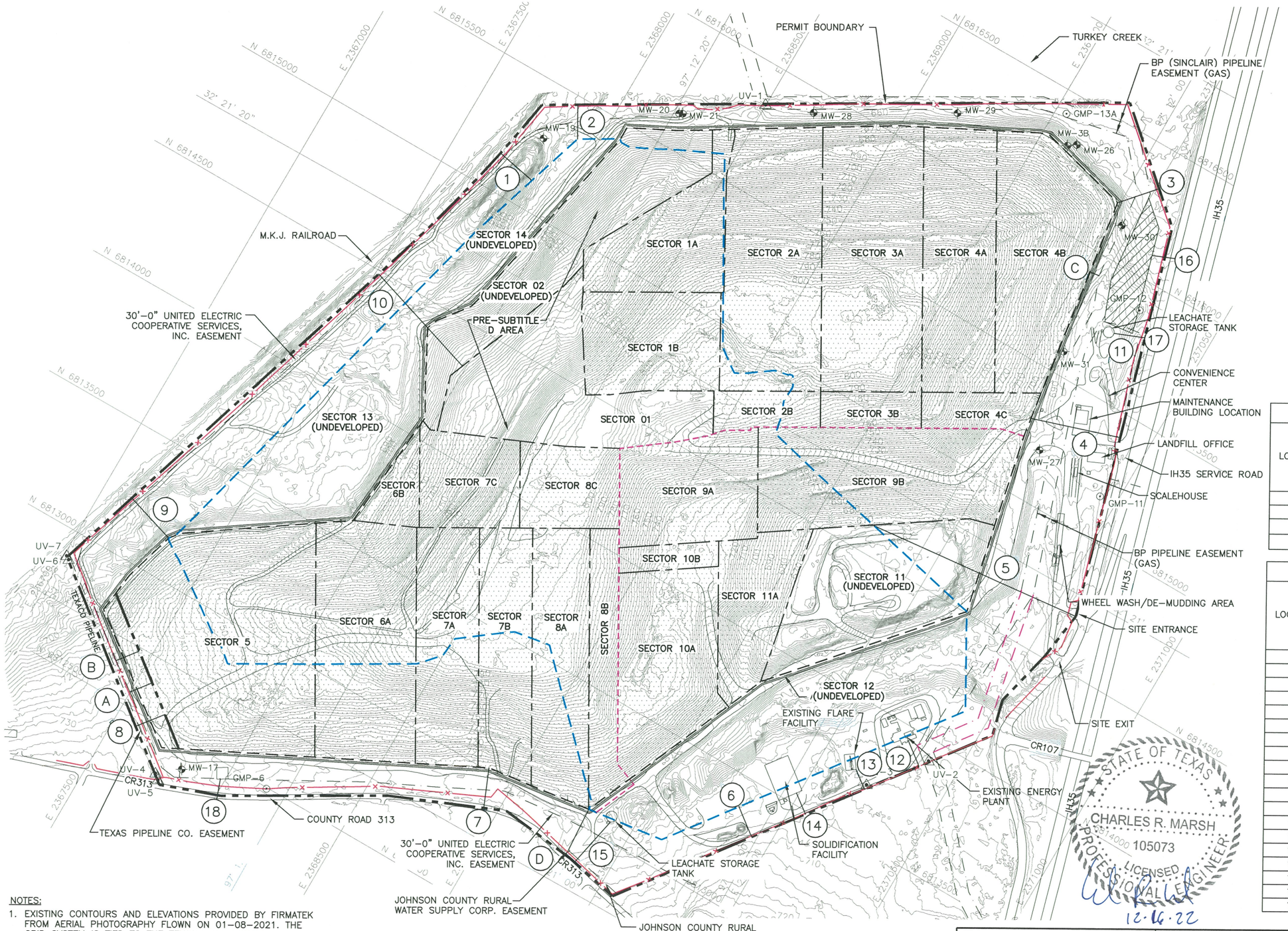

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- NEWLY PERMITTED AIRSPACE LIMIT OF WASTE
- EXISTING FENCE (SEE NOTE 4)
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- PROPOSED EASEMENT (SEE NOTE 3)
- SECTOR BOUNDARY
- EXISTING SUBTITLE D COMPOSITE LINED AREA
- MW-7 PERMITTED GROUNDWATER MONITORING WELL
- GMP-12 PERMITTED GAS MONITORING PROBE

BUFFER ZONE INFORMATION		
LOCATION	BUFFER ZONE BETWEEN EASEMENT BOUNDARY AND EXISTING/PERMITTED LIMIT OF WASTE	BUFFER ZONE BETWEEN EASEMENT BOUNDARY AND NEWLY PERMITTED AIRSPACE
A	30 FEET	94 FEET
B	32 FEET	99 FEET
C	40 FEET	40 FEET
D	178 FEET	178 FEET

BUFFER ZONE INFORMATION		
LOCATION	BUFFER ZONE BETWEEN PERMIT BOUNDARY AND EXISTING/PERMITTED LIMIT OF WASTE	BUFFER ZONE BETWEEN PERMIT BOUNDARY AND NEWLY PERMITTED AIRSPACE
1	320 FEET	166 FEET
2	90 FEET	137 FEET
3	174 FEET	174 FEET
4	361 FEET	361 FEET
5	419 FEET	879 FEET
6	488 FEET	130 FEET
7	161 FEET	161 FEET
8	62 FEET	125 FEET
9	216 FEET	216 FEET
10	289 FEET	495 FEET
PROCESSING/DISPOSAL UNIT BUFFER ZONE INFORMATION		
11	EXISTING LEACHATE STORAGE TANK	123 FEET
12	EXISTING LFGTE FACILITY	110 FEET
13	EXISTING LFG FLARE	85 FEET
14	EXISTING SOLIDIFICATION FACILITY	91 FEET
15	EXISTING LEACHATE STORAGE TANK	214 FEET
16	PROPOSED LFGTE FACILITY	50 FEET
17	PROPOSED LEACHATE STORAGE TANK	125 FEET
18	LEACHATE STORAGE TANK	65 FEET

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. AS SHOWN IN APPENDIX I/IIC, THE BUFFER ZONES VARY AROUND THE PERIMETER OF THE SITE, BUT IN NO CASE ARE THEY LESS THAN 50-FEET FOR EXISTING WASTE. THE BUFFER ZONE BETWEEN THE PERMIT BOUNDARY AND THE NEWLY PERMITTED AIRSPACE (PERMIT NO. 1417C) IS AT LEAST 125-FEET.
3. THE PROPOSED EASEMENT SHOWN IS FOR VISUAL PURPOSES ONLY. THE ACTUAL LOCATION WILL BE DETERMINED AT A LATER DATE IN COORDINATION WITH THE EASEMENT HOLDER.
4. EXISTING FENCE IS SHOWN WHERE IT DOES NOT OVERLAP WITH PERMIT BOUNDARY. EXISTING FENCELINE LOCATED WITHIN HEAVILY VEGETATED AREAS WAS APPROXIMATED.

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER
12-16-22

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SHEET I/IIC-4

- [ ] DRAFT
- [X] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: C-1 BUFFER ZONE.DWG
DRAWN BY: JDW
DESIGN BY: JBP
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
BUFFER ZONE PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

WWW.WCGRP.COM

DRAWING I/IIC-1

O:\0771\368\EXPANSION 2021\PARTS I-IV\I-IIC\CLEAN\C-1 BUFFER ZONE.dwg, rarrington, 1:2

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

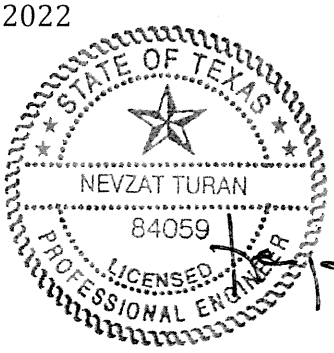
PART III – SITE DEVELOPMENT PLAN
SITE DEVELOPMENT PLAN NARRATIVE

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

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WCG Project No. 0771-368-11-123

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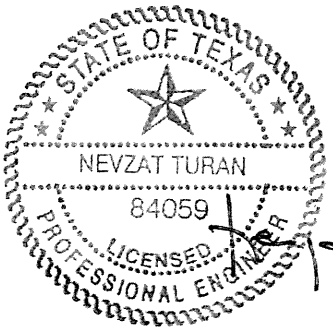

12/16/2022

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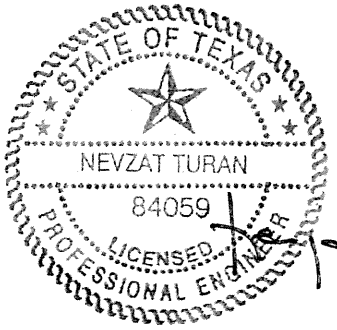

12/16/2022

APPENDIX IIIM
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APPENDIX IIIN
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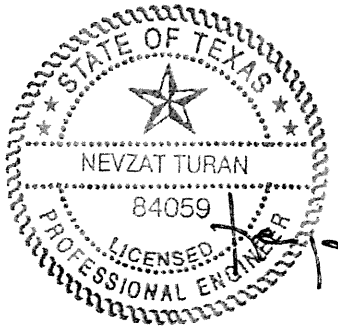

12/16/2022

LEGEND

- LANDFILL PERMIT BOUNDARY
- PROPOSED LIMITS OF WASTE
- PERMITTED LIMITS OF WASTE
- 700 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- EASEMENT
- PROPOSED RELOCATED EASEMENT
- MW-16 — EXISTING GROUNDWATER MONITORING WELL
- GMP-3 — EXISTING LFG MONITORING PROBE
- MW-16 — PROPOSED GROUNDWATER MONITORING WELL
- GMP-3 — PROPOSED LFG MONITORING PROBE



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0 200 400
SCALE IN FEET

GMP-2A
MW-37
MW-19
MW-20
MW-21
MW-28
MW-29
GMP-13A
BP PIPELINE EASEMENT (GAS)
MW-3B
MW-26
MW-30
IH35
SITE BOUNDARY/PROPERTY LINE
MW-36
GMP-1A
MW-35
GMP-3A
M.K.J. RAILROAD
MW-34
GMP-4A
GMP-14
GMP-12
LEACHATE STORAGE TANK
MW-31
CONVENIENCE CENTER
MAINTENANCE BUILDING LOCATION
LANDFILL OFFICE
SCALEHOUSE
MW-27
GMP-11
BP PIPELINE EASEMENT (GAS)
BP PIPELINE EASEMENT (GAS)
WASTE DISPOSAL AREA
(REFER TO PARTS I/II, APPENDIX I/IIA FOR THE SEQUENCE OF DEVELOPMENT FOR THE WASTE DISPOSAL AREA)
SITE ENTRANCE
GMP-5B
GMP-15
MW-17
MW-44
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POWERLINES
LEACHATE STORAGE TANK
CR313
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CR107
MW-39
GMP-17
GMP-9B
MW-40
MW-41
GMP-8A
N 6816500
N 6816000
N 6815500
N 6815000
N 6814500
N 6814000
N 6813500
N 6813000
N 6812500
E 2367000
E 2367500
E 2368000
E 2368500
E 2369000
E 2369500
E 2370000
E 2371000
730
710

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021.
2. APPENDIX IIIA INCLUDES INFORMATION ON THE LANDFILL UNIT DESIGN.
3. LANDFILL DISPOSAL OPERATIONS WILL OCCUR IN OPEN AREAS WITHIN THE PERMITTED WASTE DISPOSAL FOOTPRINT; THEREFORE, ADEQUATE VENTILATION WILL BE PROVIDED.
4. THE PROPOSED EASEMENT SHOWN IS FOR ILLUSTRATION PURPOSES ONLY. THE ACTUAL LOCATION WILL BE DETERMINED AT A LATER DATE IN COORDINATION WITH THE EASEMENT HOLDER.

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TURKEY CREEK LANDFILL
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FIGURE III-2

O:\0771\369\EXPANSION 2021\PART II\III-2-SITE PLAN CLEAN.dwg, rarrington, 1:2

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JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

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PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIA
LANDFILL UNIT DESIGN INFORMATION

Prepared for

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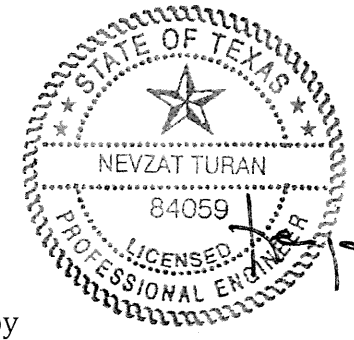

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WCG Project No. 0771-368-11-123

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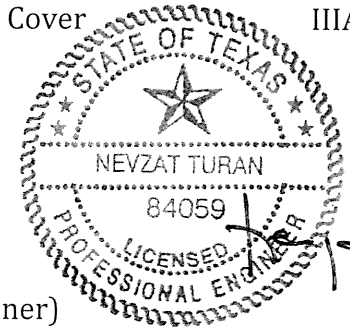

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APPENDIX IIIA-C
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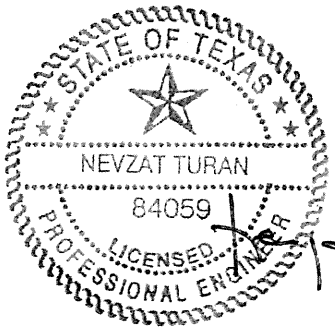

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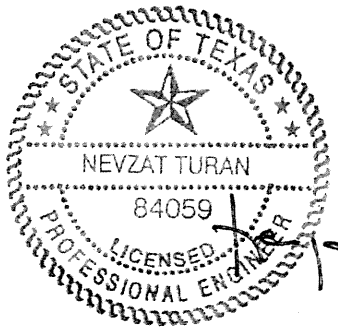

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The landfill completion plan is shown on Drawing A.3. Details of the final cover system are presented on Drawings A.15 through A.17. Material specifications along with construction and testing procedures for the final cover system are provided in Appendix IIIE – Final Cover System Quality Control Plan (FCSQCP).

The drainage system is detailed in Appendix IIIF – Surface Water Drainage Plan. Drainage from the landfill is directed through a system of swales, chutes, and perimeter channels to the stormwater detention ponds. The detention ponds and pond outlet structures are detailed in Appendix IIIF – Surface Water Drainage Plan.

Permanent final cover erosion control structures include swales and chutes that will be constructed upon installation of the final cover. The design of the final cover system erosion control structures is provided in Appendix IIIF-B. As part of the final cover construction, an erosion layer capable of sustaining native vegetation will be constructed. Areas that receive final cover will be seeded upon completion of final cover placement. A soil loss and sheet flow velocity demonstration for the erosion layer is included in Appendix IIIF-D. The erosion layer will include a vegetation layer that provides for an 95 percent ground coverage. If there are areas that do not maintain at least 95 percent coverage they will be re-seeded until at least 95 percent coverage is maintained.

The stormwater controls for the landfill have been designed consistent with the TCEQ regulations for Type I MSW landfills. The stormwater runon/runoff controls have been designed for a 25-year frequency storm event. These include drainage controls for the final cover, perimeter drainage channels, culverts, and detention ponds, including pond outfalls. Details for the perimeter drainage system and associated calculations are included in Appendix IIIF – Surface Water Drainage Plan.

5.2 Final Cover Stability Analysis

A stability analysis for the existing and proposed final cover systems is provided in Appendix IIIM – Geotechnical Report and is summarized below.

- **Final Cover Stability.** The stability of the proposed final cover slopes was evaluated at the most critical sections. The final cover slopes were analyzed using drained and undrained strength parameters (effective and total stress, respectively). The minimum factors of safety generated were all greater than the minimum recommended factor of safety of 1.3 (total stress analysis) and 1.5 (effective stress analysis).
- **Final Cover System Stability.** The interfaces of the components of each final cover system were evaluated using infinite slope stability analysis. The minimum factor of safety calculated for the final cover system is greater than the acceptable factor of safety of 1.5 for long-term stability.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

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PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIA-A
LINER, OVERLINER, AND FINAL COVER SYSTEM DETAILS

Prepared for

Texas Regional Landfill Company, LP

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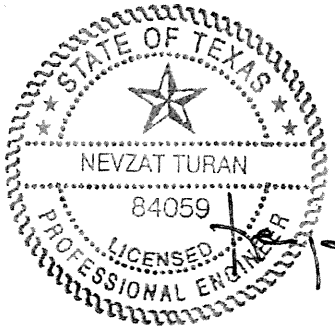

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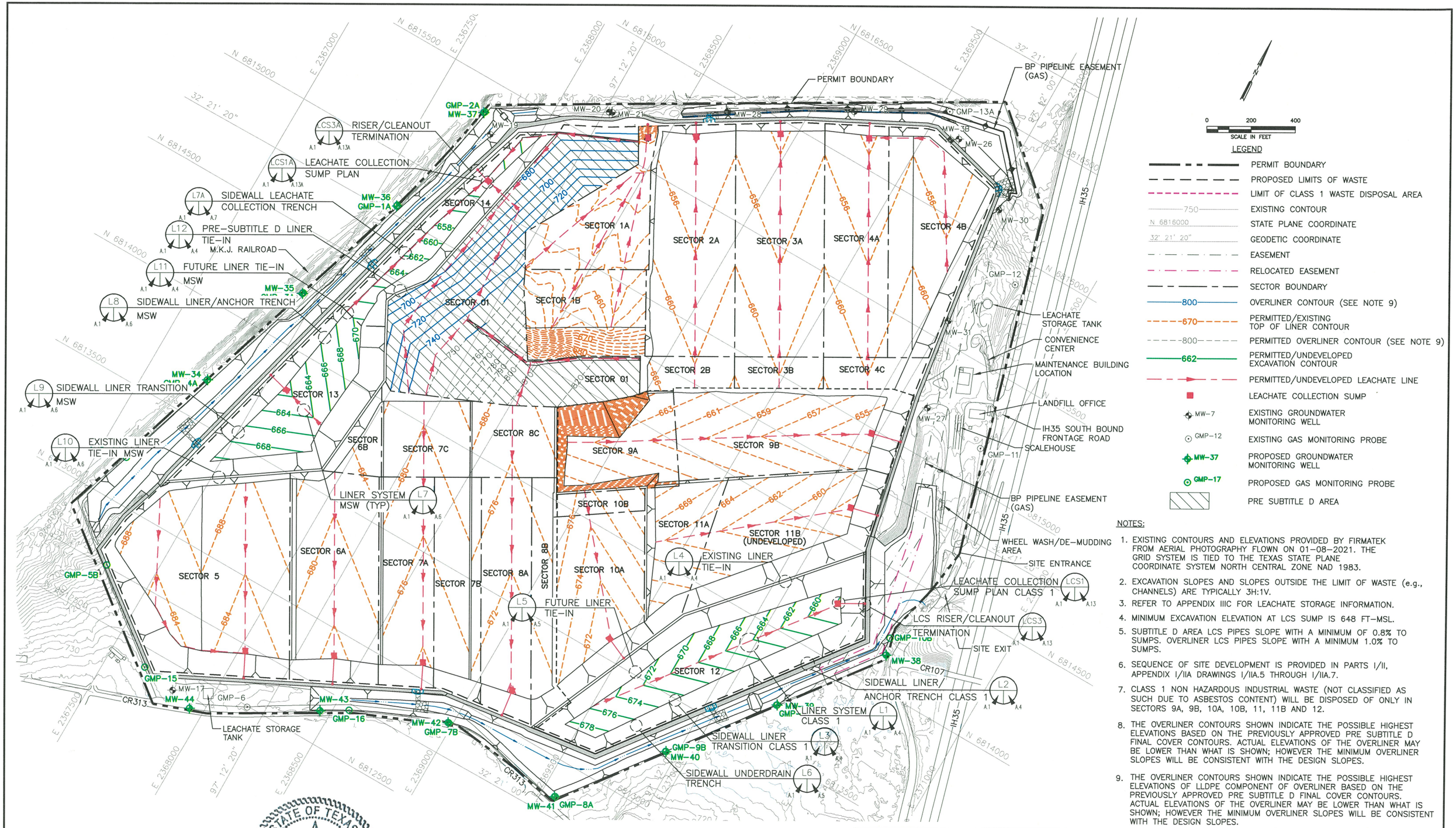

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. EXCAVATION SLOPES AND SLOPES OUTSIDE THE LIMIT OF WASTE (e.g., CHANNELS) ARE TYPICALLY 3H:1V.
3. REFER TO APPENDIX IIIC FOR LEACHATE STORAGE INFORMATION.
4. MINIMUM EXCAVATION ELEVATION AT LCS SUMP IS 648 FT-MSL.
5. SUBTITLE D AREA LCS PIPES SLOPE WITH A MINIMUM OF 0.8% TO SUMPS. OVERLINER LCS PIPES SLOPE WITH A MINIMUM 1.0% TO SUMPS.
6. SEQUENCE OF SITE DEVELOPMENT IS PROVIDED IN PARTS I/II, APPENDIX I/IIA DRAWINGS I/IIA.5 THROUGH I/IIA.7.
7. CLASS 1 NON HAZARDOUS INDUSTRIAL WASTE (NOT CLASSIFIED AS SUCH DUE TO ASBESTOS CONTENT) WILL BE DISPOSED OF ONLY IN SECTORS 9A, 9B, 10A, 10B, 11, 11B AND 12.
8. THE OVERLINER CONTOURS SHOWN INDICATE THE POSSIBLE HIGHEST ELEVATIONS BASED ON THE PREVIOUSLY APPROVED PRE SUBTITLE D FINAL COVER CONTOURS. ACTUAL ELEVATIONS OF THE OVERLINER MAY BE LOWER THAN WHAT IS SHOWN; HOWEVER THE MINIMUM OVERLINER SLOPES WILL BE CONSISTENT WITH THE DESIGN SLOPES.
9. THE OVERLINER CONTOURS SHOWN INDICATE THE POSSIBLE HIGHEST ELEVATIONS OF LLDPE COMPONENT OF OVERLINER BASED ON THE PREVIOUSLY APPROVED PRE SUBTITLE D FINAL COVER CONTOURS. ACTUAL ELEVATIONS OF THE OVERLINER MAY BE LOWER THAN WHAT IS SHOWN; HOWEVER THE MINIMUM OVERLINER SLOPES WILL BE CONSISTENT WITH THE DESIGN SLOPES.

STATE OF TEXAS
NEVZAT TURAN
84059
LICENSED
PROFESSIONAL ENGINEER
12/16/2022

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DESIGN BY: DEP
REVIEWED BY: NT

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PREPARED FOR
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MAJOR PERMIT AMENDMENT EXCAVATION PLAN

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JOHNSON COUNTY, TEXAS

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DRAWING A.1

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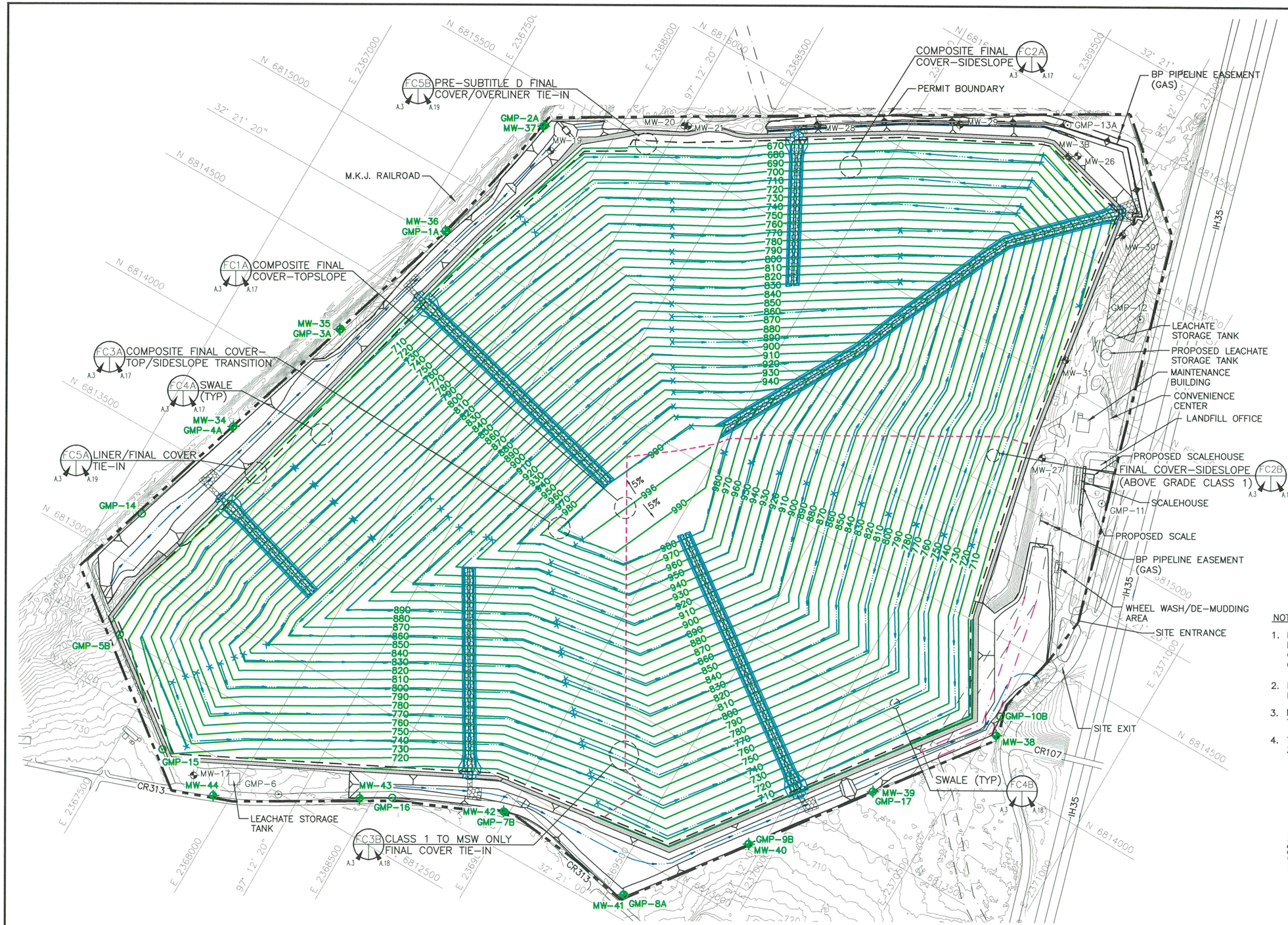

LEGEND

- PERMIT BOUNDARY
- PROPOSED LIMITS OF WASTE
- 750 EXISTING CONTOUR
- N 6816000 STATE PLANE COORDINATE
- 32° 21' 20" GEODETIC COORDINATE
- EASEMENT
- PROPOSED RELOCATED EASEMENT
- 800 FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- GABIONS
- MW-7 EXISTING GROUNDWATER MONITORING WELL
- GMP-12 EXISTING GAS MONITORING PROBE
- MW-7 PROPOSED GROUNDWATER MONITORING WELL
- GMP-17 PROPOSED GAS MONITORING PROBE
- FUTURE LFGTE FACILITY LOCATION

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR DRAINAGE DESIGN INFORMATION.
3. MAXIMUM FINAL COVER ELEVATION IS 946.0 FT-MSL. MAXIMUM TOP OF WASTE ELEVATION IS 942.5 FT-MSL.
4. TYPICAL SIDESLOPES ARE 4H:1V IN THE CLASS 1 AREA AND 3.5H:1V IN THE MSW AREA, TYPICAL TOPSLOPE IS 5%.

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DESIGN BY: DEP
REVIEWED BY: NT

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MAJOR PERMIT AMENDMENT LANDFILL COMPLETION PLAN

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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DRAWING A.3

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TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

VOLUME 2 OF 6

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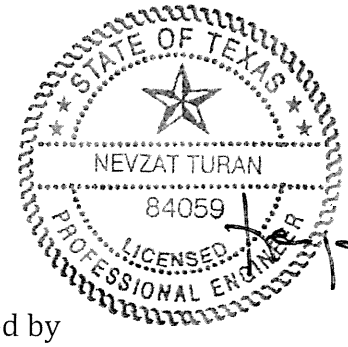

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JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 2 OF 6

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12/16/2022

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIB
OVERLINER COMPLIANCE DEMONSTRATION

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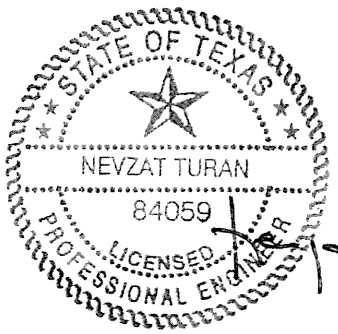
APPENDIX IIIB-B
HELP Model Analysis

APPENDIX IIIB-C
MULTIMED Model Analysis



12/16/2022

TABLES

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Table 4-1 Major Assumptions Used to Determine MULTIMED Model Input Parameters IIIB-9



with 6 oz/sy non-woven geotextile heat-bonded to both sides. A 24-inch-thick protective cover layer will be placed above the leachate collection layer.

Details for the overliner system are provided in Appendix IIIA-A – Liner, Overliner, and Final Cover System Details. Design of the overliner leachate collection is presented in Appendix IIIC – Leachate and Contaminated Water Management Plan. Stability of the overliner system is analyzed in Appendix IIIM-A. Overliner settlement analysis is provided in Appendix IIIM-B.

1.3 Overliner Demonstration Overview

The purpose of the overliner compliance demonstration is to show that the proposed containment system design for the overliner area, which is designed for MSW only, will meet the overliner compliance demonstration requirements set forth in §330.331(a)(1).

The overliner demonstration will show that once the overliner is installed, leachate infiltration into the waste below the overliner will be nearly eliminated. Once the Subtitle D final cover is in place, leachate generation rates will decrease in the entire pre-Subtitle D area. Figure IIIB-A-1 shows the location and extent of the overliner area. Figure IIIB-A-2 shows general section configuration of the pre-Subtitle D area and the overliner.

Section 2 provides a discussion of the site's hydrogeological conditions. As discussed in Section 2 hydrogeology of the provides sound subsurface conditions with highest hydraulic conductivity values in 10^{-4} cm/s levels with no water producing aquifer zone associated with the POC model demonstration. The overliner compliance demonstration method is discussed in Section 3. The HELP model and MULTIMED model input parameters are discussed in Section 4, and the results of the compliance demonstration are provided in Section 5.

In conclusion, the proposed overliner system meets all requirements listed in §330.331(c) by providing significant improvements to both the developments and natural (e.g., subsurface) conditions at the site as isolating the pre-Subtitle D waste from precipitation will practically eliminate water movement into subsurface in the area. Waste Connections is a leading landfill developer in the country that maintains continuous partnership with qualified engineering and construction companies for their development projects.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

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PART III – SITE DEVELOPMENT PLAN
APPENDIX IIID
LINER QUALITY CONTROL PLAN

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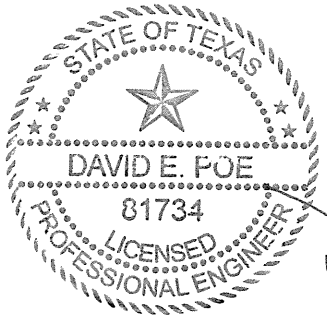

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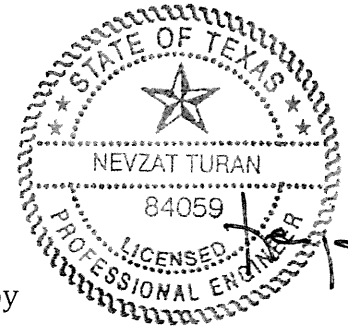

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WCG Project No. 0771-368-11-123

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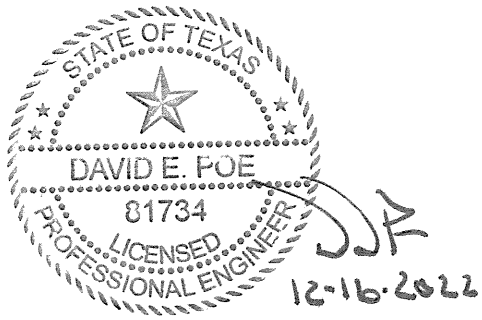

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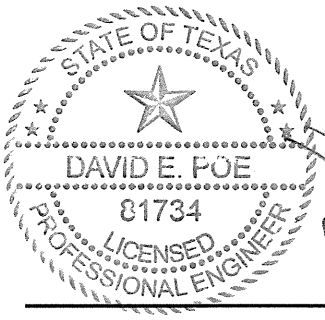

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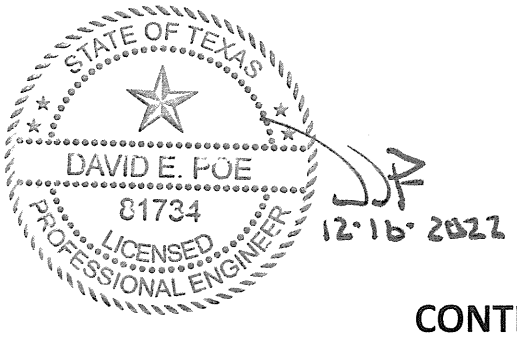

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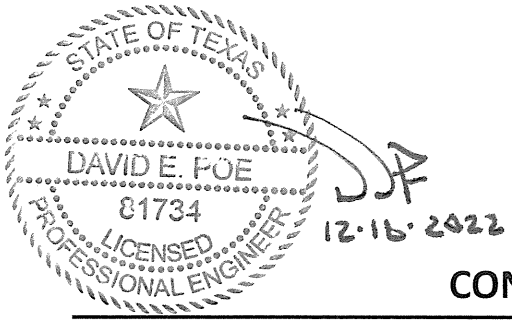

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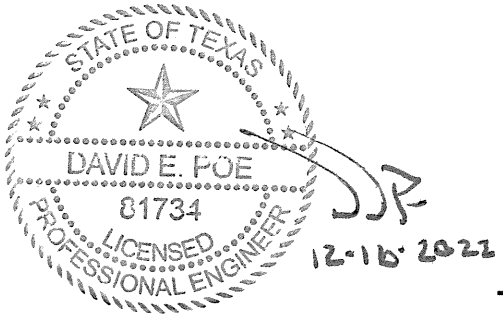

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with gravel and geotextile will be placed into this underdrain trench. Also, a geocomposite drainage layer will be placed on the sideslope above the seasonal high water table elevation to maintain drawdown of the groundwater within the Upper Sand unit. The geocomposite will be anchored into the sideslope at a minimum of two feet and will extend one foot into the underdrain trench. Temporary sumps may be constructed to maintain positive drainage within the underdrain trench. The temporary sumps will consist of drainage stone enveloped in geotextile with an 18-inch-diameter HDPE riser pipe for groundwater removal.

Liner areas that extend below the highest measured potentiometric surface will be designed and constructed to provide protection against long-term uplift from hydrostatic forces by the use of ballast in accordance with Title 30 TAC §330.203. Ballast, if required, will be designed, installed, and verified as described in Section 8.3. Example ballast calculations are provided in Appendix IIID-B.

2.3.10 Liner Tie-In Construction

Newly constructed liners will be tied-in with any adjoining existing liners. Additionally, terminations will be constructed for future tie-ins along edges where the liner will be extended in the future. The tie-ins with existing clay liners will be constructed utilizing a sloped transition a minimum of 10-foot-wide for the 2-foot-thick clay liner and 15 feet wide for the 3-foot-thick clay liner. Terminations for future tie-ins will be constructed by extending the clay liner approximately 10 feet past the limits for the cell under construction. The liner tie-in details are shown in Appendix IIIA – Landfill Unit Design Information. Waste and intermediate cover will not be deposited closer than 10 feet to the edge of any cell or 20 feet from the leading edge of a constructed clay liner (whichever is greater) where a future tie-in will be constructed. Red-colored markers (i.e., SLER markers) will be placed along the limits of the cells with constructed clay liners and tied to the site grid system in accordance with Title 30 TAC §330.143(b)(1).

2.4 Construction Testing

2.4.1 Standard Operating Procedures

As set forth in Title 30 TAC §330.339(c)(6), permeability tests demonstrating the suitability of soils to be used in constructing clay liners shall be performed in the laboratory using the procedures and guidance of Title 30 TAC §330.339(4)(A). Field quality control will be provided by field tests evaluated based on comparison with laboratory results (i.e., moisture-density compaction curves, Atterberg limits, and gradation) as well as permeability testing of undisturbed field samples of compacted liner soils.

CQA monitors with qualified professional experience in geotechnical engineering and/or engineering geology will perform field and laboratory tests in accordance with applicable standards specified in this LQCP. All quality control testing and evaluation of soil liners will be performed during construction of the liner and must be complete before placement of the leachate collection system, except for the testing required for the final constructed lift, verification of liner thickness, or cover material thickness. Standard operating and test procedures will be utilized per the POR's direction. Sampling from the constructed soil liner lifts will be performed in accordance with ASTM D 1587. The sampling holes (e.g., samples for coefficient of

placement, to document the liner did not undergo uplift prior to placement of waste (whether waste ballast is required or not).

- If waste is used for ballast, verification from the Site Manager that the weight of the compaction equipment being used to compact the waste ballast is no less than 40,000 pounds, and that this compaction equipment was utilized during the entire period of placing waste ballast.
- If waste is used for ballast, documentation of the observations that the initial 5 feet of waste used for ballast on the liner system is free of brush and large bulky items, which may not be compacted to the required density.
- A waste-as-ballast placement record (Appendix IIID-A) completed and signed by the Site Manager.
- Survey of the top of waste to document that the required waste ballast thickness has been placed.
- Water-level measurements taken in the site monitor well/piezometer system adjacent to the liner construction area to verify that the groundwater level has not exceeded the design high water level.
- Final ballast thickness calculation using procedures included in Appendix IIID-B and the as-built minimum densities and thicknesses for each component as well as updated groundwater levels.
- A BER will be prepared and signed and sealed by a professional engineer licensed to practice in Texas. The BER will also be signed by an authorized site representative.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

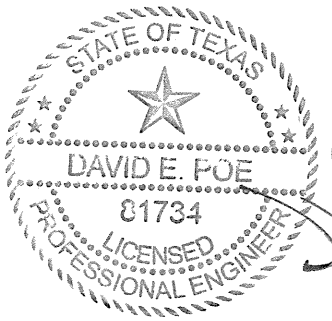
PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIE
FINAL COVER SYSTEM QUALITY CONTROL PLAN
STANDARD SUBTITLE D FINAL COVER

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



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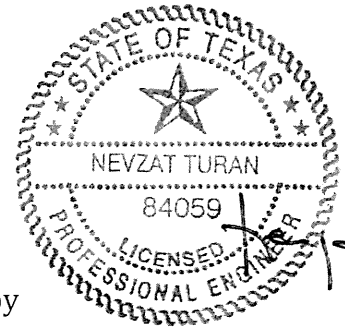

12/16/2022

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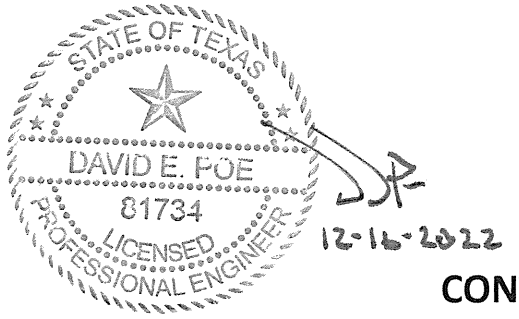

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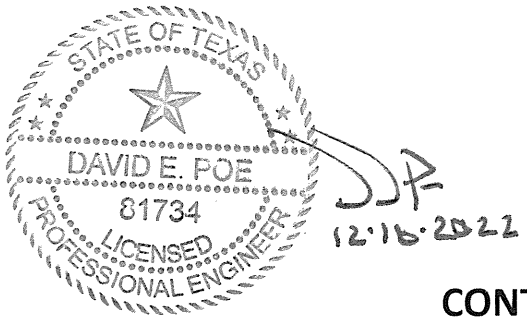

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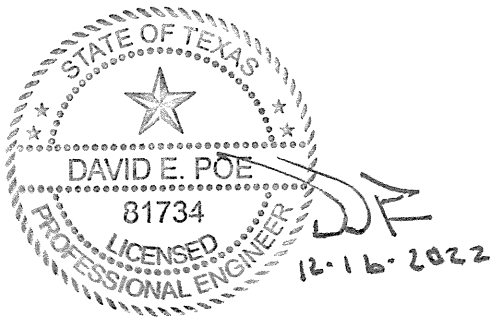
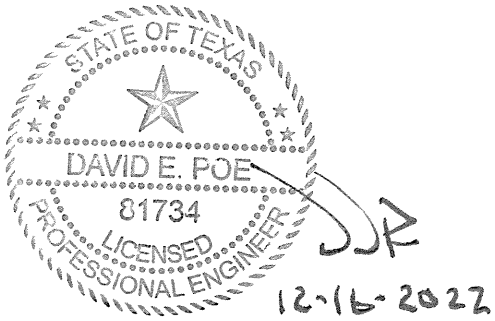


APPENDIX IIIE-A

FINAL COVER DRAINAGE LAYER DESIGN

Includes pages IIIE-A-1 through IIIE-A-32



INTRODUCTION

The Hydrologic Evaluation of Landfill Performance (HELP) Model, Version 3.07 was used to estimate the head on final cover geomembrane. This HELP analysis was used to demonstrate that the proposed pipe spacing and single-sided drainage geocomposite are adequate to keep potential uplift forces from adversely impacting the erosion layer.

The closed landfill conditions were modeled for a 30-year period. The evaporative zone depth was selected to be 12 inches and the leaf area index was selected to be 4.5. These parameters are consistent with the parameters shown in Appendix IIIC-A. The curve number for the closed topslope condition is 81.4 and the percent runoff area is 100, which corresponds to "good" ground cover. This is representative of the final cover, which will have a minimum 95 percent vegetation coverage.

The final cover over the Subtitle D areas consist of a 12-inch erosion layer with the top 6 inches capable of sustaining growth of vegetation, a geocomposite drainage layer, a 40-mil LLDPE geomembrane liner, and an 18-inch infiltration layer. The geomembrane liner was modeled for good installation quality. The infiltration layer consists of compacted soil with a hydraulic conductivity of $1x10^{-5}$ cm/s. Default values for the moisture content, porosity, field capacity, and wilting point for each layer were selected.

The scenario analyzed in the HELP model used a model area of 1.08 acres, which represents the largest estimated topdeck area that would contribute to a particular drainage collection pipe. The maximum pipe spacing for this area is 115 feet.

Refer to page IIIE-A-19 for a summary of the HELP analysis. The HELP model output for the closed 5 percent top slope is included on pages IIIE-A-20 through IIIE-A-26.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

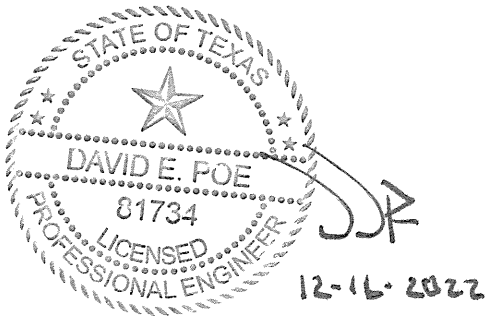
PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIE-B
WATER BALANCE FINAL COVER SYSTEM
QUALITY CONTROL PLAN

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



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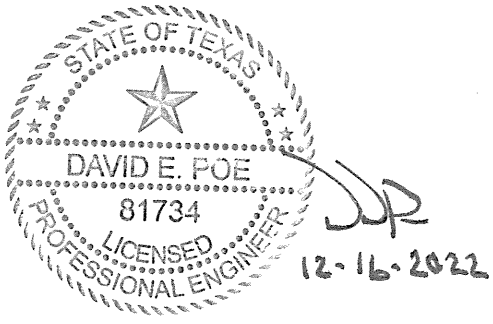

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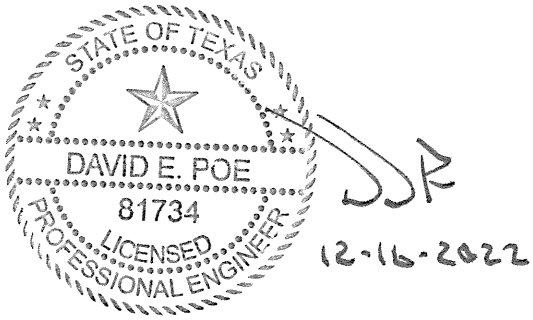

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIE-B-1
PERFORMANCE VERIFICATION PLAN FOR
OPTION 2 WATER BALANCE COVER

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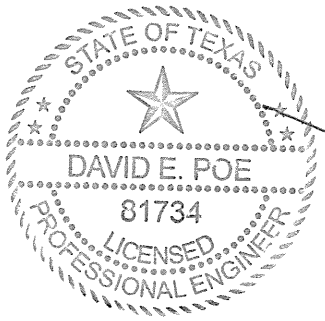

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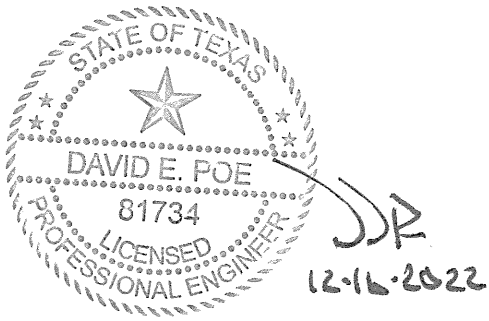

TURKEY CREEK LANDFILL
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APPENDIX IIIE-B-1-B

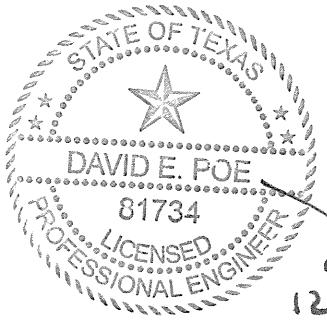
WATER BALANCE FINAL COVER
VEGETATION ESTABLISHMENT VERIFICATION PLAN
FOR OPTION 2 WATER BALANCE FINAL COVER

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Blvd., Suite 206
Fort Worth, TX 76109
817-735-9770

Project No. 0771-368-11-123

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	1.5	Verification of Established WB Final Cover Vegetation	IIIE-B-1-B-1
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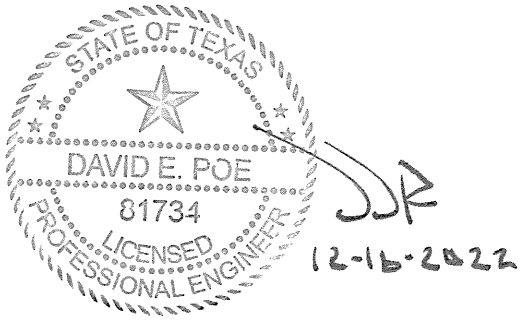

1.3 Maintenance Activities to be Completed During the Vegetation Establishment Period

The following maintenance activities will be performed to ensure that the vegetation planted during the construction of the final cover system is maintained so that it will meet the vegetation performance specification established for this project.

- The site will irrigate and fertilize the WB Final Cover area to promote vegetation growth.
- Vegetation will be maintained and mowed as appropriate, depending on the season. No mowing will be allowed until grasses establish mature seed.
- Bare areas will be over seeded to facilitate vegetation growth.
- Areas of significant differential settlement will be regraded and re-seeded.
- Areas that experience erosion will be promptly repaired.
- If it is determined that landfill gas is detrimental to any specific area of the established vegetation, the LFG extraction system will be expanded to include additional extraction wells in those areas.
- Vehicles with more than 16 psi ground pressure will not be allowed over the constructed final cover areas during the Vegetation Establishment Period, unless access by a vehicle that does not meet this requirement is required due to a critical maintenance activity or emergency. If a vehicle that does not meet this requirement is used over the cover system, the area disturbed will be evaluated and repaired, if necessary.

1.4 Vegetation Performance Specification

For the vegetation to be considered "established" a professional engineer will complete an evaluation of the vegetation topsoil layer at the end of the vegetation establishment period (typically 2 to 3 years). The performance specification for the vegetation layer is discussed in Section 3 of Appendix IIIJ, Appendix IIIJ-B, and is summarized below.

- Percent Vegetation Cover – 90 percent. This will be based upon the demonstration that a satisfactory stand of turf, defined as 90 percent ground cover and no bare areas larger than one square foot of the established species, exists in the WB final cover area. Final cover will be designed to achieve 95 percent vegetative coverage for erosion prevention.
- Root Penetration – minimum depth of 40 inches. As discussed in Section 3 of Appendix IIIJ, Appendix IIIJ-B, the minimum root depth required is 40 inches based on the UNSAT-H demonstration.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

VOLUME 3 OF 6

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



Prepared by

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WCG Project No. 0771-368-11-123

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TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 3 OF 6

CONTENTS

PART III - SITE DEVELOPMENT PLAN
Appendix IIIF – Surface Water Drainage Report



TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIF
SURFACE WATER DRAINAGE PLAN

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



Prepared by

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APPENDIX IIIF-B
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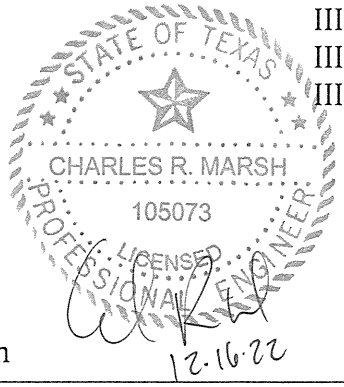

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4.3 Offsite Drainage Area Map
4.4 Site Drainage Patterns
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for industrial activity as stipulated under Section 402 of the Clean Water Act and under Chapter 26 of the Texas Water Code, the TPDES program. A copy of the multi-sector permit is included in Parts I/II, Appendix I/IIE. Any stormwater that has become contaminated by contact with the working face or with leachate will be handled in accordance with Appendix IIIC – Leachate and Contaminated Water Management Plan. The facility maintains a current Stormwater Pollution Prevention Plan prepared consistent with TPDES permit requirements.

2.2 Erosion and Sedimentation Control Plan

The Turkey Creek Landfill will use various interim and permanent erosion and sedimentation controls throughout the life of the site. The interim controls will be used around active areas and external embankment sideslopes and top dome surfaces. These controls will include temporary letdown structures, soil berms, and vegetation of intermediate cover areas to minimize the erosion potential from these areas. These interim controls will be used during all phases of landfill development to provide effective erosion stability for the external sideslopes and top dome surfaces. Refer to Appendix IIIF-F – Erosion Control Plan for All Phases of Landfill Operation for more information.

Permanent controls include swales and chutes that will be constructed upon completion of the final cover. As part of the final cover construction, an erosion layer capable of sustaining vegetation will be constructed. Areas that receive final cover will be vegetated in accordance with Appendix IIIJ – Closure Plan upon completion of final cover placement. Final cover vegetation will protect the erosion layer soil against erosive runoff velocities. A soil loss and sheet flow velocity demonstration for the erosion layer is included in Appendix IIIF-D. The erosion layer will include a vegetation layer that provides for a 95 percent ground coverage, to keep soil loss below the required design values. If there are areas that do not maintain at least 90 percent vegetative coverage, vegetation in these areas will be reestablished to maintain at least 90 percent vegetative cover.

Erosion will be controlled by vegetation in drainage structures with flow velocities less than or equal to 5 feet per second (fps). For drainage structures with flow velocities greater than 5 fps, rock riprap, gabions, or other surface reinforcing materials as designed will be used for surface reinforcement as depicted on the plans.

During site development, measures such as best management practices (BMPs) and sedimentation ponds will be employed to control erosion and sedimentation. BMPs may include the use of temporary rock riprap, silt fences, straw bales, check dams, interceptor swales and berms, temporary and permanent seeding and sodding, surface roughening, matting and mulching, sediment traps, and surface wetting for dust control (refer to Appendix IIIF-F for more information).

3 DRAINAGE SYSTEM DESIGN

3.1 Methodology

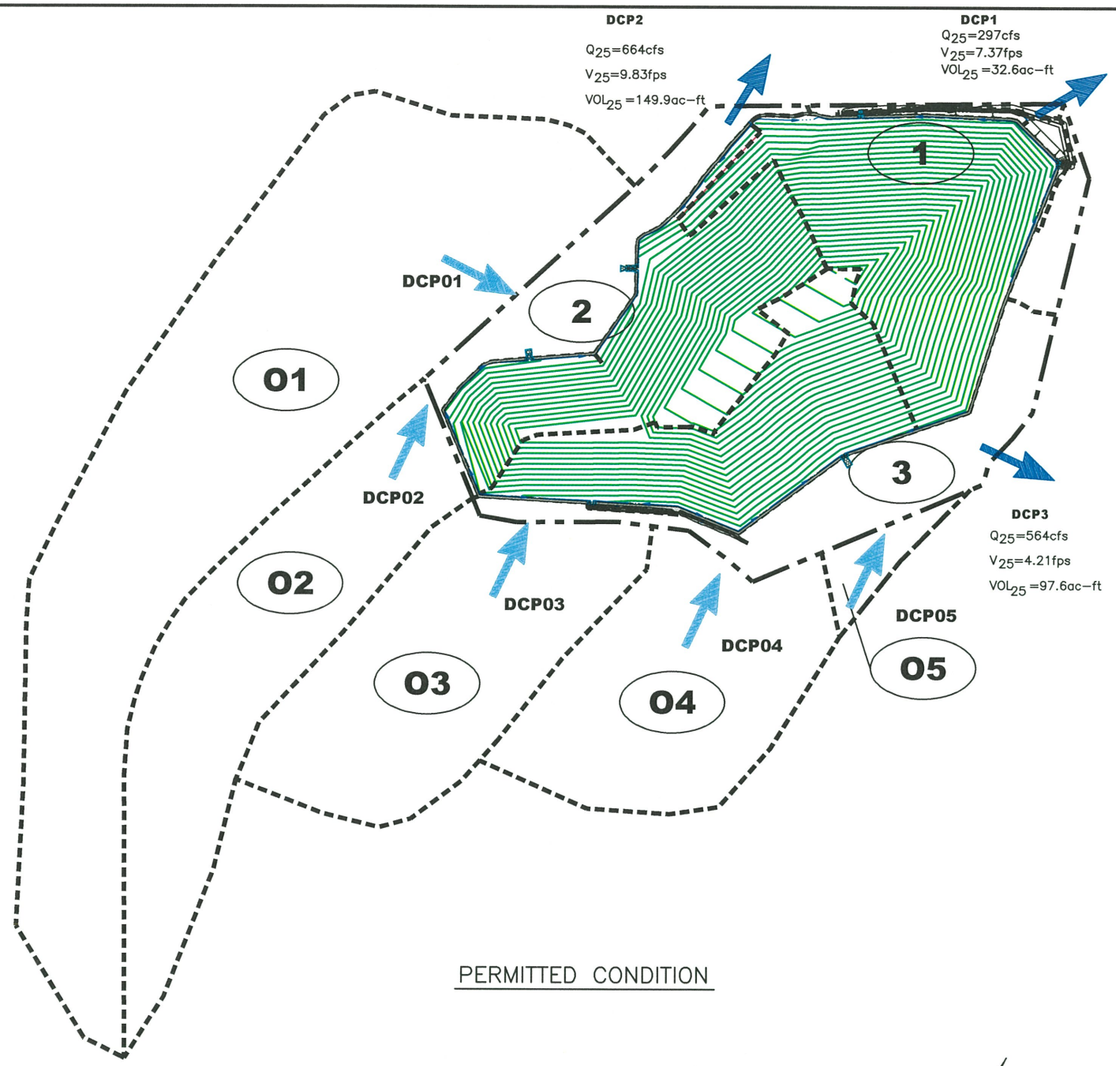
Drainage calculations for the final cover system erosion control structures and perimeter drainage system are based on the peak flow rates resulting from the 25-year frequency rainfall event for the area. The United States Army Corps of Engineers (USACE) HEC-1 computer program was used to compute peak flow rates produced from the design storm for the completion conditions. The hydraulic methods employed in this study are consistent with those presented in the TCEQ *Guidelines for Preparing a Surface Water Drainage Report for Municipal Solid Waste Facility* (RG-417, May 2018) and the TxDOT Bridge Division Hydraulic Design Manual, September 2019. The HEC-1 computer program is used to model the entire landfill (i.e., all drainage areas) even drainage areas less than 200 acres. This method produces a more conservative flow rate for design purposes. Rational method is only used to analyze swale flow rates as the drainage area for swales are less than 200-acres. For comparison purposes the letdowns have been modeled using HEC-1 and rational method. This information can be found on page IIIF-C-9A. As shown on this page rational method results in lower flow rates than HEC-1.

Water surface profiles were determined for the perimeter channels using the Channel Analysis Program (HYDROCALC HYDRAULICS Version 2.0.1 for Windows, Dodson & Associates, 1996-2010) that is based on Manning's formula for uniform flow and HEC-RAS, A river analysis system computer program (version 6.0.0 2021) that is based on the solution of one-dimensional energy equation with energy loss due to friction. The perimeter channels are designed to collect and route runoff from the 25-year frequency storm event to the detention pond. Manning's *"n"* values for the channels and culverts were taken from the TxDOT Bridge Division Hydraulic Design Manual (Table 4-7, page 4-43; and Table 4-9, page 4-46), September 2019.

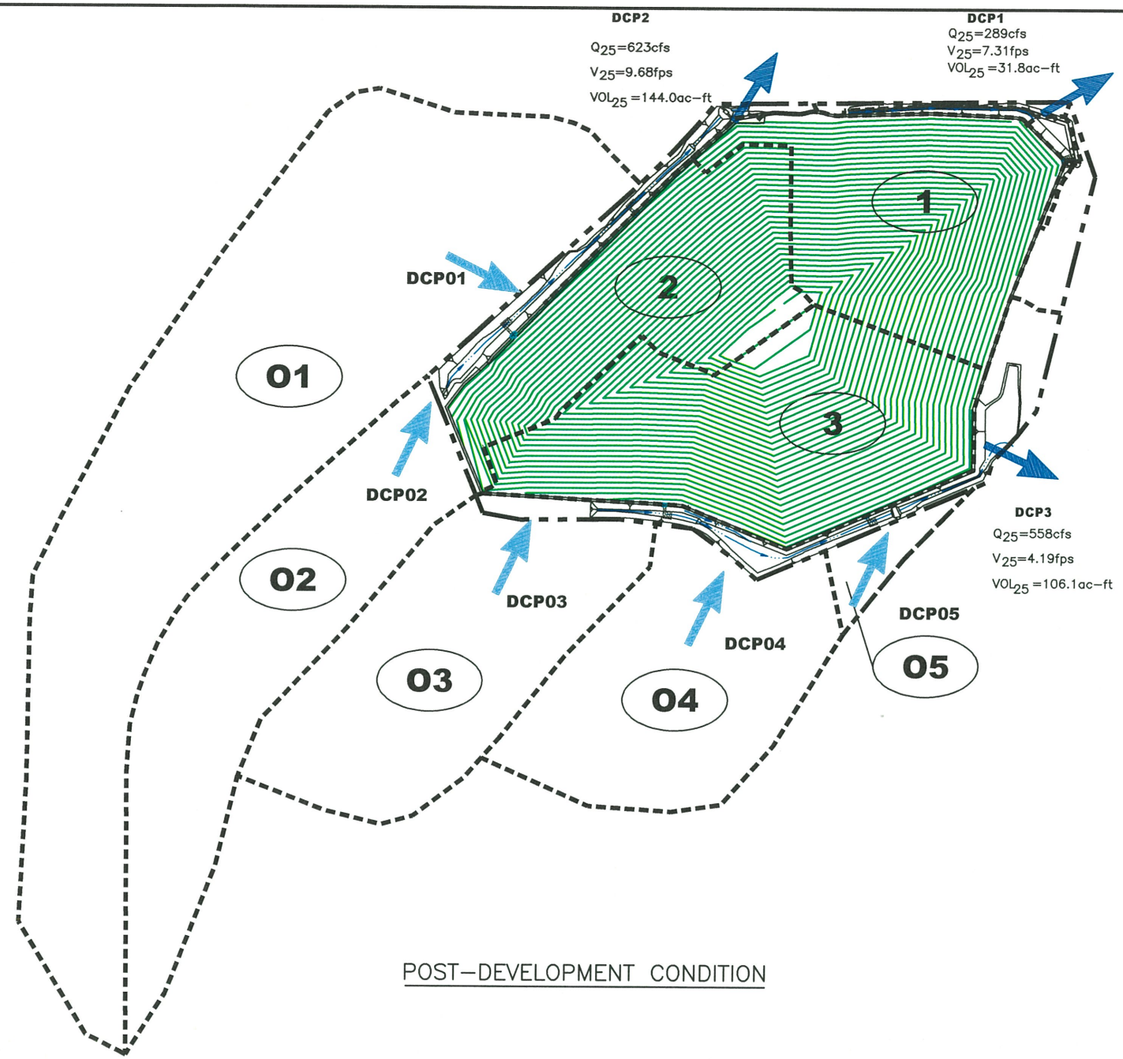
3.2 Hydrologic Analysis

3.2.1 Description of Computer Program

HEC-1 was developed by the USACE Hydrologic Engineering Center to simulate the surface runoff response of a watershed. The HEC-1 model represents a watershed as a network of hydrologic and hydraulic components. The modeling process results in the computation of stream-flow hydrographs at desired locations in the watershed. The hydrologic analysis for the post-development condition is presented in Appendix IIIF-A. The hydrologic analysis for the permitted landfill completion condition is included in Appendix IIIF-E.



PERMITTED CONDITION



POST-DEVELOPMENT CONDITION

0 500 1000
SCALE IN FEET

LEGEND

- PROPERTY BOUNDARY
- LIMITS OF WASTE
- DRAINAGE DIVIDE
- PERMITTED/PROPOSED FINAL COVER CONTOUR
- O5 DRAINAGE AREA LABEL
- UPLAND DRAINAGE ENTERING SITE
- STORMWATER DISCHARGE POINT

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER
12.16.22

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FILE: 0771-368-11
CAD: 4.5 RUNON RUNOFF.DWG
DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: CRM

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

MAJOR PERMIT AMENDMENT
SITE DRAINAGE PATTERNS
RUNON/RUNOFF

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE 4.5

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O:\0771\368\EXPANSION 2021\PART III\FIGURES\CLEAN\4.5- RUNON RUNOFF.dwg, rarrington, 1:2

Table 4-1
Permitted and Post-Development 25-Year Site Drainage Summary

Stormwater Discharge Point[1]	Permitted Condition					Post-Development Condition				
	Flow Rate (cfs)	Drainage Area (acres)	Time to Peak (hrs)	Runoff Volume[2] (ac-ft)	Velocity at Permit Boundary[2] (fps)	Flow Rate (cfs)	Drainage Area (acres)	Time to Peak (hrs)	Runoff Volume[2] (ac-ft)	Velocity at Permit Boundary[2] (fps)
DCP01	466	180.49	12.58	82.0	8.38	466	180.49	12.58	82.0	8.38
DCP02	188	74.63	12.67	33.9	5.34	188	74.63	12.67	33.9	5.34
DCP03	206	69.25	12.50	31.5	6.47	206	69.25	12.50	31.5	6.47
DCP04	179	61.05	12.50	27.7	3.93	179	61.05	12.50	27.7	3.93
DCP05	22	6.34	12.42	2.9	1.84	22	6.34	12.42	2.9	1.84
DCP1 (Northeast)	297	69	12.17	32.6	7.37	289	67	12.83	31.8	7.31
DCP2 (North)[3]	664	330	12.67	149.9	9.83	623	316	12.25	144.0	9.68
DCP3 (Southeast)[4]	564	213	12.50	97.6	4.21	558	228	12.33	106.1[5]	4.19

[1] Stormwater discharge points are shown on Figure 4.6. The volume shown is the total volume of runoff for the hydrograph duration.
[2] Runoff volume and velocity calculations are provided in Appendix IIIF-A and IIIF-E.
[3] Discharge point DCP2 includes DCP01 and DCP02.
[4] Discharge Point DCP3 includes DCP03, DCP04, and DCP05.
[5] As shown the post-development condition results in a slightly higher runoff volume but a lower flow rate and velocity. The drainage improvements proposed at the site will result in a more controlled release of stormwater, which is not an adverse impact.

APPENDIX IIIF-A

POST-DEVELOPMENT CONDITION HYDROLOGIC CALCULATIONS

Includes pages IIIF-A-1 through IIIF-A-74



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Precipitation Loss Data	IIIF-A-3
Hydrograph Development Information	IIIF-A-15
Post-development HEC-1 Analysis Drainage Areas	IIIF-A-27
HEC-1 Output – Post-development 25-Year, 24-Hour Storm Event	IIIF-A-28
Volume Calculations	IIIF-A-66
Velocity Calculations	IIIF-A-70



Required: Determine the volume generated by the site and offsite areas using the excess rainfall calculated in the HEC-1 analysis of the post-development condition.

Method: 1. Use the excessive rainfall data generated by the HEC-1 analysis to determine the volume produced by the site for the post-development condition.

1. Post-development Condition

1. a. Total Flow to Unnamed Tributary of Turkey Creek **northeast** of permit boundary (DCP1)

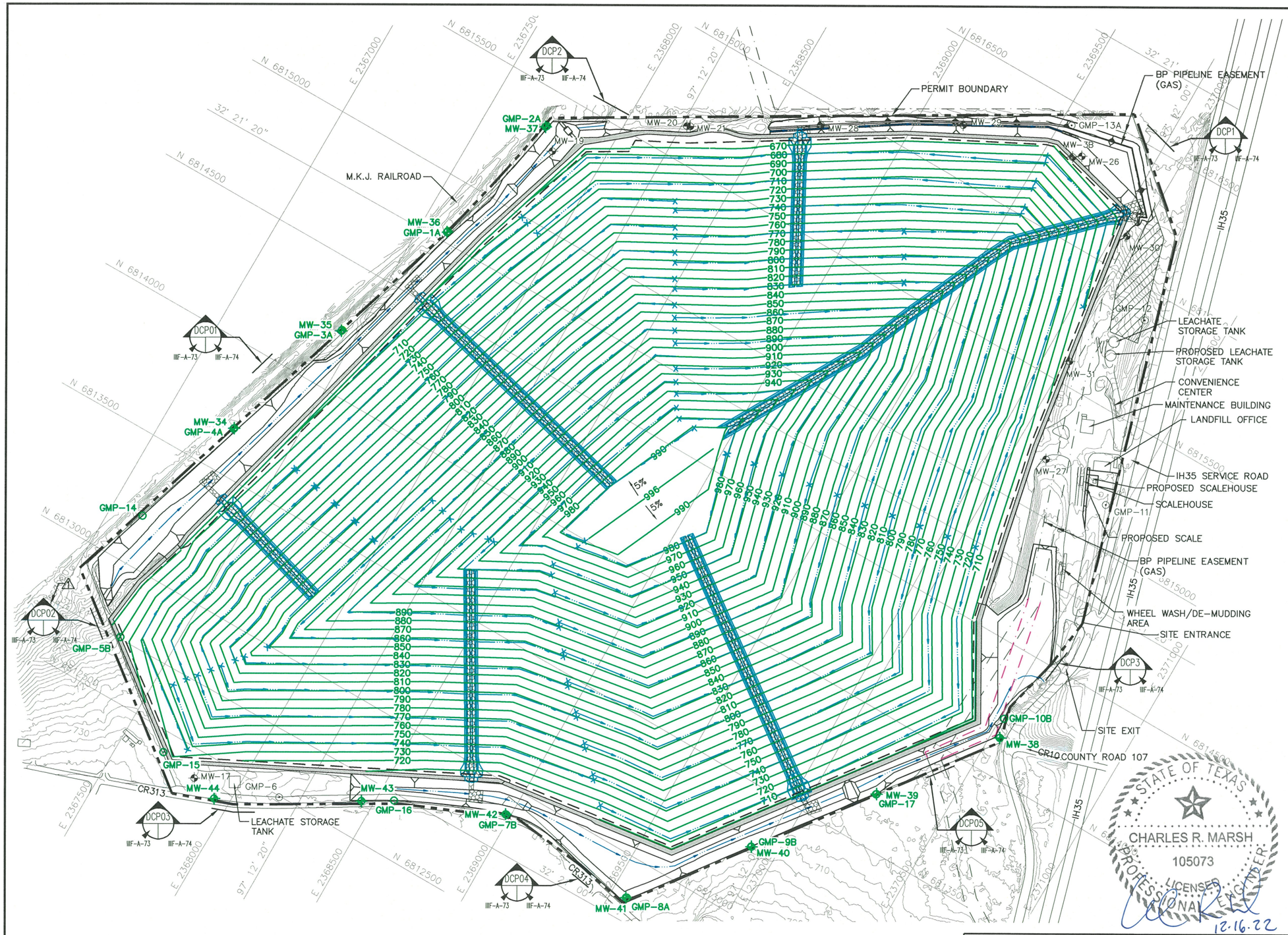
Area No.	Area (sq mi)	Total Excess Rainfall (in)	Area (ac)	Volume (ac-ft)
DA3	**0.0353**	**5.68**	**22.58**	**10.7**
DA4	**0.0520**	**5.68**	**33.25**	**15.7**
S3	**0.0027**	**5.45**	**1.71**	**0.8**
S4	**0.0101**	**5.45**	**6.49**	**2.9**
CH2	**0.0023**	**5.45**	**1.49**	**0.7**
CH3	**0.0006**	**5.45**	**0.37**	**0.2**
P2	**0.0020**	**7.33**	**1.27**	**0.8**

DCP1 Volume = 31.8 ac-ft

1. b. Total volume of flow for areas discharging to the **north** (DCP2)

Area No.	Area (sq mi)	Total Excess Rainfall (in)	Area (ac)	Volume (ac-ft)
DA1	**0.0203**	**5.68**	**12.96**	**6.1**
DA2	**0.0576**	**5.68**	**36.87**	**17.5**
O1	**0.2820**	**5.45**	**180.49**	**82.0**
O2	**0.1166**	**5.45**	**74.63**	**33.9**
S1	**0.0018**	**5.45**	**1.14**	**0.5**
S2	**0.0015**	**5.45**	**0.99**	**0.4**
CH1	**0.0122**	**5.45**	**7.79**	**3.5**

DCP2 Volume = 144.0 ac-ft



LEGEND

- PERMIT BOUNDARY
- LIMITS OF WASTE
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- PROPOSED EASEMENT (SEE NOTE 4)
- 800 — FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- PROPOSED PERIMETER CHANNEL
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING GAS MONITORING PROBE
- MW-37 — PROPOSED GROUNDWATER MONITORING WELL
- GMP-17 — PROPOSED GAS MONITORING PROBE
- FUTURE LFGTE FACILITY LOCATION

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR DRAINAGE DESIGN INFORMATION.
3. MAXIMUM FINAL COVER ELEVATION IS 996.0 FT-MSL. MAXIMUM TOP OF WASTE ELEVATION IS 992.5 FT-MSL.
4. THE PROPOSED EASEMENT SHOWN IS FOR VISUAL PURPOSES ONLY. THE ACTUAL LOCATION WILL BE DETERMINED AT A LATER DATE IN COORDINATION WITH THE EASEMENT HOLDER.

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER
12.16.22

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DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
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PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS		
NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
POST DEVELOPMENT DRAINAGE

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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DRAWING IIIF-A-73

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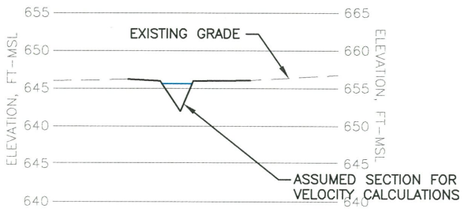


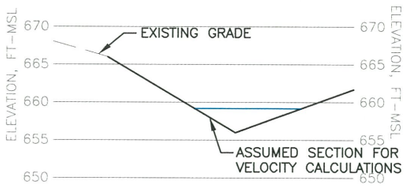
DISCHARGE POINT 1

DCP1

IIIF-A-73 IIIF-A-74

0 40 80
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 2

DCP2

IIIF-A-73 IIIF-A-74

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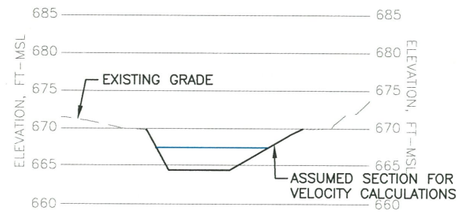
0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 3

DCP3

IIIF-A-73 IIIF-A-74

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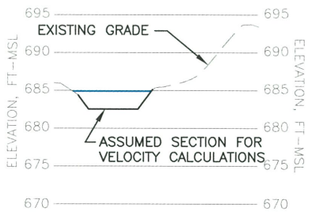
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 01

DCP01

IIIF-A-73 IIIF-A-74

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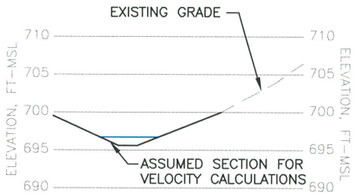
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 02

DCP02

IIIF-A-73 IIIF-A-74

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SCALE IN FEET (HORIZONTAL)

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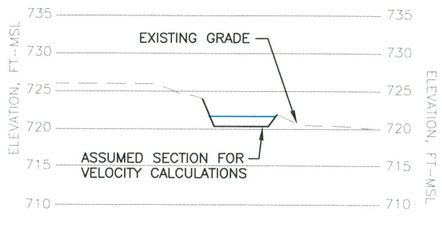
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 03

DCP03

IIIF-A-73 IIIF-A-74

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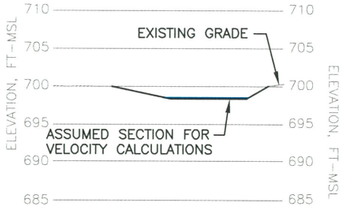
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



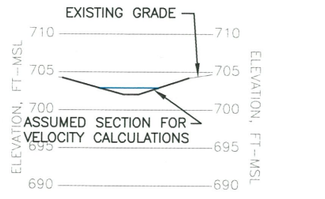
DISCHARGE POINT 05

DCP05

IIIF-A-73 IIIF-A-74

0 40 80
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 04

DCP04

IIIF-A-73 IIIF-A-74

0 40 80
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED
PROFESSIONAL ENGINEER

12.16.22

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: IIIF-A-69-DISCHARGE POINT SEC.DWG

DRAWN BY: JDW
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
POST DEVELOPMENT DISCHARGE POINT VELOCITY CALCULATIONS

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

WWW.WCGRP.COM

DRAWING IIIF-A-74

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APPENDIX IIIF-C

FINAL COVER EROSION CONTROL STRUCTURE DESIGN

Includes pages IIIF-C-1 through IIIF-C-23



CONTENTS

Drainage Swale Design	IIIF-C-1
Drainage Letdown (or Chute) Design	IIIF-C-8



Required: Compare drainage letdown peak flow rates between the Rational Method and HEC-1. for the 25-*year frequency storm.

Method:

1. Determine the 25-year, 24-hour flow rates for the drainge letdown drainage areas by the Rational Method.
2. Obtain the peak flow rates calculated by HEC-1 for the letdown drainage areas, included in Appendix III-F-A.

Reference:

1. State of Texas, Department of Transportation, Bridge Division, Hydraulic Manual, 3rd Edition, September 2019.
2. NOAA Atlas 14 - Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0: Texas (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, and National Weather Service, 2018)

Solution:

1. Determine the 25-year intensity flow rates.

$$Q = CIA$$

Where:
C= 0.7 (runoff coefficient, Ref 1.)
I = intensity in/hr
A= drainage area, ac

$$I = \frac{b}{(t_c + d)^e}$$

b = 83.01
d = 10.65
e = 0.775

From Ref. 2, for Johnson County 25-year storm event

t_c is assumed to be 10 min.

I = 7.95 in/hr

Drainage Letdown	Area (ac)	Rational Flow Rate (cfs)	HEC-1 Flow Rate (cfs)
LD1	12.96	72.2	106
LD2	36.87	205.3	299
LD3	22.58	125.7	178
LD4	33.25	185.1	253
LD5	44.98	250.5	347
LD6	27.53	153.3	233

Conclusion: As shown in the table above, for the same drainage areas (i.e., for drainage letdowns) HEC-1 estimates higher peak flow rates than those calculated using the Rational Method. Therefore, usign the peak flow rates estimated by HEC-1 to design the drainage letdowns provides a more conservative design for these structures.

APPENDIX IIIF-D

EROSION LAYER EVALUATION

Includes pages IIIF-D-1 through IIIF-D-37



EROSION LAYER EVALUATION

This appendix presents the supporting documentation for evaluation of the thickness of the erosion layer for the final cover system at the Turkey Creek Landfill. The evaluation is based on the premise of adding excess soil to increase the time required before maintenance is needed as recommended in the EPA Solid Waste Disposal Facility Criteria Technical Manual (EPA 530-R-93-017, November 1993). The design procedure is as follows:

1. Minimum thickness of the erosion layer at the end of the 30-year postclosure period is evaluated based on the depth of frost penetration or 6 inches, whichever is greater. For Johnson County, the approximate depth of frost penetration is approximately 6 inches (see IIIF-D-10). Therefore, the minimum erosion layer thickness is 6 inches.

2. Soil loss is calculated using the Universal Soil Loss Equation (USLE) by following SCS procedures. The soil loss is adjusted by a safety factor of 2 and is then converted to a thickness. The thickness of the soil loss over a 30-year postclosure period is added to the minimum thickness of the erosion layer (from Step 1) to yield an initial thickness to be placed at closure of the site. According to the USLE, the typical 5 percent topslope and 28.6 percent side slope require a minimum of 6.082 inches and 7.041 inches, respectively, for the erosion layer. These USLE requirements include the 6-inch minimum required by regulations. Conservatively, a 12-inch erosion layer is proposed over final cover. These calculations begin on page IIIF-D-3.

3. Stormwater flows over the final cover system by (1) sheet flow over the topslope and sideslopes and (2) channelized flow in the drainage berms (or swales). As discussed in Section 2.2 and Appendix IIIF-C, flow also occurs in the letdown structures. The letdown structures are lined with gabions or FML to prevent erosion given that the velocities in the letdowns are over 5 ft/sec.

   Sheet flow velocities for the topslope and sideslope cases for a 25-year storm event are calculated to be less than permissible nonerosive velocities. A permissible nonerosive velocity is defined as 5.0 ft/sec or less. Calculated sheet flow velocities range from 0.23 to 0.43 ft/sec for topslope and sideslope cases. The supporting calculations are presented on pages IIIF-D-20 through IIIF-D-28.

   Channelized flow for drainage swales is also calculated to be less than permissible nonerosive velocities. Calculated channelized flow velocities

range from 2.14 to 2.76 ft/sec for the drainage swales. The supporting calculations are presented on pages IIIF-C-3 through IIIF-C-7.

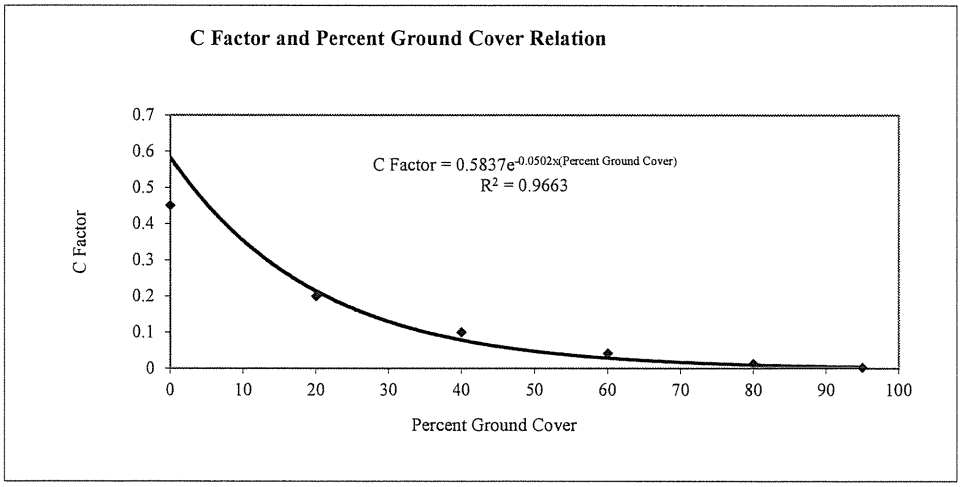
4. Vegetation for the site will be native and introduced grasses with root depths of 6 inches to 8 inches. The erosion layer shall also include a mixture of Bermuda, vetch, rye, wheat grass, wild flowers, and flowering plants. The seeding is specified on the attached pages IIIF-D-29 through IIIF-D-37. The seeding included on pages IIIF-D-29 through IIIF-D-37 is specified by TxDOT for temporary and permanent erosion control for Johnson County, Texas (Fort Worth District).
5. Native and introduced grasses will be hydroseeded with fertilizer on the disked (parallel to contours) erosion layer upon final grading. Temporary cold weather vegetation will be established if needed. Irrigation will be employed for 6 to 8 weeks or until vegetation is well established. Erosion control measures such as silt fences and straw bales will be used to minimize erosion until the vegetation is established. Areas that experience erosion or do not readily vegetate after hydroseeding will be reseeded until vegetation is established or the soil will be replaced with soil that will support the grasses.
6. Slope stability information is included in Appendix IIIE.

Using the above information and Figure 2 (Ref 2, p.9), the L_s factors are determined.

Case	Slope (%)	Slope Length (ft)	L_s
1. Typical Top Slope	5	119	0.59
2. Longest Top Slope	5	249	0.85
3. Typical Side Slope	28.6	105	7.50
4. Typical Side Slope	25	120	6.50
5. Longest Side Slope (28.6%)	28.6	130	8.10
6. Longest Side Slope (25%)	25	145	7.00

The plant cover or cropping management factor, C, represents the percentage of soil loss that would occur if the surface were partially protected by some combination of cover and management practices. C Factor for Permanent Pasture, Range, and Idle Land with No Appreciable Canopy has the following relation with percent ground cover (GC) (from Ref 2, p.7) .

% GC	C Factor
0	0.45
20	0.2
40	0.1
60	0.042
80	0.013
95	0.003



C Factor= $0.5837e^{(-0.0502x90)}$

C Factor= 0.003 (for 95% ground cover)

The erosion control practice factor, P, measures the effect of control practices that reduce the erosion potential of the runoff by influencing drainage patterns, runoff concentration , and runoff velocity. Contouring for this site will be done only to establish vegetation.

P = 1.00

2. Soil loss calculations

Slope Condition	R	K	L_s	C	P	A (tons/ac/yr)
1. Typical Top Slope 5% slope 119 ft length	290	0.25	0.59	0.003	1.00	0.13
2. Longest Top Slope 5% slope 249 ft length	290	0.25	0.85	0.003	1.00	0.18
3. Typical Side Slope 28.6% slope 105 ft length	290	0.25	7.50	0.003	1.00	1.63
4. Typical Side Slope 25.0% slope 120 ft length	290	0.25	6.50	0.003	1.00	1.41
5. Longest Side Slope 28.6% slope 130 feet length	290	0.25	8.10	0.003	1.00	1.76
6. Longest Side Slope 25% slope 145 feet length 145	290	0.25	7.00	0.003	1.00	1.52

Note: Erosion layer will be maintained to provide 90% ground cover.

3. Erosion layer thickness calculations:

$$T_{el} = 6in + \frac{AYF(2000lb/ton)(12in/ft)}{w(43{,}560sf/ac)}$$

Where:

T_{el} = Erosion layer thickness
A = Soil loss (ton/ac/yr)
Y = Postclosure period (yr)
F = Factor of Safety
w = Specific weight of soil (pcf)

Y =	30	yr
F =	2	
w =	110	pcf

1. Typical Top Slope Thickness:		
T_{el}, Required thickness[1] =	6.039	in
Total estimated soil loss =	0.039	in
Minimum Specified thickness =	12.000	in
2. Longest Top Slope Thickness:		
T_{el}, Required thickness[1] =	6.054	in
Total estimated soil loss =	0.054	in
Minimum Specified thickness =	12.000	in
3. Typical Sideslope Thickness:		
T_{el}, Required thickness[1] =	6.490	in
Total estimated soil loss =	0.490	in
Minimum Specified thickness =	12.000	in
4. Typical Sideslope Thickness:		
T_{el}, Required thickness[1] =	6.424	in
Total estimated soil loss =	0.424	in
Minimum Specified thickness =	12.000	in
5. Longest Sideslope Thickness (28.6%):		
T_{el}, Required thickness[1] =	6.529	in
Total estimated soil loss =	0.529	in
Minimum Specified thickness =	12.000	in
6. Longest Sideslope Thickness (25%):		
T_{el}, Required thickness[1] =	6.457	in
Total estimated soil loss =	0.457	in
Minimum Specified thickness =	12.000	in

Note: [1]Required thicknesses include 6 inch minimum required and estimated soil loss.

4. Summary:

Calculated erosion losses are shown in Step 2 above.
The erosion layer will be a minimum of 12 inches thick.
As shown above, this is a conservative design considering
the maximum expected soil loss for a 30 year period is 1.17 inches.

SOIL LOSS ESTIMATE SUMMARY TABLE

Case	Slope (%)	Length (ft)	L_s	Percent Ground Cover	C Factor	A (tons/ac/yr)
Top Slope	5	119	0.59	60	0.042	1.8
Top Slope	5	119	0.59	70	0.017	0.7
Top Slope	5	119	0.59	80	0.013	0.6
Top Slope	5	119	0.59	90	0.0064	0.3
Top Slope	5	119	0.59	95	0.0030	0.1
Top Slope	5	249	0.85	60	0.042	2.6
Top Slope	5	249	0.85	70	0.017	1.0
Top Slope	5	249	0.85	80	0.013	0.8
Top Slope	5	249	0.85	90	0.0064	0.4
Top Slope	5	249	0.85	95	0.0030	0.2
Side Slope	28.6	105	7.50	60	0.042	22.8
Side Slope	28.6	105	7.50	70	0.017	9.2
Side Slope	28.6	105	7.50	80	0.013	7.1
Side Slope	28.6	105	7.50	90	0.0064	3.5
Side Slope	28.6	105	7.50	95	0.003	1.6
Side Slope	25	120	6.50	60	0.042	19.8
Side Slope	25	120	6.50	70	0.017	8.0
Side Slope	25	120	6.50	80	0.013	6.1
Side Slope	25	120	6.50	90	0.0064	3.0
Side Slope	25	120	6.50	95	0.003	1.4
Side Slope	28.6	130	8.10	60	0.042	24.7
Side Slope	28.6	130	8.10	70	0.017	10.0
Side Slope	28.6	130	8.10	80	0.013	7.6
Side Slope	28.6	130	8.10	90	0.0064	3.8
Side Slope	28.6	130	8.10	95	0.0030	1.8
Side Slope	25	145	7.00	60	0.042	21.3
Side Slope	25	145	7.00	70	0.017	8.6
Side Slope	25	145	7.00	80	0.013	6.6
Side Slope	25	145	7.00	90	0.0064	3.2
Side Slope	25	145	7.00	95	0.0030	1.5

TURKEY CREEK LANDFILL
0771-368-11-123
SHEET FLOW VELOCITY

Required: Determine the sheet flow velocity for the final cover system design and compare to the permissible non-erodible flow velocity.

Method:

1. Determine the flow using the Rational Method.
2. Calculate flow depth using Kinematic Wave procedures.
3. Compute flow velocity and compare to permissible non-erodibility velocity.

References:

1. Raudkivi, A.J., *Hydrology - An Advanced Introduction to Hydrological Processes and Modeling*, 1979.
2. NOAA Atlas 14 - Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0: Texas
3. United States Soil Conservation Service, *TR-55 Hydrology for Small Watersheds*, December 1989.

Solution: Use the typical case scenarios from the USLE calculation to determine the expected sheet flow velocity.

Case 1. Typical top slope

slope =	0.05	ft/ft
length =	119	ft

Case 2. Longest top slope

slope =	0.05	ft/ft
length =	249	ft

Case 3. Typical side slope

slope =	0.286	ft/ft
length =	105	ft

Case 4. Typical side slope

slope =	0.25	ft/ft
length =	120	ft

Case 5. Longest Side Slope (28.6%)

slope =	0.286	ft/ft
length =	130	ft

Case 6. Longest Side Slope (25%)

slope =	0.25	ft/ft
length =	145	ft

Time of Concentration:

$$t_c = \frac{0.007(nL)^{0.8}}{(P_{2,24})^{0.5} S^{0.4}}$$

Where:

t_c =	time of concentration (hr)
n =	Manning's roughness coefficient
L =	slope length
$P_{2,24}$ =	2-year, 24-hour rainfall depth (in)
S =	slope (ft/ft)

TURKEY CREEK LANDFILL
0771-368-11-123
SHEET FLOW VELOCITY

Determine $P_{2,24}$:

$P_{2,24}$ = 3.98 in (ref 2)

Calculate t_c:

Case 1:

n =	0.24	
L =	119	
$P_{2,24}$ =	4.0	
S =	0.05	
t_c =	0.17	hr
	10.19	min

Case 2:

n =	0.24	
L =	249	
$P_{2,24}$ =	4.0	
S =	0.05	
t_c =	0.31	hr
	18.40	min

Case 3:

n =	0.24	
L =	105	
$P_{2,24}$ =	4.0	
S =	0.286	
t_c =	0.08	hr
	4.59	min

Case 4:

n =	0.24	
L =	120	
$P_{2,24}$ =	4.0	
S =	0.25	
t_c =	0.09	hr
	4.59	min

Case 5:

n =	0.24	
L =	130	
$P_{2,24}$ =	4.0	
S =	0.286	
t_c =	0.09	hr
	5.45	min

Case 6:

n =	0.24	
L =	145	
$P_{2,24}$ =	4.0	
S =	0.25	
t_c =	0.10	hr
	6.27	min

TURKEY CREEK LANDFILL
0771-368-11-123
SHEET FLOW VELOCITY

Calculate the design 25-year frequency for each condition:

$Q = CiA$

Where:
- Q = flow rate (cfs)
- C = runoff coefficient
- i = rainfall intensity (in/hr)
- A = drainage area (ac)

$i = b/(t_c+d)^e$

Where:

i =	rainfall intensity (in/hr)		
b =	constant for Johnson County	=	83.01
d =	constant for Johnson County	=	10.65
e =	constant for Johnson County	=	0.775
t_c =	time of concentration (min)		

For a unit width of final cover, the flow lengths shown on sheet IIIF-D-7 for each case is used.

A=[Length (ft) x Width (ft)] / 43560 sq. ft/acre = A in acres

Case 1:

C =	0.7	
t_c =	10.19	min
i =	7.90	in/hr
Length:	119.00	ft
A	0.0027	ac
Q =	0.015	cfs

Case 2:

C =	0.7	
t_c =	18.40	min
i =	6.11	in/hr
Length:	249.00	ft
A	0.0057	ac
Q =	0.024	cfs

Case 3:

C =	0.7	
t_c =	4.59	min
i =	10.07	in/hr
Length:	105.00	ft
A	0.0024	ac
Q =	0.017	cfs

Case 4:

C =	0.7	
t_c =	4.59	min
i =	10.07	in/hr
Length:	120.00	ft
A	0.0028	ac
Q =	0.017	cfs

Case 5:

C =	0.7	
t_c =	5.45	min
i =	9.65	in/hr
Length:	130.00	ft
A	0.0030	ac
Q =	0.020	cfs

Case 6:

C =	0.7	
t_c =	6.27	min
i =	9.65	in/hr
Length:	145.00	ft
A	0.0033	ac
Q =	0.022	cfs

TURKEY CREEK LANDFILL
0771-368-11-123
SHEET FLOW VELOCITY

Approximate depth of flow:

Using Manning's Equation

$$V = (1.49/n)\, y^{0.67}\, S^{0.5}$$

$Q = VA \quad \Rightarrow \quad V = Q/A$

$A = y \times 1$ (assuming unit width of flow)

substituting for V

$$Q/y = (1.49/n)\, y^{0.67}\, S^{0.5}$$

$$Q = (1.49/n)\, y^{1.67}\, S^{0.5}$$

solve for y

$$y = (Qn/1.49\, S^{0.5})^{1/1.67}$$

$$y = (Qn/1.49 S^{0.5})^{0.6}$$

Case 1:		
Q =	0.015	cfs
n =	0.24	
S =	0.05	ft/ft
y =	0.066	ft

Case 2:		
Q =	0.024	cfs
n =	0.24	
S =	0.05	ft/ft
y =	0.089	ft

Case 3:		
Q =	0.017	cfs
n =	0.24	
S =	0.286	ft/ft
y =	0.042	ft

Case 4:		
Q =	0.017	cfs
n =	0.24	
S =	0.25	ft/ft
y =	0.044	ft

Case 5:		
Q =	0.020	cfs
n =	0.24	
S =	0.286	ft/ft
y =	0.047	ft

Case 6:		
Q =	0.022	cfs
n =	0.24	
S =	0.25	ft/ft
y =	0.052	ft

TURKEY CREEK LANDFILL
0771-368-11-123
SHEET FLOW VELOCITY

Determine sheet flow velocity:

V = Q/A (assume unit flow width for the flow area, A)

Case 1:			Case 2:		
Q =	0.015	cfs	Q =	0.024	cfs
A =	0.066	sf	A =	0.089	sf
V =	0.23	ft/s	V =	0.28	ft/s
Case 3:			Case 4:		
Q =	0.017	cfs	Q =	0.017	cfs
A =	0.042	sf	A =	0.044	sf
V =	0.40	ft/s	V =	0.39	ft/s
Case 5:			Case 6:		
Q =	0.020	cfs	Q =	0.022	cfs
A =	0.047	sf	A =	0.052	sf
V =	0.43	ft/s	V =	0.43	ft/s

Permissible non-erodible velocity is 5.0 ft/s. Therefore, expected sheet flow velocity is acceptable on the final cover system top and side slopes.

APPENDIX IIIF-E

PERMITTED LANDFILL CONDITION HYDROLOGIC CALCULATIONS

Includes pages IIIF-E-1 through IIIF-E-69



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TURKEY CREEK LANDFILL
0771-368-11-123
UNIT HYDROGRAPH DATA
PROPOSED EXPANSION CONDITION

Snyder's Hydrograph Coefficients (Espey's 10 Minute Method)

Permitted Conditions

Area No.	Area (acres)	Max. Flow Length (L) (ft)	S (ft/ft)	I (%)	Manning "n"	Φ[1]	T_r[2] (min)	T_{lag}[3] (min)	T_{lag} (hr)	Area[4] (sq mi)	q_p[5] (cfs/sq mi)	C_p[6]
O1	180.49	6,381	0.0110	10	0.04	0.84	36.1	33.6	0.56	0.2820	716.3	0.63
O2	74.63	4,784	0.0115	5	0.04	0.86	39.3	36.8	0.61	0.1166	678.5	0.65
O3	69.25	3,820	0.0147	10	0.04	0.84	29.8	27.3	0.46	0.1082	912.5	0.65
O4	61.05	2,617	0.0172	5	0.04	0.86	30.9	28.4	0.47	0.0954	883.6	0.65
O5	6.34	1,135	0.0282	2	0.04	0.87	27.1	24.6	0.41	0.0099	1115.0	0.71
S1	13.82	2,309	0.0225	25	0.04	0.79	18.4	15.9	0.26	0.0216	1634.4	0.68
S2	1.74	100	0.0950	2	0.04	0.87	11.4	8.9	0.15	0.0027	2954.4	0.69
S3	6.40	1,184	0.0355	5	0.04	0.86	21.5	19.0	0.32	0.0100	1426.7	0.71
S4	1.93	684	0.0190	5	0.04	0.86	22.1	19.6	0.33	0.0030	1449.8	0.74
S5	21.38	2,043	0.0225	15	0.04	0.82	20.8	18.3	0.30	0.0334	1409.0	0.67
S6	3.78	1,466	0.0164	2	0.04	0.87	32.9	30.4	0.51	0.0059	924.1	0.73
S7	4.10	630	0.0413	2	0.04	0.87	21.5	19.0	0.32	0.0064	1452.1	0.72

[1] Conveyance efficiency coefficient from Dodson & Associates Inc., *ProHec-1 Program Documentation*, 1995, pages 6-19 and 6-20.
[2] $T_r = 3.1(L^{0.23})(S^{-0.25})(I^{-0.18})(\Phi^{1.57})$
[3] $T_{lag} = T_r - \Delta t/2$
[4] From area summary sheet
[5] $q_p = 31600(A^{-0.04})(T_r^{-1.07})$
[6] $C_p = 49.375(A^{-0.04})(T_r^{-1.07})(T_{lag})$

T_r = surface runoff to unit hydrograph peak (min)
L = distance along main channel from study point to watershed boundary (ft)
S = main channel slope (ft/ft)
I = impervious cover within the watershed (%)
T_{lag} = watershed lag time (min)
Δt = computation interval (minutes)
q_p = unit hydrograph peak discharge (cfs/sq mi)
C_p = Snyder's peaking coefficient

Required: Determine the volume generated by the site and offsite areas using the excess rainfall calculated in the HEC-1 analysis of the post-development site conditions.

Method: 1. Use the excessive rainfall data generated by the HEC-1 analysis (see Appendix IIIF-E) to determine the volume produced by the site for the post-development conditions.

1. Permitted Conditions

1. a. Total Flow to Unnamed Tributary of Turkey Creek **northeast** of permit boundary (DCP1)

Area No.	Area (sq mi)	Total Excess Rainfall (in)	Area (ac)	Volume (ac-ft)
DA3	**0.0333**	**5.68**	**21.31**	**10.1**
DA4	**0.0566**	**5.68**	**36.22**	**17.1**
S2	**0.0027**	**5.45**	**1.74**	**0.8**
S3	**0.0100**	**5.45**	**6.40**	**2.9**
CH2	**0.0023**	**5.45**	**1.47**	**0.7**
CH5	**0.0007**	**5.45**	**0.45**	**0.2**
P1	**0.0021**	**7.33**	**1.34**	**0.8**

Total Volume of flow discharging from northeast of the Permit Boundary (refer to Figure 4.4 in the Drainage Report for the location) = 32.6 ac-ft

1. b. Total volume of flow for areas discharging to the **north** (DCP2)

Area No.	Area (sq mi)	Total Excess Rainfall (in)	Area (ac)	Volume (ac-ft)
DA1	**0.0232**	**5.68**	**14.83**	**7.0**
DA2	**0.0554**	**5.45**	**35.46**	**16.1**
O1	**0.2820**	**5.45**	**180.49**	**82.0**
O2	**0.1166**	**5.45**	**74.63**	**33.9**
S1	**0.0216**	**5.45**	**13.82**	**6.3**
CH1	**0.0161**	**5.45**	**10.30**	**4.7**

Total Volume of flow discharging from north of the Permit Boundary (refer to Figure 4.4 in the Drainage Report for the location) = 149.9 ac-ft

TURKEY CREEK LANDFILL
0771-368-11-123
VELOCITY CALCULATIONS
EXISTING EXPANSION CONDITION

Required: Determine the flow velocities entering and exiting the permit boundary using HYDROCALC HYDRAULICS (Version 2.0, 1996-2010) for the flows calculated for the 25-year and 25- year storm event in the HEC-1 analysis.

Method:

1. Use the flow data generated by the HEC-1 analysis to determine velocity of runoff entering the landfill permit boundary.

2. Use the flow data generated by the HEC-1 analysis to determine velocity of runoff exiting the landfill permit boundary.

1. Flow Velocity entering the landfill permit boundary

O1

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 466 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	466	0.0110	0.03	2.00	2.00	15.00	2.72	8.38

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O2

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 188 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	188	0.0115	0.03	2.00	2.00	30.00	1.09	5.34

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O3

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 206 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	206	0.0182	0.03	2.00	4.00	20.00	1.25	6.95

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O4

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 179 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	179	0.0172	0.03	50.00	50.00	15.00	0.82	3.93

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

O5

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 22 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	22	0.0282	0.03	100.00	40.00	100.00	0.11	1.84

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)

2.

Flow Velocity exiting the landfill permit boundary

DCP1

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 297 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	297	0.013	0.03	2.50	2.50	17.00	1.86	7.37

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010).

DCP2

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 664 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	664	0.018	0.03	5.00	5.00	0.00	3.68	9.83

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010).

DCP3

- Flows were obtained from the HEC-1 files included in this Appendix and are summarized below.

Q_{25} = 564 cfs

Storm Year	Flow Rate (cfs)	Bottom Slope (ft/ft)	Manning's n	Side Slope (left)	Side Slope (right)	Bottom Width (ft)	Normal Depth (ft)	Flow Vel. (fps)
25	564	0.0025	0.03	2.50	7.00	32.00	2.92	4.21

Note: Calculations were performed using the HYDROCALC HYDRAULICS for Windows program developed by Dodson and Associates (Version 2.01, 1996-2010)



LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EASEMENT
- 800 — FINAL COVER CONTOUR
- LIMIT OF CLASS 1 WASTE DISPOSAL AREA
- DRAINAGE LETDOWN
- DRAINAGE SWALE
- GABIONS
- MW-7 — EXISTING GROUNDWATER MONITORING WELL
- GMP-12 — EXISTING GAS MONITORING PROBE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY DALLAS AERIAL SURVEYS FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. REFER TO APPENDIX IIIF-SURFACE WATER DRAINAGE PLAN FOR DRAINAGE DESIGN INFORMATION.
3. MAXIMUM FINAL COVER ELEVATION IS 946.0 FT-MSL. MAXIMUM TOP OF WASTE ELEVATION IS 942.5 FT-MSL.

STATE OF TEXAS
CHARLES R. MARSH
105073
LICENSED PROFESSIONAL ENGINEER
12.16.22

- [ ] DRAFT
- [x] FOR PERMITTING PURPOSES ONLY
- [ ] ISSUED FOR CONSTRUCTION

DATE: 02/2022
FILE: 0771-368-11
CAD: IIIF-E-68-POST DEV DRAINAGE.DWG

DRAWN BY: RAA
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
PERMITTED LANDFILL DRAINAGE

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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DRAWING IIIF-E-68

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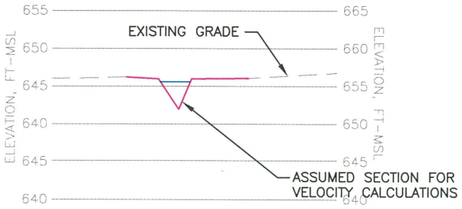
O:\0771\368\EXPANSION 2021\PART III\IIIF\IIIF-E\CLEAN\IIIF-E-68_PERMITTED LANDFILL DRAINAGE.dwg, rarrington, 1:2



DISCHARGE POINT 1

DCP1

IIIF-A-68 IIIF-A-69

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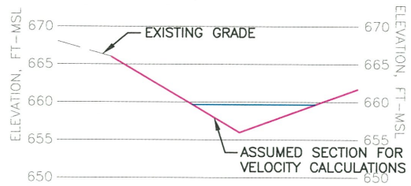
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 2

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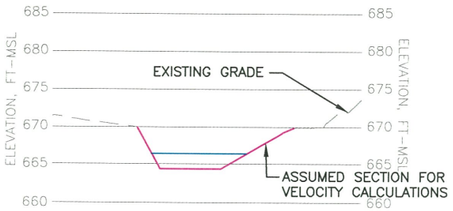
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 3

DCP3

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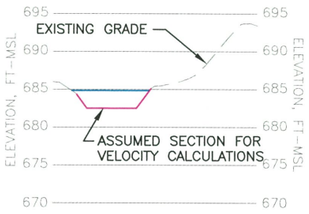
0 10 20
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 01

DCP01

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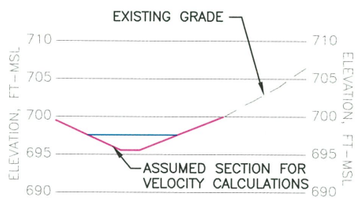
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 02

DCP02

IIIF-A-68 IIIF-A-69

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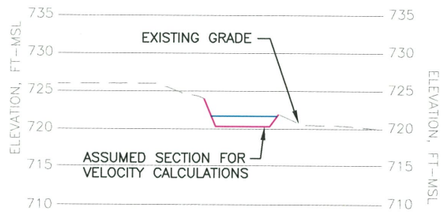
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 03

DCP03

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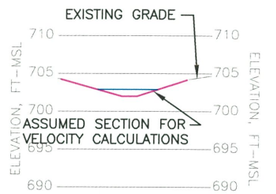
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 04

DCP04

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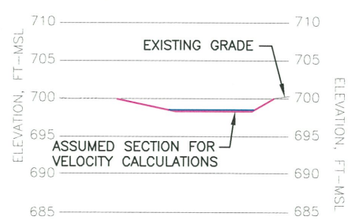
SCALE IN FEET (VERTICAL)



DISCHARGE POINT 05

DCP05

IIIF-A-68 IIIF-A-69

0 40 80
SCALE IN FEET (HORIZONTAL)

0 10 20
SCALE IN FEET (VERTICAL)

STATE OF TEXAS
CHARLES R. MARSH
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LICENSED
PROFESSIONAL ENGINEER

12-16-22

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DATE: 02/2022
FILE: 0771-368-11
CAD: IIIF-E-69-DISCHARGE POINT SEC.DWG

DRAWN BY: RAA
DESIGN BY: BPY
REVIEWED BY: CRM

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
PERMITTED DISCHARGE POINT VELOCITY CALCULATIONS

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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O:\0771\368\EXPANSION 2021\PART III\IIIF\IIIF-E\CLEAN\IIIF-E-69_DISCHARGE POINT SECTIONS.dwg, rarrington, 1:2

APPENDIX IIIF-G

EXCERPTS FROM PROPOSED CLOMR



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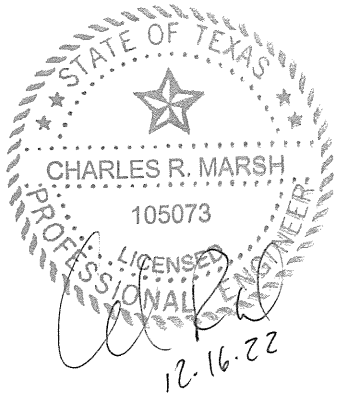
FLOODPLAIN SUMMARY **IIIF-G-1**

APPENDIX IIIF-G-A
Excerpts from the Proposed CLOMR Application

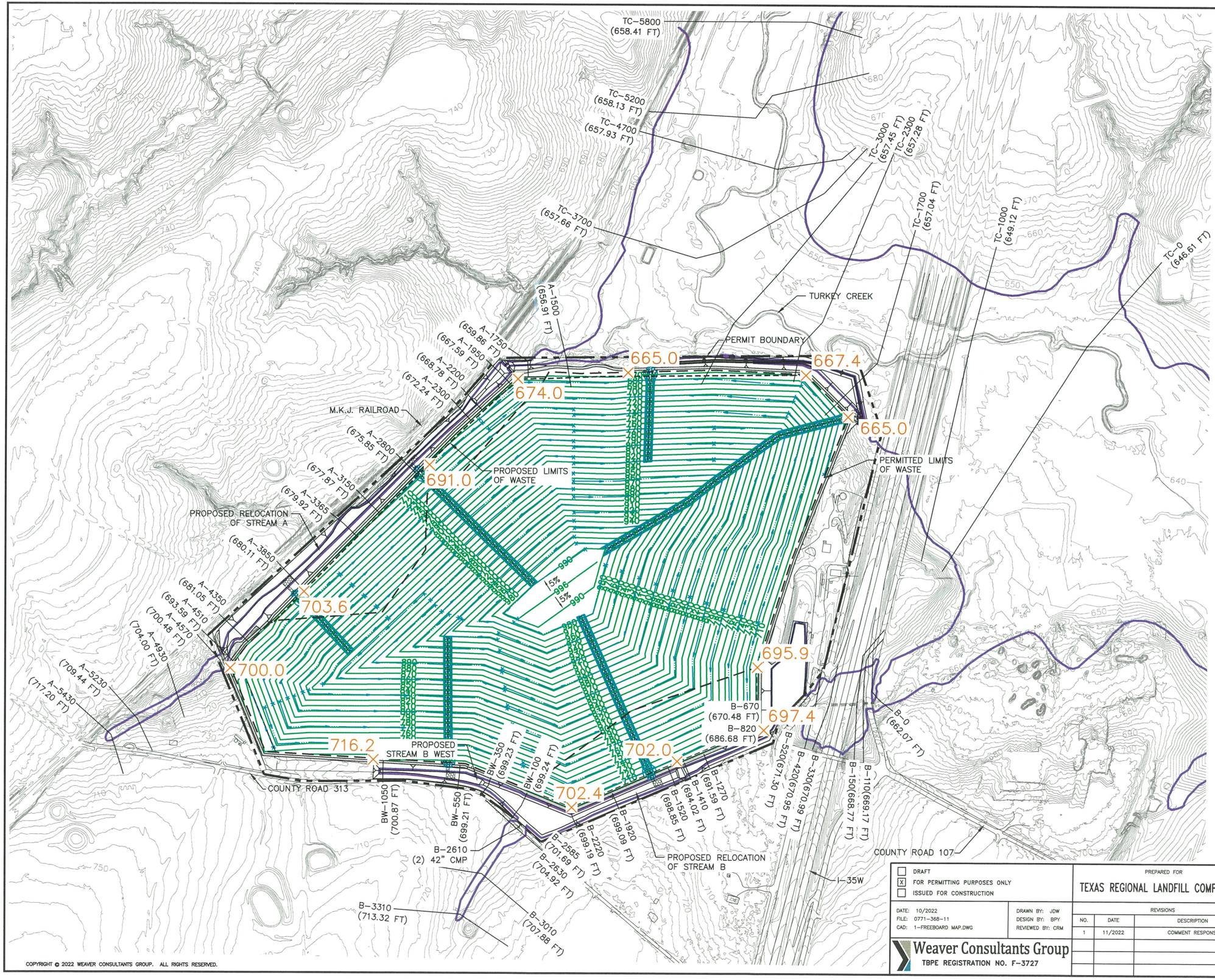


FLOODPLAIN SUMMARY

This appendix addresses §330.61(m).

As discussed in Parts I/II in Section 11, Parts I/II-Appendix I/IIC, and Part III-Appendix IIIF, the floodplain for Turkey Creek is located on the north and west sides of the permit boundary. A Conditional Letter of Map Revision (CLOMR) was developed for the proposed expansion to revise the floodplain limits as a part of the proposed landfill development.

Excerpts from the CLOMR are included in Appendix IIIF-G-A. As shown in Appendix IIIF-G-A, the proposed solid waste fill areas will not be located within the limits of the post-development 100-year floodplain in the proposed CLOMR. Additionally, the post development condition of the landfill is protected from the 100-year floodplain by the proposed perimeter berms. These berms provide a minimum 3 foot freeboard between the 100-year water surface and the limit of waste. Figure 1 illustrates the availability of freeboard at the facility. The CLOMR was developed to account for the geometric and hydrologic changes of the post-development conditions.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TC-5200 (658.13 FT)
TC-4700 (657.93 FT)
TC-3700 (657.66 FT)
TC-3000 (657.45 FT)
TC-2300 (657.28 FT)
TC-1700 (657.04 FT)
TC-1000 (649.12 FT)
TC-0 (646.61 FT)
A-1500 (656.91 FT)
A-1750 (659.86 FT)
A-1950 (661.59 FT)
A-2200 (668.78 FT)
A-2300 (672.24 FT)
A-2800 (675.85 FT)
A-3150 (677.87 FT)
A-3365 (679.92 FT)
A-3850 (680.11 FT)
A-4350 (681.05 FT)
A-4510 (693.59 FT)
A-4570 (700.48 FT)
A-4930 (704.00 FT)
A-5230 (709.44 FT)
A-5430 (717.20 FT)
TURKEY CREEK
PERMIT BOUNDARY
665.0
667.4
674.0
665.0
691.0
703.6
700.0
695.9
697.4
716.2
702.0
702.4
PROPOSED LIMITS OF WASTE
PERMITTED LIMITS OF WASTE
PROPOSED RELOCATION OF STREAM A
PROPOSED STREAM B WEST
PROPOSED RELOCATION OF STREAM B
COUNTY ROAD 313
COUNTY ROAD 107
M.K.J. RAILROAD
I-35W
B-670 (670.48 FT)
B-820 (686.68 FT)
B-0 (662.07 FT)
B-150(668.77 FT)
B-110(669.17 FT)
B-330(670.69 FT)
B-420(670.95 FT)
B-520(671.30 FT)
B-1270 (691.59 FT)
B-1410 (694.02 FT)
B-1520 (698.85 FT)
B-1920 (699.09 FT)
B-2220 (699.19 FT)
B-2585 (701.69 FT)
B-2630 (704.92 FT)
B-3010 (707.88 FT)
B-3310 (713.32 FT)
B-2610 (2) 42" CMP
BW-350 (699.23 FT)
BW-100 (699.24 FT)
BW-550 (699.21 FT)
BW-1050 (700.87 FT)
15%
990
995
1000
1005
1010
1015
1020
1025
1030
1035
1040
1045
1050
1055
1060
1065
1070
1075
1080
1085
1090
1095
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1110
1115
1120
1125
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1135
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1150
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1165
1170
1175
1180
1185

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

VOLUME 4 OF 6

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

Weaver Consultants Group, LLC
TBPE Registration No. F-3727
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109
817-735-9770

WCG Project No. 0771-368-11-123

This document is intended for permitting purposes only.

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 4 OF 6

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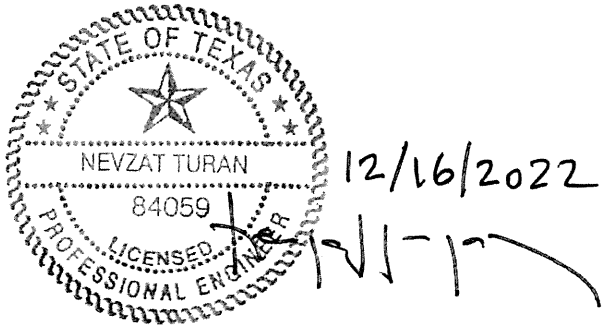
PART III - SITE DEVELOPMENT PLAN

Appendix IIIG – Geology Report

Appendix IIIH – Groundwater Monitoring, Sampling, and Analysis Plan



TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIG
GEOLOGY REPORT

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



12/16/2022

Prepared by

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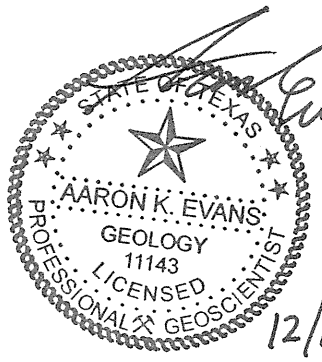
WCG Project No. 0771-368-11-123



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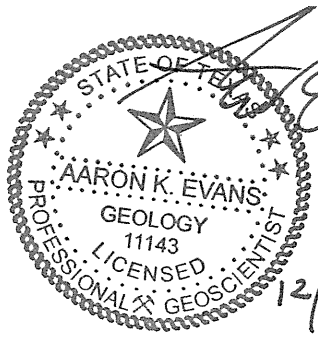

12/16/2022

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Site Exploration Data

APPENDIX IIIG-C
Site Geologic Data

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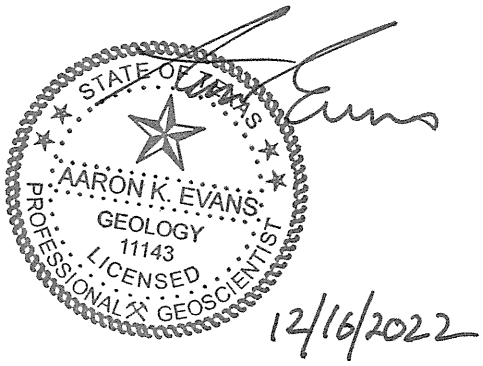
Site Hydrogeologic Data

APPENDIX IIIG-E
2021 Soil Boring Plan and TCEQ Approval Letter



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GEOLOGY REPORT CERTIFICATION

Site Information

Site: Turkey Creek Landfill

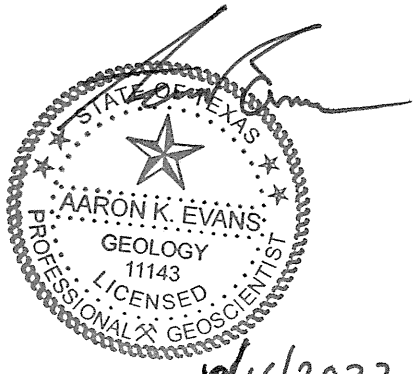
Site Location: Johnson County

MSW Permit No.: 1417D

Qualified Groundwater Scientist Statement

I, Aaron K. Evans, am a Texas-licensed professional geoscientist and a qualified groundwater scientist as defined in Title 30 TAC §330.3(120). I have prepared the Geology Report which constitutes Appendix IIIG of this permit application. In my professional opinion, the Geology Report is in compliance with the requirements specified in Title 30 TAC §§330.63(e). This report has been completed specifically for the Turkey Creek Landfill. The only warranty made by me in connection with this report is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

Firm/Address: Weaver Consultants Group, LLC
6420 Southwest Blvd., Suite 206
Fort Worth, Texas 76109



Signature: _____
Aaron K. Evans, P.G., Texas License No. 11143

Date: 12/16/2022

4 GROUNDWATER INVESTIGATION REPORT

4.1 Water Level Measurements

Groundwater at the facility has been evaluated using historical water-level data from the facility's former piezometers, former groundwater monitoring wells, existing groundwater monitoring wells, and eight piezometers installed in 2021. Groundwater elevations from the currently approved Subtitle D groundwater monitoring wells are provided in Table 4-1 and were measured during monitoring events dating back to November of 1995. These data were obtained from the facility's Subtitle D groundwater database which maintained by The Carel Corporation. In addition, Weaver Consultants Group began conducting water level readings from the facility's existing groundwater monitoring wells and eight newly installed piezometers in September 2021, which are summarized in Table 4-2. Groundwater potentiometric surface contour maps prepared from the March and September 2021 water level data are presented as Figures IIIG-D-1 and IIIG-D-2 in Appendix IIIG-D. These groundwater contour maps indicate a groundwater flow regime that consistent with those depicted historically for the facility. Historical groundwater flow regime and groundwater monitoring system design is further discussed in Appendix IIIH of the SDP.

4.3.2 Lower Confining Unit

The low vertical hydraulic conductivity of the Bounding Shale Unit (arithmetic mean K_v of $2.63x10^{-8}$ cm/sec) and contrasting higher horizontal conductivity of the Lower Sand unit (arithmetic mean K_h of $1.10x10^{-3}$ cm/sec) and Bounding Shale Unit (arithmetic mean K_h of $3.6x10^{-6}$ cm/sec) indicate a directional permeability differential of 2 to 3 orders of magnitude between sediments of the uppermost aquifer and the confining shale sediments. Under these conditions, perched groundwater flows horizontally within the confining low permeability sediments of the Bounding Shale Unit and downgradient toward Turkey Creek and the northernmost areas of the site. Evidence of this confined perched condition is also indicated by approximately 60 feet of potentiometric head separation between the uppermost aquifer and the regional Woodbine Aquifer as illustrated in the expanded cross section on Figure IIIG-C-13.

4.3.3 Groundwater Monitoring System

The existing groundwater monitoring system design includes 13 point of compliance (POC) monitoring wells screened within Lower Sand and Bounding Shale unit sediments of the uppermost aquifer. Two additional existing POC monitoring wells (MW-3B and MW-20) are screened at shallower depths within the Upper Sand Unit (spanning the Upper Sand and Bounding Shale unit contact). These two Upper Sand wells are located strategically near the lowest point of the landfill unit (MW-3B) and the lowest point immediately downgradient of the pre-Subtitle D fill area (MW-20). The current groundwater monitoring system utilizes two background monitoring wells located hydraulically upgradient of the landfill unit (MW-17 and MW-18). The proposed groundwater monitoring system network buildout is illustrated on Figure IIIH-A-1 in Appendix IIH of the SDP and includes 19 POC monitoring wells and three background monitoring wells. The groundwater monitoring system design is further discussed in the Groundwater Sampling and Analysis Plan provided in Appendix IIIH of the SDP.

4.4 Class 1 Waste Disposal Area Location Restrictions

The site's permitted Class 1 Waste disposal areas are shown on Figure IIIG-D-4 and include Sectors 9 through 11. The Class 1 waste disposal area was permitted in 2012 following TCEQ-acceptance of the Limited Scope Permit Amendment application (LSPA) by Geosyntec Consultants. This LSPA included a subsurface characterization performed by The Carel Corporation in 2012 to assess hydrogeologic conditions beneath the then-proposed Class 1 waste disposal footprint pursuant to the location restrictions defined in Title 30 TAC §335.584(b)(1 and 2), which was made a part of the site's existing permit (MSN-1417B) as Attachment 11E. A complete copy of the 2012 Subsurface Characterization report (obtained from Permit No. MSW-1417B) is provided in Appendix IIIG-D. The 2012 investigation included six geotechnical borings (B9-1, B9-2, B10-1, B10-2, B11-1, and B12-1) advanced to assess the composition, saturation, and permeability of soils beneath the Class 1 waste disposal footprint. The results of this investigation were documented in

APPENDIX IIIG-C

SITE GEOLOGIC DATA

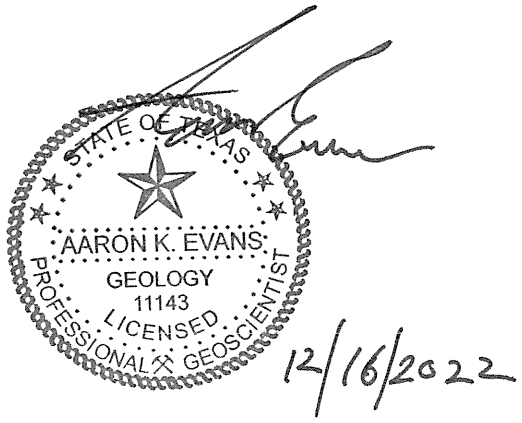


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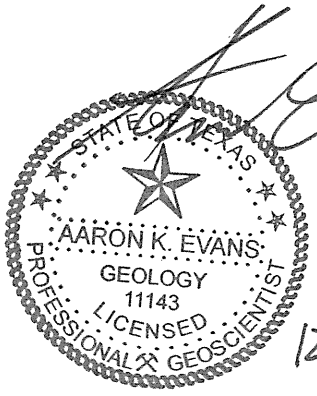
FIGURE IIIG-C-1 – Geologic Cross Section Index Map
FIGURE IIIG-C-2 – Geologic Cross Section A-A′
FIGURE IIIG-C-3 – Geologic Cross Section B-B′
FIGURE IIIG-C-4 – Geologic Cross Section C-C′
FIGURE IIIG-C-5 – Geologic Cross Section D-D′
FIGURE IIIG-C-6 – Geologic Cross Section E-E′
FIGURE IIIG-C-7 – Geologic Cross Section F-F′
FIGURE IIIG-C-8 – Geologic Cross Section G-G′
FIGURE IIIG-C-9 – Geologic Cross Section H-H′
FIGURE IIIG-C-10 – Geologic Cross Section I-I′
FIGURE IIIG-C-11 – Geologic Cross Section J-J′
FIGURE IIIG-C-12 – Expanded Geologic Cross Section F-F′ Index Map
FIGURE IIIG-C-13 – Expanded Geologic Cross Section F-F′



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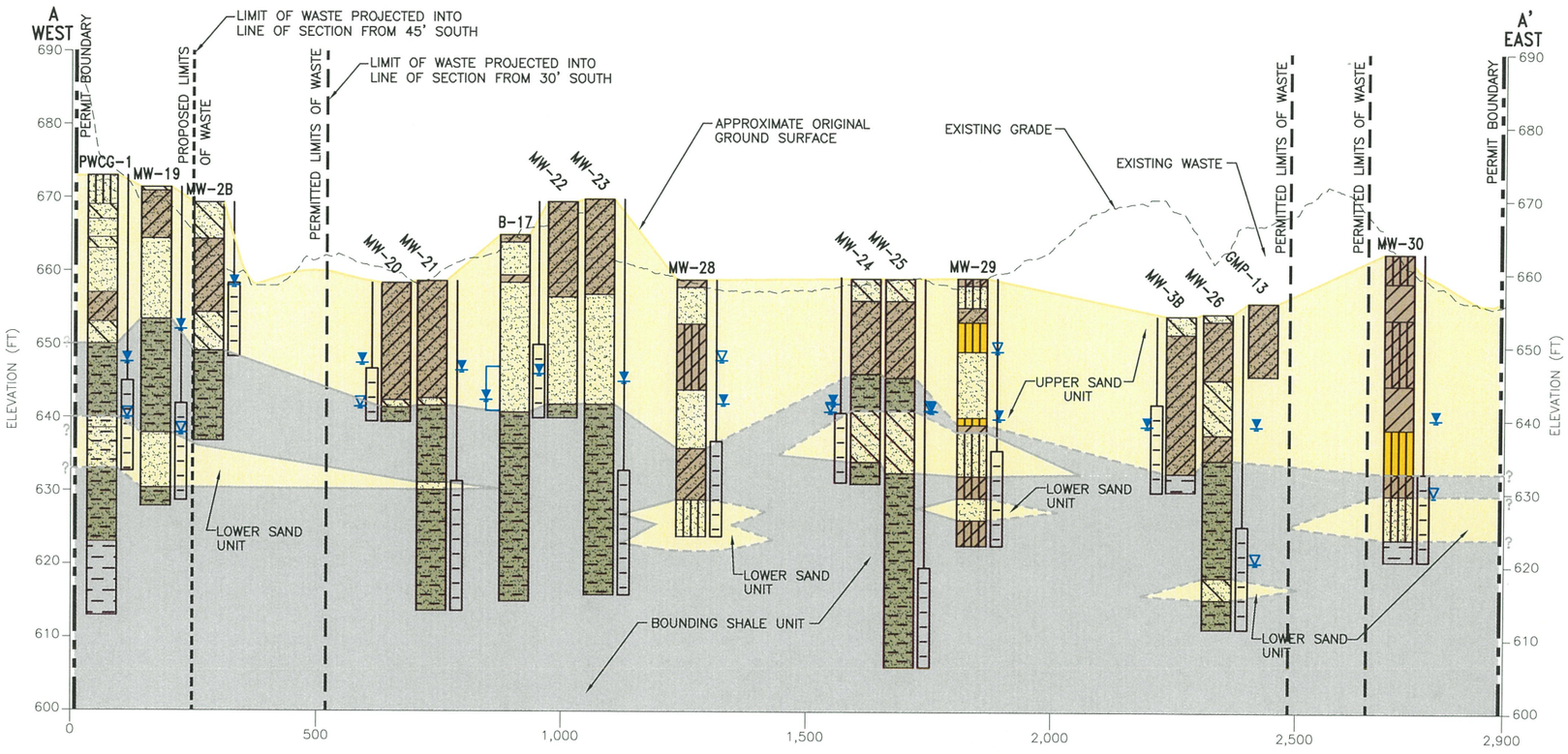

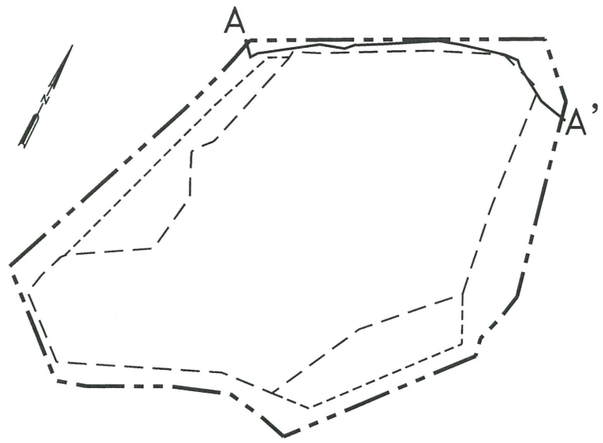

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE

- SANDY CLAY
- CLAYEY SAND
- SHALE or SILTY SHALE
- SILTY CLAY
- SANDY SHALE
- SILTY SAND OR SILTY SANDSTONE
- SAND or SANDSTONE
- SILT OR SILTSTONE
- CLAY
- SHALY SAND or SHALY SANDSTONE

- MONITORING WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- STATIC GROUNDWATER ELEVATION (FT-MSL) (SEE NOTES 2 AND 3)
- GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)
- RANGE OF STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER PIEZOMETER GAUGING DATA (SEE NOTE 3)

0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING OBTAINED FROM LITHOLOGIC BOREHOLE LOGS.
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4. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
5. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE DEPICTED.
6. BORING GRAPHICS ARE HORIZONTALLY EXAGGERATED FOR ILLUSTRATION PURPOSES AND MAY BE OFFSET FROM ONE ANOTHER TO PREVENT OVERLAP IN SECTION SPACE.

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FIGURE IIIG-C-2

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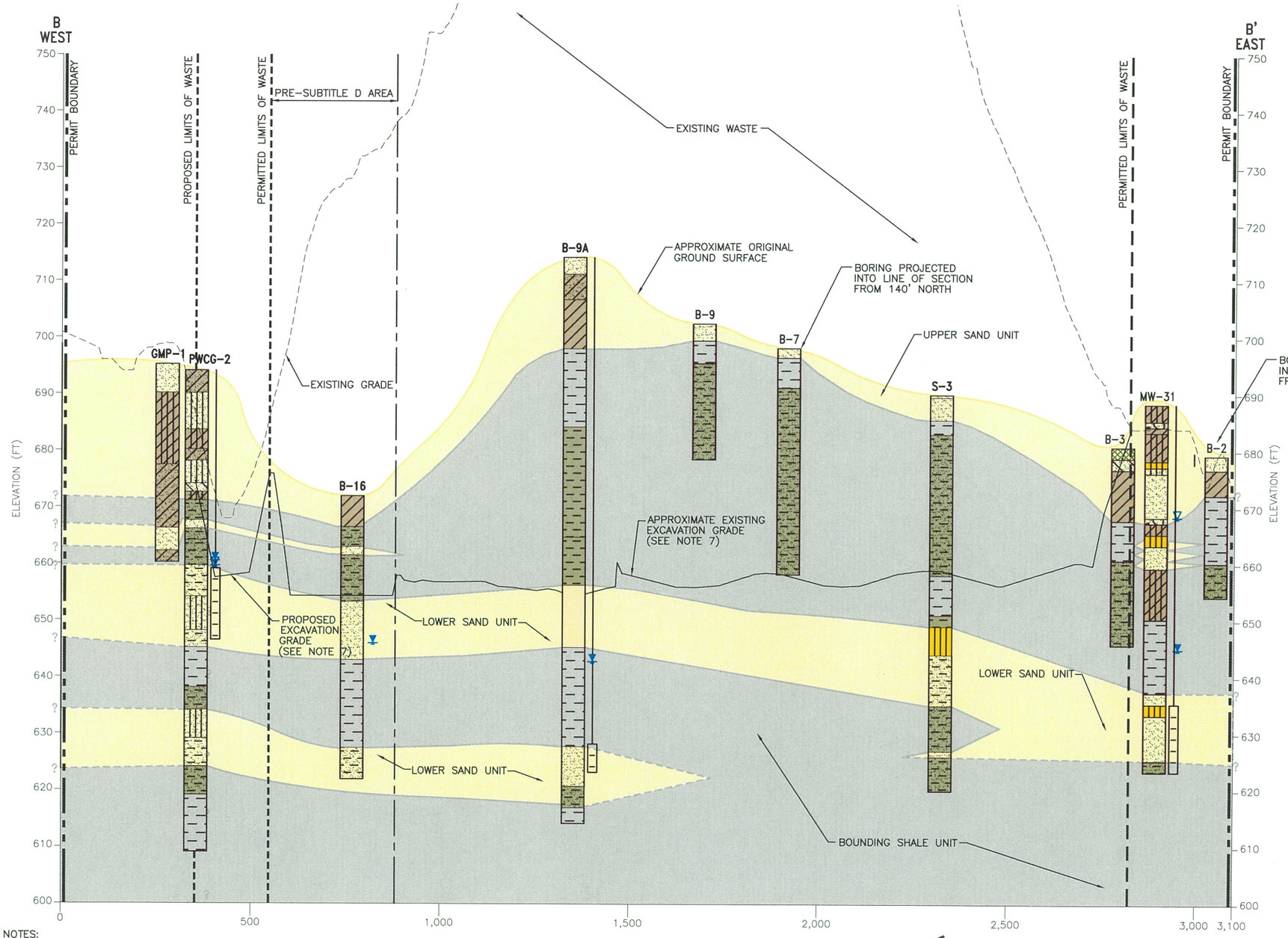

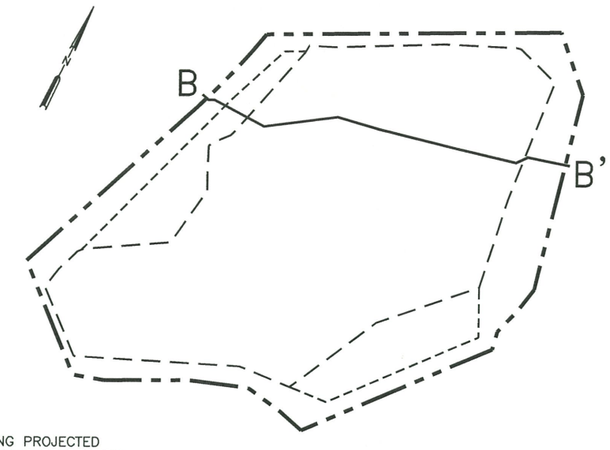

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE

- SANDY CLAY
- CLAYEY SAND
- GRAVEL or SANDY GRAVEL
- SHALE or SILTY SHALE
- SILTY CLAY
- SHALY SAND or SHALY SANDSTONE
- SAND or SANDSTONE
- SILTY SAND OR SILTY SANDSTONE
- EARTHEN FILL
- CLAY
- SILT OR SILTSTONE
- SANDY SHALE

- MONITORING WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
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7. EXISTING EXCAVATION GRADES SHOWN ARE WITHIN THE PERMITTED LIMITS OF WASTE. PROPOSED EXCAVATION GRADES ARE SHOWN BETWEEN THE PERMITTED AND PROPOSED LIMITS OF WASTE.

0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

STATE OF TEXAS
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FIGURE IIIG-C-3

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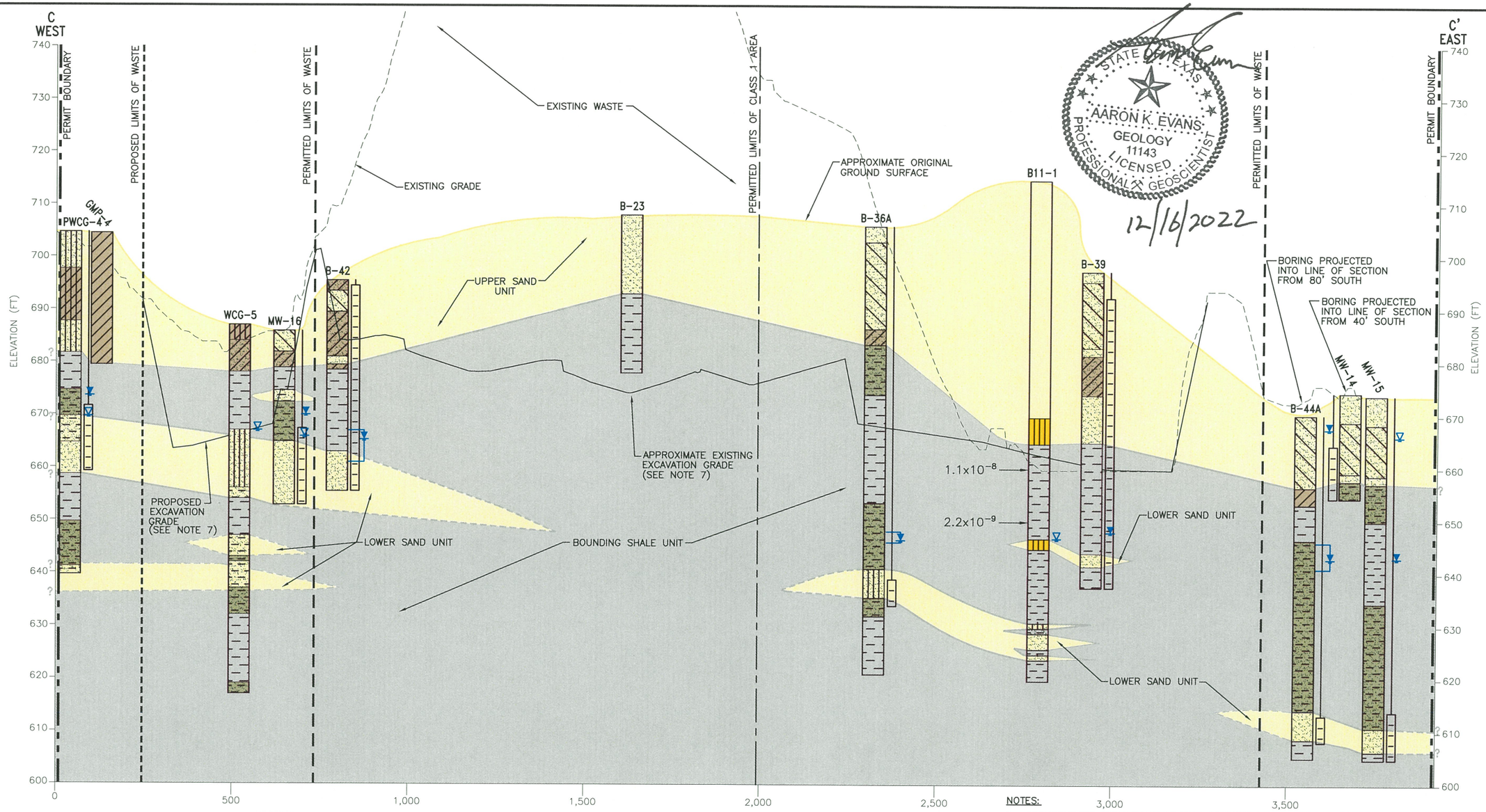

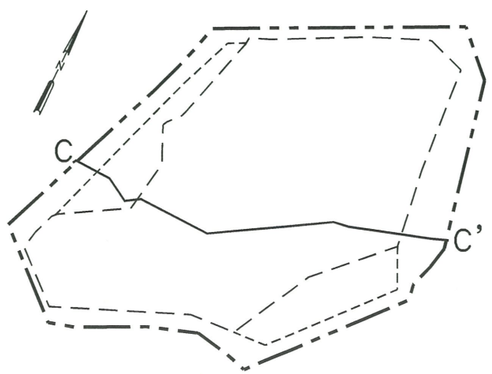

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- MONITORING WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- STATIC GROUNDWATER ELEVATION (FT-MSL) (SEE NOTES 2 AND 3)
- GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)
- RANGE OF STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER PIEZOMETER GAUGING DATA (SEE NOTE 3)
- $2.2x10^{-9}$ LABORATORY VERTICAL PERMEABILITY (cm/sec) FROM APRIL 2012 SUBSURFACE INVESTIGATION BY THE CAREL CORPORATION.

- SANDY CLAY
- SHALE or SILTY SHALE
- SAND or SANDSTONE
- CLAY
- CLAYEY SAND
- SILTY CLAY
- SILTY SAND
- SILT OR SILTSTONE
- SANDY SHALE
- NOT LOGGED
- SHALY SAND or SHALY SANDSTONE

0 10 20
VERTICAL SCALE IN FEET
0 150 300
HORIZONTAL SCALE IN FEET

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FIGURE IIIG-C-4

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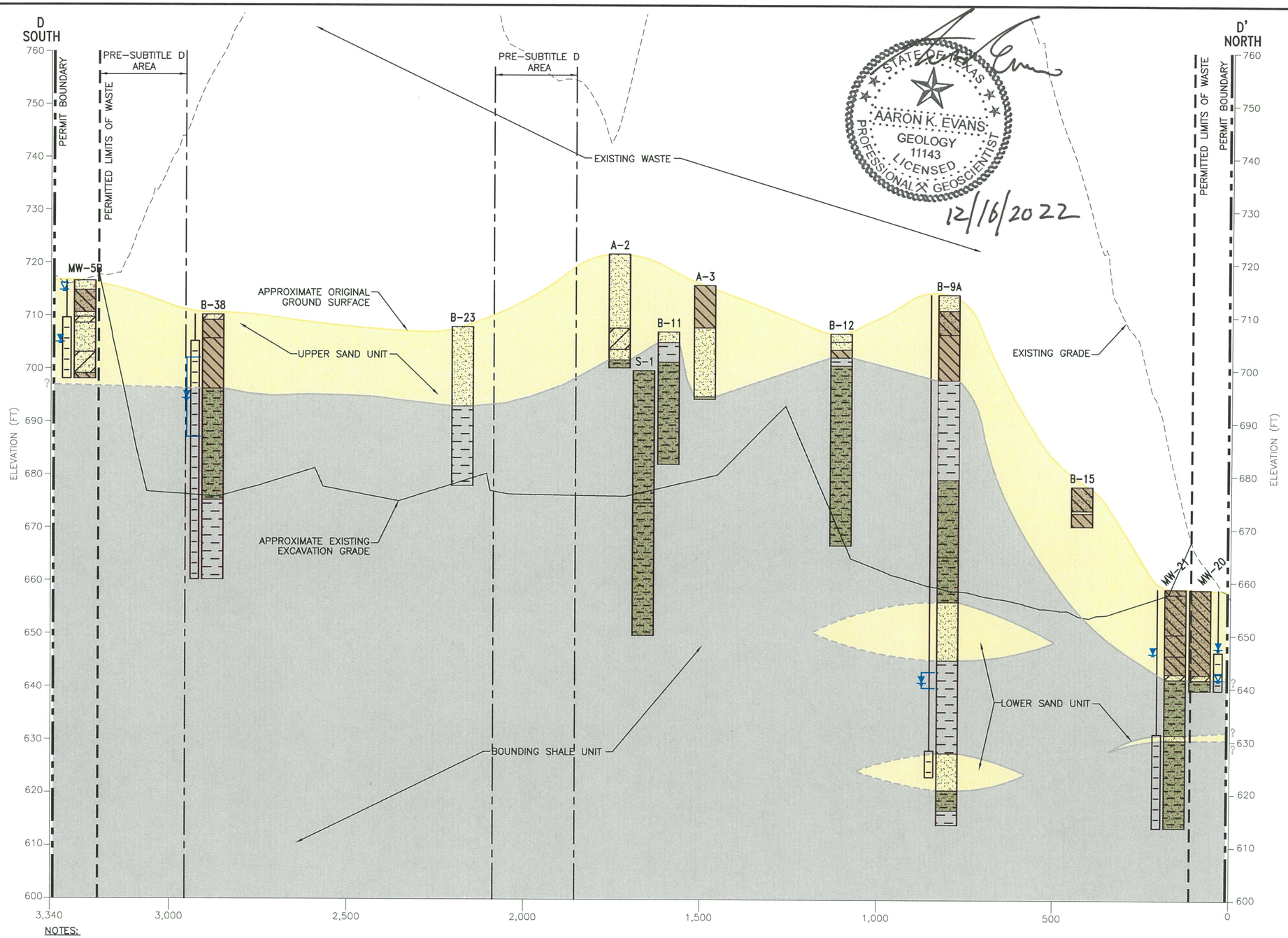

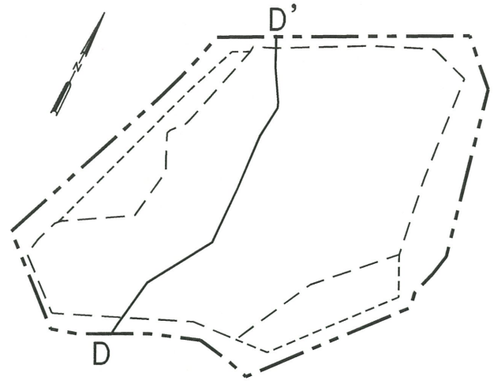

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- SANDY CLAY
- CLAYEY SAND
- SHALE or SILTY SHALE
- SHALY SAND or SHALY SANDSTOI
- SAND or SANDSTONE
- SANDY SHALE
- CLAY
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0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

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FIGURE IIIG-C-5

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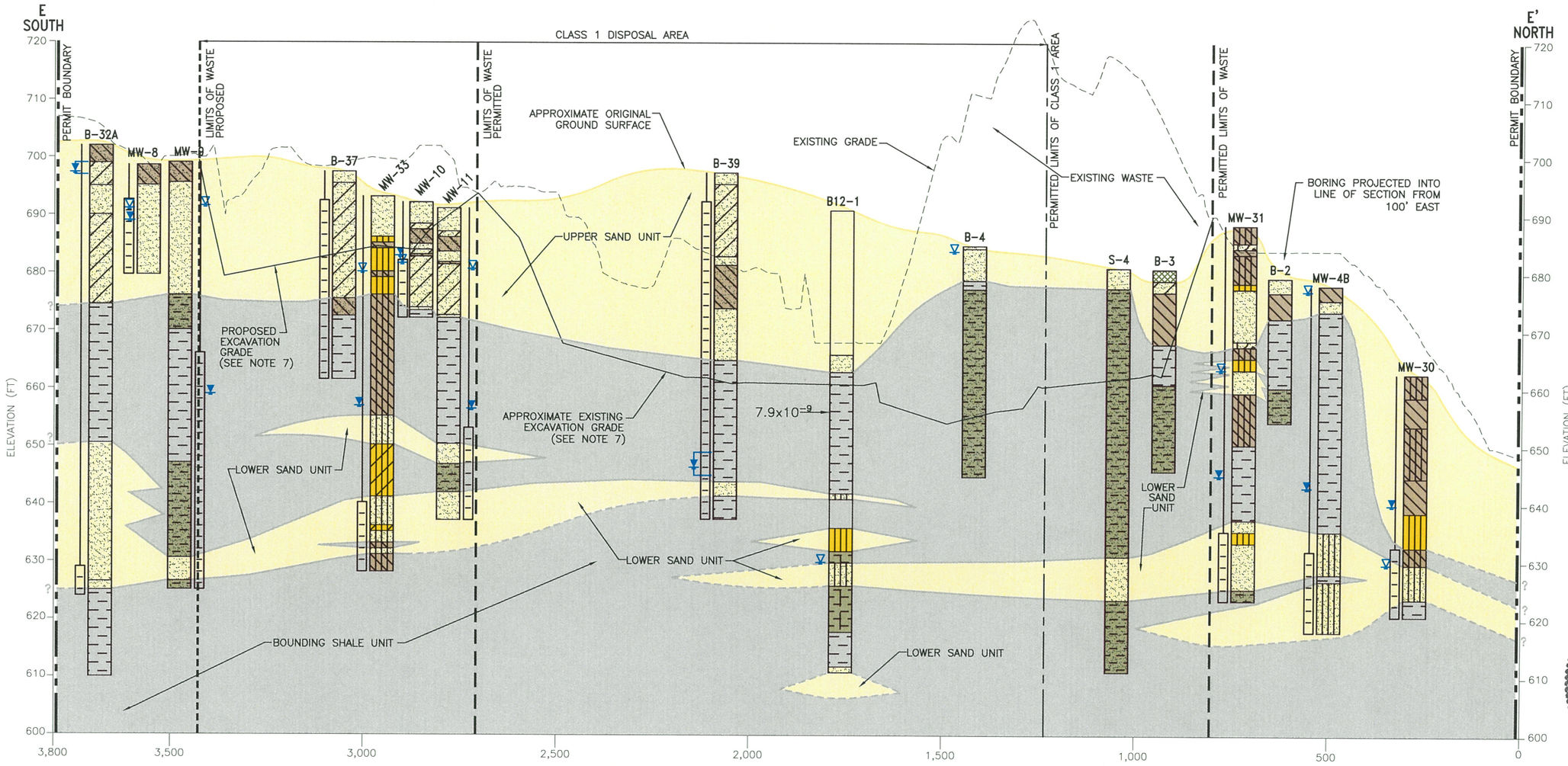

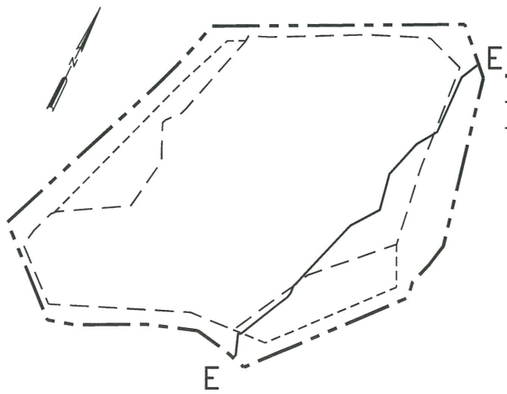

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
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- STATIC GROUNDWATER ELEVATION (FT-MSL) (SEE NOTES 2 AND 3)
- GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)
- RANGE OF STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER PIEZOMETER GAUGING DATA (SEE NOTE 3)
- 7.9x10^{-9} LABORATORY VERTICAL PERMEABILITY (cm/sec) FROM APRIL 2012 SUBSURFACE INVESTIGATION BY THE CAREL CORPORATION.

0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

- SANDY CLAY
- CLAYEY SAND
- SHALY SAND or SHALY SANDSTONE
- SHALE or SILTY SHALE
- SILTY CLAY
- GRAVEL or SANDY GRAVEL
- SAND or SANDSTONE
- SILTY SAND
- SANDY SHALE
- CLAY
- SILT or SILTSTONE
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MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS SECTION E-E'

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE IIIG-C-6

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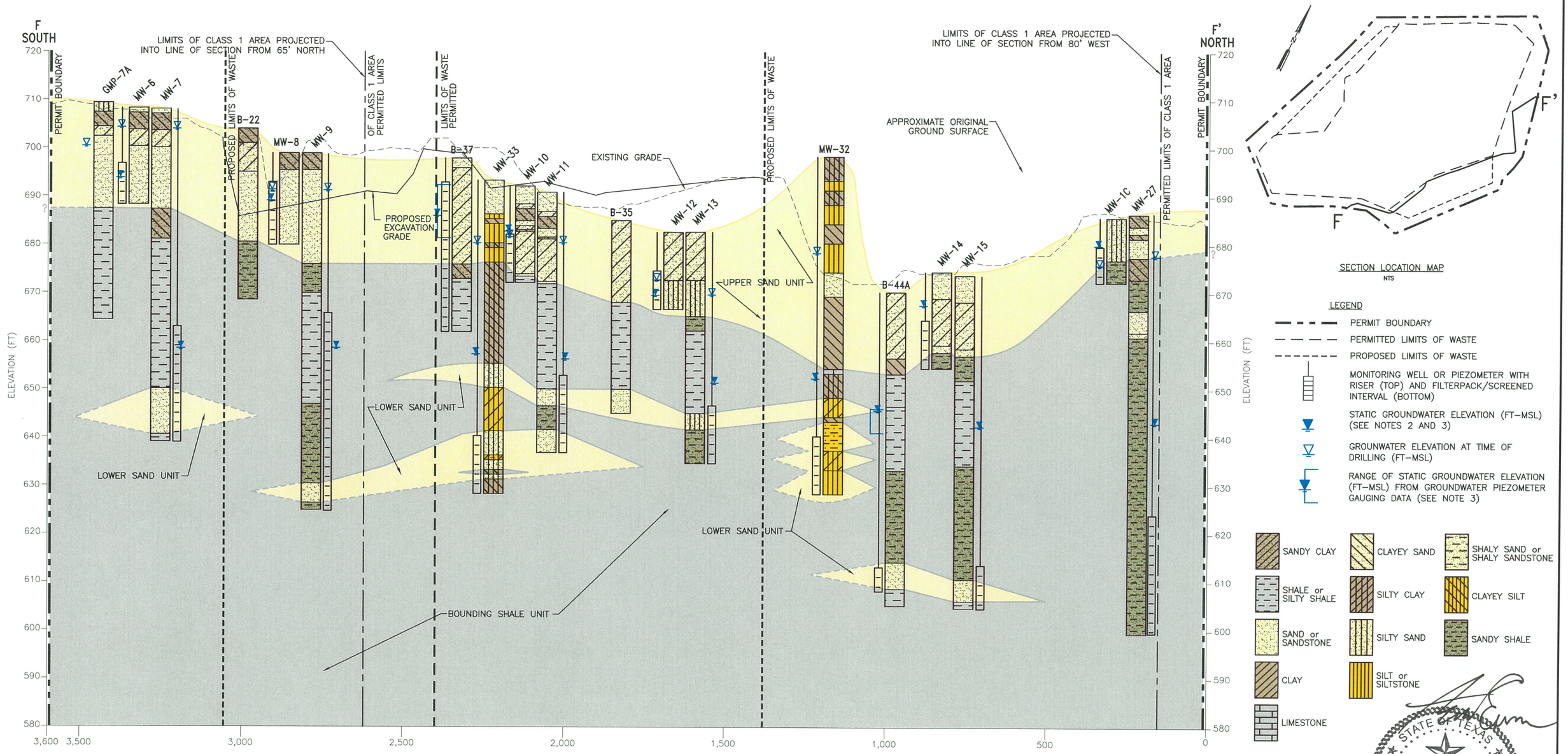


SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- MONITORING WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
- STATIC GROUNDWATER ELEVATION (FT-MSL) (SEE NOTES 2 AND 3)
- GROUNWATER ELEVATION AT TIME OF DRILLING (FT-MSL)
- RANGE OF STATIC GROUNDWATER ELEVATION (FT-MSL) FROM GROUNDWATER PIEZOMETER GAUGING DATA (SEE NOTE 3)

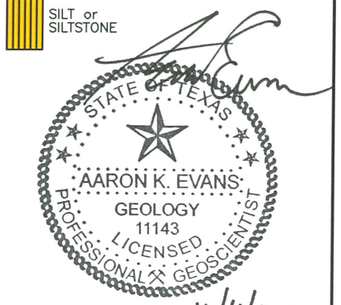
- SANDY CLAY
- CLAYEY SAND
- SHALY SAND or SHALY SANDSTONE
- SHALE or SILTY SHALE
- SILTY CLAY
- CLAYEY SILT
- SAND or SANDSTONE
- SILTY SAND
- SANDY SHALE
- CLAY
- SILT or SILTSTONE
- LIMESTONE

NOTES:

1. GROUNDWATER ELEVATIONS AT TIME OF DRILLING OBTAINED FROM LITHOLOGIC BOREHOLE LOGS.
2. STATIC GROUNDWATER ELEVATIONS FOR GROUNDWATER MONITORING WELLS OBTAINED FROM AUGUST 2010 GROUNDWATER SAMPLING EVENT GAUGING DATA COLLECTED BY THE CAREL CORPORATION.
3. STATIC GROUNDWATER ELEVATIONS FOR PIEZOMETERS OBTAINED FROM PREVIOUS SUBSURFACE INVESTIGATION DATA SUMMARY TABLES AND AS-BUILT SURVEY REPORTS OR GAUGING COMPLETED BY WCG IN SEPTEMBER 2021.
4. CROSS SECTION LOCATION INDICATED ON SECTION LOCATION MAP INSET AND FIGURE IIIG-C-1.
5. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE DEPICTED.
6. BORING GRAPHICS ARE HORIZONTALLY EXAGGERATED FOR ILLUSTRATION PURPOSES AND MAY BE OFFSET FROM ONE ANOTHER TO PREVENT OVERLAP IN SECTION SPACE.

0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET



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CAD: IIIG-C-7_SECTION F.DWG
DRAWN BY: JDW
DESIGN BY: AKE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS

NO.	DATE	DESCRIPTION
1	11/2022	COMMENT RESPONSE

MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS SECTION F-F'

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE IIIG-C-7

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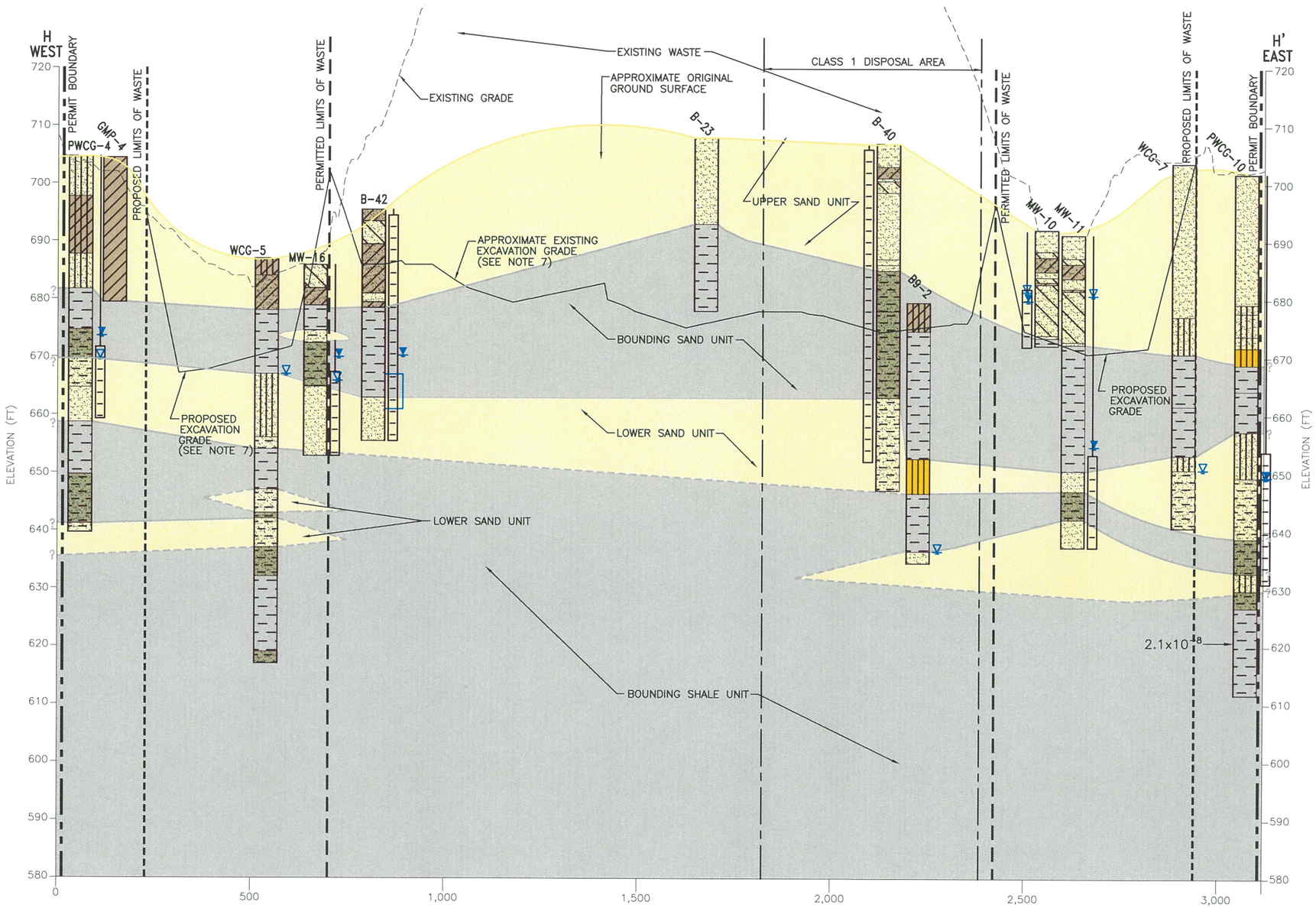

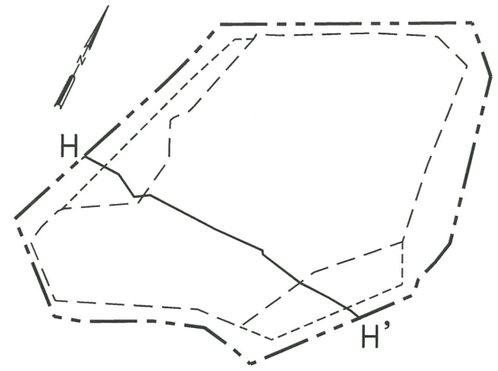

SECTION LOCATION MAP
NTS

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- MONITORING WELL OR PIEZOMETER WITH RISER (TOP) AND FILTERPACK/SCREENED INTERVAL (BOTTOM)
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- SAND or SANDSTONE
- SILT OR SILTSTONE
- CLAY
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6. BORING GRAPHICS ARE HORIZONTALLY EXAGGERATED FOR ILLUSTRATION PURPOSES AND MAY BE OFFSET FROM ONE ANOTHER TO PREVENT OVERLAP IN SECTION SPACE.
7. EXISTING EXCAVATION GRADES SHOWN ARE WITHIN THE PERMITTED LIMITS OF WASTE. PROPOSED EXCAVATION GRADES ARE SHOWN BETWEEN THE PERMITTED AND PROPOSED LIMITS OF WASTE.

0 10 20
VERTICAL SCALE IN FEET

0 150 300
HORIZONTAL SCALE IN FEET

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
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LICENSED
PROFESSIONAL GEOSCIENTIST
12/16/2022

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REVIEWED BY: NT

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PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS

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MAJOR PERMIT AMENDMENT
GEOLOGIC CROSS SECTION H-H'

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE IIIG-C-9

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TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

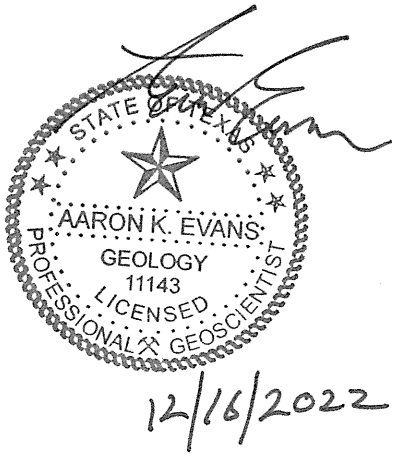
PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIH
GROUNDWATER SAMPLING AND ANALYSIS PLAN

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



Prepared by

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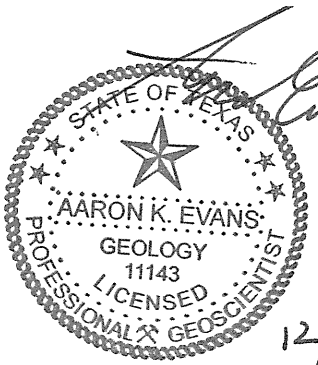
817-735-9770

WCG Project No. 0771-368-11-123



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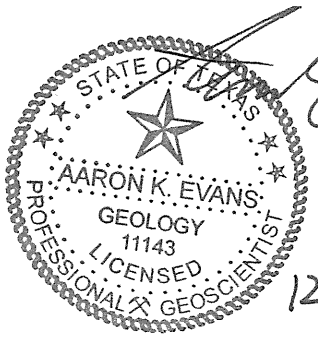

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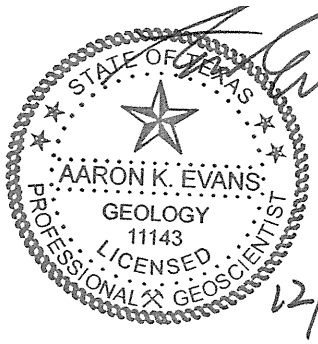

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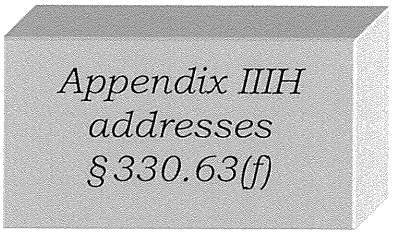
1 INTRODUCTION



This groundwater sampling and analysis plan (GWSAP) has been prepared for the Turkey Creek Landfill (Municipal Solid Waste [MSW] Permit No. 1417D). This plan incorporates the GWSAP procedures and methodology from the previous permit (MSW Permit No. 1417C). The following plan contains the groundwater monitoring system design aspects, system engineering report, the procedures for collecting representative samples from groundwater monitoring wells, and the basic laboratory requirements for obtaining representative data. The plan also includes monitoring well placement, design and construction, and well development procedures. This GWSAP has been prepared, and will be followed, in accordance with Title 30 TAC §330.401 through §330.415, §330.419 and §330.421. Groundwater monitoring will be conducted through the active life of the site and post-closure care period, pursuant to Title 30 TAC §330.401(f). Once approved, a copy of this GWSAP will be placed in the Site Operating Record.

wells, convert five existing piezometers to monitoring wells, install five new monitoring wells, and plug and abandon seven existing monitoring wells to accommodate the development of the lateral expansion areas and future perimeter drainage buildout.

As illustrated on Figure IIIH-A-1, and in accordance with Title 30 TAC §330.403, the proposed groundwater monitoring system network is designed with POC detection monitoring wells spaced less than 600-feet apart along a continuous approximately 8,100-foot-long point of compliance. A Groundwater Monitoring System Certification for the proposed network design is provided on page IIIH-A-4 in Appendix IIIH-A.

2.1.2.1 Point of Compliance Monitoring Wells

The existing system utilizes 16 POC monitoring wells which are located hydraulically downgradient of the permitted limits of waste (MW-3B, 7, 9, 13, 15, 19, 20, 21, 26, 27, 28, 29, 30, 31, 32 and 33). These existing POC monitoring wells are screened within Lower Sand unit and Bounding Shale unit sediments; except for MW-3B and MW-20 which are screened at shallower depths within the Upper Sand unit (spanning the Upper Sand and Bounding Shale unit contact). These two Upper Sand unit screened wells are strategically located near the lowest point of the landfill unit (MW-3B) and the lowest point immediately downgradient of the pre-Subtitle D fill area (MW-20). Monitoring wells MW-3B and MW-20 are paired with Lower Sand unit screened POC monitoring wells MW-26 and MW-21; respectively.

The proposed system network utilizes 19 POC monitoring wells by retaining 10 existing POC monitoring wells (MW-3B, MW-15, MW-20, MW-21, MW-26, MW27, MW-28, MW-29, MW-30, MW-31), converting four existing piezometers to POC monitoring wells (MW-35[PWCG-3], MW-37[PWCG-1], MW-38[PWCG-9], MW-41[PWCG-12]), and installing five new POC monitoring wells (MW-36, MW-39, MW-40, MW-42, and MW-43) as shown on Figure IIIH-A-1 in Appendix IIIH-A.

At least two years prior to waste placement in Sector 13 or Sector 14, monitoring wells MW-34, MW-35, and MW-37 will be converted from their former piezometer designations, new monitoring well MW-36 will be installed, and the wells will begin quarterly background data collection monitoring in accordance with Section 5.3. Existing monitoring wells MW-18 and MW-19 will be plugged and abandoned following background data collection completion and TCEQ acceptance of the background data statistical for monitoring wells MW-34 through MW-37.

At least two years prior to the development of Sector 12, monitoring wells MW-38 and MW-40 will be converted from their former piezometer designations, new monitoring wells MW-39, MW-40, and MW-42 will be installed, and the wells will begin quarterly background data collection monitoring in accordance with Section 5.3. Existing POC monitoring wells MW-7, MW-9, MW-13, MW-32, and MW-33 will be plugged and abandoned following the completion of background data collection and TCEQ acceptance of the background data statistical evaluation for monitoring wells MW-38 through MW-42.

Within 180 days of permit application approval, monitoring well MW-43 will be installed and the well will begin quarterly background data collection monitoring in accordance with Section 5.3.

2.1.2.2 Background Monitoring Wells

The existing system utilizes two background monitoring wells (MW-17 and MW-18) which are located hydraulically upgradient from the permitted limits of waste. Monitoring well MW-18 is screened within Lower Sand unit and Bounding Shale unit sediments and monitoring well MW-17 is screened at shallower depths within the Upper Sand unit.

The proposed system network utilizes three background monitoring wells (MW-17, MW-34, and MW-44) by retaining existing Upper Sand unit screened background monitoring well MW-17, converting existing Lower Sand unit screened piezometer PWCG-4 to background monitoring well MW-34, and installing new monitoring well MW-44, as shown on Figure IIIH-A-1 in Appendix IIIH-A.

At least two years prior to waste placement in Sector 13 or 14, replacement background monitoring well MW-34 will be converted from piezometer PWCG- and will begin quarterly background data collection monitoring in accordance with Section 5.3. Monitoring well MW-18 will be plugged and abandoned following the completion of background data collection and TCEQ acceptance of the background data statistical evaluation for monitoring well MW-34.

Collectively, background monitoring wells MW-17 and MW-34 will provide representative background groundwater quality data applicative to all POC detection monitoring wells in accordance with Title 30 TAC §330.403(a)(1). Monitoring well MW-17 will continue to provide background data which serves to support statistical analysis for comparably screened POC monitoring wells MW-3B and MW-20. Monitoring wells MW-34 and MW-44 will provide background data which serves to support statistical analysis for the facility's 16 comparably screened POC detection monitoring wells.

Within 180 days of permit application approval, monitoring well MW-44 will be installed and the well will begin quarterly background data collection monitoring in accordance with Section 5.3. Within six months of installation, the facility will evaluate the hydraulic gradient in the vicinity of MW-44. If it is determined that MW-44 is downgradient of the landfill unit, the facility will notify TCEQ and submit a permit modification to the Site Development Plan, in accordance with Title 30 TAC §305.70(j), to revise the designation of monitoring well MW-44 from background to POC monitoring well.

Table 2-1
Groundwater Monitoring Well Network

Well Name	Gradient Position	Current Condition	System Status
MW-3B	POC	Existing MW	Retained in system
MW-7	POC	Existing MW	To be removed from system
MW-9	POC	Existing MW	To be removed from system
MW-13	POC	Existing MW	To be removed from system
MW-15	POC	Existing MW	Retained in system
MW-17	BG	Existing MW	Retained in system
MW-18	BG	Existing MW	To be removed from system
MW-19	POC	Existing MW	To be removed from system
MW-20	POC	Existing MW	Retained in system
MW-21	POC	Existing MW	Retained in system
MW-26	POC	Existing MW	Retained in system
MW-27	POC	Existing MW	Retained in system
MW-28	POC	Existing MW	Retained in system
MW-29	POC	Existing MW	Retained in system
MW-30	POC	Existing MW	Retained in system
MW-31	POC	Existing MW	Retained in system
MW-32	POC	Existing MW	To be removed from system
MW-33	POC	Existing MW	To be removed from system
MW-34	BG	Existing Piezometer PWCG-4	To be converted to MW (Replacement for MW-18)
MW-35	POC	Existing Piezometer PWCG-3	To be converted to MW
MW-36	POC	Future MW	To be installed as new MW
MW-37	POC	Existing Piezometer PWCG-1	To be converted to MW
MW-38	POC	Existing Piezometer PWCG-9	To be converted to MW
MW-39	POC	Future MW	To be installed as new MW
MW-40	POC	Future MW	To be installed as new MW
MW-41	POC	Existing Piezometer PWCG-12	To be converted to MW
MW-42	POC	Future MW	To be installed as new MW
MW-43	POC	Future MW	To be installed as new MW
MW-44	BG	Future MW	To be installed as new MW

MW = Groundwater Monitoring Well.
POC = Point of compliance monitoring well located hydraulically downgradient from waste.
BG = Background monitoring well located hydraulically upgradient from waste.

2.2 Monitoring Well Design and Maintenance

Well location coordinates, nearest ground elevations, and top of casing elevations and well construction details for the facility's existing groundwater monitoring wells and future piezometer to monitoring well conversions were obtained from WCG asbuilt survey reports, lithologic borehole logs, and monitor well data sheets (provided in Appendix IIIG of the SDP). Construction details for the facility's five new monitoring

wells installations (MW-36, MW-28, MW-39, MW-42, MW-43, and MW-44) are estimated from the existing subsurface and topographic data. These data are summarized in Figure IIIH-A-2 (Groundwater Monitoring Well Details). Typical groundwater monitoring well specifications are depicted in Figure IIIH-A-3. Review of monitoring well installation records indicate that the facility's existing monitoring wells, and the existing piezometers scheduled for future conversion to monitoring wells, are constructed in accordance with the requirements of Title 30 TAC §330.421.

All parts of the groundwater monitoring system will be operated and maintained so that they perform to design specifications throughout the life of the monitoring program. Any monitoring well that is damaged to the extent that it is no longer suitable for sampling will be reported to the TCEQ who may make a determination about whether to repair or replace the well. Well plugging and abandonment will be performed by a Texas-licensed monitoring well driller in accordance with TCEQ and any other applicable regulatory requirements. No monitoring well will be plugged and abandoned without prior written authorization from TCEQ. Any new or replacement monitoring well installation will be performed in accordance with Title 30 TAC §330.421 by a Texas-licensed monitoring well driller. Monitoring well construction will provide for the maintenance of the integrity of the borehole, collection of representative groundwater samples from the uppermost aquifer, and prevention of migration of groundwater and surface water within the borehole in accordance with Title 30 TAC §330.421(a).

2.3 Groundwater Monitoring Program

Facility detection monitoring wells will be sampled semi-annually for the detection monitoring parameters listed in 40 Code of Federal Regulations (CFR), Part 258, Appendix I, which are also listed in Table 5-1 in Section 5.1. Details regarding groundwater sampling, analyses, and statistical comparison procedures are discussed in the following sections of Appendix IIIH.

In accordance with Title 30 TAC §403(e)(3), Texas Regional Landfill Company, LP will promptly notify the executive director, and any local pollution agency with jurisdiction that has requested to be notified, in writing of changes in facility construction or operation or changes in adjacent property that affect or are likely to affect the direction and rate of groundwater flow and the potential for detecting groundwater contamination and that may require the installation of additional monitoring wells or sampling points. Such additional wells or sampling points require a modification of the site development plan which will be requested in accordance with Title 30 TAC §305.70(j).

facility will submit an application for a permit amendment or modification to make appropriate changes within 90 days of this determination.

5.6.2 Semiannual Assessment Monitoring Reporting

If there are one or more facility wells in assessment monitoring status, then the facility will submit a semiannual assessment monitoring report within 60 days after completion of each semiannual groundwater assessment monitoring event. The semiannual groundwater assessment monitoring report will include the same data and information required in the facility's semiannual detection monitoring report (as defined in Section 5.6.1), but will be specific to the facility's assessment monitoring wells, constituents, and statistics. The assessment monitoring statistical results will be compared to Groundwater Protection Standard concentrations to determine if the results are statistically significant.

The required semiannual groundwater assessment monitoring information may be provided either within the facility's semiannual detection monitoring report or submitted in an assessment-specific semiannual groundwater report. If the required detection and assessment monitoring information are combined into a single semiannual report submittal, then the combined report will be submitted to TCEQ within 60 days after completion of the semiannual groundwater monitoring event.

6 STATISTICAL METHODOLOGY – GROUNDWATER DATA ANALYSES

6.1 Statistical Methodology

Statistical analyses of groundwater analytical data will be performed in accordance with Title 30 TAC §330.405, §330.407, and §330.409, and EPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance (March, 2009). Statistical comparisons will be performed using Sanitas™, a commercial software program developed by Sanitas Technologies, Inc. or other equivalent statistical program. Flow charts depicting statistical analyses protocols for control charts, prediction limits, and 95 percent confidence intervals are included in Appendix IIIH-F. It is not possible to predict all future potential circumstances. Therefore, alternate statistical methods may be used as deemed appropriate for the data distribution of the constituents being evaluated, providing that they conform to the requirements and guidelines set forth in Title 30 TAC §330.407 and §330.409, and EPA Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities – Unified Guidance (March, 2009).

6.2 Exceedances, Resampling, ASDs, and Assessment Monitoring

Detection monitoring for the constituents listed in Table 5-1 of Section 5.1 and referenced in Title 30 TAC §330.419(a) will be conducted in accordance with Sections 5.3 and 5.5. An Initial Statistical Exceedance (ISE) of any constituent will be based on a detected concentration that exceeds the constituent's statistical limit. If an ISE of any constituent is indicated at any detection monitoring well, a notice will be made to the TCEQ (and any other pollution control agency with jurisdiction that has requested to be notified) within 14 days.

6.2.1 Verification Resampling

Verification re-sampling is an integral part of the statistical methodology that is required to verify if an actual SSI has occurred. In the event that an ISE is indicated for any constituent listed in Table 5-1 (Section 5.1), verification resampling will be completed to either confirm or disconfirm the ISE. The verification resampling results will be submitted to TCEQ within the appropriate regulatory timeframe. If the ISE is verified through resampling then the verified exceedance constitutes a Statistically Significant Increase (SSI) and the facility will either:

(1) Notify the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) in writing of the verified SSI within 14 days and begin assessment monitoring within 90 days of the written notice (Title 30 TAC §330.407(b)(1)), or

(2) Within 14 days of the verified SSI determination date, notify the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) in writing of the facility's intent to submit an alternative source demonstration (ASD) report; and

(3) Within 90 days of the verified SSI determination, submit an ASD report to the TCEQ (and any local pollution agency with jurisdiction that has requested to be notified) that demonstrates that a source other than the facility caused the contamination or that the SSI resulted from error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (Title 30 TAC §330.407(b)(3)(B)). The report must be prepared and certified by a qualified groundwater scientist. If the report does not sufficiently demonstrate an alternative contamination source to the TCEQ, then the facility must begin assessment monitoring with 90 days of the written ASD intent notification.

If the ASD is accepted by TCEQ then the monitoring well may remain in detection monitoring status. If the owner/operator does not make a demonstration satisfactory to the executive director within 90 days of the date of the SSI notice, as made evident by a letter of denial from TCEQ, then the owner/operator will initiate an assessment monitoring program meeting the requirements of Title 30 TAC §330.409.

6.3 Assessment Monitoring

Assessment monitoring will be conducted at least semiannually in accordance with Title 30 TAC §330.409. The landfill will sample and analyze the groundwater monitoring system for the full list of constituents in 40 CFR, Part 258, Appendix II. Analyses for these constituents will also be conducted for the each well located on either side of the well exhibiting the verified SSI, unless an alternative subset of wells is designated by the TCEQ.

For any new constituent detected in the point of compliance wells as a result of the completed Appendix II analysis, a minimum of four statistically independent samples from each background well will be collected and analyzed to establish background levels for the additional constituent, unless an alternative subset of Appendix II background constituent analyses is designated by the TCEQ. After sampling the assessment monitoring wells for Appendix II constituents, the TCEQ may specify an appropriate subset of wells to be sampled and analyzed for the Appendix II constituents during assessment monitoring and may delete any of the Appendix II

constituents if the landfill demonstrates that the constituents are not reasonably expected to be in or derived from the waste contained in the unit.

If the concentrations of all 40 CFR Part 258, Appendix II constituents are shown to be at or below background values, using the statistical procedures in §330.405(f), for two consecutive sampling events, the owner or operator will notify the Executive Director in writing and return to detection monitoring if approved.

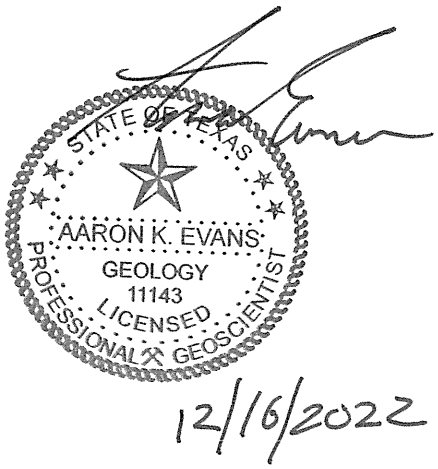
6.4 Corrective Action Monitoring

Detection of assessment monitoring constituents at statistically significant levels, as defined in Title 30 TAC §330.409, could result in corrective action monitoring. Groundwater monitoring for the purpose of corrective action assessment and remediation will be conducted in accordance with Title 30 TAC §330.411 through §330.415, and in consultation with TCEQ. At a minimum, the assessment will address the following:

- a characterization of the contaminated groundwater, including concentrations of assessment constituents as defined in 30 TAC §330.409;
- the concentration limit for each constituent found in the groundwater;
- detailed plans and an engineering report describing the corrective action to be taken;
- a description of how the groundwater monitoring program will demonstrate the adequacy of the corrective action; and
- a schedule for submittal of the above information provided the owner or operator obtains written authorization from the executive director prior to submittal of the complete permit application.

APPENDIX IIIH-A

GROUNDWATER MONITORING SYSTEM



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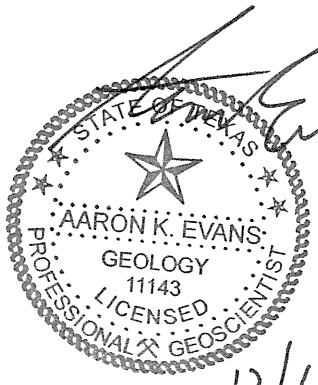
Carel Corporation Groundwater Potentiometric Surface Maps IIIH-A-10



12/16/2022

STATE OF TEXAS
AARON K. EVANS
GEOLOGY
11143
LICENSED
PROFESSIONAL GEOSCIENTIST
12/16/2022

TURKEY CREEK
BP PIPELINE EASEMENT (GAS)
M.K.J. RAILROAD
IH35
CR313
CR107
ACCESS ROAD
LEACHATE STORAGE TANK
MAINTENANCE BUILDING LOCATION
LANDFILL OFFICE
IH35 SERVICE ROAD
SCALEHOUSE
BP PIPELINE EASEMENT (GAS)
WHEEL WASH/DE-MUDDING AREA
SITE ENTRANCE

SECTOR 1A
SECTOR 1B
SECTOR 2A
SECTOR 2B
SECTOR 3A
SECTOR 3B
SECTOR 4A
SECTOR 4B
SECTOR 4C
SECTOR 5
SECTOR 6A
SECTOR 6B
SECTOR 7A
SECTOR 7B
SECTOR 7C
SECTOR 8A
SECTOR 8B
SECTOR 8C
SECTOR 9A
SECTOR 9B
SECTOR 10A
SECTOR 10B
SECTOR 11A
SECTOR 11 (UNDEVELOPED)
SECTOR 12
SECTOR 13
PRE-SUBTITLE D AREA

MW-17 (711.54)
MW-18 (674.01)
MW-19 (651.34)
MW-20 (646.82)
MW-21 (646.18)
MW-28 (641.42)
MW-29 (639.65)
MW-3B (640.14)
MW-26 (639.44)
MW-30 (639.82)
MW-31 (645.50)
MW-27 (643.66)
MW-15 (642.86)
MW-32 (653.25)
MW-13 (653.71)
MW-33 (658.32)
MW-38 (PWCG-9) (643.34)
MW-39
MW-40
MW-41 (PWCG-12) (658.40)
MW-42
MW-43
MW-44
MW-34 (PWCG-4) (673.58)
MW-35 (PWCG-3) (669.89)
MW-36
MW-37 (PWCG-1) (651.39)
MW-7 (660.72)
MW-9 (660.61)

576' 520' 569' 499' 577' 580' 590' 590' 590' 543' 543' 543' 583' 581' 551' 404' 381'

N 0 200 400
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PERMITTED LIMITS OF WASTE
- PROPOSED LIMITS OF WASTE
- 750 — EXISTING CONTOUR
- N 6816000 — STATE PLANE COORDINATE
- 32° 21' 20" — GEODETIC COORDINATE
- EXISITNG EASEMENT
- PROPOSED EASEMENT RELOCATION
- SECTOR BOUNDARY
- PRE-SUBTITLE D AREA
- MW-7 (660.72) — EXISTING GROUNDWATER MONITORING WELL (TO REMAIN) WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-9 (660.61) — EXISTING GROUNDWATER MONITORING WELL (TO BE REMOVED) WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-34 (PWCG-4) (673.58) — PROPOSED GROUNDWATER MONITORING WELL (TO BE CONVERTED FROM EXISTING PIEZOMETER) WITH GROUNDWATER ELEVATION POSTED IN FT-MSL
- MW-34 — PROPOSED GROUNDWATER MONITORING WELL (TO BE INSTALLED)
- 670 — UPPERMOST AQUIFER GROUNDWATER POTENTIOMETRIC SURFACE ELEVATION CONTOUR IN FT-MSL
- EXISTING POINT OF COMPLIANCE
- PROPOSED POINT OF COMPLIANCE

NOTES:

1. EXISTING CONTOURS AND ELEVATIONS PROVIDED BY FIRMATEK FROM AERIAL PHOTOGRAPHY FLOWN ON 01-08-2021. THE GRID SYSTEM IS TIED TO THE TEXAS STATE PLANE COORDINATE SYSTEM NORTH CENTRAL ZONE NAD 1983.
2. EXISTING MONITORING WELL AND PIEZOMETER LOCATION COORDINATES OBTAINED FROM AS-BUILT SURVEYS PERFORMED BY WEAVER CONSULTANTS GROUP IN 2020 AND 2021.
3. GROUNDWATER ELEVATIONS GAUGED BY WCG ON SEPTEMBER 15, 2021 AND POSTED IN FT-MSL BY EACH MONITORING WELL AND PIEZOMETER LOCATION.
4. MONITORING WELLS MW-3B, MW-17, AND MW-20 ARE SCREENED IN UPPER SAND UNIT SEDIMENTS AND HAVE NOT BEEN CONTOURED.
5. PROPOSED MONITORING WELLS WILL BE INSTALLED, OR CONVERTED FROM EXISTING PIEZOMETERS, AS LANDFILL IS DEVELOPED IN ACCORDANCE WITH SECTION 2.0, FIGURE IIIH-A-2, AND FIGURE IIIH-A-3 OF THE FACILITY'S GWSAP.
6. PROPOSED MONITORING WELL MW-44 PROJECTED AS BACKGROUND WELL, BUT MAY BE CONVERTED TO POC WELL IF THE HYDRAULIC GRADIENT INDICATE THE WELL TO BE DOWNGRADIENT OF THE LANDFILL UNIT FOLLOWING INSTALLATION.

0:\0771\368\EXPANSION 2021\PART IIH\IIIH\CLEAN\IIIH-A-1-GW SYSTEM LAYOUT.dwg, rarrington, 1:2

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DRAWN BY: JDW
DESIGN BY: AKE
REVIEWED BY: NT

Weaver Consultants Group
TBPE REGISTRATION NO. F-3727

PREPARED FOR
TEXAS REGIONAL LANDFILL COMPANY, LP

REVISIONS

NO.	DATE	DESCRIPTION
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MAJOR PERMIT AMENDMENT GROUNDWATER MONITORING SYSTEM LAYOUT

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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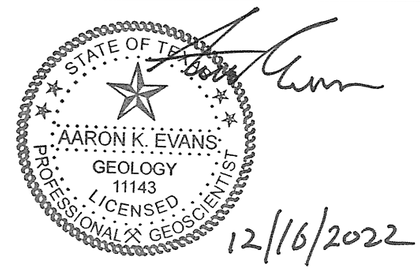
FIGURE IIIH-A-1

MONITORING WELL NAME	BACKGROUND (BG) OR POINT OF COMPLAINCE (POC) WELL?	INSTALL DATE	NAD 83 STATE PLANE COORDINATES		TOP OF CASING ELEVATION	GROUND ELEVATION	MONITORING WELL CONSTRUCTION DEPTHS				MONITORING WELL CONSTRUCTION ELEVATIONS				GROUNDWATER ELEVATION[4]
			NORTHING	EASTING			TOP OF FILTER PACK	TOP OF SCREEN	BOTTOM OF SCREEN	BOTTOM OF FILTER PACK	TOP OF FILTER PACK	TOP OF SCREEN	BOTTOM OF SCREEN	BOTTOM OF FILTER PACK	
EXISTING MONITORING WELLS - TO REMAIN IN SYSTEM															
MW-3B[5]	POC	Oct-90	6816304.53	2369610.69	671.04	670.0	27.6	29.6	39.6	39.9	642.4	640.4	630.4	630.1	640.14
MW-15	POC	Dec-93	6814727.75	2370465.60	676.80	674.4	60.0	63.0	68.0	69.0	614.4	611.4	606.4	605.4	642.86
MW-17	BG	May-95	6812392.27	2367830.51	729.55	727.6	16.5	17.7	22.7	23.5	711.1	709.9	704.9	704.1	711.54
MW-20	POC	May-95	6815639.26	2368219.11	660.96	659.1	11.8	13.5	18.5	19.0	647.3	645.6	640.6	640.1	646.82
MW-21	POC	May-95	6815645.65	2368231.68	660.84	659.1	27.3	33.8	43.8	45.0	631.8	625.3	615.3	614.1	646.18
MW-26[5]	POC	May-95	6816325.71	2369640.88	663.95	661.4	36.0	39.5	49.5	50.0	625.4	621.9	611.9	611.4	639.44
MW-27	POC	May-95	6815204.53	2370131.83	688.64	686.7	62.5	70.2	80.2	83.0	624.2	616.5	606.5	603.7	643.66
MW-28	POC	Oct-09	6815911.12	2368678.84	661.55	658.6	22.0	25.0	35.0	35.0	636.6	633.6	623.6	623.6	641.42
MW-29	POC	Oct-09	6816196.93	2369170.59	662.04	658.7	23.5	26.5	36.5	36.5	635.2	632.2	622.2	622.2	639.65
MW-30	POC	Oct-09	6816139.27	2369958.22	665.53	663.1	30.0	32.0	42.0	42.0	633.1	631.1	621.1	621.1	639.82
MW-31	POC	Oct-09	6815590.54	2370014.49	690.95	688.1	53.0	55.0	65.0	65.0	635.1	633.1	623.1	623.1	645.50
EXISTING MONITORING WELLS - TO BE REMOVED FROM SYSTEM															
MW-7	POC	Dec-93	6812923.65	2368851.92	710.96	709.1	45.0	58.0	68.0	69.0	664.1	651.1	641.1	640.1	660.72
MW-9	POC	Dec-92	6813054.66	2369368.04	702.20	700.3	33.0	49.0	74.0	74.0	667.3	651.3	626.3	626.3	660.61
MW-13[5]	POC	Dec-92	6814103.66	2369908.98	691.84	688.9	42.1	44.1	54.1	54.1	646.8	644.8	634.8	634.8	653.71
MW-18	BG	May-95	6813938.76	2367556.26	688.85	686.8	21.0	23.5	33.5	34.0	665.8	663.3	653.3	652.8	674.01
MW-19	POC	May-95	6815283.03	2367805.84	673.17	670.8	29.5	32.2	42.2	43.5	641.3	638.6	628.6	627.3	651.34
MW-32	POC	Oct-09	6814466.96	2370203.86	698.03	695.1	58.0	60.0	70.0	70.0	637.1	635.1	625.1	625.1	653.25
MW-33[5]	POC	Sep-09	6813628.83	2369587.47	705.73	702.0	61.6	63.6	73.6	73.6	640.4	638.4	628.4	628.4	658.32
PROPOSED MONITORING WELLS - TO BE ADDED TO SYSTEM															
MW-34 (PWCG-4)[6]	BG	Jul-21	6813684.57	2367265.44	704.65	704.6	33.0	35.4	45.4	50.0	671.6	669.3	659.3	654.6	673.60
MW-35 (PWCG-3)[6]	POC	Aug-21	6814236.20	2367438.65	692.71	689.6	28.0	30.9	40.9	50.0	661.6	658.7	648.7	639.6	669.90
MW-36[7]	POC	TBD	6814790.87	2367605.97	697.00	694.0	35.0	37.0	47.0	48.0	659.0	657.0	647.0	646.0	663.81
MW-37 (PWCG-1)[6]	POC	Aug-21	6815354.23	2367733.98	676.85	673.8	28.0	30.3	40.3	42.0	645.8	643.5	633.5	631.8	651.40
MW-38 (PWCG-9)[6]	POC	May-21	6814149.29	2370537.73	699.98	697.1	52.0	56.4	66.4	70.0	645.1	640.7	630.7	627.1	643.30
MW-39[7]	POC	TBD	6814727.75	2370465.60	702.00	705.0	48.0	51.0	66.0	67.0	657.0	654.0	639.0	638.0	652.52
MW-40[7]	POC	TBD	6813273.49	2369897.49	707.00	710.0	58.0	61.0	76.0	77.0	652.0	649.0	634.0	633.0	657.10
MW-41 (PWCG-12)[6]	POC	May-21	6812843.77	2369563.48	708.29	705.1	59.0	64.2	79.2	81.0	646.1	640.9	625.9	624.1	658.40
MW-42[7]	POC	TBD	6812890.50	2368980.40	709.00	711.0	45.0	55.0	70.0	71.0	666.0	656.0	641.0	640.0	660.70
MW-43[7]	POC	TBD	6812646.58	2368453.79	717.00	714.0	53.0	58.0	73.0	74.0	661.0	656.0	641.0	640.0	662.00
MW-44[7]	TBD[9]	TBD	6812360.39	2367938.64	739.00	736.0	75.0	80.0	95.0	96.0	661.0	656.0	641.0	640.0	670.00

NOTES:

1. ALL ELEVATIONS LISTED IN FEET ABOVE MEAN SEA LEVEL (FT-MSL); ALL DEPTHS LISTED IN FEET BELOW GROUND SURFACE (FT-BGS).
2. EXISTING MONITORING WELL COORDINATES, TOP OF CASING ELEVATIONS, AND GROUND ELEVATIONS OBTAINED FROM ASBUILT SURVEY CONDUCTED BY WEAVER CONSULTANTS GROUP IN JANUARY 2020.
3. MONITORING WELL COMPLETION DETAILS FOR EXISTING WELLS AND PROPOSED PIEZOMETER TO WELL CONVERSIONS OBTAINED FROM MONITOR WELL DATA SHEETS AND/OR LITHOLOGIC LOGS AND REFLECT ASBUILT CONDITION.
4. GROUNDWATER ELEVATIONS GAUGED BY WEAVER CONSULTANTS GROUP IN SEPTEMBER 2021.
5. EXISTING MONITORING WELLS MW-3B, MW-13, MW-26, AND MW-33 HAVE BEEN RAISED SINCE INITIAL INSTALLATION; LISTED INFORMATION REFLECTS ASBUILT CONDITION AS SURVEYED IN JANUARY 2020.
6. DETAILS FOR MONITORING WELLS PROPOSED FOR CONVERSION FROM EXISTING PIEZOMETERS OBTAINED FROM ASBUILT SURVEY CONDUCTED BY WCG IN SEPTEMBER 2021 WITH FORMER PIEZOMETER NAME LISTED IN PARENTHESIS.
7. DETAILS FOR PROPOSED FUTURE MONITORING WELL INSTALALTIONS ESTIMATED FROM EXISTING SUBSURFACE INVESTIGATION DATA; ACTUAL DETAILS TO BE DETERMINED AT TIME OF INSTALLATION BASED ON SUBSURFACE CONDITIONS ENCOUNTERED.
8. TBD = TO BE DETERMINED.
9. FUTURE MONITORING WELL MW-44 PROJECTED AS BACKGROUND WELL; BUT MAY BE CONVERTED TO POC WELL IF THE HYDRAULIC GRADIENT INDICATE THE WELL TO BE DOWNGRADIENT OF THE LANDFILL UNIT FOLLOWING INSTALLATION.



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TEXAS REGIONAL LANDFILL COMPANY, LP

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MAJOR PERMIT AMENDMENT GROUNDWATER MONITORING WELL DETAILS

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS

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FIGURE IIIH-A-2

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O:\0771\368\EXPANSION 2021\PART III\IIIH\CLEAN\IIIH-A-2-WELL DETAILS.dwg, rarrington, 1:2

GROUNDWATER MONITORING SYSTEM CERTIFICATION

General Site Information

Site: Turkey Creek Landfill

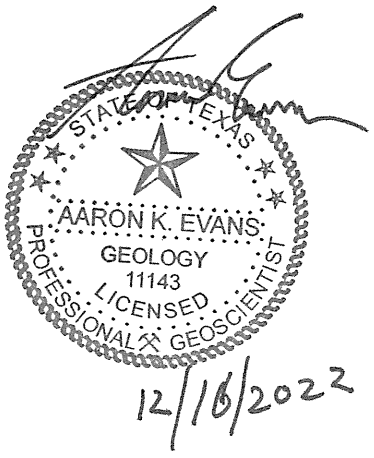
Site Location: Johnson County

MSW Permit No.: 1417D

Qualified Groundwater Scientist Statement

I, Aaron K. Evans, am a registered professional geoscientist in the State of Texas and a qualified groundwater scientist as defined in Title 30 TAC §330.3(120). I have reviewed the groundwater monitoring system and supporting details contained herein. In my professional opinion, the groundwater monitoring system design and construction details are in compliance with the groundwater monitoring requirements specified in Title 30 TAC §§330.401, 330.403, 330.405, 330.407, 330.409, 330.419, and 330.421. This system has been designed for the Turkey Creek Landfill. The only warranty made by me in connection with this document is that I have used that degree of care and skill ordinarily exercised under similar conditions by reputable members of my profession, practicing in the same or similar locality. No other warranty, expressed or implied, is intended.

Firm/Address: Weaver Consultants Group, LLC
6420 Southwest Boulevard, Suite 206
Fort Worth, Texas 76109



Signature: _____
Aaron K. Evans, P.G., Texas License No. 11143

Date: 12/16/2022

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

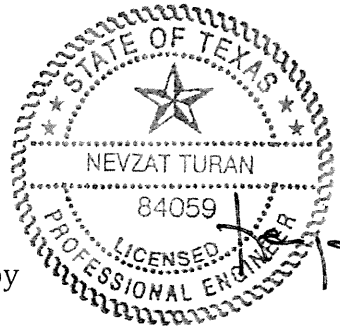
VOLUME 5 OF 6

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



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WCG Project No. 0771-368-11-123

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TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION
VOLUME 5 OF 6

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Appendix III I – Landfill Gas Management Plan
Appendix IIIJ – Closure Plan
Appendix IIIK – Postclosure Care Plan
Appendix IIIL – Closure and Postclosure Care Cost Estimates



12/16/2022

TURKEY CREEK LANDFILL
JOHNSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW-1417D

MAJOR PERMIT AMENDMENT APPLICATION

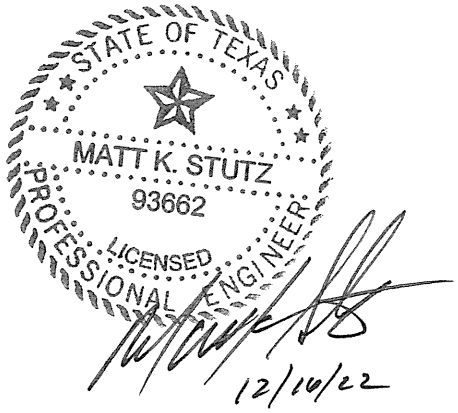
PART III – SITE DEVELOPMENT PLAN
APPENDIX III I
LANDFILL GAS MANAGEMENT PLAN

Prepared for

Texas Regional Landfill Company, LP

February 2022

Revised November 2022



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6420 Southwest Boulevard, Suite 206
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817-735-9770

WCG Project No. 0771-368-11-123

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The LFG monitoring (postclosure care period) program will continue for a period of 30 years after final closure of the facility or until the owner or operator receives written authorization from TCEQ to revise or discontinue the program. The request to revise or discontinue LFG monitoring program will be based on a demonstration along with collected data by the owner or operator that there is no potential for gas migration along the property boundary or into on-site structures.

3 MONITORING

3.1 Perimeter Monitoring

3.1.1 Existing Perimeter Monitoring Network

The site currently has thirteen permanent existing LFG monitoring probes and seven utility trench vents to monitor the concentration of methane gas in accordance with Title 30 TAC §330.371(a)(2). The locations of the existing perimeter monitoring probes/vents are shown on Figure III I-A-1 in Appendix III I-A. The boring logs for the existing LFG monitoring probes are included in Appendix III I-C.

Currently, there are no LFG monitoring probes installed along the northern perimeter of the permit boundary due to the presence of Turkey Creek, which act as a natural barrier to any potential LFG migration in this area. However, a utility trench vent has been installed to serve the gas pipeline along the northern permit boundary shown on Figure III I-A-1 in Appendix III I-A. Given that there are no changes to the permit boundary or the waste placement along the northern boundary and Turkey Creek runs along the vicinity which acts as a natural barrier for gas migration, the northern trench vent will continue to be monitored concurrent with other perimeter probes/vents monitoring events along the northern permit boundary. In addition, the post-closure land use will not interfere with the gas monitoring and control system.

As a result of the proposed landfill expansion as listed in Table III I-1, 9 of the existing LFG monitoring probes will be abandoned and re-drilled, 4 new probes will be added, and 4 of the existing LFG monitoring probes will remain. At landfill completion, the monitoring network will consist of 17 LFG monitoring probes as shown on Figure III I-A-1 in Appendix III I-A. The existing probes will be abandoned and re-drilled to allow for future filling and site operations. The abandonment will include removing the surface completion material, attempting to pull the probe casing materials, and grouting the borehole with bentonite grout from the total depth to surface. The probes will be abandoned and plugged in accordance with applicable rules in Title 16 TAC Chapter 76.

3.1.2 Proposed Landfill Gas Monitoring Network

As part of the proposed landfill expansion, 9 existing probes will be abandoned and 13 new probes will be installed as the site develops. The proposed perimeter landfill gas monitoring network will consist of seventeen (17) LFG monitoring probes. The 6 new probes along the western side (GMP-1A, GMP-2A, GMP-3A, GMP-4A, GMP-5B, and GMP-14) will be installed prior to the development of Sectors 13 and/or 14 and remaining 7 new probes will be installed within 12 months following the issuance of the permit (MSW-1417D) by TCEQ. The proposed probes will be installed in accordance with applicable rules in Title 16 TAC Chapter 76.

The location of the proposed new probes, the existing probes that will be abandoned, and the existing probes that will be remain in-place are shown on Figure III I-A-1 in Appendix III I-A. The proposed probe is designed to be single tube probe and will be installed similar to the detail shown on Figure III I-A-2 in Appendix III I-A. The depth of the new probe will be dependent on the field conditions at the time of installation, however at a minimum; the depth of the probe will extend down to the lowest bottom of waste placement elevation within 1,000 feet of the proposed probe location. Data regarding the new probes is summarized in Table III I-2 below.

Table III I-2
Proposed LFG Monitoring Probe Data[1]

Probe ID	Probe Ground Surface Elevation[2] (ft msl)	Lowest Bottom of Waste within 1,000 ft[3] (ft msl)	Proposed Probe Bottom Elevation (ft msl)	Proposed Boring Depth (ft bgs)
GMP-1A	693	656	654	39
GMP-2A	673	653	651	22
GMP-3A	689	656	654	35
GMP-4A	704	665	663	41
GMP-5B	711	667	665	46
GMP-7B	708	672	670	38
GMP-8A	705	670	668	37
GMP-9B	710	662	660	50
GMP-10B	692	655	653	39
GMP-14	700	665	663	37
GMP-15	730	674	672	58
GMP-16	712	672	670	42
GMP-17	702	659	657	45

[1] The data given is approximate. Actual probe ground elevation, bottom elevation, and depth will be determined prior to and/or at the time of installation.
[2] Probe ground surface elevation based on aerial topographic survey flown on January 8, 2021.
[3] Lowest bottom of waste elevation within 1,000 feet of the proposed probe based on Drawing I/IIA.9 – Excavation/Overliner Plan included in Parts I/II, Appendix A.

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JOHNSON COUNTY, TEXAS
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MAJOR PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIJ
CLOSURE PLAN

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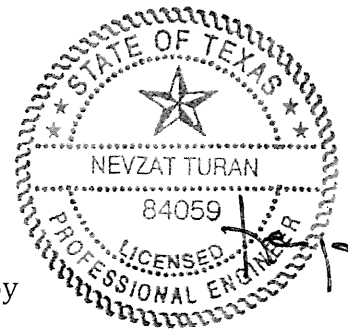

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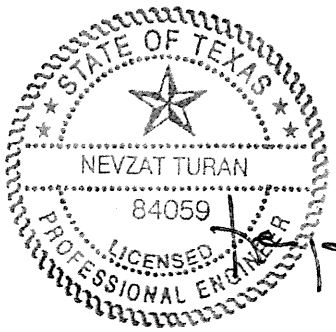

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2 FINAL COVER SYSTEM

2.1 Introduction

The final cover system for the Turkey Creek Landfill has been developed to incorporate the requirements of Title 30 TAC §330.457(f)(4). The rules state that the owner or operator of an MSW landfill unit shall complete closure activities for the unit in accordance with the approved closure plan within 180 days following the initiation of closure activities (closure activities for MSW landfill units shall begin no later than 30 days after the date on which the unit receives the known final receipt of wastes, or, if the unit has remaining capacity and there is a reasonable likelihood that the unit will receive additional wastes, no later than one year after the most receipt of wastes). Such a system will include installation of a multi-layer cover system and a storm water runoff control system. The storm water runoff controls are addressed in Appendix IIIF – Surface Water Drainage Plan. The surface drainage and erosion control measures include in Appendix IIIF are applicable to all final cover options. The final cover system design is discussed below. Final cover system design drawings are included in Appendix IIIA-A.

2.2 Cover System Design

Final cover for MSW (only) areas, including areas with both pre-Subtitle D or Subtitle D bottom liners will be constructed consistent with the requirements of Title 30 TAC §330.457(a)(1) or (d), as presented in Table IIIJ-1 below. Pre-Subtitle D and Subtitle D MSW disposal areas may be closed with a Water Balance (WB) cover consistent with the Alternative Final Cover requirements of 30 TAC §330.457(d) and TCEQ Guidance for Requesting a Water Balance (WB) Alternative Final Cover for a Municipal Solid Waste Landfill, March 2017 (RG-494), as demonstrated in Appendices IIIJ-A and IIIJ-B of this appendix and presented in Table IIIJ-1. Appendix IIIJ-B includes a demonstration of equivalency of the proposed WB Final Cover Daily Option 2 (as labeled in R6-494), and the cover system described in Title 30 TAC §330.457(a)(1). Final cover for Class 1 areas will be constructed consistent with the requirements of Title 30 TAC 330.457(b), as presented in Table IIIJ-1 of this appendix.

Both standard Subtitle D and alternative final cover systems will be available for the closure of the MSW only portions of the site (i.e., alternative WB final cover system is not applicable to Class 1 areas). The final cover system will provide a low maintenance

cover, protect against erosion, reduce rainfall percolation through the cover system and subsequently minimize leachate generation within the landfill. As depicted on Figure IIIJ-1 (and Drawing A.3 – Landfill Completion Plan in Appendix IIIA-A), a maximum slope of 6 percent is provided for the top slopes. Typical sideslopes 3.5H:1V for the MSW only area and 4H:1V for the Class 1 area are provided to minimize erosion and facilitate drainage of the landfill.

2.2.1 Final Cover System Options

The final cover system options that are applicable for both composite liner (Class 1 and MSW areas) and overliner areas, as well as pre-Subtitle D areas that currently do not have final cover, are shown in Table IIIJ-1 and as depicted in Figure IIIJ-2. To date, no final cover has been placed at the site.

- Engineering plans will be developed to address site closure at the time of discontinued waste filling.
- The final waste received will be placed and properly compacted.
- Excavations will be filled with suitable material, and the site will be graded to promote runoff and prevent ponding.
- The final cover system will be constructed according to specifications.
- The top of the landfill will be regraded and reshaped as needed to provide the proper slope for positive drainage.
- As noted above (first bullet), a revised final closure plan will be developed and submitted to the TCEQ for approval.
- Following application of final cover, the site will be vegetated with appropriate grasses to minimize erosion. The established grasses will provide a minimum of 95 percent coverage of the final cover system.
- A surface water management system will be constructed to minimize erosion.
- A closure certification will be prepared by an independent licensed professional engineer and submitted to TCEQ for approval.
- All proper notices and documentation will be filed with the appropriate agencies.

3.2.1 Estimate of Largest Active Disposal Area

Consistent with Title 30 TAC §330.503(a), the largest area that could be open within the next year is shown on Figure IIIL-1 in Appendix IIIL. Consistent with this rule and TCEQ guidelines for financial assurance to complete closure and postclosure activities, financial assurance will be posted for the current active area as discussed in Appendix IIIL – Cost Estimate for Closure and Postclosure Care. As additional liner areas developed, Appendix IIIL will be updated (closure plan does not need to be updated) per §305.70(j) to ensure continued compliance with financial assurance requirements. The entire 219.6-acre site will also need to be administratively closed.

Supporting calculations are presented in Appendix IIIL – Cost Estimate for Closure and Postclosure Care.

3.2.2 Estimate of Maximum Inventory of Waste Ever On Site

The estimate of maximum inventory of waste (defined as waste and daily cover) ever on site over the active life of the facility is approximately 37.7 million cubic yards. The site life calculations (Appendix IIIN – Site Life Calculations) show that

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PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIJ-A
WATER BALANCE FINAL COVER DESIGN – OPTION 1

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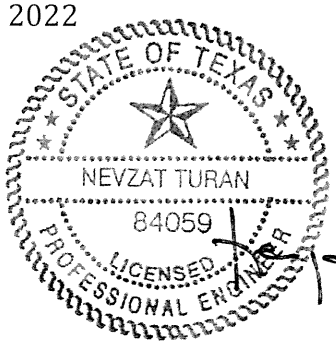

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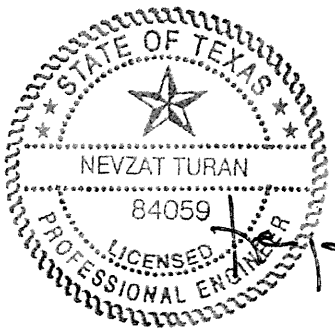

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1 WB FINAL COVER DESIGN – OPTION 1

This option has been developed based on Section 4.1 Option 1 – Statewide Design Table included in the TCEQ Guidance for Requesting a Water Balance (WB) Alternative Final Cover for a Municipal Solid Waste Landfill, March 2017 (RG-494). Any changes related to Option 1 in the referenced guidance document will be adapted to this design per §305.70(j). A typical detail describing both Option 1 and Option 1 is shown on Figure IIIJ-A-1.

Based on the TCEQ Guidance document, the site is located in the Geoclimatic Region 7-Dallas which allows for a 3 ft. 10 inches thick minimum storage layer thickness that will be overlain by a 6-inch thick erosion layer. The following final cover description is based on the TCEQ Guidance document:

- Final cover storage layer thickness = 3 feet 10 inches
- Erosion layer thickness = 6 inches
- Hydraulic conductivity of final cover storage layer at construction = 1×10^{-8} cm/s
- Hydraulic conductivity of final cover storage layer at service = 1×10^{-6} cm/s

Vegetation will be established to cover a minimum of 95 percent. The erosion layer will be capable of sustaining vegetative growth. The final cover will be constructed in accordance with Appendix IIIE-B – Water Balance Final Cover System which includes the provision of Section 9 of the TCEQ Guidance document.

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PART III – SITE DEVELOPMENT PLAN
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WATER BALANCE FINAL COVER DESIGN- OPTION 2

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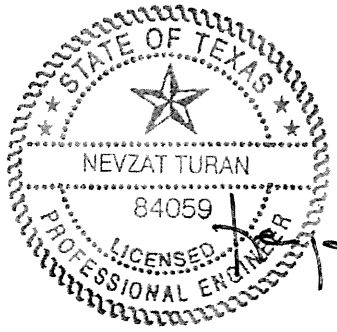

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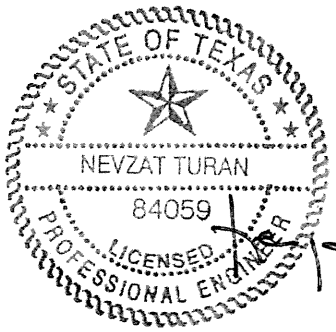

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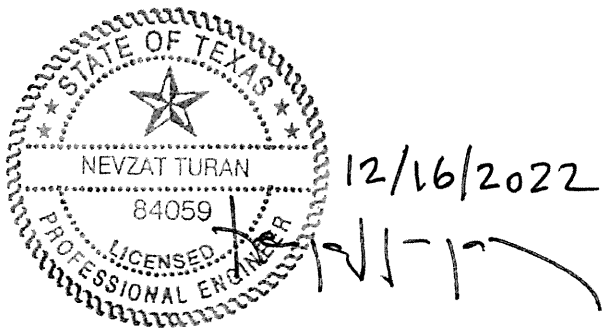

- Suction Head. UNSAT-H utilizes the initial suction head of the soil layers for initial hydraulic conditions. An initial matric suction of 15,000 cm has been used. The impact of initial suction head for each year on the multi-year program is insignificant to represent low water content. The values of initial suction head for each year were adjusted by the program for subsequent years based on results from previous years when the program is run for multiple years (i.e., program uses the soil suction head estimated for the ending day of the year as the initial suction head for the next year automatically).

The UNSAT-H Version 3.01 model allows for the ability to consider hysteresis in the water retention function. The tolerance limit on entrapped air content below which volumetric air content is considered zero was $1x10^{-10}$ cm. The tolerance limit on head changes below which a change in head does not trigger a path reversal was also $1x10^{-10}$ cm. The maximum head value for all materials above which hysteresis does not occur was considered 1000 cm. In this particular simulation, there is a maximum of 7 hysteretic paths with a maximum of 0.25 entrapped air content. The factor relating the imbibition α_i to the desorption of α_d is 2.0. The soil-specific maximum suction head above which hysteresis is not operable is 1000 cm.

3.4 Vegetation

The establishment of vegetation is a key component of the WB cover. The critical parameters are the percent ground cover and root penetration. For modeling purposed, ~~A~~ a percent ground cover of 90 percent was used for the WB soil final cover. This is a very conservative assumption given that the WB cover will support a denser ground cover and because the final cover will be designed to achieve 95 percent ground coverage. Table 3-3 provides a summary of how the vegetation performance specification was developed to verify that the WB cover will meet or exceed the selected input value in the UNSAT-H model. In addition, Table 3-3 provides a summary of how characteristics of the seed mix used for the vegetation establishment will meet the performance specification included in Appendix IIIE-B-1-B.

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PART III – SITE DEVELOPMENT PLAN
APPENDIX IIIL
COST ESTIMATE FOR CLOSURE AND POSTCLOSURE CARE

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3 POSTCLOSURE CARE COST ESTIMATE

The postclosure care period has been established by TCEQ regulations to be 30 years. During this period, continuous maintenance must be ongoing to assure the integrity and effectiveness of the final cover system, monitoring systems, leachate collection system, drainage system, and landfill gas system. A summary of postclosure costs is presented in Table 2. The costs will be adjusted annually as indicated in Section 4.

Engineering postclosure estimates include the cost of annual site inspections, corrective plans and specifications, and site compliance monitoring. Site inspections will be performed annually and will include identification of areas experiencing settlement or subsidence, identification of erosion or other drainage-related problems, and inspection of the leachate collection system, gas control and monitoring system, and the groundwater monitoring system. Correctional plans and specifications include the costs for an engineering consultant to prepare construction plans and specifications to correct problems identified during the site inspections. Gas monitoring and groundwater sampling and analysis will be performed as outlined in the postclosure plan.

Postclosure construction/maintenance estimates include the costs to correct problems identified during the engineering site inspections and as specified by the engineer's correctional plans and specifications. These costs will also include any ongoing site maintenance that is needed throughout the postclosure period. These costs include cover and drainage maintenance and annual seeding and mowing costs. The leachate disposal costs include trucking, treatment and disposal costs from areas contributing to leachate generation (approximately 122.6 acres).

In accordance with Title 30 TAC §330.507(b), continuous financial assurance coverage for post-closure care shall be provided until the facility is released in writing by the executive director from the post-closure care period in accordance with the requirements of the post-closure care plan.

3.1 Engineering Costs

As shown on Table 2, engineering postclosure estimates include the cost of annual site inspections, corrective plans and specifications, and site compliance monitoring. The estimates are based on the largest area with waste in-place which is 138.4 acres. Site inspections will be performed annually and will include identification of areas experiencing settlement or subsidence, identification of erosion or other drainage-related problems, and inspection of the leachate collection system, gas control and monitoring system, and the groundwater monitoring system. Correctional plans and specifications include the costs for an engineering consultant to prepare construction plans and specifications to correct problems identified

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MAJOR PERMIT AMENDMENT APPLICATION

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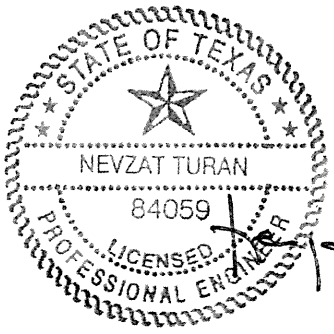

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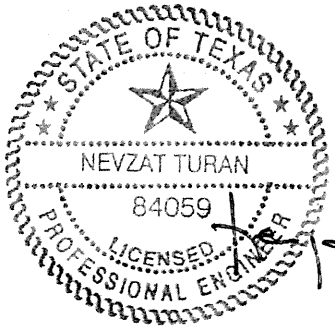

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TURKEY CREEK LANDFILL
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PART III – SITE DEVELOPMENT PLAN
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volume of incoming waste is projected to be approximately 3,877 tons per day (1,108,822 tons per year based on a 286-day operating schedule).

Site life calculations based on the Turkey Creek Landfill projections are shown on pages IIIN-3 and IIIN-4.

In the event the annual waste acceptance rate exceeds the maximum annual rate set forth in the application and the exceedance is not associated with a temporary occurrence, a permit modification will be submitted to the TCEQ consistent with Title 30 TAC §330.125(h), and include the revised estimated waste acceptance rate, and any needed changes in the SOP to manage the increased waste acceptance rate and protect public health and the environment. Note that this requirement is not intended to make the estimated waste acceptance rate a limiting factor of the landfill permit or operations.

1.2 Population Equivalent

Using the average waste inflow rate of 1,108,822 tons per year discussed in Section 1.1 (an average daily volume of 3,877 tons per day based on a 286-day operating schedule) and assuming 5 pounds of waste is generated per capita per day, the population equivalent is:

$$\frac{(1{,}108{,}822 \text{ tons per year}) \times (2{,}000 \text{ pounds/ton})}{(5 \text{ pounds/person/day}) \times (365 \text{ days/year})} = 1{,}215{,}147 \text{ persons}$$

1.3 Landfill Capacity

The estimated total capacity of waste (defined as waste and daily cover) ever on site over the active life of the facility is approximately 37.7 million cubic yards. The total volume available for solid waste and daily cover after January 8, 2021 (date of topographic information) is estimated to be 20,950,000 cubic yards. This airspace estimate includes the remaining available volume in the existing permitted area. The current volume of waste (defined as waste and daily cover) in-place as of January 8, 2021, is approximately 16.75 million cubic yards.

1.4 Site Life Calculations

The site life calculations are presented on pages IIIN-3 and IIIN-4. In summary, the site life is projected to be approximately 12.9 years, which would result in the site's closure during the year 2033.

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PART IV – SITE OPERATING PLAN

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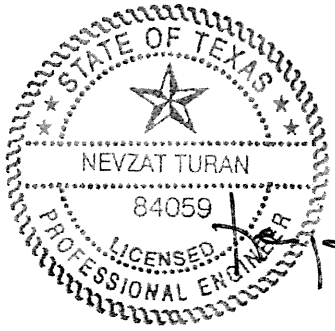

12/16/2022

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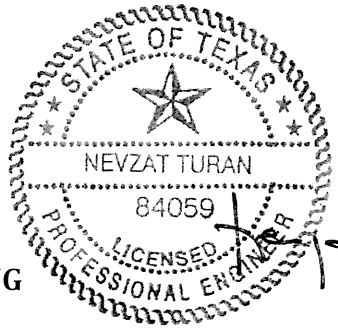

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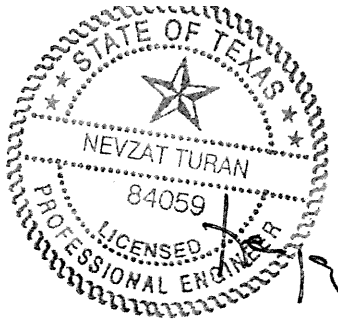

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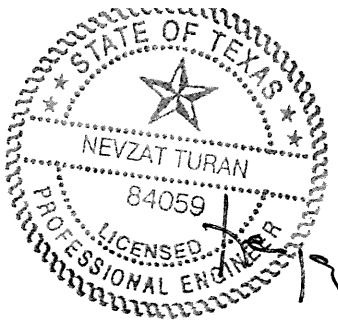

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2.2 Training

The Landfill Manager and the Turkey Creek Landfill management team will train the Equipment Operators, Scale Operators, Laborers, and Spotters in the contents of this SOP, as described in Table 2.1. Site personnel will receive training in the applicable sections of this SOP within 6 months after the date of their employment or assignment to the facility (or to a new position at the facility) and must take part in an annual review of the initial SOP training.

Records of training procedures, dates, topics covered, and personnel attending will be placed in the Site Operating Record. Records will include a written description of the type and amount of both introductory and continuing training that is provided to each employee. Personnel may also receive training at TCEQ-sponsored or other appropriate training courses, as deemed appropriate by the Landfill Manager.

In addition to the above, training also will be provided related to Class 1 waste as set forth in Title 30 TAC §335.586. Training will be targeted to personnel specifically designated to participate in the handling, management and disposal of Class 1 waste. Topics of training will include (but not limited to (1) use, inspection and repair of facility emergency and monitoring equipment; (2) communications and alarm systems; (3) response to fires, explosions or groundwater contamination events; (3) contingency plan implementation; and (4) shutdown operations. Facility personnel designated for this training will receive initial training within 6 months of employment, and participate in an annual review of this information on an annual basis. Record of all personnel training will be maintained in the site operating record.

4 OPERATIONAL PROCEDURES

4.1 Access Control

Public access to the waste fill area is controlled by the entrance facility, which houses the Scale Operators, located in the southeast portion of the facility. The site entrance facilities are staffed during hours of operation. The Scale Operators control access and monitor all vehicles entering and exiting the site.

4.1.1 Site Security

Site security measures are designed to prevent unauthorized persons from entering the site, to protect the facility and its equipment from possible damage caused by trespassers, and to prevent disruption of facility operations caused by unauthorized site entry.

Unauthorized access to the site is minimized by controlling access with perimeter fencing, gated entrance, gated construction entrance, natural barriers (e.g., M.K.T. Railroad, Turkey Creek and its tributaries, and heavily-wooded vegetation), and a closed circuit television system that monitors the entrance and exit. The perimeter fence and gate will be inspected as indicated in Section 4.24. Repairs and maintenance will be performed as necessary. Refer to Section 4.24 of this SOP for site inspection and maintenance schedule.

In the event of a breach of the access controls (i.e., a portion of a fence is impacted in a way that it no longer prevents access to the site), the TCEQ Regional Office and any local pollution agency with jurisdiction that has requested to be notified will be notified within 24 hours of detection of the breach. The breached area will be temporarily repaired within 24 hours of detection and will be permanently repaired by the time specified to the TCEQ Regional Office when it was reported in the initial breach report. In this case, the TCEQ Regional Office will also be notified when the permanent repair is completed. If a permanent repair can be made within 8 hours of detection, no notification to the TCEQ Regional Office is required. Temporary repairs may consist of a barbed wire fence, a 3-foot-high earthen berm, equipment, a security guard posted in the area of the breach or other barriers.

Entry to the active portion of the site will be restricted to designated personnel, approved waste haulers, and properly identified persons whose entry is authorized by Turkey Creek Landfill management. Visitors will be allowed on the active area

The site boundary markers will be placed at each corner of the site and along each boundary line at intervals no greater than 300 feet apart. The buffer zone markers will be placed along each buffer zone boundary at all corners and between corners at intervals of 300 feet.

The easement and right-of-way markers will be placed along the centerline of an easement and along the boundary of right-of-way at each corner within the site and at the intersection of the site boundary. The easement and right-of-way markers will also be placed at intervals no greater than 300 feet along the centerline of the area. The current site coordinate based grid system will be used as shown on the Site Layout Plans. The grid system markers will be spaced no greater than 100 feet apart measured along perpendicular lines. Intermediate markers will be installed in the case where markers cannot be seen from opposite boundaries. The grid system markers will be maintained during the active life of the site. The SLER/GLER markers will be placed so that all areas for which a SLER/GLER has been submitted and approved the TCEQ are readily determinable. Such markers are to provide site workers immediate knowledge of the extent of approved disposal areas. These markers will be located so that they are not destroyed during operations until operations extend into the next SLER/GLER. The location of these markers will be tied into the landfill grid system. SLER/GLER markers will not be placed inside the evaluated areas.

A permanent benchmark has been established at the site in an area that is readily accessible and will not be used for disposal. The benchmark elevation has been surveyed from a known United Stated Coast and Geodetic Survey Benchmark. The benchmark is a bronze survey marker stamped with elevation and survey date and set in concrete.

Floodplain protection markers will be placed along the floodplain boundary at spacing not exceeding 300 feet in accordance with the requirements of this section.

4.8 Control of Waste Spilled on Route to the Site

The Landfill Manager or his designee will take steps to encourage that vehicles hauling waste to the working face or other unloading areas arrive on-site with a tarpaulin, net, or other means to properly secure the load (as discussed in Section 4.5). These steps are necessary to prevent the escape of any part of the load by blowing or spilling. A sign will be posted at the entrance indicating that improperly covered or contained vehicles shall be covered and/or are subject to a surcharge.

The Landfill Manager will be responsible for the cleanup of waste materials spilled along and within the right-of-way of all public access roads serving the site for a distance of two miles in either direction from the entrance to the site. For days that the landfill is open, cleanup for the spilled solid waste materials will be performed as described in Table 2-24. Laborers performing litter and spilled solid waste materials collection will be required to wear appropriate safety equipment. A log will be maintained to document the date and time the roads are checked.

4.18 Soil Management, Placement, and Compaction of Daily, Intermediate, and Final Cover

4.18.1 Soil Management

The earthen material that will be used for daily cover, intermediate cover, final cover, and other uses will be obtained from onsite and offsite soil borrow sources.

The earthen material will consist of soil that has not previously come in contact with waste and will be of sufficient volume to meet the fire protection requirements specified in Section 7.7. As this earthen material is used, it will be replenished and/or located as soon as practical but will at all times be maintained to meet the fire protection requirements specified in Section 7.7. Both the volume of earthen material required to be maintained within 1,000 feet of each working face and the volume of the earthen material to cover each working face with at least a 1 day application of 6 inches of daily cover will be documented on the Cover Application Log (refer to Section 4.18.5 and Section 7.7.4 for an example earthen material calculation).

4.18.2 Daily Cover

Daily cover of waste is used to control disease vectors, windblown waste, odors, fires, and scavenging and to promote runoff from the fill area. At least once every 24 hours, the exposed solid waste fill area(s) will be covered by (1) at least 6 inches of soil cover material that has not been previously mixed with garbage, rubbish, or other solid waste, or (2) an approved Alternate Daily Cover (ADC) material. An ADC Operating Plan (ADCOP) is included in Appendix IVB of this SOP. The plan addresses the following items.

- Description and thickness of the alternative cover material
- Effect of ADC on vectors, fires, odors, and windblown litter
- Application and operational methods to be utilized at the site when using the ADC
- Chemical composition of the material and the MSDS(s) for the ADC

ADC is used to cover waste in areas that will be filled again within a 24-hour period. The executive director may require testing of runoff from areas of ADC for compliance with TPDES discharge limits, or require the runoff from ADC areas be managed as contaminated water.

The remaining portion of this section details the procedures to be used if soil daily cover is utilized. To ensure that the soil daily cover soil will be adequate (i.e., minimize vectors, prevent contaminated stormwater runoff, prevent odors, etc.) the following procedures will be followed:

infiltration into the filled areas and to minimize contact with solid waste. Erosion of final or intermediate cover will be repaired within 5 days after the initial inspection by restoring the cover material, grading, compacting, and seeding unless the TCEQ Regional Office approves otherwise, based on the extent of the damage requiring more time to repair, or the repairs are delayed because of weather conditions. The date of detection of erosion and date of completion of repairs, including reasons for any delays, must be documented in the Cover Application Log (refer to Section 4.18.5). Such periodic inspections and restorations are required during the entire operational life and for the postclosure maintenance period. Refer to Section 4.24 of this SOP for a Site Inspection and Maintenance List.

The final cover system, including the erosion control structures (drainage swales and chutes) will be maintained during and after construction. During the active life of the site, the Landfill Manager or his designee will inspect the final cover system consistent with the schedule and requirements listed in Section 4.24 of this SOP (Site Inspection and Maintenance List). This includes the inspection of final cover following significant rainfall events as described in Section 4.24.

Postclosure care inspection procedures are outlined in the Postclosure Care Plan (Appendix IIIK).

4.18.5 Temporary Waiver

The executive director may grant a temporary waiver from the daily cover, ADC, and intermediate cover requirements if the operator demonstrates that there are extreme seasonal climatic conditions that make meeting such requirements impractical.

4.18.6 Cover Application Log

Throughout the landfill operation, a Cover Application Log will be maintained by the Landfill Manager or his designee and be readily available for inspection in accordance with Title 30 §330.165(h). For intermediate cover and daily cover, the log will specify the date cover (no exposed waste) was accomplished, the area covered (by use of the grid system), how it was placed, when it was completed, and the last area covered. For ADC, the Cover Application Log will include the application rate and total amount of ADC applied to the working face on days ADC is applied. For final cover, the log will show the final cover area, specify the area covered, the date cover was applied, the thickness applied that date, and reference the final cover certification report for each area. The signature of the Landfill Manager or his designee will certify that the work was accomplished as stated in the log. Repairs will be documented in the log. The date of detection of erosion, or other repair issues, the date of completion of repair (including reasons for any delays) will be included to document the repair.

concerning measurements and analyses performed at the site, will be retained in the Site Operating Record.

Additionally, the TCEQ Monthly Waste Receipt Summary Report will be prepared by the Landfill Manager or his designee and submitted to the TCEQ no later than the 25th day of the month following the month that waste was received. The executive director may set alternative schedules for recordkeeping and notification requirements. This report will be submitted consistent with TCEQ requirements. Reports will be on forms provided by the TCEQ.

A Quarterly Municipal Solid Waste Fee Report will be submitted to the TCEQ on a form provided by the TCEQ. In addition to a statement of the amount of Class 1 RACM received for processing or disposal, the report will contain other information requested on the form. The required quarterly report will be submitted to the TCEQ within the timeframe required by the TCEQ.

In the event that bags or containers that contain RACM rupture, they will be immediately contained by spraying the area with water to prevent the spread of RACM. Also, earthen dikes, berms or by other appropriate measures will be constructed to contain the spill. The Landfill Manager or his designee will be promptly notified of the spill and will coordinate the collection and disposal of the spilled RACM. The spilled RACM will be picked up mechanically or by employees wearing proper protective equipment and re-packaged for disposal.

Upon closure of the facility, a notation indicating that the site accepted RACM will be placed in the real property records of Johnson County. This notation will indicate where the RACM was disposed of on the property by showing its location on a site diagram. A copy of this documentation will be provided to the TCEQ.

4.20.6 Class 2 and Class 3 Non-Hazardous Industrial Waste

Class 2 and Class 3 non-hazardous industrial solid wastes will be accepted for disposal at the facility in accordance with the SWAP presented in Appendix IVC of this SOP and the acceptance of such wastes will not interfere with the operation of the Turkey Creek Landfill.

4.20.7 Class 1 Non-Hazardous Industrial Waste

The following sections describe the acceptance and management criteria for Class 1 waste received at the facility. In accordance with Title 30 TAC §330.173(f), authorization for the facility to accept Class 1 waste is subject to the facility operating in compliance with the MSW regulations and other specification conditions under the permit. Failure to operate the site in compliance with the conditions imposed by the executive director may result in revocation of the Class 1 waste authorization.

4.20.7.1 Class 1 Non-Hazardous Waste Disposal Locations and Quantity

Class 1 non-hazardous industrial waste, other than asbestos-containing waste, will be placed only in designated waste disposal sectors that meet the requirements of Title 30 TAC §330.331(e) (relating to Design Criteria for MSW Landfills that Accept Class 1 Waste). Industrial Solid Waste that is defined as a Class 1 only because of its asbestos content will be accepted and handled in accordance with the procedures listed in Section 4.20.5. The site will not accept Class 1 industrial solid waste in an amount in excess of 20 percent of the total amount of waste (not including Class 1 waste) accepted during the current or previous year (measured on a consistently applied weight or volume basis, unless a variance is authorized by the executive director).

4.20.7.2 Class 1 Waste Liner Design, Waste Placement, and Cover

Waste placement, daily cover placement, and intermediate cover placement for Class 1 waste will be accomplished consistent with the procedures for other wastes that are accepted at the landfill (refer to Section 4.18 of this SOP). The design of Class 1 waste areas is consistent with the requirements of Title 30 TAC §330.331(e), and is included in Part III, Appendix IIIC – Leachate and Contaminated Water Management Plan.

Each truck will stop at the scale house where directions to the appropriate working face will be provided. The Scale Attendant will direct waste haulers to follow the signs as they enter the facility. Access roadways will be clearly marked with portable signs directing Class 1 haulers to the Class 1 working face, and MSW haulers to the MSW working face. Spotters (or Equipment Operators) will verify waste cargo with haulers before unloading.

4.20.7.3 Manifesting of Class 1 Wastes

Shipments of Class 1 wastes must be accompanied by a waste manifest document. The waste manifest is to be completed by the generator and transporter and will accompany each waste load. Turkey Creek Landfill will verify pre-authorization for disposal and complete the destination section of each manifest and return one copy of the completed manifest to the driver. One copy of the completed waste manifest will also be returned to the waste generator within 30 days after receipt of the waste. Manifests are prepared in triplicate, and the remaining copy will be filed and maintained in the Site Operating Record for a period of not less than 3 years.

The Scale Operator, Landfill Manager or his designee, or the Special Waste Department will attempt to resolve any Class 1 waste discrepancies. If the discrepancy can be resolved, the waste may be accepted. If the discrepancy cannot be resolved, the waste shipment will be rejected and documented.

4.20.7.4 Random Inspection of Class 1 Waste Shipments

Shipments of Class 1 wastes are subject to the random waste inspections for identifying unauthorized wastes as described in Section 6.2 of this SOP. The Landfill Manager or his designee will notify the transporter and/or generator of the identification of any unauthorized waste. The transporter and/or generator will be required to take all necessary steps to determine the origin and to assure that in the future such wastes are either not collected or are taken to a facility approved to accept such waste. The TCEQ may also be contacted to provide the name and contact information of the transporter/generator and to report measures taken to resolve the arrival of unauthorized waste (i.e., returned for disposal at an approved facility). Instances of unauthorized waste presented by a transporter or generator may result in Turkey Creek Landfill refusing to accept waste from that transporter or generator.

4.20.7.5 Additional Class 1 Waste Verifications

The Class 1 waste delivered to the Turkey Creek Landfill for disposal will receive a visual inspection to observe the contents and nature of waste. Additional waste verifications may be performed, as determined by the Landfill Manager or his designee, or the Special Waste Department, and may include pH testing, water reactivity testing, and ignitability testing. Class 1 wastes, except excluded loads, are subject to random screening, as well as spot checking and testing as described in Section 6.2 of this SOP.

4.20.7.6 Class 1 Waste Recordkeeping and Reporting

All information and documents pertaining to Class 1 waste profiled for disposal and delivered to the landfill for disposal in the Class 1 cell including, but not limited to, all records concerning measurements and analyses performed at the site will be retained at the site in accordance with the provisions in Section 9 of this SOP, unless otherwise indicated.

Additionally, the TCEQ Monthly Waste Receipt Summary Report will be prepared by the Landfill Manager or his designee and submitted to the TCEQ no later than the 25th day of the month following the month that waste was received. The executive director may set alternative schedules for recordkeeping and notification requirements. This report will be submitted consistent with TCEQ requirements. Reports will be on forms provided by the TCEQ.

A Quarterly Municipal Solid Waste Fee Report will be submitted to the TCEQ on a form provided by the TCEQ. In addition to a statement of the amount of Class 1 waste received for processing or disposal, the report will contain other information requested on the form. The required quarterly report will be submitted to the TCEQ within the time frame required by the TCEQ.

4.20.7.7 Class 1 Waste-Related Inspection Requirements

Section 4.24 of this SOP presents a Site Inspection and Maintenance List with inspection items and frequencies that will be followed at the facility, including certain items which specifically pertain to Class 1 waste operations.

4.20.7.8 Class 1 Waste Contingency Plan

Introduction

This Class 1 waste contingency plan has been developed to minimize hazards to human health or the environment from fires, explosions, or any unplanned sudden or non-sudden release of Class 1 waste or constituents of such waste to air, soil, or surface water. The provisions of the plan must be carried out immediately whenever there is a fire, explosion, or release of waste or constituents of such waste that could threaten human health or the environment.

A copy of this Class 1 waste contingency plan and all revisions to the plan must be maintained at the facility and submitted to the local providers that may be called upon to provide emergency services (as identified subsequently in this plan).

This Class 1 waste contingency plan must be reviewed and updated, if necessary, whenever: (1) the facility permit affecting Class 1 waste operations is revised; (2) the plan fails in an emergency; (3) the facility changes in its Class 1 waste design, construction, operation, maintenance, or other circumstances in a way that materially increases the potential for fires, explosions, or releases of Class 1 waste or constituents of such waste, or changes the response necessary in an emergency; or (4) the list of emergency equipment materially changes.

Emergency Contacts

The Landfill Manager or his designee will maintain a list of names, addresses, and phone numbers (office and home) of persons qualified to act as Emergency Coordinator (as discussed subsequently in this plan), and this list must be kept up-to-date and at the facility. Where more than one person is listed as the Emergency Coordinator, one must be named as primary Emergency Coordinator and others must be listed in the order in which they will assume responsibility as alternates.

The facility is within the coverage area of the following emergency services providers:

- City of Alvarado Police and Fire Department
- Texas Health Resources Burleson (Hospital)
- Texas Department of Public Safety (Emergency Spill Response)

Emergency Equipment

Class 1 waste related emergencies at the facility could potentially involve spills or fires. Accordingly, the emergency equipment related to Class 1 waste and its location on-site is listed below.

Item	Location	Capabilities
Class A/B/C Fire Extinguishers	One per piece of heavy equipment involved in Class 1 waste operations (e.g., excavator, bulldozer).	Extinguish small combustion fires.
Site Two-Way Telecommunication Radios or Cellular Phones	One per site personnel assigned to Class 1 waste operations, including Landfill Manager or his designee.	Maintain contact among site personnel; inform personnel or emergency situations.

This list of emergency equipment must be kept up to date. Equipment required for emergency response (including monitoring, communications, fire and explosion response, groundwater contamination and other emergency mitigation efforts) will be inspected, maintained and replaced on a periodic basis as needed to maintain availability.

Evacuation Plan

In the event the facility needs to be evacuated, the following actions will be taken:

- The Emergency Coordinator (discussed subsequently in this contingency plan) will designate emergency response team leaders, who will notify all personnel at the facility to evacuate the site immediately.
- The scale house located in the southeastern portion of the site near the main entrance/exit will be the primary evacuation rally point for facility personnel to gather during the evacuation. The evacuation routes to reach this rally point are via the main site haul roads and perimeter roads.
- Emergency response team leaders will take a head count of facility personnel once they arrive at the designated rally point, and will each report back to the Emergency Coordinator of whether their personnel are accounted for.

Emergency Coordinator

The Landfill Manager or his designee will serve as the primary Emergency Coordinator, so that there is an Emergency Coordinator either on the facility premises or on call (i.e., available to respond to an emergency by reaching the facility within a short period of time) with the responsibility for coordinating all emergency response measures. The Emergency Coordinator will be thoroughly familiar with this Class 1 Waste Contingency Plan, operations and activities at the facility, the location of records within the facility, and the facility layout. In addition, this person has the authority to commit the resources needed to carry out this Class 1 Waste Contingency Plan.

Emergency Procedures

Whenever there is an imminent or actual emergency situation such as a release, fire, or explosion that could threaten human health or the environment, the Emergency Coordinator will immediately:

- Notify appropriate facility personnel in person or by phone (two-way site telecommunications).
- Assess the situation by identifying the character, exact source, amount, and areal extent of any released materials. The Emergency Coordinator may do this by observation or review of facility records or manifests, and, if necessary, by chemical analysis. This assessment will consider possible hazards to human health or the environment that may result from the release, fire, or explosion. This assessment must consider both direct and indirect effects of the release, fire, or explosion (e.g., the effects of any toxic, irritating, or asphyxiating gases that are generated, or the effects of any surface run-off from water or chemical agents used to control fire and heat-induced explosions).
- If help is needed, notify appropriate state or local agencies with designated response roles. If the Emergency Coordinator determines that the facility has had a release, fire, or explosion that could threaten human health or the environment outside the facility, the following applies:
    - If the Emergency Coordinator's assessment indicates that evacuation of local areas may be advisable, the Emergency Coordinator will immediately notify appropriate local authorities, and must be available to help appropriate officials decide whether local areas should be evacuated. This includes an immediate notification of the National Response Center (using their 24-hour toll free number 1-800-424-8802). The report must include:
        - name and telephone number of person making report
        - name and address of facility
        - time and type of incident (e.g., release, fire)
        - name and quantity of material(s) involved, to the extent known
        - the extent of injuries, if any
        - the possible hazards to human health, or the environment, outside the facility
- During an emergency, the Emergency Coordinator will take reasonable measures necessary to ensure that fires, explosions, and releases do not occur, recur, or spread to other waste at the facility. These measures must include, where applicable, stopping operations, collecting and containing released waste, and removing or isolating containers. Further details are presented in the bullets that follow.

- Should any accidental spill of Class 1 wastes occur at the facility, it will be immediately contained by earthen dikes, berms or by other appropriate measures. The Landfill Manager or his designee will be promptly notified of the spill and will coordinate the collection and disposal of the spilled material. The spilled wastes will be picked up mechanically or by employees wearing proper protective equipment and managed according to procedures for handling the special waste.
- For larger spills, or where there is potential for the waste to impact waters of the state, the Emergency Coordinator will assess the situation and determine the appropriate means to contain and collect the material. If spilled material threatens to impact storm water discharge from the site, the Landfill Manager or his designee will use booms or diversionary dikes, or excavate holes or pits as needed to contain the spilled material. Equipment typically available for spill response includes excavators, backhoes, dozers, pumps, and haul trucks. In the event of a spill that cannot be picked up using hand-held tools, this equipment will be used as needed to contain and collect spilled material. For larger spills of liquid wastes that cannot be adequately cleaned up with on-site equipment, a qualified emergency cleanup contractor or vacuum truck company will be contacted to assist with cleaning up the spill. Once the liquids are removed, a visual inspection of the spill area will be made, and soils observed to be potentially impacted will be over-excavated and disposed with the collected material as described below.
- Should an incident occur where hazardous wastes, radioactive waste, or other prohibited wastes are suspected or discovered, the waste will not be authorized for disposal but instead will be isolated until the material can be adequately identified to determine the proper disposition/remediation of the material and the appropriate handling procedures. During this identification process, the generator's representative will be contacted to determine the identity of the material, and the planned disposition/ remediation of the material. The proper disposition/remediation of the prohibited waste will be specific to the waste and will be implemented.
- Immediately after an emergency incident, the Emergency Coordinator will provide for treating, storing, or disposing of recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility. The owner or operator will classify all recovered waste, contaminated soil or surface water, or any other material that results from a release, fire, or explosion at the facility in accordance with TCEQ rules.
- The Emergency Coordinator will ensure that in the affected area(s) of the facility:
    - no waste that may be incompatible with the released material is treated, stored, or disposed of until cleanup procedures are completed; and
    - emergency equipment listed in this Contingency Plan is cleaned and fit for its intended use before operations are resumed.

4.21 Prevention of Discharge of Contaminated Water

The Landfill Manager will implement necessary steps to control and prevent the discharge of contaminated water from the facility. No discharge of contaminated water will occur without obtaining specific written authorization from the TCEQ prior to the discharge. All water contacting waste or contaminated soils will be treated as contaminated water. Runon and runoff for the 25-year, 24-hour storm event will be controlled following the procedures set forth in the Groundwater and Surface Water Protection Plan and the Leachate and Contaminated Water Management Plan. The landfill will be operated consistent with Title 30 TAC §330.15(h) regarding discharge of solid wastes or pollutants into waters of the United States.

4.22 Leachate and Contaminated Water Management Plan

Leachate and contaminated water will be controlled at the Turkey Creek Landfill as specified in the Leachate and Contaminated Water Management Plan. Consistent with Title 30 TAC §330.177, recirculation of leachate or gas condensate will only occur over the areas underlain by a Subtitle D liner system (i.e., composite liner system with a leachate collection system). Leachate will be recirculated from a water truck or other comparable equipment using a spray bar or hose to distribute leachate back to the working face (i.e., within the active waste fill area that is contained by the containment berm).

The following performance standards will govern the application rate of leachate recirculation.

- The rate of leachate recirculation will not exceed the moisture holding capacity of the landfill. For example, the application rate will be applied so that no seeps or ponding is observed in the vicinity of the recirculation area. In addition, leachate recirculation over a specific phase will cease if the leachate flow rate to a sump approaches the capacity of the pump within the sump. If this occurs, recirculation activities will move to another phase.
- Leachate recirculation will not occur immediately before, during, or immediately after rainfall events, or during freezing temperatures that could affect the holding-capacity of the waste.
- Leachate recirculation will not occur during high wind events.

The leachate generated from the landfill will be recirculated to the landfill working face, and excess quantities of leachate will be directed to the leachate storage facilities where it will be transported to the liquid waste bulking facility using a tanker truck or other compatible equipment, a properly permitted privately-owned off-site facility, or a POTW for treatment using third party trucks. Per Title 30 TAC §330.991(a)(7) leachate recirculation will not exceed 100,000 gallons per day.

4.23 Waste-for-Ballast Verification

In the areas of the landfill excavation which have been identified to extend below the groundwater table, the liner system itself and the waste placed above the liner system will provide ballast (weight) to protect the liner system from uplift forces due to inward and upward seepage forces of the groundwater. Soil or compacted waste may be used as ballast. The areas of landfill excavation requiring ballast are identified in the Site Layout Plans.

As discussed in the Liner Quality Control Plan (LQCP), the Construction Quality Assurance Professional of Record (POR) will verify that short-term and long-term uplift of the liner system has been controlled by the ballast. The verification will be documented in the Ballast Evaluation Report (BER) which will be submitted to the TCEQ for approval. As discussed in the LQCP, the BER will contain the signature and seal of the POR performing the evaluation and the signature of the site operator.

4.23.1 First Lift Considerations

As specified in Section 4.9 of this SOP, appropriate personnel will be on-site full time during the placement of the first 5 feet of waste over the liner system to verify that this lower 5 feet of waste does not contain large bulky items which could damage the liner system or which cannot be compacted to the required density.

4.23.2 Documentation

The calculations for the height of waste required to ballast the liner system will be submitted with the SLER/GLER for TCEQ approval. Once the compacted waste ballast is in place, the "Waste-For-Ballast Placement Record" and the engineer's survey elevations of the top of the waste documentation will be provided in the BER. As discussed in the currently permitted SLQCP, the BER will contain the documentation substantiating that the appropriate depth of ballast has been placed over the liner system. The BER will contain the signature and seal of the POR performing the evaluation and the signature of the Landfill Manager.

implements. Inspectors will observe the waste materials as the waste discharged from the truck is spread and separated. The waste will be sufficiently spread to determine its character and composition. Inspectors will wear appropriate personal protective equipment during the inspection which includes, at a minimum, the following:

- Gloves
- Work boots
- Clothing which minimizes contact with waste
- High visibility clothing
- Hardhat

Additional personal protective equipment will be used if regulated hazardous waste or PCB waste is identified. In the event that regulated hazardous waste or PCB waste is identified during an inspection, waste inspection activities will cease until inspection personnel obtain sufficient protective equipment, if needed. This additional equipment may include:

- Respirator with appropriate cartridge filters (i.e., organic vapor or particulate)
- Tyvek suit or coveralls
- Eye protection

6.3 Managing Prohibited Wastes

Unknown wastes undergoing inspection by Turkey Creek Landfill personnel must be properly segregated and protected against the elements, secured against unauthorized removal, and isolated from other waste and activities.

Known prohibited wastes detected during an inspection will be returned immediately to the transporter and generator. If the transporter is not available, the waste will be safely stored until provisions for removal can be arranged.

If regulated hazardous waste or PCB wastes are detected, the TCEQ and any local pollution agency with jurisdiction that has requested to be notified, will be notified. As soon as is practical, the transporter will be required to remove the regulated hazardous waste or PCB waste from the site. Prior to removal, the transporter must obtain an EPA identification number, package the waste in accordance with TxDOT regulations, and properly manifest the waste designating a permitted facility to treat, store, or dispose of the hazardous waste.

7.8 Liquid Waste Solidification Area Fire

The fire protection procedure for the liquid waste solidification area is described in Appendix IVE of this SOP.

7.9 Contacting Fire Department and TCEQ

If firefighting assistance is needed from the local fire department, the Landfill Manager or his designee will call 911, or the local fire department, and report the fire. The Landfill Manager will also notify Scale Operators, who will direct the fire department personnel to the scene of the fire.

If a fire occurs that is not extinguished within 10 minutes of detection, the TCEQ's Regional Office will be contacted immediately by telephone, but not later than four hours, and in writing within 14 days with a description of the fire and the resulting response.

7.10 Training

As described in Section 2.2 and Table 2-1 of this SOP, employees will receive training in all aspects of this SOP and this section, including but not limited to the following fire safety and protection topics:

- Fire safety rules and regulations
- Hot load management
- Fire prevention procedures
- Vehicle and equipment fires
- Working face fire protection and fire fighting, including water truck/storage tank and soil stockpile requirements
- Convenience Center and Wood Waste Processing Area fires
- Liquid Waste Solidification Area fires
- Contacting Fire Department and TCEQ

Training will be conducted by site employees or contract personnel experienced in fire safety and protection. Training will be scheduled and attendance will be recorded and maintained in the site operating record.

9 RECORDKEEPING REQUIREMENTS

The Landfill Manager will maintain a copy of the current permit (including any permit modifications); the approved SDP, SOP, Groundwater Sampling and Analysis Plan, Final Closure Plan, Postclosure Care Plan, Landfill Gas Management Plan, and Leachate and Contaminated Water Management Plan; and any other TCEQ required plans or documents onsite (or an alternate location approved by the executive director) at all times during the active life of the facility. Deviation from the permit and incorporated plans or related permit documents (except as allowed by the permit, plans or related permit documents) is a violation of TCEQ's MSW regulations. The landfill will maintain the Site Operating Record in an organized format which allows the information to be easily located and retrieved. Additionally, all information contained in the Site Operating Record will be furnished upon request to the executive director and will be made available for inspection by the executive director. As required by the TCEQ, the Site Operating Record will be maintained at the site.

The Landfill Manager is responsible for recording and retaining in the Site Operating Record the information listed below:

- All location restriction demonstrations
- Inspection logs and records, training procedures, and notification procedures relating to excluding the receipt of prohibited waste
- Inspection records and training procedures relating to fire prevention and site safety
- All inspection documentation noted on Table 4.24 – Site Inspection and Maintenance List
- Fire Occurrence Notices
- Personnel training records and operator licenses. Training records (including operator licenses) for current personnel will be kept until closure and training records on former employees will be kept for at least three years from the date the employee last worked at the facility. Records may accompany personnel transferred within the company.
- Landfill Gas Management Plan
- Cover Application Logs including application rate and total amount of ADC applied to the working face on days ADC is applied.

- Results from gas monitoring events and any remediation plans relating to explosive and other gases
- Unit design documentation for the placement of leachate or gas condensate in the landfill
- Remediation plans for explosive and other gases, if applicable
- All inspection logs and reports and all demonstrations, certifications, findings, monitoring, testing, and analytical data relating to groundwater monitoring and corrective action
- Closure plans and monitoring, testing, or analytical data relating to closure requirements
- Postclosure care plans and monitoring, testing, or analytical data relating to postclosure requirements
- Cost estimates and financial assurance documentation relating to financial assurance for closure and postclosure care
- Copies of all correspondence and responses relating to the operation of the facility, modifications to the permit, approvals, and other matters pertaining to technical assistance
- Any and all documents, manifests, scale tickets, generator waste profile sheets, etc., involving special waste
- RACM Acceptance Records
- Class 1 non-hazardous industrial waste profile and acceptance records
- A record of each unauthorized material removal event
- Annual waste acceptance rate documentation including Quarterly and Annual Solid Waste Summary Reports. Waste reports will be prepared and submitted in accordance with the site-applicable requirements of Title 30 TAC §330.675.
- A record of alternate operations hours
- Access control breach and repair notices
- Other documents as specified by the approved permit or by the executive director of the TCEQ

The Landfill Manager will retain all information contained within the Site Operating Record and all plans required for the facility for the life of the facility including the postclosure care period. The above listed items will be incorporated into the Site Operating Record within seven working days of the completion of the item/record or receipts of the analytical data. Physical space limitations may warrant the offsite storage of non-electronic (paper) records older than five years at a nearby records storage facility or corporate office.

In addition to the above, the permittee will provide written notice in the form of a Soils and Liner Evaluation Report (SLER), Geomembrane Liner Evaluation Report (GLER), and/or Geosynthetic Clay Liner Evaluation Report (GCLER) detailing the final construction and lining of a new disposal cell. The reports will be submitted to the TCEQ for review 14 days prior to the placement of any waste in the new cell. If verbal or written response from the TCEQ is not provided by the end of the 14th day following TCEQ receipt of the report(s), placement of solid waste may begin. All SLER, GLER, and GCLER approvals will be maintained in the Site Operating Record.