Texas Commission on Environmental Quality

Waste Permits Division Correspondence Cover Sheet

Date: 6-30-25
Facility Name: TASWA DRF
Permit or Registration No.: 2290A

Nature of Correspondence:
☐ Initial/New
☒ Response/Revision to TCEQ Tracking No.: 31420471 (from subject line of TCEQ letter regarding initial submission)

Affix this cover sheet to the front of your submission to the Waste Permits Division. Check appropriate box for type of correspondence. Contact WPD at (512) 239-2335 if you have questions regarding this form.

Table 1 - Municipal Solid Waste Correspondence

Applications	Reports and Notifications
☐ New Notice of Intent	☐ Alternative Daily Cover Report
☐ Notice of Intent Revision	☐ Closure Report
☐ New Permit (including Subchapter T)	☐ Compost Report
☐ New Registration (including Subchapter T)	☐ Groundwater Alternate Source Demonstration
☒ Major Amendment	☐ Groundwater Corrective Action
☐ Minor Amendment	☐ Groundwater Monitoring Report
☐ Limited Scope Major Amendment	☐ Groundwater Background Evaluation
☐ Notice Modification	☐ Landfill Gas Corrective Action
☐ Non-Notice Modification	☐ Landfill Gas Monitoring
☐ Transfer/Name Change Modification	☐ Liner Evaluation Report
☐ Temporary Authorization	☐ Soil Boring Plan
☐ Voluntary Revocation	☐ Special Waste Request
☐ Subchapter T Disturbance Non-Enclosed Structure	☐ Other:
☐ Other:	

Table 2 - Industrial & Hazardous Waste Correspondence

Applications	Reports and Responses
☐ New	☐ Annual/Biennial Site Activity Report
☐ Renewal	☐ CPT Plan/Result
☐ Post-Closure Order	☐ Closure Certification/Report
☐ Major Amendment	☐ Construction Certification/Report
☐ Minor Amendment	☐ CPT Plan/Result
☐ CCR Registration	☐ Extension Request
☐ CCR Registration Major Amendment	☐ Groundwater Monitoring Report
☐ CCR Registration Minor Amendment	☐ Interim Status Change
☐ Class 3 Modification	☐ Interim Status Closure Plan
☐ Class 2 Modification	☐ Soil Core Monitoring Report
☐ Class 1 ED Modification	☐ Treatability Study
☐ Class 1 Modification	☐ Trial Burn Plan/Result
☐ Endorsement	☐ Unsaturated Zone Monitoring Report
☐ Temporary Authorization	☐ Waste Minimization Report
☐ Voluntary Revocation	☐ Other:
☐ 335.6 Notification	
☐ Other:	

BIGGS & MATHEWS ENVIRONMENTAL, INC
TBPELS No. F-256 & No. 10194895 ♦ TBPG No. 50222

June 30, 2025

Chance Robinson, Project Manager
Municipal Solid Waste Permits – MC124
Texas Commission on Environmental Quality
P. O. Box 13087
Austin, Texas 78711-3087

Re: Texoma Area Solid Waste Authority
TASWA Disposal and Recycling Facility
MSW Permit No. 2290A
Grayson County
NOD1 - TCEQ Tracking No. 31420471

Dear Mr. Robinson:

This response to your request for additional information addressed to Mr. John O'Steen, dated May 22, 2025, is submitted on behalf of Texoma Area Solid Waste Authority for the TASWA Disposal and Recycling Facility permit amendment application submitted March 7, 2025. The responses to the Texas Commission on Environmental Quality (TCEQ) comments are presented below in the order listed in your email.

1. Provide tabs in the hard copy of the application that are consistent with the bookmarks in the PDF version.

RESPONSE: Tabs are provided in the hard copy of the application for all main sections.

2. Please ensure that all tables of content for the sub-appendices/attachments indicate the location of all tables, drawings and figures throughout the application.

RESPONSE: Tables of contents are provided for the main sections of the application per 330.57(g)(3).

3. Page numbering is inconsistent. Revise the page numbers in the application to indicate the Part, Appendix and sub-appendix/attachment, as an example: IIID7-12. If the Appendix is solely Figures and Drawings the figure/drawing number will be satisfactory.

RESPONSE: Page numbering has been added to Appendix IIB, IID, IIE, IIF, IIG, IIH, G3, and IVB. The remainder of the application has page numbering as required by 330.57(g)(6).

4. Revise the table in Part I Section 1.1 and Section 6.1.1 to have Table 1-1 and 6-1 in their title respectively.

RESPONSE: Adding a table number is not needed or required.

5. Appendix IIJ (Waste Acceptance Plan Form-20873) Section C Part 2c, item v. and item ix are both marked yes and no. Revise TCEQ Form-20873 to ensure item v. and ix. are marked either yes or no. Review Part IV Section 8.20 for consistency.

RESPONSE: TCEQ-20873 Section C item v. has been revised to indicate only no and item ix. has been revised to indicate only yes.

6. Revise the table in Part II Section 2.2 to have Table 2-1 in the title.

RESPONSE: Adding a table number is not needed or required.

7. i) Clarify if TxDOT was aware of the relocation of the facility entrance during email communication dated July 12, 2022.

   ii) TCEQ defers to the TxDOT recommendations for the adequacy and design capacity of state-maintained roadways, therefore, provide a current letter from TxDOT confirming the adequacy and design capacity of roadways, including the relocated entrance, in accordance with 30 TAC §330.23(a),

RESPONSE: (i)The location of the facility entrance at State Hwy 56 will not be relocated. The scalehouse and other entrance facilities will be relocated in the future and a permit modification or amendment will be prepared when needed.

(ii) The correspondence from TxDOT included in the application confirms the adequacy and design capacity of roadways as required.

8. Provide current documentation of coordination with the FAA, as the validity of documentation included in the application for hazard determination expired on 04/04/2024.

RESPONSE: While the geometry and location of the FAA "Determination of No Hazard to Air Navigation" included in the application does not and will not change, an application to update the determination has been submitted to the FAA and Part

Appendix IIH will be updated when the updated determinations are received from the FAA.

9. Revise the table 'Stratigraphy of the Cretaceous of North Texas' in Part II Section 10.2 to have Table 2-2 in the title.

RESPONSE: Adding a table number is not needed or required.

10. Revise the tables in Part III Attachment B Section 2 to have Table 2-1 and 2-2 respectively in their title.

RESPONSE: Adding a table number is not needed or required.

11. Provide generalized construction details, including drawings of all the storage and processing units with regard to approximate dimensions and capacities, construction materials, vents, covers, enclosures, protective coatings of surfaces, as applicable for the leachate collection area, the reusable items storage area, the large items storage area, the wood waste/brush area, and the citizen's collection center. Provide the information in a format that addresses each area separately.

RESPONSE: Descriptions (Attachment B narrative) and scaled drawings (Appendix B1) including generalized construction details and locations for the leachate collection area, reusable items storage area, large items storage area, wood waste/brush area and the citizen's collection center have been included in Attachment B. Drawings B.3 and B.4 have been revised to clarify general construction materials.

12. Provide adequate floor drains for the reusable items storage area, large items storage area, wood waste/brush area, and citizen's collection center. Specify why these would not apply if not applicable.

RESPONSE: Floor drains are not applicable for the reusable items storage area, citizen's collection center, or large item staging areas as items are stored under a covered shed, in rolloff containers or over a lined area adjacent to the active fill area. If utilized, the wood/brush area will also not require a floor drain.

13. i) For clarity, revise Appendix C1D to refer to the table directly by stating '...table C1D-1.

    In addition, revise the perimeter channel summary Table and the detention pond table to have Table C1D-1 and C1D-2 respectively in their title.

    ii) Provide the responsible engineer's seal and signature with a date in compliance with 22 TAC §137.33 (relating to Sealing Procedures) for all the work performed by the responsible engineer for each component of the surface water drainage report.

Provide the engineer's seal and signature for the summary of design calculations and the outcome of computerized modeling.

RESPONSE: (i) Adding a table number is not needed or required.

(ii) Each component of the surface water drainage report (Part III Attachment C including appendices) is sealed with signature and date as required by the Engineering Practice Act.

*** ***Attachment C Global Change***
Please note the following revision to Attachment C due to coordination with wetland mitigation: Pond 1 was redesigned to preserve existing wetlands. The revised pond layout is shown on drawings C1A.2 and C1C.1 and has been incorporated throughout the permit.

14. Demonstrate that the volume of runoff at boundary analysis points (e.g., CP2, CP6, and CP7) will not alter the existing drainage pattern(s) during post-development conditions. Refer to Regulatory Guidance (RG) 417 for more information.

RESPONSE: Section 4 - Postdevelopment Conditions, Attachment C1, was revised to discuss the increased volume of runoff at comparison points CP2, CP6, CP7, and CP8 and demonstrate how this does not alter existing drainage patterns.

Drawing 6A-A.1 – Drainage Area Map from the current permit is included as an attachment to this letter. For the East Drainage Area (429.9 acres), there is no net increase in runoff volume contributing to this drainage area. For the West Drainage Area (1,569.7 acres), there is a 10.4 acre-feet increase in runoff volumes at CP6, CP7, CP8, and CP9; however, given the large size of the West Drainage Area, this minimal increase will not alter existing drainage patterns. Therefore, existing drainage patterns are maintained for both the East and West Drainage Areas.

15. i) Revise the design, including the drawing of the run-on control system, to provide a minimum freeboard of one foot, as required by 30 TAC 330.207(b).

    ii) Revise the design, including drawings of the runoff control system, to provide a minimum freeboard of one foot, as required by 30 TAC 330.207(b). Also, indicate the freeboard on cross sectional drawing(s).

RESPONSE: **(i) Design (Page D6C.3) and Drawing D6-C1 have been revised to provide minimum freeboard of one foot for the run-on control berms.**

(ii) Design (Page D6C.3) and Drawing D6-C1 have been revised to provide/indicate minimum freeboard of one foot for the runoff containment berms.

16. Describe the details for repairing the erosion layer of the final cover that will be caused by the soil loss indicated in the Erosion Layer Evaluation section of the application (ex. frequency, schedules, etc.).

RESPONSE: Page C1E.8 was revised to correct the quantity of erosion. Appendix C1E includes repair protocols and procedures for restoring the erosion layer to design specifications.

17. Provide sample design calculations and cross-sectional details for perimeter channels, pond inlets and outlets, and for flexible membrane anchorages over downchutes.

RESPONSE: The requested design calculations and cross-sectional details are already provided in the following locations:

- ***Pond design information and hydraulic analysis is included in Appendix C1C***
- ***Perimeter channel design calculations are included in Appendix C1D***
- ***Design calculations for final cover drainage controls are included in Appendix C1E***
- ***All plan and detail drawings, including cross-sectional details for perimeter channels, pond inlets and outlets, and flexible membrane anchorages over downchutes, are included in Attachment C3***

18. Describe the details for repairing the intermediate cover layer that will be caused by the soil loss indicated in the Erosion Layer Evaluation section of the application (ex. frequency, schedules, etc.).

RESPONSE: The details for repairing the intermediate cover layer are already fully described in the Best Management Practices included in Appendix C1F. This section provides comprehensive procedures for maintaining the intermediate cover system, including inspection schedules, repair protocols, and restoration procedures to address soil loss during the operational period of the facility.

19. Indicate flow directions for all drainage sub-areas of existing and developed conditions with appropriate legend information.

RESPONSE: Drawings C1A.2 and C1C.1 were revised to show the reach for each sub-area. Drawings C1A.1 and C1B.1 already showed the reach for each sub-area. The legends for C1A.1, C1A.2, C1B.1, and C1C.1 were revised to add the drainage reach.

20. Discuss how the runoff volume at boundary analysis points (e.g., CP2, CP6, and CP7) will not impact the existing drainage pattern. Refer to RG-417 for more information.

RESPONSE: See T14 Response.

21. i) Revise the tables in Part III Appendix D7 to include 'Table X-Y" with X being the number based on the section and Y being the number of tables in each section sequentially. In addition, revise Sections 2.1, 4.8.1, 4.8.2, 5.5.2, 5.5.4, 6.2.2, 6.2.4, 6.5.1. 6.5.2 and 7.4 in Appendix D8 to refer to their respective table by stating '...Table X-Y below'.

    ii) Clarify if any surface impoundment will be constructed with liner and confirm that the liner quality control plan provided in Attachment D7 will be applicable for the construction of liner for surface impoundments.

RESPONSE: **(i)** ***Adding a table number is not needed or required.***

(ii) ***There are no surface impoundments designed to contain leachate, contaminated water, or other waste that would require liner systems. The reference to "surface impoundment" in Part III, Attachment C1, Appendix C1B, page C1B.2 and in Part III, Attachment C1, Appendix C1C, page C1C.1 have been removed for clarity.***

22. Define "suitable materials," "similar materials," and "appropriate equipment," as indicated in Section 3.1, Attachment D.

RESPONSE: Suitable and similar materials are materials that accomplish the purpose of all weather access. Appropriate equipment is equipment that is capable of controlling or removing mud and maintaining access roads.

23. Revise the Landfill Design Parameters Table in Part III Attachment D, Section 3.3 to have Table 3-1 in the title.

RESPONSE: Adding a table number is not needed or required.

24. Revise the table provided for Capacity and Site Life Projection by providing the data for the first year through ninety-second year and provide the responsible engineer's seal and signature with a date.

RESPONSE: The table on page D4.2 in Attachment D4 has been updated to show data from the first year through year 93. The section is sealed with signature and date as required by the Engineering Practice Act.

25. Provide discussions/narratives for the outcome of the HELP modeling for the leachate generation and include the responsible engineer's seal and signature on Page D6B.4.

RESPONSE: A discussion/narrative for the outcome of HELP modeling for leachate generation is included in Attachment D6 and is not necessary or relevant to duplicate in Attachment D5 and/or Attachment D7. Attachment D6 and appendices are sealed with signature and date as required by the Engineering Practice Act.

26. Provide the responsible engineer's seal and signature on ballast calculations.

RESPONSE: Attachment D7 Appendix D7C is sealed with signature and date as required by the Engineering Practice Act.

27. Provide the responsible engineer's seal and signature for the leachate collection system design.

RESPONSE: Attachment D5 Appendix D6A is sealed with signature and date as required by the Engineering Practice Act.

28. Discuss why actual material properties were not used for the foundation evaluation for stability, settlement, and constructability, as stated in the application.

RESPONSE: Material properties from samples collected and tested during on-site boring investigations and construction projects were used for the evaluation of stability, settlement, and constructability. Typical material properties from listed references were used for solid waste and geosynthetic materials.

29. A duplicate copy of Page D7B.5 was incorrectly included as Page D7C.5, please revise with the correct page.

RESPONSE: Duplicate page D7B.5 was removed and remainder of pages in D7C were renumbered.

30. Include text in Part III, Attachment D7, Section 3.3.2 to indicate that the system will be operated until the ED approves it ceasing.

RESPONSE: Part III Attachment D7 Section 3.3.2 has been revised to indicate that a temporary dewatering system will be operated until the ED approves decommissioning or 14 days after TCEQ receives the BER.

31. Add text to Part III, Attachment D7, Section 8 to include brush as a prohibited item in the first five feet of ballast.

RESPONSE: Text prohibiting brush in the first five feet of waste placed over the protective cover of a liner has been added to Section 8.9 of Part IV – Site Operating Plan.

32. Add required acknowledgement text for this rule to Part III, Attachment D7, Section 9.4.

RESPONSE: Part III, Attachment D7, Section 3.3.2 has been modified to include the requested acknowledgement text.

33. Add required cross-sections in Part III, Attachment D7.

RESPONSE: Liner construction details are included in Attachment D3 and incorporated by reference in Attachment D7.

34. Add required acknowledgement text for this rule to Part III, Attachment D7.

RESPONSE: Part III, Atachment D7, Section 1.1 has been modified to include the requested acknowledgment text.

35. Revise the tables in Part III Attachment E to include 'Table X-Y" with X being the number based on the section and Y being the number of tables in each section sequentially. In addition, revise Sections 3.4.1, 5.1, and 5.2 in Attachment E to refer to their respective table by stating '...Table X-Y below'.

RESPONSE: Adding a table number is not needed or required.

36. Revise cross-sections F-F' and M-M' to add locations of 2290 and 2290A permit boundaries to be consistent with other cross-sections.

RESPONSE: Cross sections F-F' and M-M' have been revised as requested.

37. Revise the legends for Drawings E6-2e through E6-2aa to correctly identify contours as being for Layer V and not Layer II/III.

RESPONSE: Drawings E6.2a through E6.2aa have been revised to correctly identify the potentiometric contours for Layer V and not Layer II/III; drawing numbers were also updated for consistency.

38. Revise the table on Page 26 of Attachment E to show correct total depths for wells MW-17 and MW-19.

RESPONSE: The total well depths for MW-17 and MW-19 have been revised as requested.

39. Revise the tables in Part III Attachment F to include 'Table X-Y" in their title, with X being the number based on the section and Y being the number of tables in each section sequentially. In addition, revise Subsections 2.3.1, 2.3.3, and 3.3 in Attachment F to refer to their respective tables by stating '...Table X-Y below'.

RESPONSE: Adding a table number is not needed or required.

40. Revise the tables in Part III Attachment F2 to include 'Table X-Y" in their title, with X being the number based on the section and Y being the number of tables in each section sequentially.

RESPONSE: Adding a table number is not needed or required.

41. Revise Part III, Attachment F, Appx F2 to specify statistical calculations and graphs will be included in the groundwater monitoring reports.

RESPONSE: Language regarding the inclusion of statistical calculation and graphs in groundwater monitoring reports is included in Section 3.4.1 of Appendix F2. No changes were made in response to this comment.

42. Include the required statement for this rule (330.407(d)) in the GWSAP.

RESPONSE: The requested language was added in Appendix F2, Section 3.4.1.

43. Include the required statement for this rule (330.401(f)) in the GWSAP.

RESPONSE: The requested language was added in Attachment F, Section 2.3.4.

44. Add two additional monitoring wells in the Layer II/III design, one potentially upgradient near the P-6S location, and one additional POC well south-southwest of MW-10A because the new potentiometric maps show a southern component to the groundwater flow.

RESPONSE: Two additional monitoring wells (MW-10B and MW-12B) have been added to the groundwater monitoring network for Layer II/III. Monitoring well MW-

10B is a downgradient monitoring well, while MW-12A is an upgradient well. Section 2.3.3 in Attachment F has been updated to include these additional monitoring wells. In addition, Drawings F1.3 and F1.5 have been revised to include monitoring wells MW-10B and MW-12A.

In addition, there was a typographical error noticed in the Layer V groundwater monitoring network. Downgradient/ point of compliance monitoring well MW-26 was relabeled MW-26A. Section 2.3.3 of Attachment F and Drawings F1.4 and F1.5 have been revised accordingly.

45. Add the language that any local pollution agency with jurisdiction that has requested to be notified will be notified in addition to the ED and add the statement regarding the installation of additional wells or sampling points.

RESPONSE: The requested language has been added to Attachment F, Section 2.3.4.

46. The application states that the PQLs used for analytical reporting would be developed by the laboratory. TCEQ has requested that all PQLs used for detection limits be set to our MSW PQLs which can be found at https://www.tceq.texas.gov/downloads/permitting/waste-permits/msw/docs/msw-pqls.pdf. Revise as needed.

RESPONSE: It is understood that it is preferred for the MSW-PQL benchmarks provided by TCEQ on May 25, 2010 be used. The TASWA DRF has utilized the MSW-PQLs since the TCEQ letter was issued in 2010. However, PQLs are method, instrument, and analyte specific. Per 30 TAC 330.405(f)(5) and the Guidelines for Preparing a Groundwater Sampling and Analysis Plan issued by TCEQ in May 2018, PQLs are defined as the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. When limits for precision and accuracy cannot be met, the owner or operator will submit information to support a recommendation for using alternative precision and accuracy limits.

The May 25, 2010 letter explains that if analytical laboratories are unable to meet the precision and accuracy performance objectives at an MSW-PQL benchmark concentration, then a subsequent adjustment will be made. And if a facility does not wish to use the MSW-PQL benchmarks, then the facility will be required to demonstrate how the preferred reporting limits chosen are representative of the lower limit of quantitation that can meet the MSW Permits Section's interlaboratory precision and accuracy performance objectives. Further, Section 3.5.1 of the Guidelines for Preparing a Groundwater Sampling and Analysis Plan states that sample results may be reported using either laboratory PQLs or MSW benchmark PQLs and that "a PQL may be modified if a different test method is used for a constituent, or if the designated PQL cannot be achieved."

The MSW-PQL benchmarks are currently being utilized at the TASWA DRF and are check sampled by the laboratory used by the TASWA RDF throughout the calendar year. It is possible that updated PQLs for the facility may be used in the future if the laboratory is no longer able to demonstrate that they can continue to meet the specified limits for precision and accuracy. Any proposed alternate limits would be submitted and approved by TCEQ. It is believed that the language regarding PQLs provided in Appendix F2 of Attachment F is consistent with the requirements of 30 TAC 330.405(f)(5), the May 25, 2010 TCEQ letter, and the Guidelines for Preparing a Groundwater Sampling and Analysis Plan provided by TCEQ; however, minor revisions to the text in Section 2 were made to provide clarification.

47. Revise Part III, Attachment F, Appendix F2 to state that no filtering of GW samples will occur prior to laboratory analysis.

RESPONSE: Language stating that samples will not be filtered in the field or in the laboratory prior to analysis is included in Section 1.6 of Appendix F2. No changes to the permit document were made as a result of this comment.

48. Provide a detailed discussion in the GWSAP of the statistical methods that will be used for calculation of groundwater background limits that includes the information required in 30 TAC 330.405(e) and (f).

RESPONSE: The requested language was added to Section 3.3 of Appendix F2.

49. Revise Part III, Attachment F, Appx F2 to add the required text for MRI IDs 593 through 618 and 620 through 626.

RESPONSE: The requested language has been added to Section 3.4.1 of Appendix F2.

50. Include acknowledgement required in this rule (330.409(i)).

RESPONSE: The requested language is added to Section 3.4.1 of Appendix F2.

51. Revise Part III, Attachment F, Section 2.3.4 to add the required text.

RESPONSE: The requested language has been added to Attachment F, Section 2.3.4.

52. i) Discuss why actual material properties were not used for the slope stability analysis (Appendix D5B).

    ii) Provide a summary and discussion for the outcome obtained from the computerized modeling used for the slope stability analysis.

RESPONSE: (i) See response to T28.

(ii) A summary and discussion of the slope stability analysis is included in Attachment D5.

53. Correct the error relating to side slopes, as the column requires the slopes in percentage (i.e., 25%, instead "4," for 4H:1V) on Page #4/Table 6 in Form TCEQ-20720.

RESPONSE: Part III, Attachment H, Page 4/Table 6 in Form TCEQ 20720 has been revised to indicate a maximum grade of the final cover side slope as 25%.

54. Revise the tables in Part III Appendix D8 to include 'Table X-Y" with X being the number based on the section and Y being the number of tables in each section sequentially. In addition, revise Sections 2.1, 4.2, 4.8.1, 5.5.1, 5.5.4, 6.2.1, 6.2.2, 6.5, and 7.4 in Appendix D8 to refer to their respective table by stating '...Table X-Y below'.

RESPONSE: Adding a table number is not needed or required.

55. Correct the provided "annual" frequency of monitoring to "semi-annual" during post-closure period. The frequency of monitoring for the maintenance activities does not appear to be consistent with the narrative provided in the original submittal (deleted portion). Provide a justification for the monitoring frequency.

RESPONSE: The cost estimate for post closure site inspections and record keeping is sufficient and no changes were made to TCEQ-20723 in Part III, Attachment J.

56. Revise Part IV Section 2.1 to refer to the table directly by stating '...Table 2-1 below'

RESPONSE: Adding a table number is not needed or required.

57. Table 2.1 'Records to be Maintained in the Site Operating Record' in Part IV only has 2-1 in the title in the 'continued page'. Revise the table to include '2-1' in the title.

RESPONSE: "Table 2-1" has been removed from the 'Records to be Maintained in the Site Operating Record' (continued) table on Page 6 of the Part IV - Site Operating Plan for consistency. Adding a table number is not needed or required.

58. Revise Part IV Section 2.5 to refer to the table directly by stating '...Table 2-2.

RESPONSE: Adding a table number is not needed or required.

59. Revise Part IV Section 2.7 to refer to the table directly by stating '...Table 2-3.

RESPONSE: Adding a table number is not needed or required.

60. Revise the Site Personnel Summary table in Part IV Section 3 to have Table 3-1 in the title.

RESPONSE: Adding a table number is not needed or required.

61. Revise Part IV Section 4 to refer to the table directly by stating '...table 4-1.

RESPONSE: Adding a table number is not needed or required.

62. Revise Part IV Sections 3.1 and 3.3 to refer to the table by stating '...Table 3-1.

RESPONSE: Adding a table number is not needed or required.

63. Revise the 'Landfill Markers' table in Part IV Section 8.7 to have Table 8-1 in the title.

RESPONSE: Adding a table number is not needed or required.

64. Add language in Part IV Section 8.20 and Part II Section 2.1, third paragraph, indicating that soil contaminated by petroleum products, crude oils, or chemicals with concentrations greater than 1,500 mg/kg total petroleum hydrocarbon or contaminated by constituents of concern that exceed the concentrations listed in §335.521(a)(l) will not be accepted at the facility. If the intention is to accept this waste, then revise to clarify.

RESPONSE: Soil contaminated by petroleum products, crude oils, or chemicals with concentrations greater than 1,500 mg/kg total petroleum hydrocarbon or contaminated by constituents of concern that exceed the concentrations listed in §335.521(a)(l) is a Class 1 Industrial waste that will not be accepted at the facility as discussed in Part IV Section 8.21 and in Part II Appendix IIJ Waste Acceptance Plan.

65. Provide language in Part IV Section 8.20 to indicate oil filters from internal combustion engines shall not be intentionally and knowingly accepted for disposal unless conditions are met in accordance with 330.171(d).

RESPONSE: Section 8.20.5 of Part IV – Site Operating Plan added as requested.

66. Revise to clarify in Part IV Section 8.20 if the facility will or will not accept RACM for disposal.

RESPONSE: Section 8.20.6 of Part IV – Site Operating Plan added as requested.

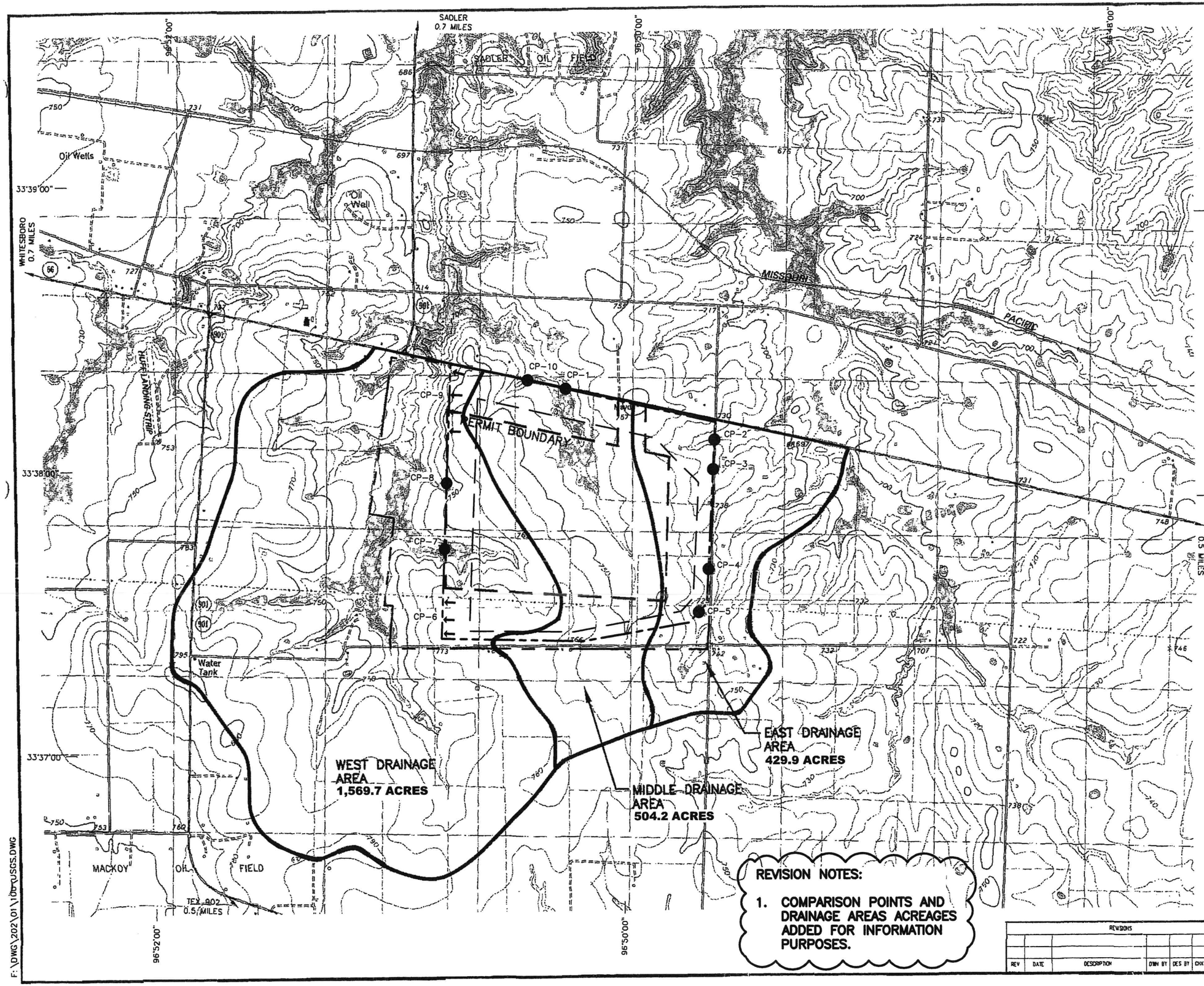
Sincerely,

BIGGS & MATHEWS ENVIRONMENTAL

David Clark, P.E.
Principal

Attachments: Drawing 6A-A-1, Drainage Area Map from 2290 permit

cc: Mr. John O'Steen, Executive Director, TASWA



SADLER, TEX.
NE/4 WHITESBORO 15' QUADRANGLE
N3337.5–W9645/7.5

1982

DMA 6651 III NE–SERIES V882

ETHEL, TEX.
SE/4 WHITESBORO 15' QUADRANGLE
N3330–W9645/7.5

1982

DMA 6651 III SE–SERIES V882

LEGEND

PROPERTY BOUNDARY

PERMIT BOUNDARY

DRAINAGE AREA DIVIDES

NOTE:

1. EXISTING CONTOURS FROM THE 1982 USGS TOPOGRAPHIC MAP, ETHEL AND SADLER QUADRANGLES.

STATE OF TEXAS
KENNETH J. WELCH
60773
REGISTERED PROFESSIONAL ENGINEER
12/20/00

ISSUED FOR PERMITTING PURPOSES ONLY

REVISION NOTES:

1. **COMPARISON POINTS AND DRAINAGE AREAS ACREAGES ADDED FOR INFORMATION PURPOSES.**

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DRAINAGE AREA MAP

TEXOMA AREA SOLID WASTE AUTHORITY DISPOSAL AND RECYCLING FACILITY PERMIT APPLICATION

BIGGS & MATHEWS, INC.
CONSULTING ENGINEERS
2500 BROOK AVE. WICHITA FALLS, TEXAS
5450-A E. LOOP 820 S. FORT WORTH, TEXAS

DSN. JMS	DATE : 12/00		ATTACHMENT
DWN. GLW	SCALE : GRAPHIC		6A–A.1
CHK. JMS	DWG : USGS.DWG		

F:\DWG\202\01\10\USGS.DWG

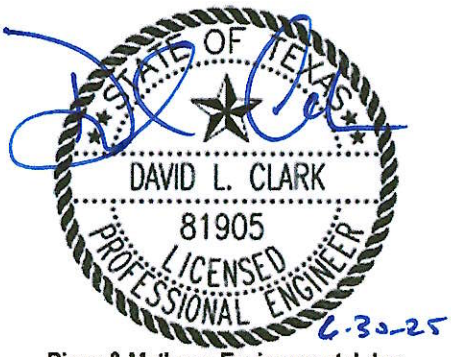
TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised March 2025
Revised June 2025



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-256

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

VOLUME 1 OF 4

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

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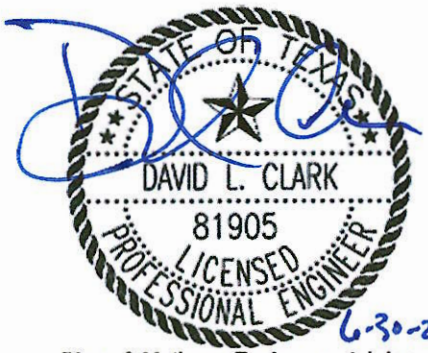

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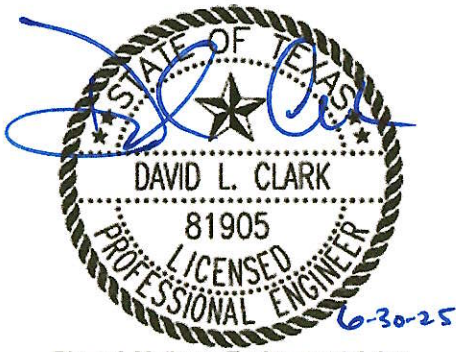

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TCEQ PERMIT NO. MSW 2290A

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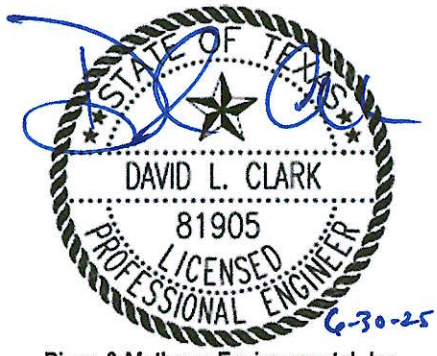
PART I
SITE AND APPLICANT INFORMATION
SUPPLEMENTARY TECHNICAL REPORT

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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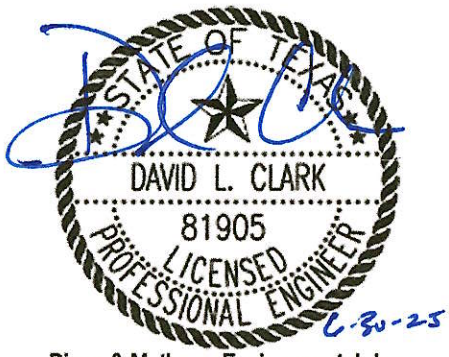

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Firm Registration No. F-256

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Texas Commission on Environmental Quality

Part I Application Form for New Permit, Permit Amendment, or Registration for a Municipal Solid Waste Facility

Instructions for completing this Part I Application Form are provided in TCEQ 00650-instr[1]. Include a Core Data Form (TCEQ 10400)[2] with the application for the facility owner, and Core Data Forms for the operator and property owner if different from the facility owner. If you have questions, contact the Municipal Solid Waste (MSW) Permits Section by email to mswper@tceq.texas.gov, or by phone at 512-239-2335. Rules cited on this form are in Title 30 Texas Administrative Code (30 TAC) and may be viewed online at www.tceq.texas.gov/goto/view-30tac.

Application Tracking Information

Facility Regulated Entity Name[3]:
TASWA Disposal and Recycling Facility

Site Operator (Permittee or Registrant Name)[4]:
Texoma Area Solid Waste Authority

MSW Authorization Number: 2290A

Initial Submission Date: 2/3/2025

Revision Date: 06/30/2025

Application Data

1. Submission Type	
☒ Initial Submission	☐ Notice of Deficiency (NOD) Response

2. Authorization Type	
☒ Permit	☐ Registration

3. Application Type	
☐ New Permit	
☒ Permit Major Amendment	☐ Permit Limited Scope Major Amendment
☐ New Registration	

[1] www.tceq.texas.gov/downloads/permitting/waste-permits/msw/forms/00650-instr.pdf
[2] www.tceq.texas.gov/goto/coredata
[3] Facility Regulated Entity Name must match the Regulated Entity Name indicated on the TCEQ Core Data Form.
[4] Site Operator is defined in 30 TAC 330.3(148) as the holder of, or the applicant for, an authorization (or license) for a municipal solid waste facility.

Applicant Signature Page

Site Operator (Permittee or Registrant Name) or Authorized Signatory

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: John O'Steen Title: Executive Director

Email Address: [redacted]

Signature: _____ Date: 6-30-25

Authorization by Facility Owner for Operator to Submit Application

To be completed by the facility owner if the application is submitted by an operator who is not the facility owner.

I am the owner of the facility that is the subject of this application, and authorize the operator, N/A to submit this application pursuant to 30 TAC 305.43(c).

Name: _____ Title: _____

Email Address: _____

Signature: _____ Date: _____

Notary

SUBSCRIBED AND SWORN to before me by the said John O'Steen

On this 30th day of June, 2025

My commission expires on the 6th day of September, 2028

JOANNE HIXSON
Notary Public, State of Texas
Comm. Expires 09-06-2028
Notary ID 1524951

Jo Anne Hixson

Notary Public in and for

Grayson County, Texas (notary's jurisdiction, including county and state)

Note: Application Must Bear Signature & Seal of Notary Public

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

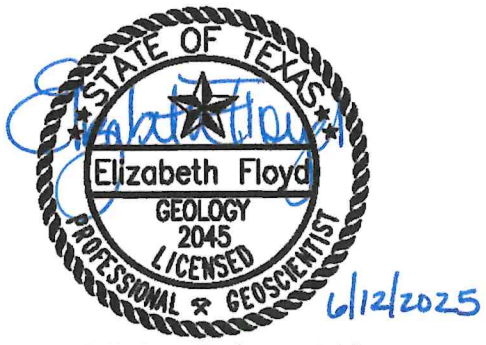
PART II
EXISTING CONDITIONS AND
CHARACTER OF THE FACILITY AND SURROUNDING AREA

PART II NARRATIVE

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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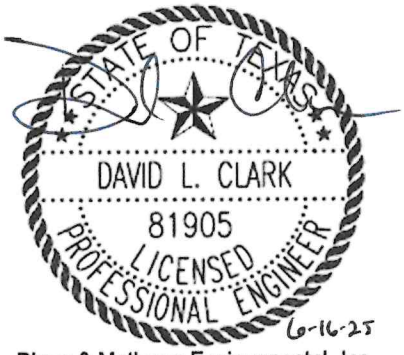

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Firm Registration No. F-256

For Sections 8.1, 10.1, 10.2, 10.3, 10.4, 11.1, 12.1 and 12.2

Prepared by

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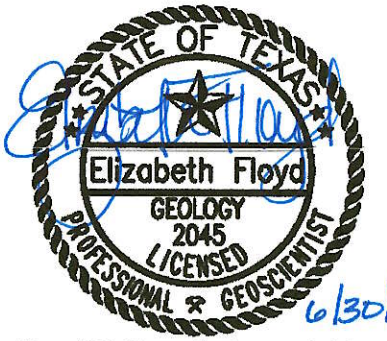
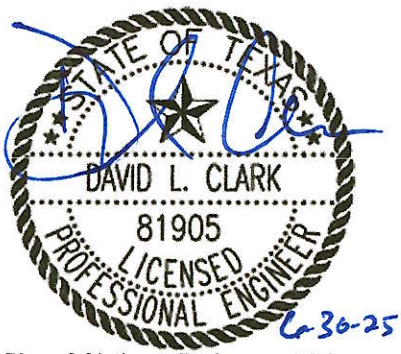


6/30/2025



6-30-25

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Firm Registration No. 50222

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

For Sections 8.1, 10.1, 10.2, 10.3, 10.4, 11.1, 12.1 and 12.2

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iv.	☐ Yes ☑ No	Waste from commercial air pollution control devices [§330.171(b), §330.3(148)(G), §330.331(e)]
v.	☒ Yes ☑ No	Tanks, drums, or containers that were used for shipping or storing any material that has been listed as a hazardous constituent in 40 CFR Part 261, Appendix VII but has not been listed as a commercial chemical product in 40 CFR §261.33(e) or (f) [§330.171(b), §330.3(148)(G)]
vi.	☐ Yes ☑ No	Drugs, other than those contained in normal household waste [§330.171(b), §330.3(148)(J)]
vii.	☐ Yes ☑ No	Contaminated foods, other than those contained in normal household waste [§330.171(b), §330.3(148)(J)]
viii.	☐ Yes ☑ No	Contaminated beverages, other than those contained in normal household waste [§330.171(b), §330.3(148)(J)]
ix.	☑ Yes ☒ No	Empty containers that have been used for pesticide, herbicide, fungicide, or rodenticide, that have been triple-rinsed before receipt at the landfill, are rendered unusable before receipt or on arrival, and are covered by the end of the same working day they are received [§330.171(c)(5)(A)]
x.	☑ Yes ☐ No	Empty containers for which triple-rinsing is not feasible or practical (e.g. paper bags, cardboard containers) that are managed as a municipal hazardous waste from a conditionally exempt small quantity generator or in accordance with requirements for disposal of industrial wastes [§330.171(c)(5)(B), §330.171(c)(6), §330.173]
xi.	☐ Yes ☑ No	Regulated asbestos-containing material (RACM) [40 CFR 261, §330.171(c)(3), §330.3(126)]
xii.	☑ Yes ☐ No	Non-regulated asbestos-containing material (non-RACM) [40 CFR 261, §330.171(c)(4), §330.3(93)]
xiii.	☐ Yes ☑ No	Incinerator ash [§330.3(148)(M), §330.171(b)]
xiv.	☐ Yes ☑ No	Soil contaminated by petroleum products, crude oils, or chemicals in concentrations of greater than 1,500 mg/kg total petroleum hydrocarbons; or contaminated by constituents of concern that exceed the concentrations listed in §335.521(a)(1) [§330.3(148)(N), §330.171(b)(4)] (may be accepted at Type I landfills with Class 1 cells. [§330.331(e)] (Excluded from Type I AE. [§330.173(a)])
xv.	☑ Yes ☐ No	Household-generated used oil filters that have been crushed to less than 20% of original volume or processed by a method other than crushing to remove all free-flowing used oil. The processing method may include (1) having the filter separated into component parts and free-flowing used oil removed from the filter element by compression; (2) having a replaceable filter medium that has been compressed to remove free-flowing used oil; **or** (3) having a housing that has been punctured and the filter drained for at least 24 hours. [§330.171(d)].
xvi.	☐ Yes ☑ No	Waste from oil, gas, and geothermal activities subject to regulation by the Railroad Commission of Texas) [§330.171(b), §330.3(148)(P)]

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

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VOLUME 2 OF 4

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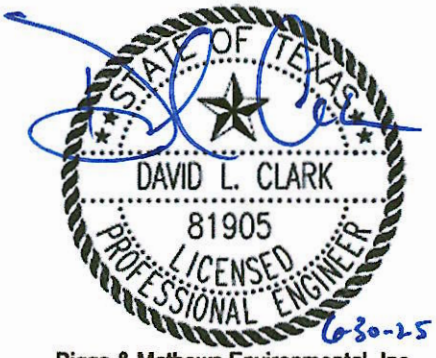

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GRAYSON COUNTY, TEXAS
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PERMIT AMENDMENT APPLICATION

VOLUME 2 OF 4

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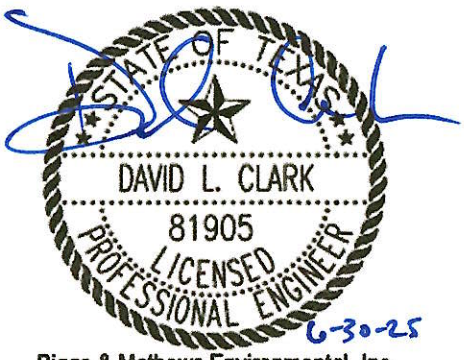

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PART III – FACILITY INVESTIGATION AND DESIGN

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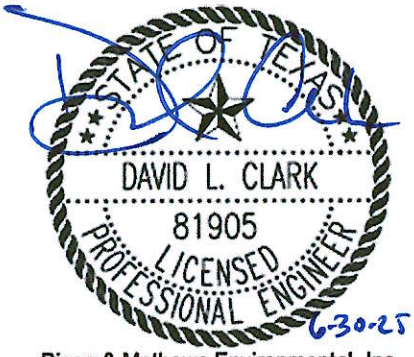

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GRAYSON COUNTY, TEXAS
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PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT B
GENERAL FACILITY DESIGN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

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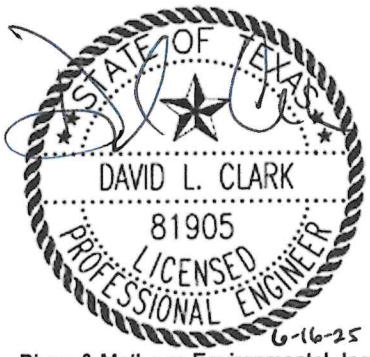
Revised June 2025



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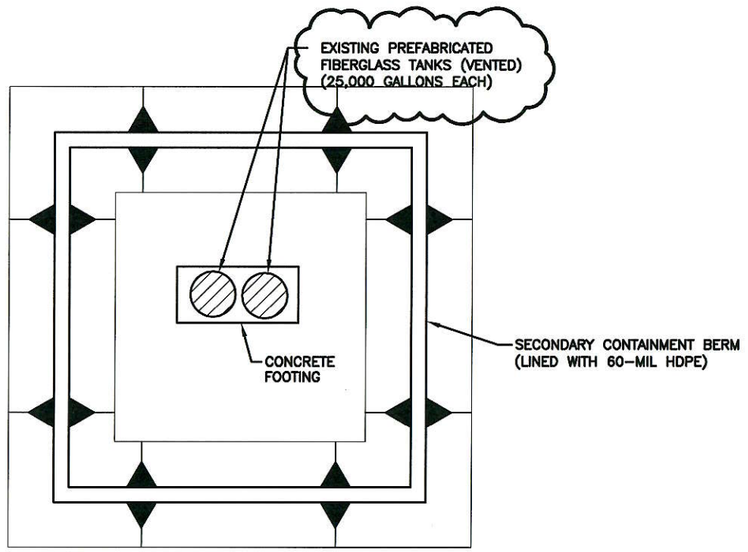
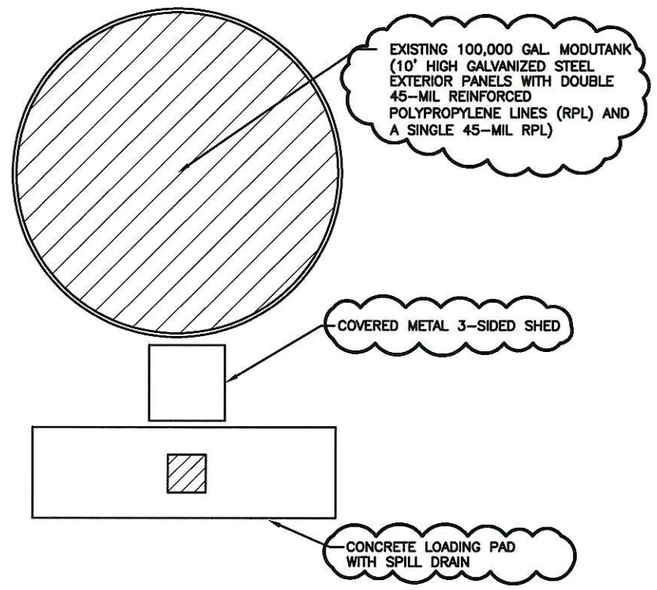
APPENDIX B1





LEACHATE STORAGE FACILITY PLAN 1 / B.3

REVISION NOTES:

1. **UPDATED MATERIALS DESCRIPTIONS.**

STATE OF TEXAS
DAVID L. CLARK
81905
LICENSED
PROFESSIONAL ENGINEER
6-10-25

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS			
1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

STORAGE FACILITIES SCHEMATIC

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

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BIGGS & MATHEWS ENVIRONMENTAL
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MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

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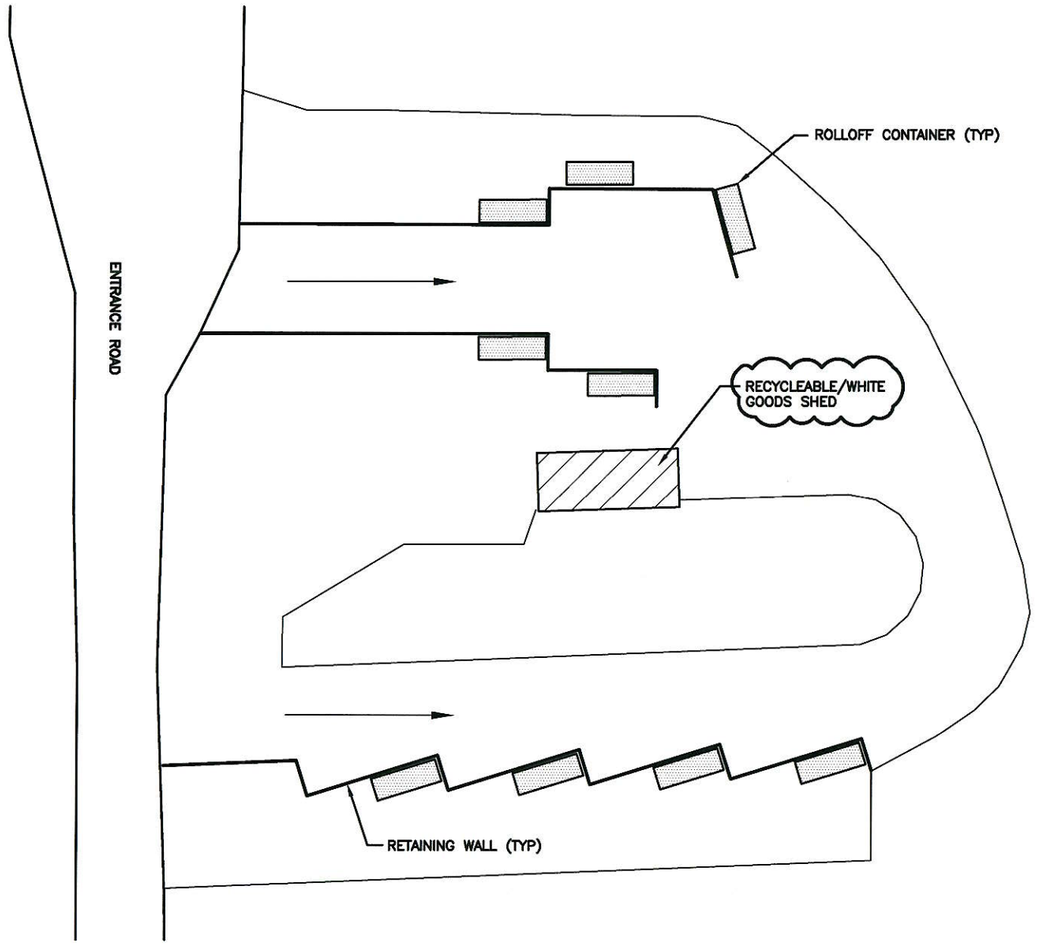

CITIZEN'S CONVENIENCE CENTER 1 B.4

0 25 50
SCALE IN FEET

REVISION NOTES:

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1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

CITIZEN'S CONVENIENCE CENTER SCHEMATIC

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
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1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

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B.4

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT C
FACILITY SURFACE WATER DRAINAGE REPORT

Prepared for

Texoma Area Solid Waste Authority, Inc.

February 2025
Revised June 2025

6/11/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

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6/11/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT C1
DRAINAGE ANALYSIS AND DESIGN

Prepared for

Texoma Area Solid Waste Authority

February 2025
Revised June 2025

6/11/2025

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6/11/2025

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4 POSTDEVELOPMENT CONDITIONS

Drawing C1-A-2 of Appendix C1A delineates the postdevelopment drainage areas that contribute runoff to the proposed permit boundary. Peak discharges at the comparison points along the proposed permit boundary, as shown on Drawing C1-A-2, were determined for the postdevelopment condition. Refer to Appendix C1C for postdevelopment hydrology calculations.

As in the current permitted condition:

Stormwater runoff does not enter the TASWA DRF permit boundary. The major portion of the stormwater runoff from the TASWA DRF enters unnamed tributaries of Mustang Creek at one location along the northern permit boundary. There is a second runoff location along the norther permit boundary just west of the primary runoff location. A minor portion of the stormwater runoff exits at four locations along the eastern permit boundary. The remaining portion of the stormwater runoff exits at four locations along the the western permit boundary.

There is an increase in runoff volume from the current permitted to post-development conditions at comparison points CP2, CP6, CP7, and CP8. This is primarily attributed to the increase in Curve Number (CN) values for the post-developed condition. In the current permitted condition, undeveloped areas have a CN value of 84. In the post-development condition, a CN value of 85 to 87 is used for all final cover areas in accordance with TCEQ guidance. The TCEQ has determined this CN value to be appropriate for landfill final cover systems as noted in RG-417. This increase in CN values results in reduced infiltration and greater surface runoff.

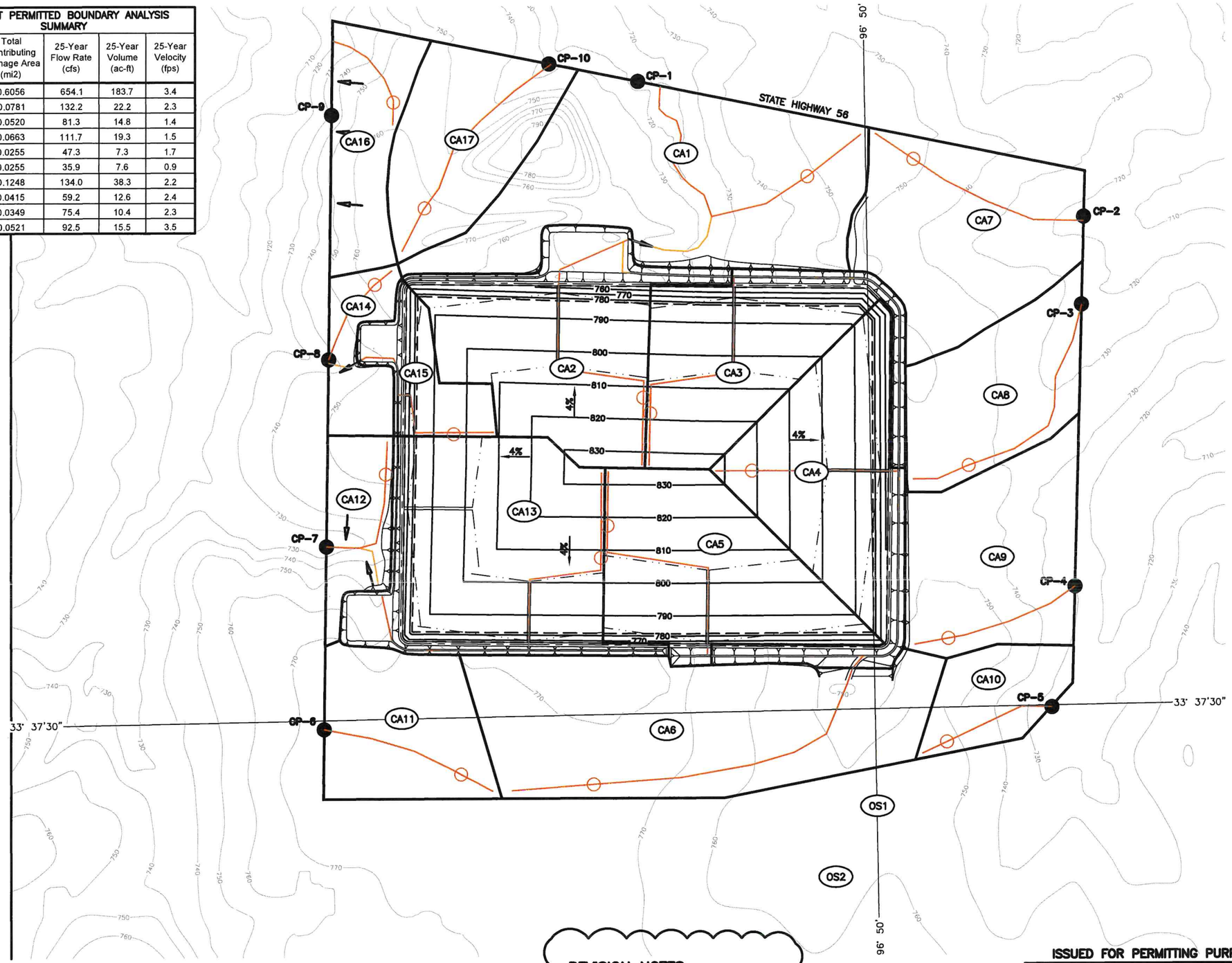
The runoff volume from CP2 drains to a TxDOT bar ditch, and then to a large tributary of Mustang Creek; the runoff volume from CP6, CP7, and CP8 drains into a large tributary of Mustang Creek. There are no water impoundments between the permit boundary and the tributaries that would be affected by the increased volumes, and because there is no increase in flow rate, no conveyances are adversely impacted. Despite this increase in runoff volume, the proposed drainage system design, including the strategically sized detention ponds with controlled release rates, ensures that the discharge from the site does not adversely alter existing drainage patterns at the permit boundary or in receiving streams. The detention ponds are designed to capture the increased volume and release it at a controlled rate that mimics pre-development flow conditions, thereby maintaining the natural drainage patterns downstream of the facility.

The locations where stormwater enters and exits the permit boundary are further discussed below in Table 2.

ATTACHMENT C1
APPENDIX C1A

CURRENT PERMITTED/POSTDEVELOPMENT COMPARISON

CURRENT PERMITTED BOUNDARY ANALYSIS SUMMARY				
Comparison Point	Total Contributing Drainage Area (mi2)	25-Year Flow Rate (cfs)	25-Year Volume (ac-ft)	25-Year Velocity (fps)
CP1	0.6056	654.1	183.7	3.4
CP2	0.0781	132.2	22.2	2.3
CP3	0.0520	81.3	14.8	1.4
CP4	0.0663	111.7	19.3	1.5
CP5	0.0255	47.3	7.3	1.7
CP6	0.0255	35.9	7.6	0.9
CP7	0.1248	134.0	38.3	2.2
CP8	0.0415	59.2	12.6	2.4
CP9	0.0349	75.4	10.4	2.3
CP10	0.0521	92.5	15.5	3.5



0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290 LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 800 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- CA01 DRAINAGE AREA DESIGNATION
- COMPARISON POINT–POINT DISCHARGE
- COMPARISON POINT–SHEET FLOW (NON–POINT DISCHARGE)

NOTE(S):

1. USGS CONTOURS DOWNLOADED FROM USGS WEBSITE ON MARCH 25, 2024.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.
4. DRAINAGE AREAS CONTRIBUTING TO EACH COMPARISON POINT ARE LISTED ON TABLE 1 – CURRENT PERMITTED BOUNDARY ANALYSIS SUMMARY IN SECTION 3 OF ATTACHMENT C1.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED
PROFESSIONAL ENGINEER
6/11/2025

REVISION NOTES:

1. FLOW PATH ADDED TO LEGEND.

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

CURRENT PERMITTED BOUNDARY ANALYSIS SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

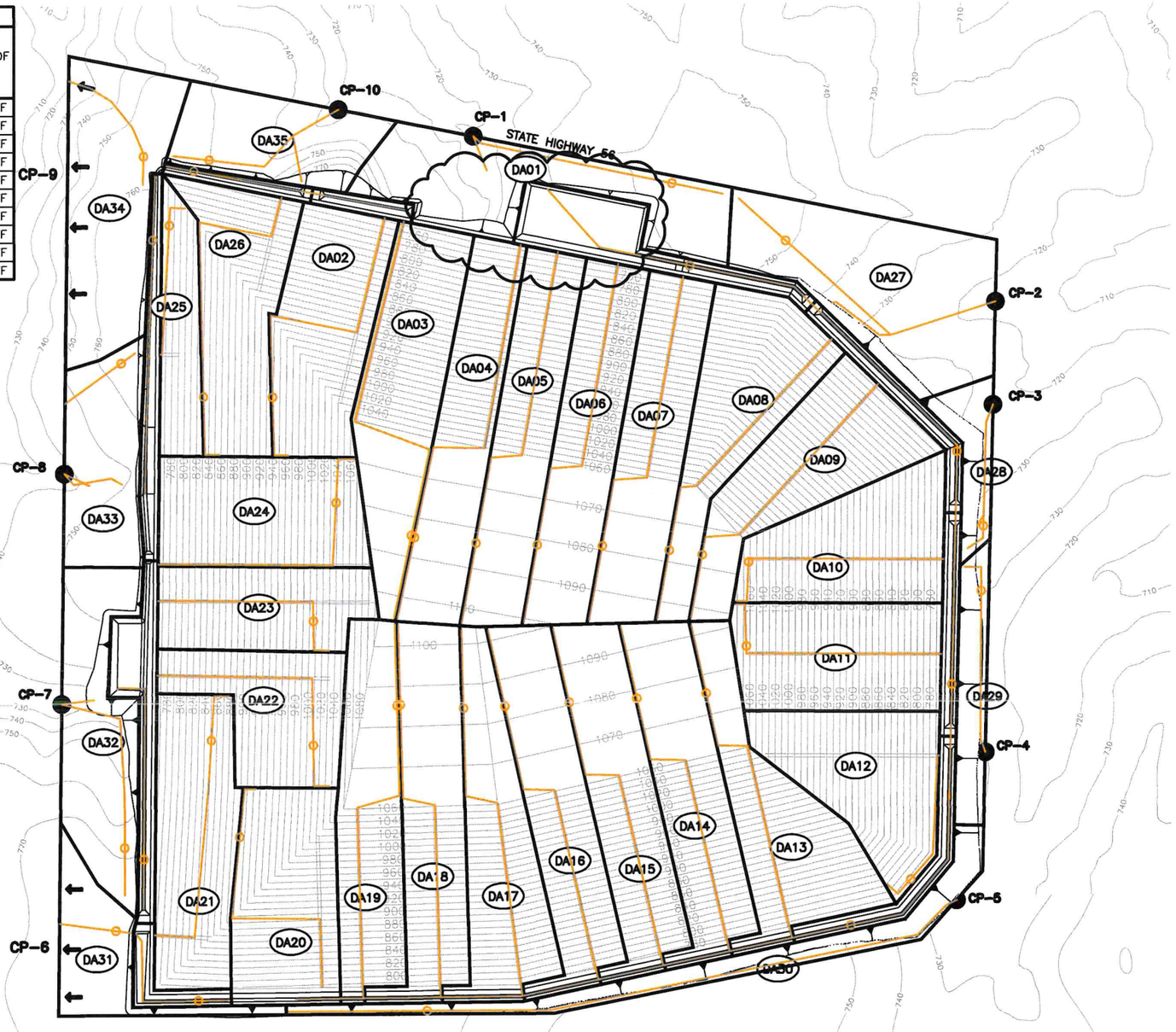
BME
BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD ◆ WICHITA FALLS
817–563–1144

TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

C1A.1

O:\TASWA\P\Drawings\ATT C\C1-A-1&C1-B-1.dwg Layout: C1-A-1 User: bboles

POST DEVELOPED BOUNDARY ANALYSIS SUMMARY					
BOUNDARY COMPARISON POINT	TOTAL CONTRIBUTING DRAINAGE AREA (mi2)	25-YEAR FLOW RATE (cfs)	25-YEAR VOLUME (ac-ft)	25-YEAR VELOCITY (fps)	TYPE OF FLOW
CP1	0.6832	596.4	176.5	3.3	RUNOFF
CP2	0.0456	128.4	23.7	2.2	RUNOFF
CP3	0.0088	80.1	13.7	1.4	RUNOFF
CP4	0.0111	110.3	18.7	1.4	RUNOFF
CP5	0.0195	30.1	5.8	2.4	RUNOFF
CP6	0.0161	36.0	9.9	0.6	RUNOFF
CP7	0.1592	131.2	44.8	2.2	RUNOFF
CP8	0.0449	57.0	13.8	2.4	RUNOFF
CP9	0.0363	77.2	10.8	2.3	RUNOFF
CP10	0.0557	47.5	9.1	2.7	RUNOFF



0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LIMIT OF WASTE
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- CA02 DRAINAGE AREA DESIGNATION
- COMPARISON POINT-POINT DISCHARGE
- COMPARISON POINT-SHEET FLOW (NON-POINT DISCHARGE)

NOTE(S):

1. USGS CONTOURS DOWNLOADED FROM USGS WEBSITE ON MARCH 25, 2024.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED
PROFESSIONAL ENGINEER
6/11/2025

REVISION NOTES:

1. POND 1 REDESIGN.
2. UPDATED SUMMARY TABLE.
3. FLOW PATHS ADDED.

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

POST DEVELOPED BOUNDARY ANALYSIS SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BME

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

C1A.2

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CURRENT PERMITTED/POSTDEVELOPED BOUNDARY ANALYSIS SUMMARY TABLE

CURRENT PERMITTED/POSTDEVELOPED BOUNDARY ANALYSIS SUMMARY TABLE

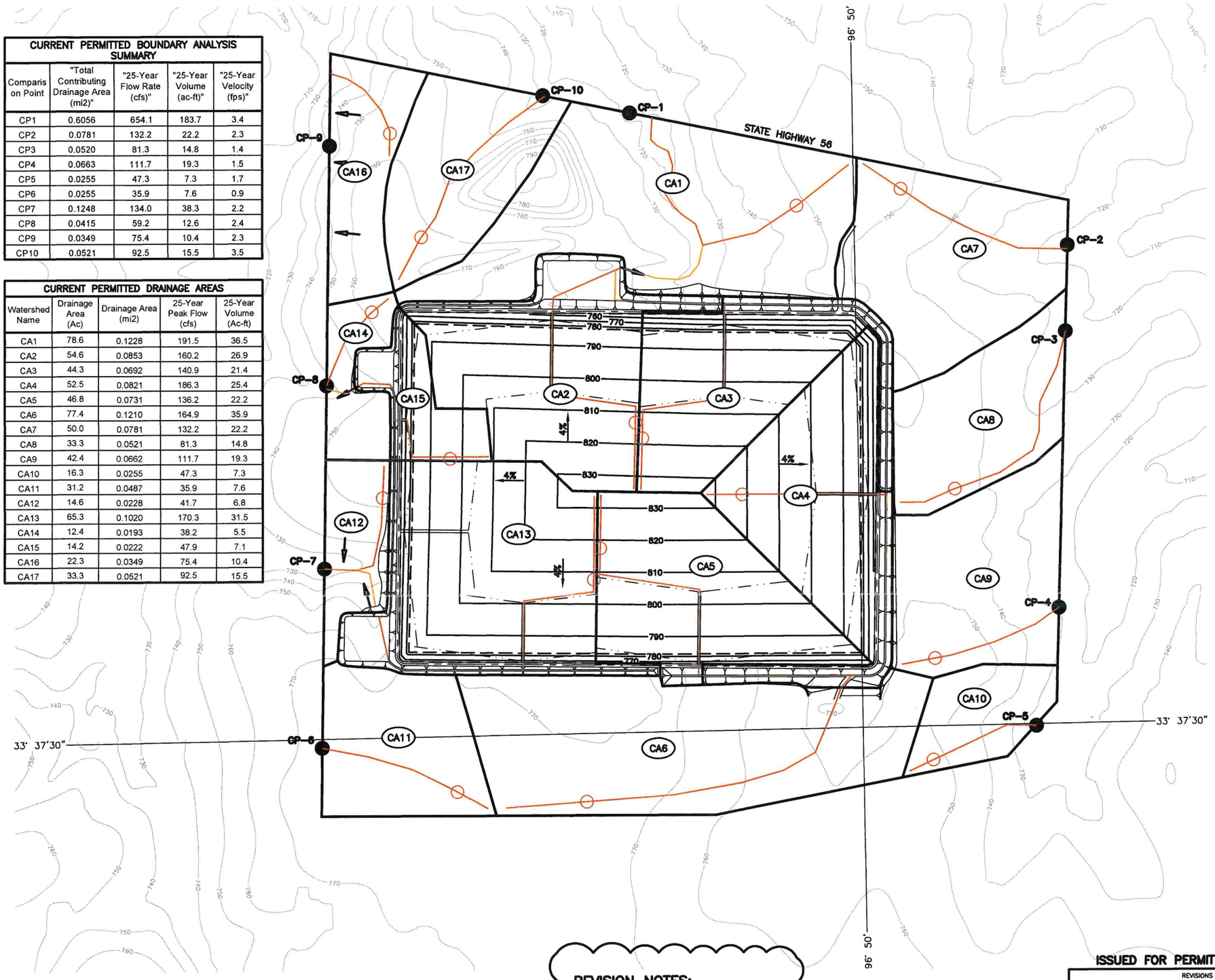
Discharge Point	Total Contributing Drainage Area (mi^2)				25-Year Flow Rate (cfs)				25-Year Volume (Ac-ft)				25-Year Velocity (fps)			
	Current Permitted	Post-Developed	Difference	Percent Difference	Current Permitted	Post-Developed	Difference	Percent Difference	Current Permitted	Post-Developed	Difference	Percent Difference	Current Permitted	Post-Developed	Difference	Percent Difference
CP1	0.6056	0.6832	0.0776	13%	654.1	596.4	-57.7	-9%	183.7	176.5	-7.2	-4%	3.4	3.3	-0.1	-3%
CP2	0.0781	0.0456	-0.0325	-42%	132.2	128.4	-3.8	-3%	22.2	23.7	1.5	7%	2.3	2.3	0.0	-1%
CP3	0.0520	0.0088	-0.0432	-83%	81.3	80.1	-1.2	-1%	14.8	13.7	-1.1	-7%	1.4	1.4	0.0	-1%
CP4	0.0663	0.0111	-0.0552	-83%	111.7	110.3	-1.4	-1%	19.3	18.7	-0.6	-3%	1.5	1.4	0.0	-1%
CP5	0.0255	0.0195	-0.0060	-24%	47.3	30.1	-17.2	-36%	7.3	5.8	-1.5	-21%	1.7	1.4	-0.3	-16%
CP6	0.0255	0.0161	-0.0094	-37%	35.9	36.0	0.1	0%	7.6	9.9	2.3	30%	0.9	0.6	-0.3	-37%
CP7	0.1248	0.1592	0.0344	28%	134.0	131.2	-2.8	-2%	38.3	44.8	6.5	17%	2.2	2.2	0.0	0%
CP8	0.0415	0.0449	0.0034	8%	59.2	57.0	-2.2	-4%	12.6	13.8	1.2	10%	2.4	2.4	0.0	-1%
CP9	0.0349	0.0363	0.0014	4%	75.4	77.2	1.8	2%	10.4	10.8	0.4	4%	2.3	2.3	0.0	1%
CP10	0.0521	0.0557	0.0036	7%	92.5	47.5	-45.0	-49%	15.5	9.1	-6.4	-41%	3.5	2.7	-0.8	-23%

ATTACHMENT C1
APPENDIX C1B

CURRENT PERMITTED HYDROLOGIC CALCULATIONS

CURRENT PERMITTED BOUNDARY ANALYSIS SUMMARY				
Comparison Point	"Total Contributing Drainage Area (mi2)"	"25-Year Flow Rate (cfs)"	"25-Year Volume (ac-ft)"	"25-Year Velocity (fps)"
CP1	0.6056	654.1	183.7	3.4
CP2	0.0781	132.2	22.2	2.3
CP3	0.0520	81.3	14.8	1.4
CP4	0.0663	111.7	19.3	1.5
CP5	0.0255	47.3	7.3	1.7
CP6	0.0255	35.9	7.6	0.9
CP7	0.1248	134.0	38.3	2.2
CP8	0.0415	59.2	12.6	2.4
CP9	0.0349	75.4	10.4	2.3
CP10	0.0521	92.5	15.5	3.5

CURRENT PERMITTED DRAINAGE AREAS				
Watershed Name	Drainage Area (Ac)	Drainage Area (mi2)	25-Year Peak Flow (cfs)	25-Year Volume (Ac-ft)
CA1	78.6	0.1228	191.5	36.5
CA2	54.6	0.0853	160.2	26.9
CA3	44.3	0.0692	140.9	21.4
CA4	52.5	0.0821	186.3	25.4
CA5	46.8	0.0731	136.2	22.2
CA6	77.4	0.1210	164.9	35.9
CA7	50.0	0.0781	132.2	22.2
CA8	33.3	0.0521	81.3	14.8
CA9	42.4	0.0662	111.7	19.3
CA10	16.3	0.0255	47.3	7.3
CA11	31.2	0.0487	35.9	7.6
CA12	14.6	0.0228	41.7	6.8
CA13	65.3	0.1020	170.3	31.5
CA14	12.4	0.0193	38.2	5.5
CA15	14.2	0.0222	47.9	7.1
CA16	22.3	0.0349	75.4	10.4
CA17	33.3	0.0521	92.5	15.5



0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 800 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- CA01 DRAINAGE AREA DESIGNATION
- COMPARISON POINT–POINT DISCHARGE
- COMPARISON POINT–SHEET FLOW (NON–POINT DISCHARGE)

NOTE(S):

1. EXISTING GROUND CONTOURS DOWNLOADED FROM USGS TNM DOWNLOAD PROGRAM. IMAGERY DATE AUGUST 19, 2022.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED
PROFESSIONAL ENGINEER
6/11/2025

REVISION NOTES:

1. FLOW PATH ADDED TO LEGEND.

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

CURRENT PERMITTED DRAINAGE AREA SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817–563–1144

TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

C1B.1

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unit hydrograph data, and reach characteristics. This information is included on pages C1B.9 and C1B.10.

The first table, titled Current Permitted Watershed Characteristics, page C1B.9, provides the summary of drainage areas, soil types, Curve Numbers (CN) values, initial loss, reach slope calculations, and determination of Manning's n value. The Soil Conservation Service (SCS) CN were derived from watershed characteristic tables from the SCS Technical Report 55 (TR-55), which included evaluation of soil and surface cover/condition characteristics. The second table, titled Unit Hydrograph Data – Snyder's Hydrograph Coefficients, page C1B.10, provides the determination of the Snyder's Unit Hydrograph parameters.

RAINFALL DATA

The hypothetical precipitation for the storm event for the facility was taken from the National Oceanic and Atmospheric Administration (NOAA) Point Precipitation Frequency Estimates (Atlas 14, Volume 11, Version 2). A return period of 25 years and a duration of 24 hours was used for the design storm. The rainfall data for the facility located in Grayson County, Texas is depicted in the table on page C1B.12.

CURRENT PERMITTED DRAINAGE STRUCTURE DESIGN PARAMETERS

Pages C1B.14 through C1B.16 include drainage structure data for the existing ponds~~,~~ and culverts ~~for the surface impoundments~~ incorporated into the hydrologic model.

HYDROLOGIC ANALYSIS

For the hydrologic evaluation, HEC-HMS was used for the precipitation-runoff simulation for the current permitted condition. The following describes the various modeling components. The HEC-HMS hydrologic analysis results begin on page C1B.18.

Watershed Subareas and Schematization

The drainage areas that contribute flow to the TASWA DRF 2290A permit boundary were delineated into subareas to derive peak flows to determine current permitted runon and runoff flows. Hydrographs are developed for each subarea and appropriately combined and routed through existing surface drainage features. The subareas are shown on Drawing C1-B-1, and pages C1B.18, 21 and 23 for the HEC-HMS schematic of the current permitted condition.

ATTACHMENT C1
APPENDIX C1C

POSTDEVELOPMENT HYDROLOGIC CALCULATIONS

POSTDEVELOPMENT NARRATIVE

30 TAC §330.305(a)

The post development hydrologic analysis represents the hydrologic calculations as defined by the landfill completion plan for the TASWA Solid Waste Disposal and Recycling Facility (TASWA DRF) MSW Permit No. 2290A in accordance with §330.305(a)-(d).

POSTDEVELOPMENT DRAINAGE AREA DRAWINGS

The Postdevelopment Drainage Area Summary (Drawing C1C.5) delineates the drainage areas that contribute stormwater runon or runoff to the proposed permit boundary. Drainage areas within the permit boundary are designated by the prefix "DA".

POSTDEVELOPMENT WATERSHED CHARACTERISTICS

Watershed characteristics have been developed for the postdevelopment hydrologic evaluation. The watershed characteristics address drainage area runoff characteristics, unit hydrograph data, reach characteristics, existing culverts, and the proposed final condition drainage system including the detention ponds. This information is included on pages C1C.7 and C1C.8.

The first table, titled Postdeveloped Watershed Characteristics, pages C1C.7 and C1C.8, provides the summary of drainage areas, soil types, Curve Numbers (CN) values, initial loss, reach slope calculations, and determination of Manning's n value. The Soil Conservation Service (SCS) CN were derived from watershed characteristic tables from the SCS Technical Report 55 (TR-55), which included evaluation of anticipated postdevelopment soil and surface cover/condition characteristics. The second table, titled Unit Hydrograph Data - Snyder's Hydrograph Coefficients, page C1C.9, provides the determination of the Snyder's Unit Hydrograph parameters. The runoff characteristics for the off-site drainage areas did not change from the current permitted condition.

POSTDEVELOPMENT DRAINAGE STRUCTURE DESIGN PARAMETERS

Pages C1C.10 through C1C.18 include drainage structure data for the existing and proposed ponds~~,~~ and culverts ~~for the surface impoundments~~ incorporated into the hydrologic model. The postdevelopment hydrologic model is defined by the landfill completion plan for the TASWA DRF MSW Permit No. 2290A.

HYDROLOGIC ANALYSIS

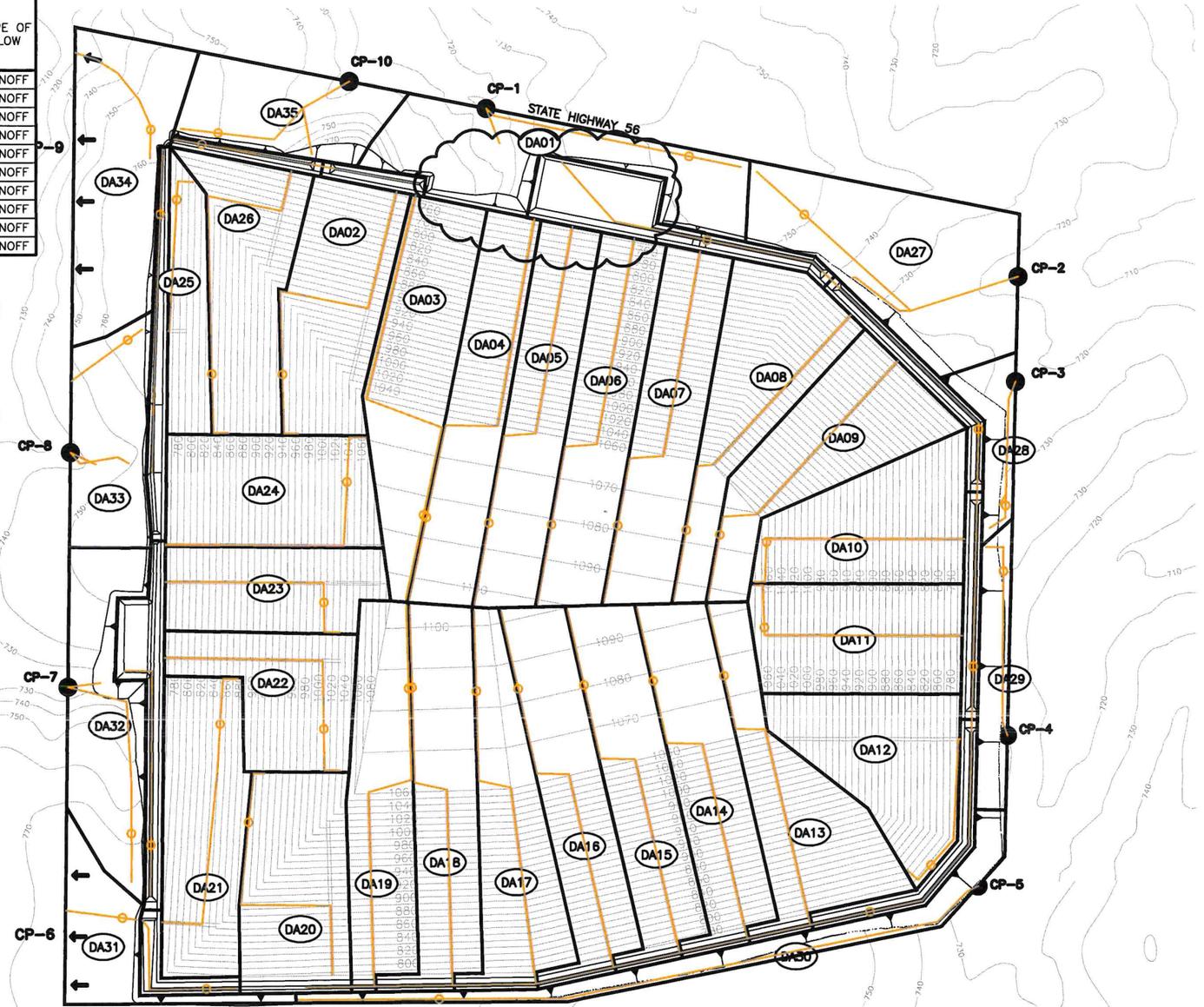
For the hydrologic evaluation, HEC-HMS was used for the precipitation runoff simulation for the postdevelopment condition. The following describes the various modeling components. The HEC-HMS hydrologic analysis results begin on page C1C.19.

POST DEVELOPED BOUNDARY ANALYSIS SUMMARY

BOUNDARY COMPARISON POINT	TOTAL CONTRIBUTING DRAINAGE AREA (mi2)	25-YEAR FLOW RATE (cfs)	25-YEAR VOLUME (ac-ft)	25-YEAR VELOCITY (fps)	TYPE OF FLOW
CP1	0.6832	596.4	176.5	3.3	RUNOFF
CP2	0.0456	128.4	23.7	2.2	RUNOFF
CP3	0.0088	80.1	13.7	1.4	RUNOFF
CP4	0.0111	110.3	18.7	1.4	RUNOFF
CP5	0.0195	30.1	5.8	2.4	RUNOFF
CP6	0.0161	36.0	9.9	0.6	RUNOFF
CP7	0.1592	131.2	44.8	2.2	RUNOFF
CP8	0.0449	57.0	13.8	2.4	RUNOFF
CP9	0.0363	77.2	10.8	2.3	RUNOFF
CP10	0.0557	47.5	9.1	2.7	RUNOFF

POST DEVELOPED DRAINAGE AREAS

WATERSHED NAME	AREA (ac)	25-YEAR FLOW RATE (cfs)	25-YEAR VOLUME (ac-ft)
DA1	22.0	65.9	10.9
POND 1	9.9	27.0	5.6
DA2	20.3	75.2	10.0
DA3	22.9	86.1	11.1
DA4	20.1	75.5	9.7
DA5	20.5	77.0	2.4
DA6	20.8	79.8	10.1
DA7	20.8	79.8	10.1
DA8	20.7	82.0	10.2
DA9	20.8	85.9	10.3
DA10	19.5	86.5	9.6
DA11	19.6	86.8	0
DA12	19.3	54.1	9.5
DA13	20.9	83.0	10.3
DA14	20.7	79.3	10.0
DA15	21.0	80.6	10.1
DA16	21.1	79.4	10.2
DA17	20.4	76.7	9.9
DA18	21.2	79.6	10.2
DA19	20.0	74.4	9.7
DA20	19.8	72.1	9.7
DA21	20.9	79.9	10.3
DA22	16.1	70.0	7.9
DA23	15.4	68.5	7.6
DA24	20.0	92.3	9.9
DA25	9.1	26.0	4.5
DA26	19.5	67.7	0
DA27	29.2	81.0	13.5
DA28	5.6	16.5	2.6
DA29	7.1	13.7	3.3
DA30	12.5	30.1	5.8
DA31	10.3	24.2	4.8
DA32	19.2	58.8	8.9
POND 2	7.5	22.1	35.9
DA33	14.5	48.5	6.7
POND 3	5.1	12.1	7.0
DA34	23.2	77.2	10.8
DA35	14.4	42.0	6.7



0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LIMIT OF WASTE
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- CA01 DRAINAGE AREA DESIGNATION
- COMPARISON POINT-POINT DISCHARGE
- COMPARISON POINT-SHEET FLOW (NON-POINT DISCHARGE)

NOTE(S):

1. EXISTING GROUND CONTOURS DOWNLOADED FROM USGS WEBSITE ON MARCH 25, 2024.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED PROFESSIONAL ENGINEER
6/11/2025

REVISION NOTES:

1. POND 1 REDESIGN.
2. UPDATED DRAINAGE AREAS TABLE AND SUMMARY TABLE.
3. FLOW PATHS ADDED.

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	OWN BY

POST DEVELOPED DRAINAGE AREA SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

C1C.1

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POSTDEVELOPED WATERSHED CHARACTERISTICS

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
UNIT HYDROGRAPH DATA
Postdeveloped Watershed Characteristics

			CN Determination						Main Reach Slope Calculation (for Espey Method)					Mannings "n" Determination			
Watershed Name	Watershed Area (ac)	Watershed Area (sq mi)	Non-Final Cover Area (ac) CN = 84	Final Cover Topslope Area (ac) CN = 85	Final Cover Sideslope Area (ac) CN = 87	Channel Area (ac) CN=87	Pond Area (ac) CN = 98	CN	Longest Reach (ft)	20% of Reach Length (ft)	Elevation @ 20% Reach Length from Upstream	Downstream Elevation	Slope (ft/ft)	Sheet Flow % of n = 0.070	Shallow Concentrated or Swale Flow	Channelized Flow % of n = 0.035	Composite n
DA01	22.0	0.0344	0.0	0.0	22.0	0.0	0.0	87	1600	320	752.0	720.0	0.0250	20	40	40	0.048
DA02	20.3	0.0317	0.0	0.0	20.3	0.0	0.0	87	2220	444	936.2	745.8	0.1072	5	25	70	0.041
DA03	22.9	0.0358	0.0	8.3	14.6	0.0	0.0	86	2600	520	1085.0	742.0	0.1649	10	25	65	0.042
DA04	20.1	0.0314	0.0	9.9	10.2	0.0	0.0	86	2560	512	1085.0	740.8	0.1681	10	25	65	0.042
DA05	20.5	0.0320	0.0	9.5	11.0	0.0	0.0	86	2510	502	1084.0	742.6	0.1700	10	25	65	0.042
DA06	20.8	0.0325	0.0	9.5	11.3	0.0	0.0	86	2430	486	1081.0	744.6	0.1730	10	25	65	0.042
DA07	20.8	0.0325	0.0	8.8	12.0	0.0	0.0	86	2350	470	1079.0	746.6	0.1768	15	25	60	0.044
DA08	20.7	0.0323	0.0	4.0	16.7	0.0	0.0	87	2160	432	1077.0	752.0	0.1881	15	30	55	0.045
DA09	20.8	0.0325	0.0	3.6	17.2	0.0	0.0	87	1980	396	1077.0	754.0	0.2039	15	20	65	0.043
DA10	19.5	0.0305	0.0	0.0	19.5	0.0	0.0	87	1540	308	1060.0	760.0	0.2435	5	15	80	0.039
DA11	19.6	0.0306	0.0	0.0	19.6	0.0	0.0	87	1570	314	1063.0	762.6	0.2392	5	20	75	0.040
DA12	19.3	0.0302	0.0	0.0	19.3	0.0	0.0	87	1030	206	773.6	765.4	0.0100	10	60	30	0.048
DA13	20.9	0.0327	0.0	4.2	15.8	0.9	0.0	87	2170	434	1075.0	764.7	0.1787	15	30	55	0.045
DA14	20.7	0.0323	0.0	8.6	11.1	1.0	0.0	86	2270	454	1078.0	766.4	0.1716	15	25	60	0.044
DA15	21.0	0.0328	0.0	9.2	10.8	1.0	0.0	86	2350	470	1080.0	768.2	0.1659	15	25	60	0.044
DA16	21.1	0.0330	0.0	9.7	10.3	1.1	0.0	86	2410	482	1083.0	770.0	0.1623	10	25	65	0.042
DA17	20.4	0.0319	0.0	6.7	12.4	1.3	0.0	86	2440	488	1084.0	772.1	0.1598	10	25	65	0.042
DA18	21.2	0.0331	0.0	10.2	9.9	1.1	0.0	86	2460	492	1086.0	774.3	0.1584	10	25	65	0.042
DA19	20.0	0.0313	0.0	6.1	13.5	0.4	0.0	86	2510	502	1065.0	776.4	0.1437	10	25	65	0.042
DA20	19.8	0.0309	0.0	0.0	18.1	1.7	0.0	87	1840	368	900.0	786.0	0.0774	5	35	60	0.042
DA21	20.9	0.0327	0.0	0.0	20.9	0.0	0.0	87	1840	368	881.7	776.7	0.0713	5	35	60	0.042
DA22	16.1	0.0252	0.0	0.0	16.1	0.0	0.0	87	1730	346	1007.5	763.4	0.1764	5	35	60	0.042
DA23	15.4	0.0241	0.0	0.0	15.4	0.0	0.0	87	1360	272	1003.1	762.0	0.2216	5	20	75	0.040
DA24	20.0	0.0313	0.0	0.0	20.0	0.0	0.0	87	1850	370	1043.8	762.0	0.1904	5	30	65	0.041

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
UNIT HYDROGRAPH DATA
Postdeveloped Watershed Characteristics

			CN Determination						Main Reach Slope Calculation (for Espey Method)					Mannings "n" Determination			
Watershed Name	Watershed Area (ac)	Watershed Area (sq mi)	Non-Final Cover Area (ac) CN = 84	Final Cover Topslope Area (ac) CN = 85	Final Cover Sideslope Area (ac) CN = 87	Channel Area (ac) CN=87	Pond Area (ac) CN = 98	CN	Longest Reach (ft)	20% of Reach Length (ft)	Elevation @ 20% Reach Length from Upstream	Downstream Elevation	Slope (ft/ft)	Sheet Flow % of n = 0.070	Shallow Concentrated or Swale Flow	Channelized Flow % of n = 0.035	Composite n
DA25	9.1	0.0142	0.0	0.0	9.1	0.0	0.0	87	1010	202	769.5	761.7	0.0097	10	60	30	0.048
DA26	19.5	0.0305	0.0	0.0	19.5	0.0	0.0	87	2240	448	827.8	752.2	0.0422	5	25	70	0.041
DA27	29.2	0.0456	29.2	0.0	0.0	0.0	0.0	84	1950	390	751.0	717.0	0.0218	15	30	55	0.045
DA28	5.6	0.0088	5.6	0.0	0.0	0.0	0.0	84	950	190	732.0	725.0	0.0092	10	0	90	0.039
DA29	7.1	0.0111	7.1	0.0	0.0	0.0	0.0	84	1260	252	730.0	729.0	0.0010	10	0	90	0.039
DA30	12.5	0.0195	12.5	0.0	0.0	0.0	0.0	84	4270	854	772.0	728.0	0.0129	5	15	80	0.039
DA31	10.3	0.0161	10.3	0.0	0.0	0.0	0.0	84	440	88	773.0	772.0	0.0028	70	30	0	0.064
DA32	19.2	0.0300	19.2	0.0	0.0	0.0	0.0	84	1460	292	767.0	728.0	0.0334	20	40	40	0.048
DA33	14.5	0.0227	14.5	0.0	0.0	0.0	0.0	84	530	106	762.0	747.0	0.0354	55	45	0	0.061
DA34	23.2	0.0363	23.2	0.0	0.0	0.0	0.0	84	870	174	756.0	720.0	0.0517	35	65	0	0.057
DA35	14.4	0.0225	14.4	0.0	0.0	0.0	0.0	84	1160	232	750.0	728.0	0.0237	25	70	5	0.054
I-02A	1.7	0.0027	0.0	0.0	0.0	1.7	0.0	87	840	168	753.5	744.0	0.0141	35	65	0	0.057
I-08A	4.0	0.0063	0.0	0.0	0.0	4.0	0.0	87	1520	304	749.2	743.2	0.0049	20	70	10	0.053
I-10A	3.3	0.0052	0.0	0.0	0.0	3.3	0.0	87	1230	246	755.4	751.2	0.0043	25	70	5	0.054
I-12A	4.5	0.0070	0.0	0.0	0.0	4.5	0.0	87	1820	364	763.2	757.1	0.0042	15	70	15	0.051
I-21A	2.7	0.0042	0.0	0.0	0.0	1.7	1.0	91	970	194	777.4	772.0	0.0070	30	70	0	0.056
P1P	9.9	0.0155	0.0	0.0	0.0	2.9	7.0	94	2092	418	742.4	728.0	0.0086	0	70	30	0.046
P2P	7.5	0.0117	0.0	0.0	0.0	4.5	3.0	91	1540	308	761.3	749.0	0.0100	0	70	30	0.046
P3P	5.1	0.0080	0.0	0.0	0.0	4.2	0.9	89	1960	392	755.1	750.0	0.0033	0	70	30	0.046
I-03	1.5	0.0023	0.0	0.0	0.0	0.0	1.5	98	630	126	750.0	743.0	0.0139	0	70	30	0.046

UNIT HYDROGRAPH DATA

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

Postdeveloped Conditions

Watershed Name	Longest Reach (ft)	Slope (ft/ft)	Impervious Cover %	Manning's "n"	Eff. Coeff.	Tr (min)	Tlag (min)	Area (sq mi)	qp (cfs/sq mi)	Tlag (hr)	Cp
					(A)	(B)	(C)		(D)		(E)
DA01	1600	0.0250	2.0	0.048	0.90	31.7	29.2	0.0344	895.1	0.49	0.68
DA02	2220	0.1072	2.0	0.041	0.88	22.8	20.3	0.0317	1277.4	0.34	0.68
DA03	2600	0.1649	2.0	0.042	0.88	21.2	18.7	0.0358	1372.0	0.31	0.67
DA04	2560	0.1681	2.0	0.042	0.88	21.1	18.6	0.0314	1391.5	0.31	0.67
DA05	2510	0.1700	2.0	0.042	0.88	20.9	18.4	0.0320	1401.5	0.31	0.67
DA06	2430	0.1730	2.0	0.042	0.88	20.7	18.2	0.0325	1418.6	0.30	0.67
DA07	2350	0.1768	2.0	0.044	0.88	20.4	17.9	0.0325	1438.6	0.30	0.67
DA08	2160	0.1881	2.0	0.045	0.88	19.7	17.2	0.0323	1493.5	0.29	0.67
DA09	1980	0.2039	2.0	0.043	0.88	18.9	16.4	0.0325	1558.9	0.27	0.67
DA10	1540	0.2435	2.0	0.039	0.85	16.4	13.9	0.0305	1819.7	0.23	0.66
DA11	1570	0.2392	2.0	0.040	0.85	16.6	14.1	0.0306	1802.0	0.23	0.66
DA12	1030	0.0100	2.0	0.048	0.90	36.1	33.6	0.0302	783.8	0.56	0.69
DA13	2170	0.1787	2.0	0.045	0.88	20.0	17.5	0.0327	1471.1	0.29	0.67
DA14	2270	0.1716	2.0	0.044	0.88	20.4	17.9	0.0323	1439.6	0.30	0.67
DA15	2350	0.1659	2.0	0.044	0.88	20.7	18.2	0.0328	1413.7	0.30	0.67
DA16	2410	0.1623	2.0	0.042	0.88	21.0	18.5	0.0330	1396.6	0.31	0.67
DA17	2440	0.1598	2.0	0.042	0.88	21.1	18.6	0.0319	1388.4	0.31	0.67
DA18	2460	0.1584	2.0	0.042	0.88	21.2	18.7	0.0331	1380.2	0.31	0.67
DA19	2510	0.1437	2.0	0.042	0.88	21.8	19.3	0.0313	1341.3	0.32	0.67
DA20	1840	0.0774	2.0	0.042	0.88	23.7	21.2	0.0309	1227.6	0.35	0.68
DA21	1840	0.0713	2.0	0.042	0.88	24.2	21.7	0.0327	1198.3	0.36	0.68
DA22	1730	0.1764	2.0	0.042	0.88	19.0	16.5	0.0252	1566.2	0.28	0.67
DA23	1360	0.2216	2.0	0.040	0.85	16.3	13.8	0.0241	1846.8	0.23	0.67
DA24	1850	0.1904	2.0	0.041	0.88	19.0	16.5	0.0313	1558.8	0.27	0.67
DA25	1010	0.0097	2.0	0.048	0.90	36.2	33.7	0.0142	805.1	0.56	0.71
DA26	2240	0.0422	2.0	0.041	0.88	28.9	26.4	0.0305	994.8	0.44	0.68
DA27	1950	0.0218	2.0	0.045	0.88	33.0	30.5	0.0456	848.8	0.51	0.67
DA28	950	0.0092	2.0	0.039	0.85	33.3	30.8	0.0088	897.1	0.51	0.72
DA29	1260	0.0010	2.0	0.039	0.85	62.0	59.5	0.0111	456.7	0.99	0.71
DA30	4270	0.0129	2.0	0.039	0.85	43.3	40.8	0.0195	656.5	0.68	0.70
DA31	440	0.0028	2.0	0.064	0.96	45.2	42.7	0.0161	631.2	0.71	0.70
DA32	1460	0.0334	2.0	0.048	0.90	28.9	26.4	0.0300	994.6	0.44	0.68
DA33	530	0.0354	2.0	0.061	0.96	25.1	22.6	0.0227	1167.6	0.38	0.69
DA34	870	0.0517	2.0	0.057	0.94	24.7	22.2	0.0363	1167.3	0.37	0.67
DA35	1160	0.0237	2.0	0.054	0.93	31.4	28.9	0.0225	921.0	0.48	0.69
I-02A	640	0.0141	2.0	0.057	0.94	33.9	31.4	0.0027	923.9	0.52	0.76
I-08A	1520	0.0049	2.0	0.053	0.93	49.4	46.9	0.0063	596.0	0.78	0.73
I-10A	1230	0.0043	2.0	0.054	0.93	48.8	46.3	0.0052	608.7	0.77	0.73
I-12A	1820	0.0042	2.0	0.051	0.93	53.7	51.2	0.0070	543.2	0.85	0.72
I-21A	970	0.0070	2.0	0.056	0.94	41.8	39.3	0.0042	724.2	0.66	0.74
P1P	2092	0.0086	2.0	0.046	0.90	44.0	41.5	0.0155	650.3	0.69	0.70
P2P	1540	0.0100	2.0	0.046	0.90	39.5	37.0	0.0117	737.9	0.62	0.71
P3P	1960	0.0033	2.0	0.046	0.90	55.3	52.8	0.0080	523.2	0.88	0.72
I-03	630	0.0139	2.0	0.046	0.90	29.6	27.1	0.0023	1072.6	0.45	0.76

(A) Conveyance efficiency from Dodson & Associates, Inc. Hands-On HEC-1, February 1999, pgs 6-19.

(B) $Tr=3.1(L^{0.23})(S^{-0.25})(I^{-0.18})(Effcoef^{1.57})$

(C) $Tlag=Tr-(5/2)$

(D) $qp=31600(A^{-0.04})(Tr^{-1.07})$

(E) $Cp=49.375(A^{-0.04})(Tr^{-1.07})(Tlag)$

Tr = Surface runoff to unit hydrograph peak (min)

L = Distance along main channel from study point to watershed boundary

S = Main channel slope (ft/ft)

I = Impervious cover within the watershed

Tlag = Watershed lag time (min)

qp = Hydrograph peak discharge (cfs/sq. mi.)

Cp = Snyder's peaking coefficient

POSTDEVELOPMENT DRAINAGE STRUCTURE DESIGN PARAMETERS

Pond Data for HEC-HMS
Pond 1 Post

Reservoir

Description:	
Downstream:	R1
Method:	Outflow Structures
Storage Method:	Elevation-Storage
Stor-Dis Function:	Pond 1 Post
Initial Condition:	Inflow = Outflow
Main Tailwater:	Assume None
Auxiliary:	None
Time Step Method:	Automatic Adaptation
Outlets:	1
Spillways:	1
Dam Tops:	1
Pumps:	0
Dam Break:	No
Dam Seepage:	No
Release:	No
Evaporation:	No

Outlet

Method:	Culvert Outlet	
Direction:	Main	
Number Barrels:	2	
Solution Method:	Automatic	
Shape:	Box	
Chart:	8: Flared Wingwalls	
Scale:	1:Wingwalls flared 30 to 75 degrees	
Length:	150	ft
Rise:	3	ft
Span:	6	ft
Inlet Elevation:	728	ft
Entrance Coefficient:	0.5	
Outlet Elevation:	727	
Exit Coefficient:	1	
Mannings n:	0.013	

Spillway

Method:	Broad-Crested Spillway
Direction:	Main
Elevation:	737.5 ft
Length:	100 ft
Coefficient:	2.6
Gates:	0

Dam Tops

Method:	Level Overflow
Direction:	Main
Elevation:	738
Length:	1190
Coefficient:	2.6

Paired Data
Elevation-Storage
Pond 1 Post

Elevation	Storage Cumulative		Incremental
(ft)	(ac-ft)	(cy)	(cy)
728.7	0.004	5.8	5.8
729.0	0.205	330.8	325.0
730.0	1.083	1,746.8	1,416.0
731.0	3.134	5,055.5	3,308.7
732.0	6.632	10,699.7	5,644.2
733.0	11.249	18,147.8	7,448.1
734.0	16.512	26,639.2	8,491.4
735.0	22.128	35,700.5	9,061.3
736.0	28.009	45,188.2	9,487.7
737.0	34.182	55,147.3	9,959.1
738.0	40.660	65,598.0	10,450.7
739.0	47.421	76,505.3	10,907.3
740.0	54.467	87,874.1	11,368.8
741.0	61.791	99,688.7	11,814.6

Pond Data for HEC-HMS
I-02

Reservoir

Description:	
Downstream:	R35
Method:	Outflow Structures
Storage Method:	Elevation-Storage
Stor-Dis Function:	I-02
Initial Condition:	Inflow = Outflow
Main Tailwater:	Assume None
Auxiliary:	None
Time Step Method:	Automatic Adaptation
Outlets:	2
Spillways:	0
Dam Tops:	0
Pumps:	0
Dam Break:	No
Dam Seepage:	No
Release:	No
Evaporation:	No

Paired Data

Elevation-Storage
I-02

Elevation	Storage Cumulative		Incremental
(ft)	(ac-ft)	(cy)	(cy)
744.0	0.000	0.0	0.0
745.0	0.010	16.9	16.9
746.0	0.052	83.9	67.0
747.0	0.139	223.8	139.9
748.0	0.285	459.2	235.4
749.0	0.504	813.0	353.8
750.0	0.811	1,307.8	494.8
751.0	1.216	1,962.3	654.5

Outlet 1

Method:	Culvert Outlet	
Direction:	Main	
Number Barrels:	1	
Solution Method:	Automatic	
Shape:	Circular	
Chart:	1: Concrete Pipe Culvert	
Scale:	1: Square edge entrance with headwall	
Length:	150	ft
Diameter:	1	ft
Inlet Elevation:	744	ft
Entrance Coefficient:	0.5	
Outlet Elevation:	743.5	
Exit Coefficient:	1	
Mannings n:	0.013	

Outlet 2

Method:	Culvert Outlet	
Direction:	Auxiliary	
Number Barrels:	1	
Solution Method:	Automatic	
Shape:	Circular	
Chart:	1: Concrete Pipe Culv	
Scale:	1: Square edge entrar	
Length:	150	ft
Diameter:	2.25	ft
Inlet Elevation:	744	ft
Entrance Coefficient:	0.5	
Outlet Elevation:	743.5	
Exit Coefficient:	1	
Mannings n:	0.013	

Pond Data for HEC-HMS
I-03

Reservoir

Description:	
Downstream:	CP01
Method:	Outflow Structures
Storage Method:	Elevation-Storage
Stor-Dis Function:	I-03
Initial Condition:	Inflow = Outflow
Main Tailwater:	Assume None
Auxiliary:	None
Time Step Method:	Automatic Adaptation
Outlets:	1
Spillways:	1
Dam Tops:	1
Pumps:	0
Dam Break:	No
Dam Seepage:	No
Release:	No
Evaporation:	No

Outlet

Method:	Culvert Outlet	
Direction:	Main	
Number Barrels:	1	
Solution Method:	Automatic	
Shape:	Circular	
Chart:	1: Concrete Pipe Culvert	
Scale:	1: Square edge entrance with headwall	
Length:	150	ft
Diameter:	3	ft
Inlet Elevation:	734.5	ft
Entrance Coefficient:	0.5	
Outlet Elevation:	733.5	
Exit Coefficient:	1	
Mannings n:	0.013	

Spillway

Method:	Broad-Crested Spillway
Direction:	Main
Elevation:	742.87 ft
Length:	100 ft
Coefficient:	2.6
Gates:	0

Dam Tops

Method:	Level Overflow
Direction:	Main
Elevation:	743.37
Length:	630
Coefficient:	2.6

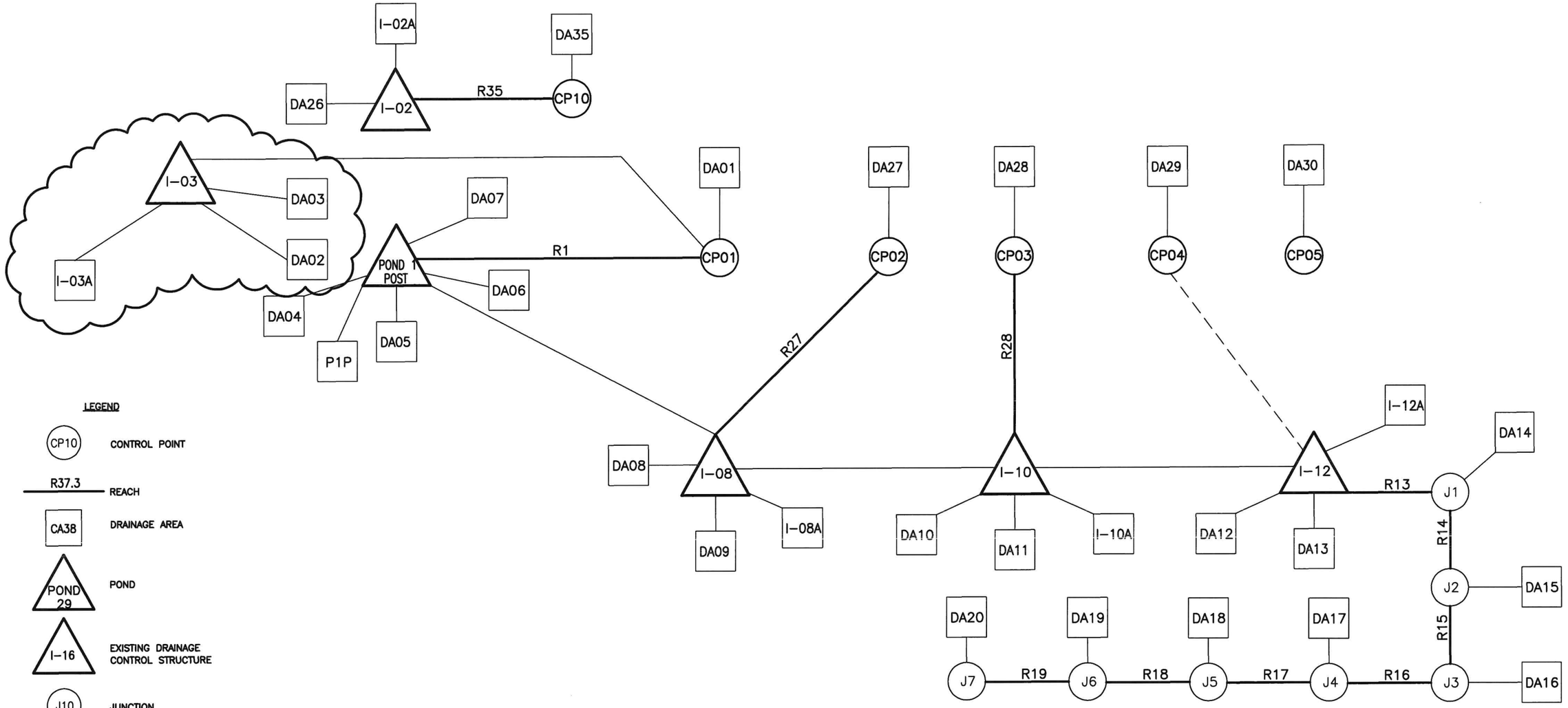
Paired Data

Elevation-Storage

I-03

Elevation	Storage Cumulative		Incremental
(ft)	(ac-ft)	(cy)	(cy)
734.5	0.002	3.3	3.3
735.0	0.026	41.7	38.4
736.0	0.088	142.4	100.7
737.0	0.204	328.9	186.5
738.0	0.387	624.8	295.9
739.0	0.653	1,053.4	428.6
740.0	1.015	1,638.2	584.8
741.0	1.489	2,402.2	764.0
742.0	2.075	3,347.9	945.7
743.0	2.771	4,470.5	1,122.6
744.0	3.564	5,750.1	1,279.6
745.0	4.437	7,159.1	1,409.0

POSTDEVELOPED HYDROLOGIC ANALYSIS
25-YEAR, 24-HOUR STORM EVENT



LEGEND

- CP10 — CONTROL POINT
- R37.3 — REACH
- CA38 — DRAINAGE AREA
- POND 29 — POND
- I-16 — EXISTING DRAINAGE CONTROL STRUCTURE
- J10 — JUNCTION

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED
PROFESSIONAL ENGINEER
6/11/2025

ISSUED FOR PERMITTING PURPOSES

REV	DATE	DESCRIPTION	DWN BY
		REVISIONS	
1	06/25	NOD 1 RESPONSE	BBB

NORTH AND EAST SCHEMATIC BOUNDARY ANALYSIS SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

C1C.2

O:\TASWA\P\Drawings\ATT C\C1-C-5_PostDrngGraph.dwg Layout: GraphDW User: bboles

Project:	2024 TASWA	Simulation Run:	North Post alternative
Start of Run:	01Jan2024, 00:00	Basin Model:	North Post
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications	Control 1

Hydrologic Element	Drainage Area (MI^2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
CP01	0.6807	596.4	1 January 2024, 12:40	176.5
CP02	0.0456	128.4	1 January 2024, 12:35	23.7
CP03	0.0088	80.1	1 January 2024, 12:35	13.7
CP04	0.0111	110.3	1 January 2024, 12:35	18.7
CP05	0.0195	30.1	1 January 2024, 12:45	5.8
CP10	0.0557	47.5	1 January 2024, 12:30	9.1
DA01	0.0344	65.9	1 January 2024, 12:30	10.9
DA02	0.0317	75.2	1 January 2024, 12:25	10
DA03	0.0358	86.1	1 January 2024, 12:20	11.1
DA04	0.0314	75.5	1 January 2024, 12:20	9.7
DA05	0.032	77	1 January 2024, 12:20	9.9
DA06	0.0325	79.8	1 January 2024, 12:20	10.1
DA07	0.0325	79.8	1 January 2024, 12:20	10.1
DA08	0.0323	82	1 January 2024, 12:20	10.2
DA09	0.0325	85.9	1 January 2024, 12:20	10.3
DA10	0.0305	86.5	1 January 2024, 12:15	9.6
DA11	0.0306	86.8	1 January 2024, 12:15	9.7
DA12	0.0302	54.1	1 January 2024, 12:35	9.5
DA13	0.0327	83	1 January 2024, 12:20	10.3
DA14	0.0323	79.3	1 January 2024, 12:20	10
DA15	0.0328	80.6	1 January 2024, 12:20	10.1
DA16	0.033	79.4	1 January 2024, 12:20	10.2
DA17	0.0319	76.7	1 January 2024, 12:20	9.9
DA18	0.0331	79.6	1 January 2024, 12:20	10.2
DA19	0.0313	74.4	1 January 2024, 12:20	9.7
DA20	0.0309	72.1	1 January 2024, 12:25	9.7
DA26	0.0305	62.7	1 January 2024, 12:30	9.6
DA27	0.0456	81	1 January 2024, 12:35	13.5
DA28	0.0088	16.5	1 January 2024, 12:35	2.6
DA29	0.0111	13.7	1 January 2024, 13:00	3.3
DA30	0.0195	30.1	1 January 2024, 12:45	5.8
DA35	0.0225	42	1 January 2024, 12:30	6.7
East	0.085	347.7	1 January 2024, 12:35	61.9
I-02	0.0332	6.3	1 January 2024, 12:50	2.4
I-02A	0.0027	5.9	1 January 2024, 12:30	0.9
I-03	0.0698	131.7	1 January 2024, 12:35	22
I-03A	0.0023	5.6	1 January 2024, 12:30	0.9

I-08	0.4326	557.1	1 January 2024, 12:35	98.4
I-08A	0.0063	10.5	1 January 2024, 12:40	2
I-10	0.3615	490.7	1 January 2024, 12:35	86.2
I-10A	0.0052	8.9	1 January 2024, 12:40	1.6
I-12	0.2952	461.2	1 January 2024, 12:35	76.4
I-12A	0.007	11.1	1 January 2024, 12:45	2.2
J1	0.2253	510.1	1 January 2024, 12:25	69.9
J2	0.193	439	1 January 2024, 12:25	59.9
J3	0.1602	365.9	1 January 2024, 12:25	49.8
J4	0.1272	292.2	1 January 2024, 12:25	39.5
J5	0.0953	220	1 January 2024, 12:25	29.7
J6	0.0622	144.3	1 January 2024, 12:25	19.4
J7	0.0309	72.1	1 January 2024, 12:25	9.7
North	0.7364	640.7	1 January 2024, 12:40	185.6
North & East	0.8214	987.3	1 January 2024, 12:35	247.5
Pond 1 Post	0.5765	464.5	1 January 2024, 13:05	143.7
P1P	0.0155	27	1 January 2024, 12:45	5.6
R1	0.5765	464.2	1 January 2024, 13:05	143.7
R13	0.2253	505.3	1 January 2024, 12:25	69.9
R14	0.193	434.7	1 January 2024, 12:25	59.9
R15	0.1602	362.4	1 January 2024, 12:25	49.8
R16	0.1272	289.3	1 January 2024, 12:25	39.6
R17	0.0953	218.1	1 January 2024, 12:25	29.7
R18	0.0622	143.1	1 January 2024, 12:25	19.4
R19	0.0309	71.2	1 January 2024, 12:25	9.7
R27	0	47.9	1 January 2024, 12:40	10.1
R28	0	64	1 January 2024, 12:40	11.1
R35	0.0332	6.3	1 January 2024, 12:55	2.4

Project: 2024 TASWA Simulation Run: North Post- alternative

Reservoir: Pond 1 Post

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	830.7 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:30
Peak Discharge:	464.5 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 13:05
Inflow Volume:	143.7 (ACRE-FT)	Peak Storage:	30.2 (ACRE-FT)
Discharge Volume:	143.7 (ACRE-FT)	Peak Elevation:	736.3 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-02

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	68.6 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:30
Peak Discharge:	6.3 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:50
Inflow Volume:	10.5 (ACRE-FT)	Peak Storage:	1.1 (ACRE-FT)
Discharge Volume:	2.4 (ACRE-FT)	Peak Elevation:	750.7 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-03

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	164.6 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:20
Peak Discharge:	131.7 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:35
Inflow Volume:	22.0 (ACRE-FT)	Peak Storage:	2.9 (ACRE-FT)
Discharge Volume:	22.0 (ACRE-FT)	Peak Elevation:	743.2 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-08

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	620.4 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:30
Peak Discharge:	557.1 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:35
Inflow Volume:	108.7 (ACRE-FT)	Peak Storage:	2.9 (ACRE-FT)
Discharge Volume:	98.4 (ACRE-FT)	Peak Elevation:	749.1 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-10

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	568.5 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:30
Peak Discharge:	490.7 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:35
Inflow Volume:	97.4 (ACRE-FT)	Peak Storage:	2.8 (ACRE-FT)
Discharge Volume:	86.2 (ACRE-FT)	Peak Elevation:	756.6 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-12

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	639.0 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:25
Peak Discharge:	461.2 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:35
Inflow Volume:	92.0 (ACRE-FT)	Peak Storage:	4.7 (ACRE-FT)
Discharge Volume:	76.4 (ACRE-FT)	Peak Elevation:	763.7 (FT)

POSTDEVELOPED VELOCITY SUMMARY

Postdeveloped 25-Year Velocity Calculations at Permit Boundary Comparison Points

Required: Determine the 25-year flow depths and velocities at the permit boundary.

Method: Calculate the flow depths and velocities using Manning's Equation.

Solution:

		Velocity Calculations						
Comparison Point	Q (cfs)	Width[1] (ft)	Bottom Slope[2] (%)	Side Slopes[3] (h:v)	Manning's n	Depth (ft)	Velocity (fps)	Shear Stress (psf)
CP01	596.4	200	0.6	15.0	0.030	**0.85**	**3.31**	**0.32**
CP02	128.4	250	1.6	25.0	0.030	**0.22**	**2.26**	**0.22**
CP03	80.1	450	1.2	0.0	0.030	**0.13**	**1.38**	**0.10**
CP04	110.3	1000	2.6	0.0	0.030	**0.08**	**1.44**	**0.12**
CP05	30.1	500	5.0	0.0	0.030	**0.04**	**1.38**	**0.14**
CP06	36.0	1100	3.0	0.0	0.030	**0.04**	**0.92**	**0.07**
CP07	131.2	200	1.0	8.0	0.030	**0.30**	**2.19**	**0.19**
CP08	57.0	200	4.0	25.0	0.030	**0.12**	**2.37**	**0.30**
CP09	77.2	500	8.0	0.0	0.030	**0.07**	**2.31**	**0.33**
CP10	47.5	100	3.0	10.0	0.030	**0.18**	**2.66**	**0.33**

Notes:

1. Comparison points where surface water runoff enters or exits the permit boundary in established natural or constructed channels; width refers to the bottom width of the channel.
   Comparison points where surface water runoff enters or exits the permit boundary as sheet flow or not well established channels; width refers to the sheet flow width.
2. For channels, bottom slope is the slope of the channel bottom where surface water enters or exits the permit boundary.
   For sheet flow, bottom slope is the slope of the ground where surface water enters or exits the permit boundary.
3. For channels, side slope is the average side slope of the channel where surface water enters or exits the permit boundary.
   For sheet flow, there are no side slopes and are represented by "0" in this table.

POSTDEVELOPED FLOW AND BOUNDARY ANALYSIS SUMMARY

Postdeveloped Flow Summary

Watershed Name	Drainage Area (Ac)	Drainage Area (mi^2)	25-Year Peak Flow (cfs)	25-Year Volume (Ac-ft)
DA01	22.0	0.0344	65.9	10.9
DA02	20.3	0.0317	75.2	10.0
DA03	22.9	0.0358	86.1	11.1
DA04	20.1	0.0314	75.5	9.7
DA05	20.5	0.0320	77.0	9.9
DA06	20.8	0.0325	79.8	10.1
DA07	20.8	0.0325	79.8	10.1
DA08	20.7	0.0323	82.0	10.2
DA09	20.8	0.0325	85.9	10.3
DA10	19.5	0.0305	86.5	9.6
DA11	19.6	0.0306	86.8	9.7
DA12	19.3	0.0302	54.1	9.5
DA13	20.9	0.0327	83.0	10.3
DA14	20.7	0.0323	79.3	10.0
DA15	21.0	0.0328	80.6	10.1
DA16	21.1	0.0330	79.4	10.2
DA17	20.4	0.0319	76.7	9.9
DA18	21.2	0.0331	79.6	10.2
DA19	20.0	0.0313	74.4	9.7
DA20	19.8	0.0309	72.1	9.7
DA21	20.9	0.0327	79.9	10.3
DA22	16.1	0.0252	70.0	7.9
DA23	15.4	0.0241	68.5	7.6
DA24	20.0	0.0313	92.3	9.9
DA25	9.1	0.0142	26.0	4.5
DA26	19.5	0.0305	62.7	9.6
DA27	29.2	0.0456	81.0	13.5
DA28	5.6	0.0088	16.5	2.6
DA29	7.1	0.0111	13.7	3.3
DA30	12.5	0.0195	30.1	5.8
DA31	10.3	0.0161	24.2	4.8
DA32	19.2	0.0300	58.8	8.9
DA33	14.5	0.0227	48.5	6.7
DA34	23.2	0.0363	77.2	10.8
DA35	14.4	0.0225	42.0	6.7
I-02A	1.7	0.0027	5.9	0.9
I-08A	4.0	0.0063	10.5	2.0
I-10A	3.3	0.0052	8.9	1.6
I-12A	4.5	0.0070	11.1	2.2
I-21A	2.7	0.0042	8.0	1.3
P1P	9.9	0.0155	27.0	5.6
P2P	7.5	0.0117	22.1	3.9
P3P	5.1	0.0080	12.1	2.6
I-03A	1.5	0.0023	5.6	0.9

Postdeveloped Boundary Analysis Summary

Comparison Point	Total Contributing Drainage Area (mi^2)	25-Year Flow Rate (cfs)	25-Year Volume (ac-ft)	25-Year Velocity (fps)
CP1	0.6832	596.4	176.5	3.31
CP2	0.0456	128.4	23.7	2.26
CP3	0.0088	80.1	13.7	1.38
CP4	0.0111	110.3	18.7	1.44
CP5	0.0195	30.1	5.8	1.38
CP6	0.0161	36.0	9.9	0.58
CP7	0.1592	131.2	44.8	2.21
CP8	0.0449	57.0	13.8	2.37
CP9	0.0363	77.2	10.8	2.31
CP10	0.0557	47.5	9.1	2.66

ATTACHMENT C1
APPENDIX C1D

PERIMETER DRAINAGE SYSTEM DESIGN

Perimeter Channel Summary

Station (feet)	Station (feet)	Flow Depth (feet)	Depth Description	Interior Berm/Road		Exterior Berm	
				Minimum Channel Depth (feet)	Minimum Freeboard	Minimum Channel Depth (feet)	Minimum Freeboard (feet)
East Ditch							
2+29	2+98	2.99	Normal	8.0	5.01	6.0	3.01
2+98	13+12	2.78	Normal	8.0	5.22	6.0	3.22
13+12	16+25	3.29	Normal	8.0	4.71	6.0	2.71
16+25	20+26	3.08	Normal	8.0	4.92	6.0	2.92
20+26	26+46	2.83	Normal	8.0	5.17	6.0	3.17
26+46	29+86	2.91	Normal	8.0	5.09	6.0	3.09
29+86	33+51	3.35	Normal	8.0	4.65	6.0	2.65
33+51	39+40	3.11	Normal	8.0	4.89	6.0	2.89
39+40	43+72	2.82	Normal	8.0	5.18	6.0	3.18
43+72	45+70	3.38	Normal	8.0	4.62	6.0	2.62
45+70	52+11	3.31	Normal	8.0	4.69	6.0	2.69
52+11	56+52	3.23	Normal	8.0	4.77	6.0	2.77
56+52	63+54	3.23	Normal	8.0	4.77	6.0	2.77
63+54	67+48	2.96	Normal	8.0	5.04	6.0	3.04
67+48	71+68	2.74	Normal	8.0	5.26	6.0	3.26
71+68	75+80	2.48	Normal	8.0	5.52	6.0	3.52
75+80	80+65	2.20	Normal	8.0	5.8	6.0	3.8
80+65	85+74	1.89	Normal	8.0	6.11	6.0	4.11
85+74	90+50	1.49	Normal	8.0	6.51	6.0	4.51
90+50	98+66	1.00	Normal	8.0	7	6.0	5
West Ditch 1							
0+00	7+85	0.75	Normal	8.0	7.25	6.0	5.25
7+85	13+39	0.52	Normal	8.0	7.48	6.0	5.48
13+39	14+92	0.82	Normal	8.0	7.18	6.0	5.18
14+92	19+06	0.21	Normal	8.0	7.79	6.0	5.79
14+92	19+06	0.33	Normal	8.0	7.67	6.0	5.67
19+06	24+75	0.21	Normal	8.0	7.79	6.0	5.79
West Ditch 2							
0+00	1+24	1.72	Normal	8.0	6.28	6.0	4.28
1+24	3+55	1.32	Normal	8.0	6.68	6.0	4.68
West Ditch 3							
0+00	3+55	0.24	Normal	8.0	7.26	6.0	3.26
West Ditch 4							
0+00	15+52	0.56	Normal	8	7.44	6.0	5.44
North Ditch							
0+00	5+76	0.17	Normal	8.0	7.83	6.0	5.83
5+76	8+36	0.70	Normal	8.0	7.3	6.0	5.3
8+36	15+77	0.17	Normal	8.0	7.83	6.0	5.83

Notes:

1. Minimum freeboard based on the pool depth of the drainage control structure as shown on drawings in Attachment C3.

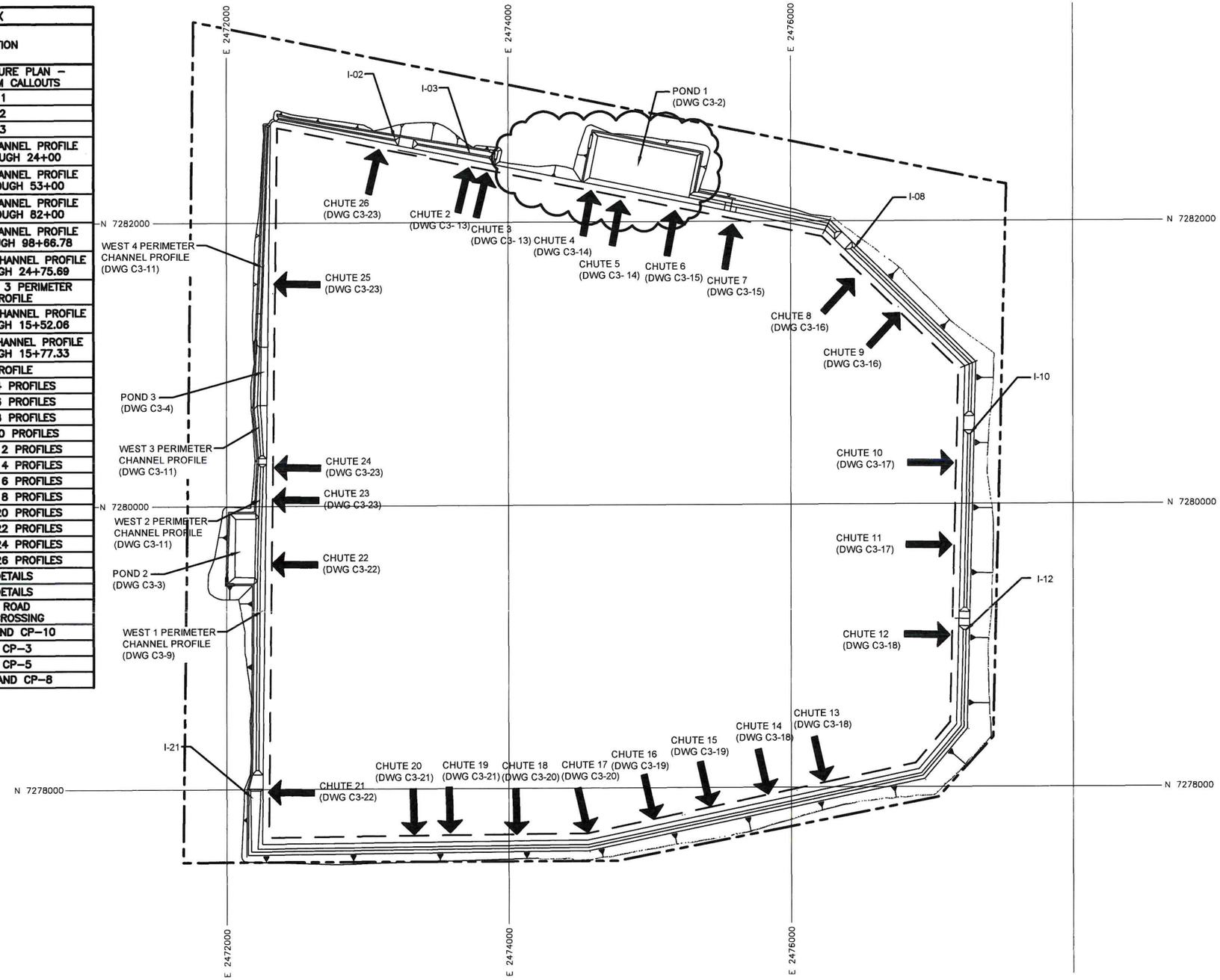
DETENTION POND ANALYSIS

The detention pond was designed to provide the necessary storage and outlet control to mitigate impacts to the receiving channels downstream of the TASWA DRF. The hydraulic design parameter for the detention pond are provided on pages C1C.11 through C1C.13. Detention pond design information is included in Attachment C3. The following table provides storage volume and surface elevation for the 25-year storm event.

Detention Pond	25-Year Water Surface Elevation (feet-msl)	Exterior Berm		Interior Berm/Road	
		Perimeter Pond Berm Elevation (feet-msl)	Freeboard (feet)	Access Road Elevation (feet-msl)	Freeboard (feet)
Pond 1 Post	736.3	738	1.7	740.0	3.7
Pond 2 Post	756.7	762.0	5.3	763.5	6.8
Pond 3 Post	754.1	756.0	1.9	762.0	7.9

PERIMETER DRAINAGE PLAN

DRAWING INDEX	
DRAWING	DESCRIPTION
C3–1	DRAINAGE STRUCTURE PLAN – DRAINAGE SYSTEM CALLOUTS
C3–2	POND 1
C3–3	POND 2
C3–4	POND 3
C3–5	EAST PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 24+00
C3–6	EAST PERIMETER CHANNEL PROFILE STA. 24+00 THROUGH 53+00
C3–7	EAST PERIMETER CHANNEL PROFILE STA. 53+00 THROUGH 82+00
C3–8	EAST PERIMETER CHANNEL PROFILE STA. 82+00 THROUGH 98+66.78
C3–9	WEST 1 PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 24+75.69
C3–10	WEST 2 AND WEST 3 PERIMETER CHANNEL PROFILE
C3–11	WEST 4 PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 15+52.06
C3–12	NORTH PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 15+77.33
C3–13	CHUTE 2 PROFILE
C3–14	CHUTE 3 AND 4 PROFILES
C3–15	CHUTE 5 AND 6 PROFILES
C3–16	CHUTE 7 AND 8 PROFILES
C3–17	CHUTE 9 AND 10 PROFILES
C3–18	CHUTE 11 AND 12 PROFILES
C3–19	CHUTE 13 AND 14 PROFILES
C3–20	CHUTE 15 AND 16 PROFILES
C3–21	CHUTE 17 AND 18 PROFILES
C3–22	CHUTE 19 AND 20 PROFILES
C3–23	CHUTE 21 AND 22 PROFILES
C3–24	CHUTE 23 AND 24 PROFILES
C3–25	CHUTE 25 AND 26 PROFILES
C3–26	DRAINAGE DETAILS
C3–27	DRAINAGE DETAILS
C3–28	PERIMETER ROAD LOW WATER CROSSING
C3–29	CP–1, CP–9, AND CP–10
C3–30	CP–2 AND CP–3
C3–31	CP–4 AND CP–5
C3–32	CP–6, CP–7, AND CP–8



0 400 800
SCALE IN FEET

LEGEND

2290A PERMIT BOUNDARY

2290A LANDFILL FOOTPRINT

NOTE(S):

1. REFER TO DRAINAGE SYSTEM CALLOUTS FOR PONDS, CHANNELS, CHUTES, AND CULVERT DETAILS.

REVISION NOTES:

1. POND 1 REDESIGN.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED
PROFESSIONAL ENGINEER

6/11/2025

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

PERIMETER DRAINAGE PLAN

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817–563–1144
TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

C1D.1

O:\TASWA\P\Drawings\ATT C\C3-1_DrngStructures.dwg Layout: C1–D–1 User: bboles

Depth and Velocity Calculations for the Perimeter Channels for the 25-Year Peak Runoff

Required: Determine the velocity and depth for the perimeter channels and compare to the permissible non-erodible flow velocity.

Method: Manning's Equation for flow velocity.

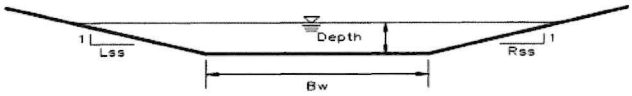
References:

1. Texas Department of Transportation, *Hydraulic Design Manual*, March 2004.

Solution:

Manning's Equation V = (k/n)(R^2/3)(S^1/2)

V = Velocity (fps)
k = Conversion Factor = 1.486
n = Manning's Roughness Coefficient = 0.03 Grass lined channel
R = Hydraulic Radius = A/Pw
A = Cross-Sectional Area (ft^2)
Pw = Wetted Perimeter (ft)
S = Channel Slope (ft/ft)
Bw = Bottom Width (ft)

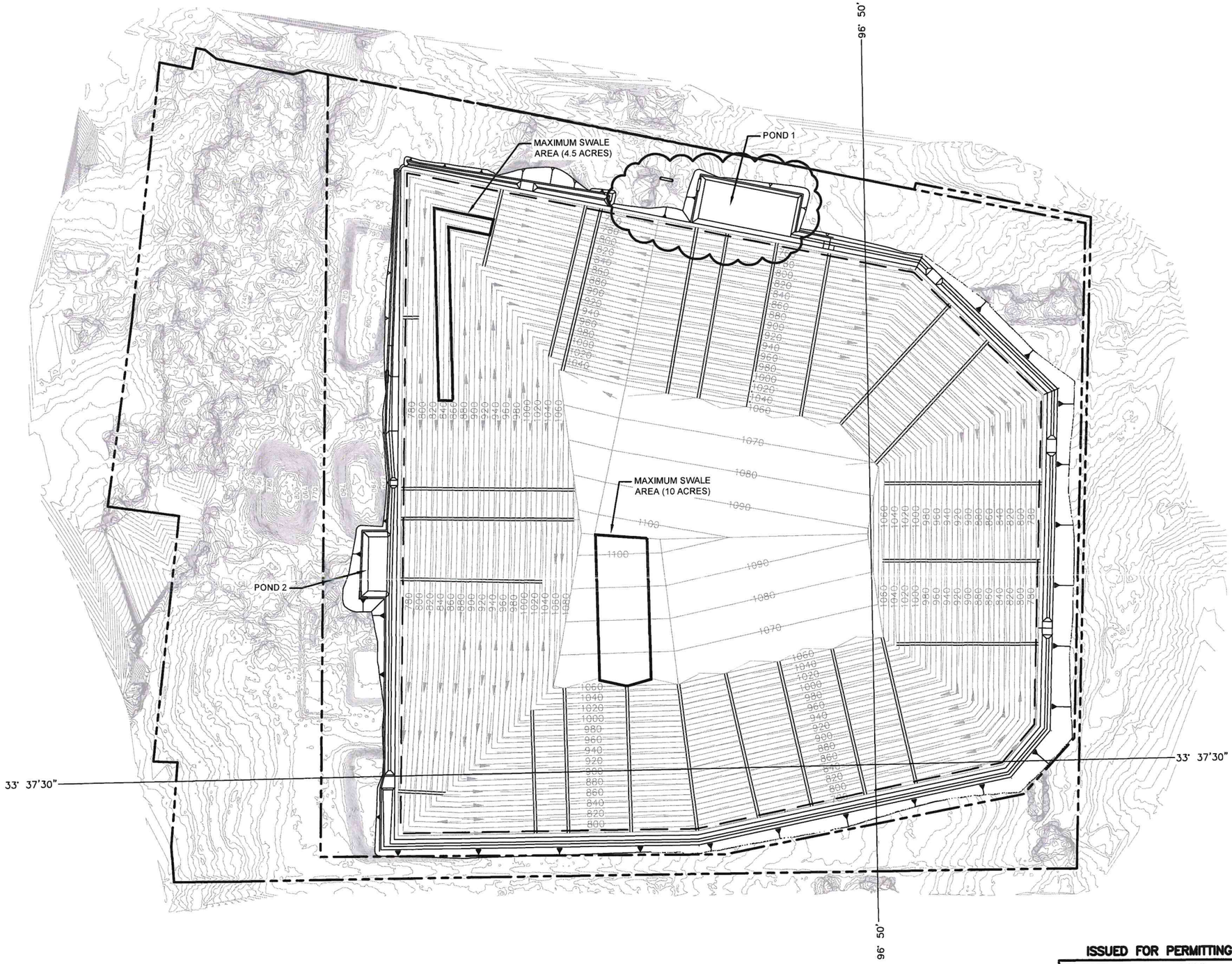


Channel	Channel Station		Q (cfs)	S (ft/ft)	BW (ft)	Rss (H:V)	Lss (H:V)	D (ft)	R (ft)	A (sf)	PW (ft)	V (fps)	Shear Stress (psf)
East Ditch													
E2	2+29	2+98	636.9	0.0066	20	4.0	4.0	2.99	2.14	95.38	44.62	6.68	1.23
E3	2+98	13+12	557.1	0.0066	20	4.0	4.0	2.78	2.02	86.69	42.96	6.43	1.15
E4	13+12	16+25	669.1	0.0050	20	4.0	4.0	3.29	2.32	109.15	47.14	6.13	1.03
E5	16+25	20+26	587.1	0.0050	20	4.0	4.0	3.08	2.19	99.38	45.37	5.91	0.96
E6	20+26	26+46	501.2	0.0050	20	4.0	4.0	2.83	2.05	88.76	43.36	5.65	0.88
E7	26+46	29+86	490.7	0.0043	20	4.0	4.0	2.91	2.10	92.26	44.03	5.32	0.78
E8	29+86	33+51	643.4	0.0043	20	4.0	4.0	3.35	2.35	112.03	47.65	5.74	0.90
E9	33+51	39+40	556.9	0.0043	20	4.0	4.0	3.11	2.21	101.00	45.67	5.51	0.84
E10	39+40	43+72	461.2	0.0043	20	4.0	4.0	2.82	2.04	88.27	43.27	5.22	0.76
E11	43+72	45+70	653.2	0.0043	20	4.0	4.0	3.38	2.37	113.25	47.86	5.77	0.91
E12	45+70	52+11	599.1	0.0039	20	4.0	4.0	3.31	2.33	110.23	47.33	5.43	0.81
E13	52+11	56+52	599.1	0.0043	20	4.0	4.0	3.23	2.28	106.43	46.65	5.63	0.87
E14	56+52	63+54	599.1	0.0043	20	4.0	4.0	3.23	2.28	106.43	46.65	5.63	0.87
R13	63+54	67+48	505.3	0.0043	20	4.0	4.0	2.96	2.12	94.21	44.40	5.36	0.79
R14	67+48	71+68	434.7	0.0043	20	4.0	4.0	2.74	1.99	84.63	42.55	5.14	0.73
R15	71+68	75+80	362.4	0.0043	20	4.0	4.0	2.48	1.84	74.38	40.49	4.87	0.67
R16	75+80	80+65	289.3	0.0043	20	4.0	4.0	2.20	1.66	63.46	38.16	4.56	0.59
R17	80+65	85+74	218.1	0.0043	20	4.0	4.0	1.89	1.46	52.09	35.58	4.19	0.51
R18	85+74	90+50	143.1	0.0044	20	4.0	4.0	1.49	1.20	38.63	32.27	3.70	0.41
R19	90+50	98+66	71.2	0.0044	20	4.0	4.0	1.00	0.85	24.10	28.28	2.95	0.28
West Ditch 1													
W1-1	0+00	7+85	40.5	0.0040	20	4.0	4.0	0.75	0.66	17.14	26.15	2.36	0.19
W1-2	7+85	13+39	40.0	0.0134	20	4.0	4.0	0.52	0.47	11.49	24.29	3.48	0.44
W1-3	13+39	14+92	87.9	0.0134	20	4.0	4.0	0.82	0.72	19.16	26.78	4.59	0.69
W1-4	14+92	19+06	8.0	0.0125	20	4.0	4.0	0.21	0.20	4.27	21.69	1.87	0.16
W1-5	14+92	19+06	8.0	0.0024	20	4.0	4.0	0.33	0.31	7.14	22.76	1.12	0.05
W1-6	19+06	24+75	8.0	0.0125	20	4.0	4.0	0.21	0.20	4.27	21.69	1.87	0.16
West Ditch 2													
W2-1	0+00	1+24	182.9	0.0043	20	4.0	4.0	1.72	1.35	46.10	34.15	3.97	0.46
W2-2	1+24	3+55	114.4	0.004	20	4.0	4.0	1.32	1.08	33.42	30.90	3.42	0.35
West Ditch 3													
W3	0+00	3+55	12.1	0.018	20	4.0	4.0	0.24	0.22	4.93	21.94	2.46	0.26
West Ditch4													
W4	0+00	15+52	26.0	0.005	20	4.0	4.0	0.56	0.50	12.37	24.59	2.10	0.16
North Ditch													
N1	0+00	5+76	6.2	0.014	20	4.0	4.0	0.17	0.16	3.52	21.40	1.76	0.15
N1-2	5+76	8+36	68.6	0.014	20	4.0	4.0	0.70	0.62	16.06	25.80	4.27	0.61
N1-3	8+36	15+77	5.9	0.014	20	4.0	4.0	0.17	0.16	3.42	21.36	1.73	0.14

ATTACHMENT C1
APPENDIX C1E

FINAL COVER DRAINAGE STRUCTURE DESIGN

FINAL COVER PLANS



0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- SWALE AREA BOUNDARY
- SWALE

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL, FROM DRONE SURVEY FLOWN JUNE 1, 2022.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

REVISION NOTES:

1. POND 1 REDESIGN.

STATE OF TEXAS
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1	06/25	NOD 1 RESPONSE	BBB

MAXIMUM SWALE AREA

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

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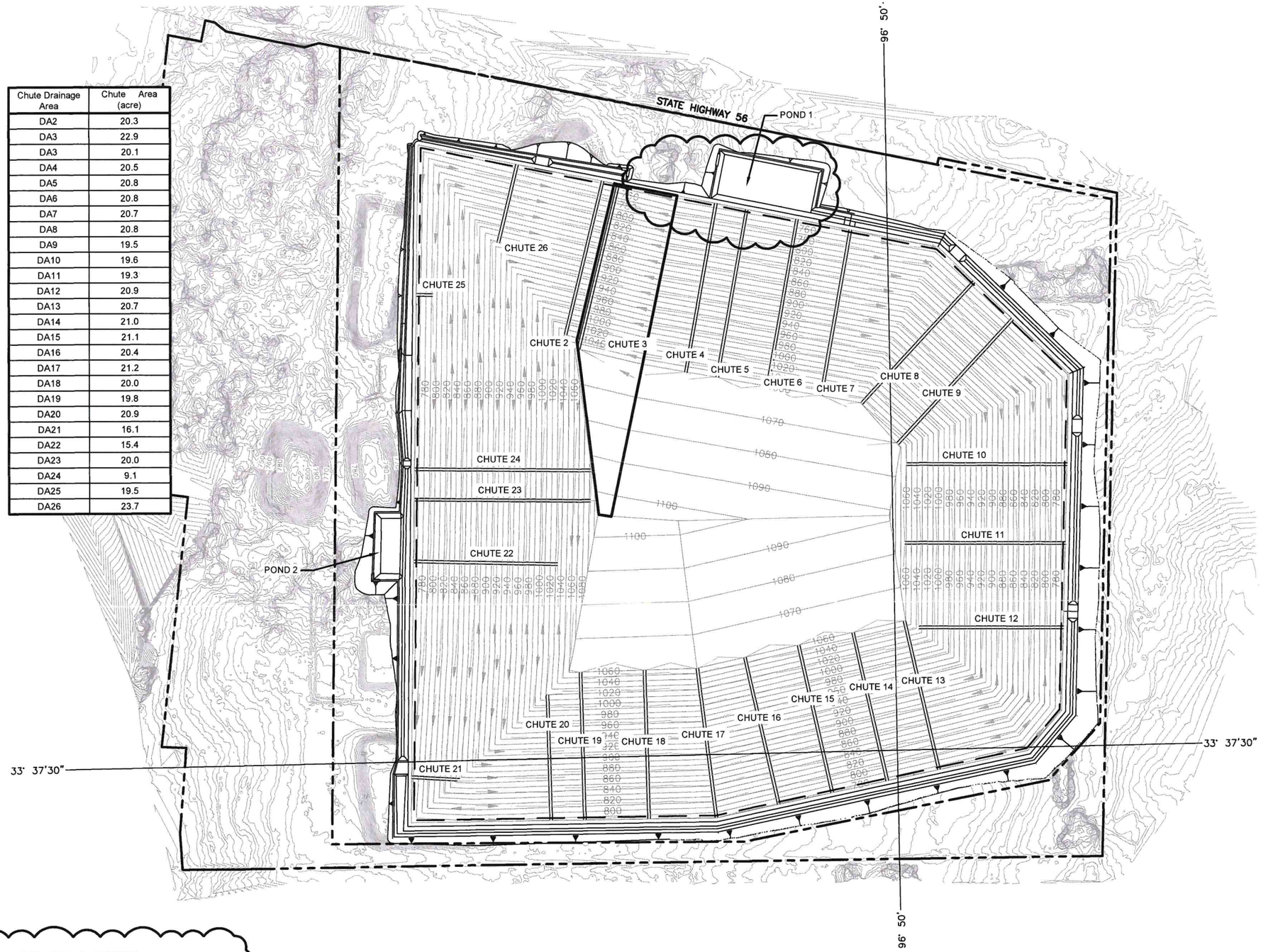
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

C1E.1

O:\TASWA\P\Drawings\ATT C\C1-E-1.dwg Layout: C1-E-1 User: bbolding

Chute Drainage Area	Chute Area (acre)
DA2	20.3
DA3	22.9
DA3	20.1
DA4	20.5
DA5	20.8
DA6	20.8
DA7	20.7
DA8	20.8
DA9	19.5
DA10	19.6
DA11	19.3
DA12	20.9
DA13	20.7
DA14	21.0
DA15	21.1
DA16	20.4
DA17	21.2
DA18	20.0
DA19	19.8
DA20	20.9
DA21	16.1
DA22	15.4
DA23	20.0
DA24	9.1
DA25	19.5
DA26	23.7



0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- SWALE AREA BOUNDARY
- SWALE

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL, FROM DRONE SURVEY FLOWN JUNE 1, 2022.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

REVISION NOTES:

1. POND 1 REDESIGN.

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REV	DATE	DESCRIPTION	DWN BY

CHUTE AREA

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C1E.2

O:\TASWA\P\Drawings\ATT C\C1-E-2.dwg Layout: C1-E-2 User: bbold

EROSION LAYER EVALUATION

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 TASWA DRF. 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. The minimum thickness of the erosion layer is based on the depth of frost penetration, or 6 inches, whichever is greater. For Grayson County, the approximate depth of frost penetration is less than 6 inches.

2. Soil loss is calculated using the Universal Soil Loss Equation (USLE) by following SCS procedures. ~~In accordance with regulatory guidance,~~ Based on 85% vegetative cover, the calculated soil loss from final cover will not exceed 3 tons per acre per year. Soil loss thickness is calculated by multiplying the soil loss by the postclosure year period (30 years), multiplying by a safety factor of 2, and then converting the soil loss to a thickness. The USLE, with a safety factor of 2, calculates the soil loss of the 4 percent top slopes to be 6.03 inches and the side slopes to be 6.70 inches. These thicknesses are then compared to the actual soil thickness of the erosion layer, which is 24 inches. These calculations begin on page C1E.8.

	4% slope	25% slope
Maximum Sheet Flow	1100 ft	120
Soil Loss	0.16 tons/acre/year	2.66 tons/acre/year

3. Sheet flow velocities for a 25-year storm event are calculated to be less than permissible nonerodible velocities. The supporting calculations are presented on page C1E.15.

4. Vegetation for the site will be native and introduced grasses with root depths of 6 inches to 8 inches.

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 may 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.

6. Slope stability information is included in Attachment D5.

Erosion Loss Evaluation

Required: Determine the required soil thickness and compare to the actual soil thickness.

Method: Expected soil loss is calculated using the Universal Soil Loss Equation. Minimum erosion layer thickness is determined by adding the minimum thickness allowed by TCEQ to the expected thickness of soil loss.

References:

1. TNRCC, *Use of the Universal Soil Loss Equation in Final Cover/Configuration Design Procedural Handbook,* October 1993.

Solution: Annual Soil Loss in tons/acre/year (A) = RKLSCP

Design Parameters	Top Slope (4%)	Perimeter Slope (25%)	
Rainfall Factor (R) =	275	275	Grayson County
Soil Erodibility Factor (K) =	0.25	0.25	(Loam)
Longest Run =	1100	120	ft
Slope =	4.0	25	%
Topographic Factor (LS) =	0.79	6.45	
Crop Management Factor (C) =	0.006	0.006	(tall grass with 85% cover)
Erosion Control Practice Factor (P) =	0.50	1.00	(Contouring)
Soil Loss (A) =	0.16	2.66	tons/acre/yr.

Erosion Layer Thickness Evaluation:

Required Thickness (T) = ~~6 inches* +~~ AYF/w

~~* - Includes required 6 inch minimum~~

	Top Slope (4%)	Perimeter Slope (25%)	
Soil Loss (A) =	0.16	2.66	tons/acre/yr.
Postclosure Period =	30	30	years
Factor of Safety (F) =	2	2	
Specific Weight of Soil (w) =	125	125	pcf

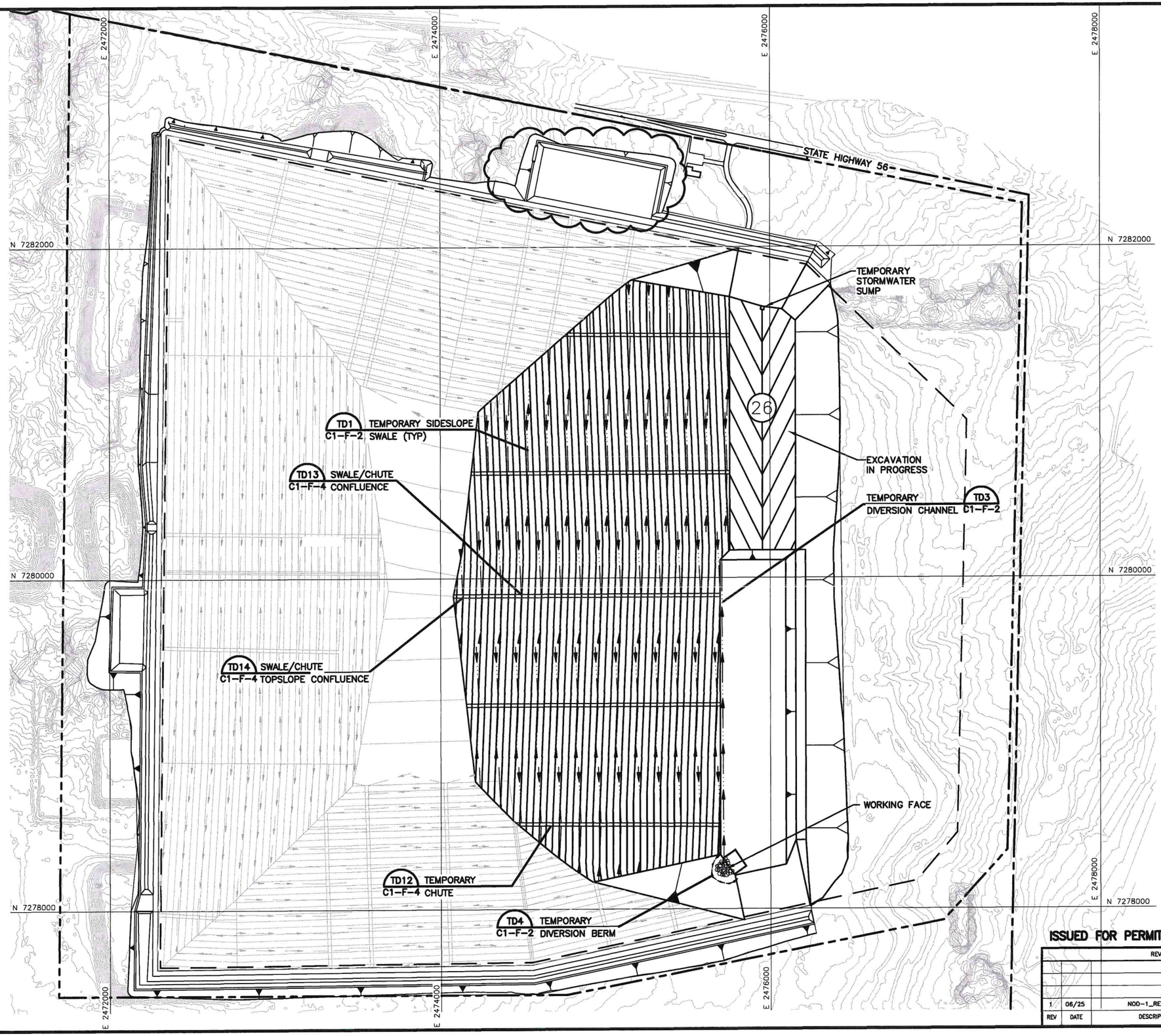
Required Soil Thickness (T) ~~6.04~~ **0.04** ~~6.70~~ **0.70** **inches**

Actual Soil Thickness ~~24.00~~ 12.00 ~~24.00~~ 12.00 inches

Summary: As noted in the permit drawing, the erosion layer will be a minimum of ~~24.00~~ 12.00 inches thick. As shown above, this is a conservative design considering the maximum expected soil loss for a 30 year period is ~~6.70~~ 0.70 inches.

ATTACHMENT C1
APPENDIX C1F

INTERMEDIATE COVER
EROSION AND SEDIMENTATION CONTROL PLAN



0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7279000 STATE PLANE COORDINATES
- 750 EXISTING 10' GROUND CONTOUR
- 700 EXCAVATION CONTOUR

NOTES:

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS AND MATHEWS ENVIRONMENTAL FROM DRONE SURVEY FLOWN ON JUNE 1, 2022.

REVISION NOTES:

1. POND 1 REDESIGN.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
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6/11/2025

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INTERMEDIATE COVER EROSION CONTROL FEATURES

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
C1F.1

O:\TASWA\P\Drawings\ATT C\C1-F-1.dwg Layout: Layout1 User: bboles

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT C3
DRAINAGE SYSTEM PLANS AND DETAILS

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025

6/11/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

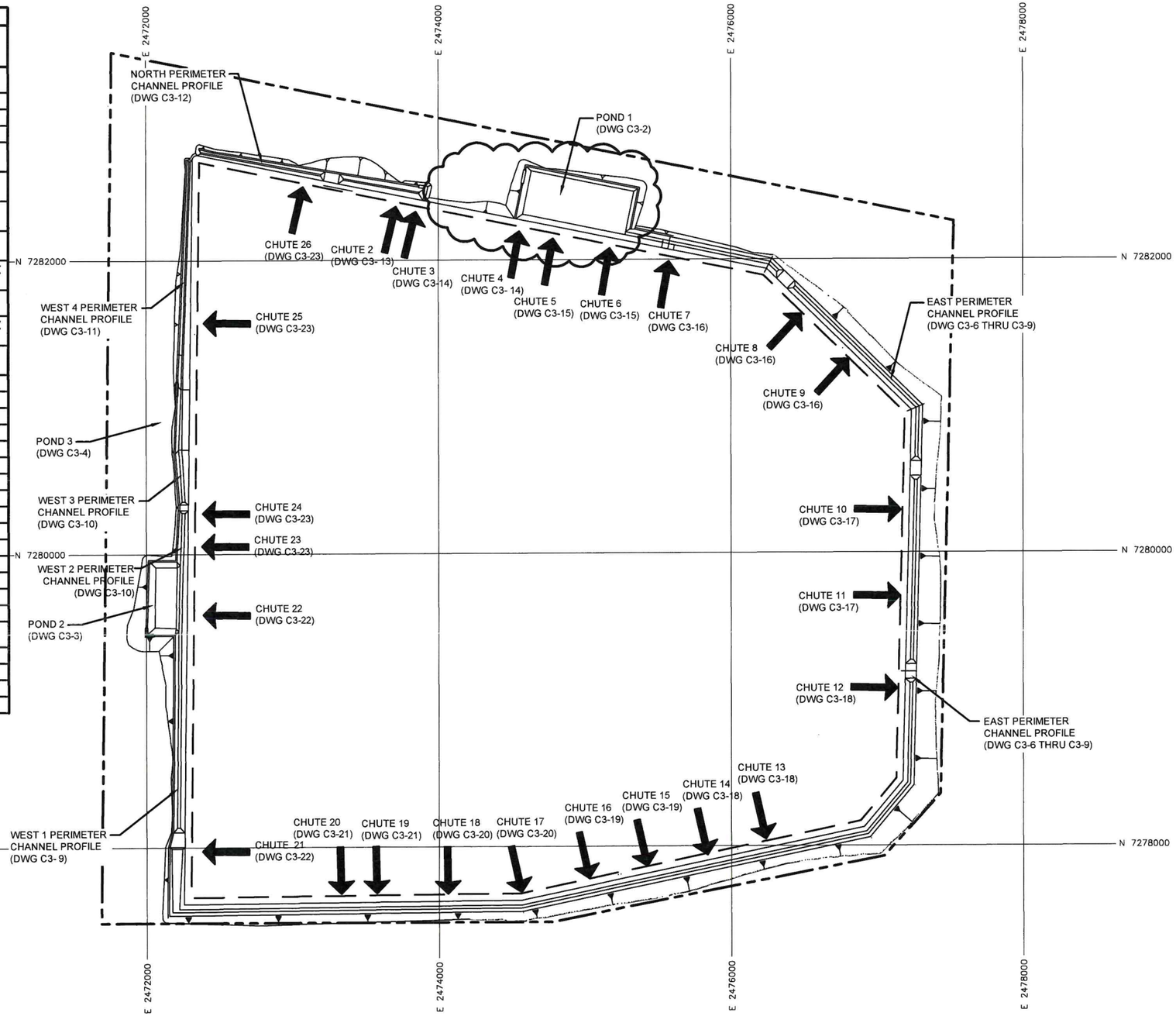
Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

DRAWING INDEX	
DRAWING	DESCRIPTION
C3–1	DRAINAGE STRUCTURE PLAN – DRAINAGE SYSTEM CALLOUTS
C3–2	POND 1
C3–3	POND 2
C3–4	POND 3
C3–5	EAST PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 24+00
C3–6	EAST PERIMETER CHANNEL PROFILE STA. 24+00 THROUGH 53+00
C3–7	EAST PERIMETER CHANNEL PROFILE STA. 53+00 THROUGH 82+00
C3–8	EAST PERIMETER CHANNEL PROFILE STA. 82+00 THROUGH 98+66.78
C3–9	WEST 1 PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 24+75.69
C3–10	WEST 2 AND WEST 3 PERIMETER CHANNEL PROFILE
C3–11	WEST 4 PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 15+52.06
C3–12	NORTH PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 15+77.33
C3–13	CHUTE 2 PROFILE
C3–14	CHUTE 3 AND 4 PROFILES
C3–15	CHUTE 5 AND 6 PROFILES
C3–16	CHUTE 7 AND 8 PROFILES
C3–17	CHUTE 9 AND 10 PROFILES
C3–18	CHUTE 11 AND 12 PROFILES
C3–19	CHUTE 13 AND 14 PROFILES
C3–20	CHUTE 15 AND 16 PROFILES
C3–21	CHUTE 17 AND 18 PROFILES
C3–22	CHUTE 19 AND 20 PROFILES
C3–23	CHUTE 21 AND 22 PROFILES
C3–24	CHUTE 23 AND 24 PROFILES
C3–25	CHUTE 25 AND 26 PROFILES
C3–26	DRAINAGE DETAILS
C3–27	DRAINAGE DETAILS
C3–28	PERIMETER ROAD LOW WATER CROSSING
C3–29	CP–1, CP–9, AND CP–10
C3–30	CP–2 AND CP–3
C3–31	CP–4 AND CP–5
C3–32	CP–6, CP–7, AND CP–8



0 400 800
SCALE IN FEET

LEGEND

2290A PERMIT BOUNDARY

2290A LANDFILL FOOTPRINT

NOTE(S):

1. REFER TO DRAINAGE SYSTEM CALLOUTS FOR PONDS, CHANNELS, CHUTES, AND CULVERT DETAILS.

REVISION NOTES:

1. POND 1 REDESIGN.

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FELIPE ANTONIO WESCOUP
103826
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6/11/2025

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DRAINAGE STRUCTURE PLAN (DRAINAGE SYTEM CALLOUTS)

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817–563–1144

TBPE FIRM NO. F–256
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C3.1

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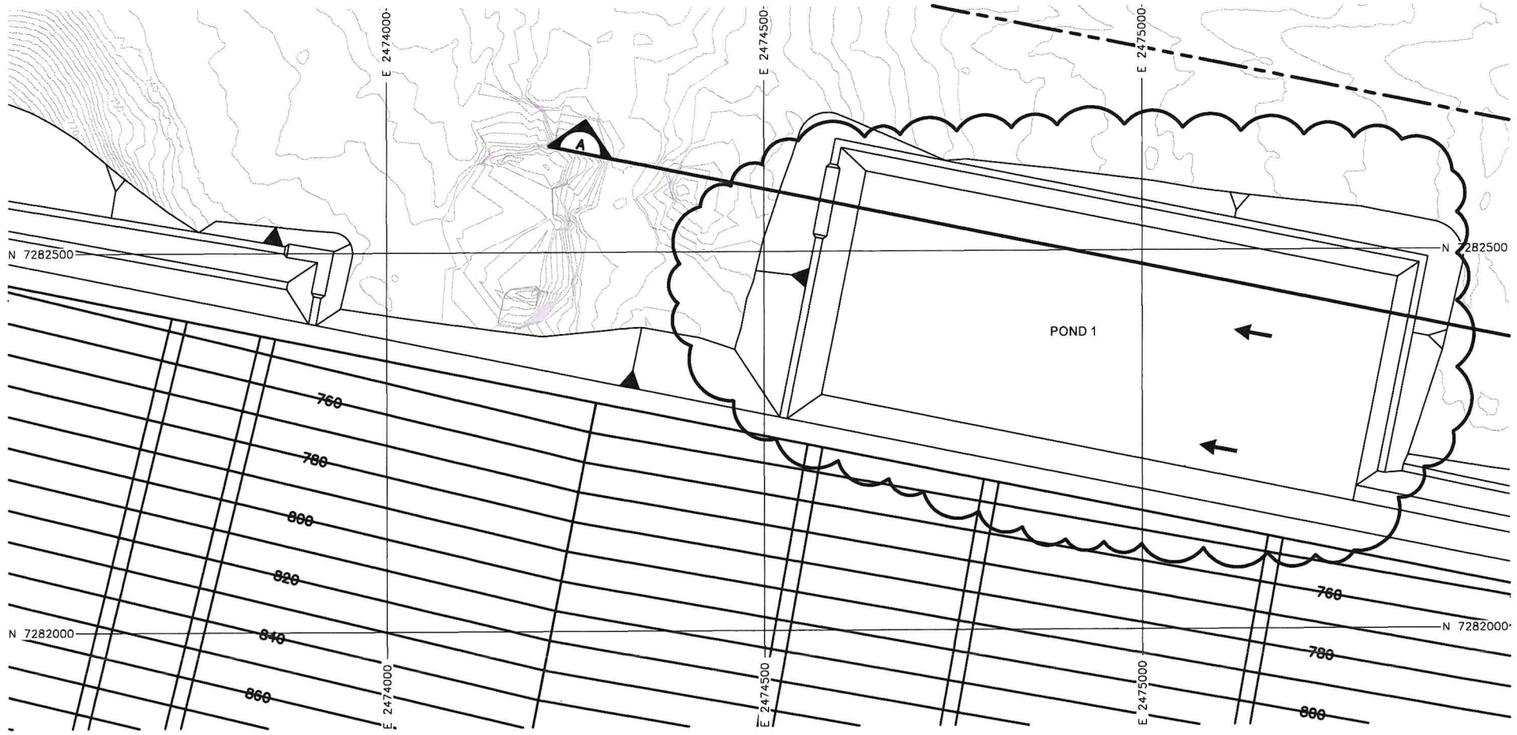


0 100 200
SCALE IN FEET

LEGEND

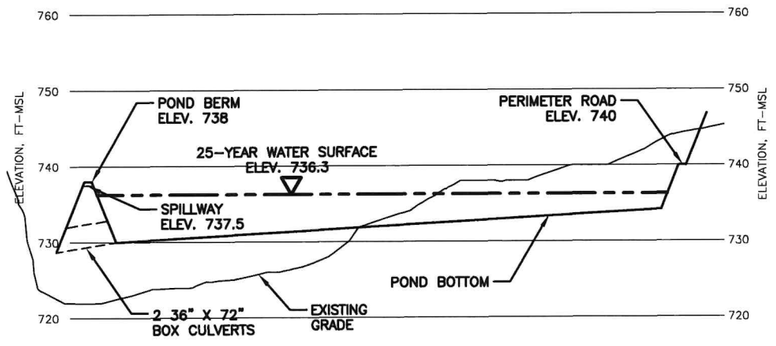
- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 500 — 10' FINAL COVER CONTOUR
- DRAINAGE FLOW DIRECTION

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL, FROM DRONE SURVEY FLOWN JUNE 1, 2022.
2. REFER TO DRAINAGE SYSTEM CALLOUTS FOR PONDS, CHANNELS, CHUTES, AND CULVERT DETAILS.

REVISION NOTES:

1. POND 1 REDESIGN.



POND 1 – SECTION A (A)

0 100 200 HORIZONTAL SCALE IN FEET
0 10 20 VERTICAL SCALE IN FEET

POND 1 ELEVATION–STORAGE RELATIONSHIP	
ELEVATION (FT)	VOLUME AT ELEVATION (AC–FT)
728.7	0.00
729	0.21
730	1.08
731	3.13
732	6.63
733	11.25
734	16.51
735	22.13
736	28.01
737	34.18
738	40.66
739	47.42
740	54.47

STATE OF TEXAS
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POND 1

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C3.2

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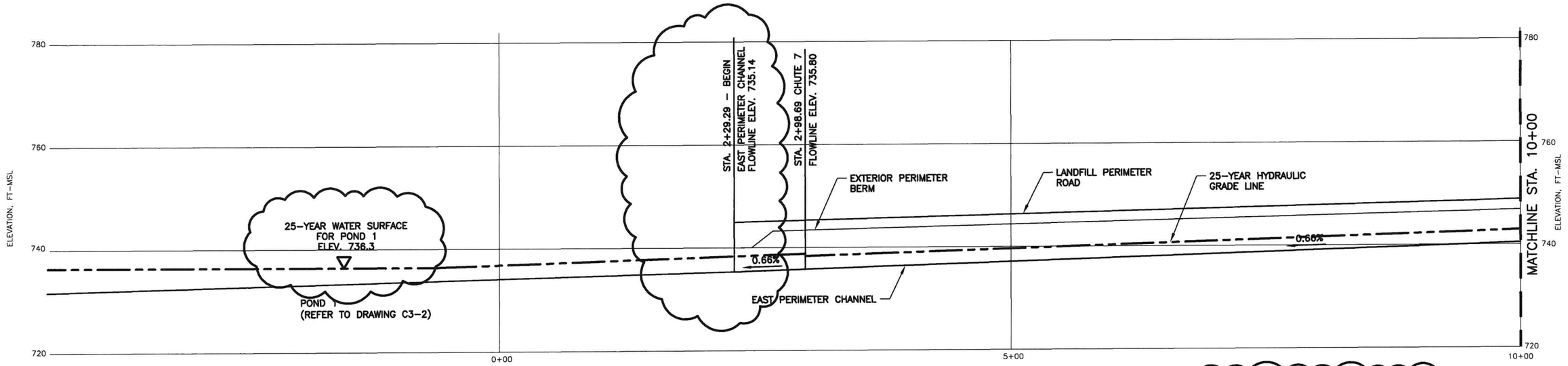


EAST PERIMETER CHANNEL PROFILE

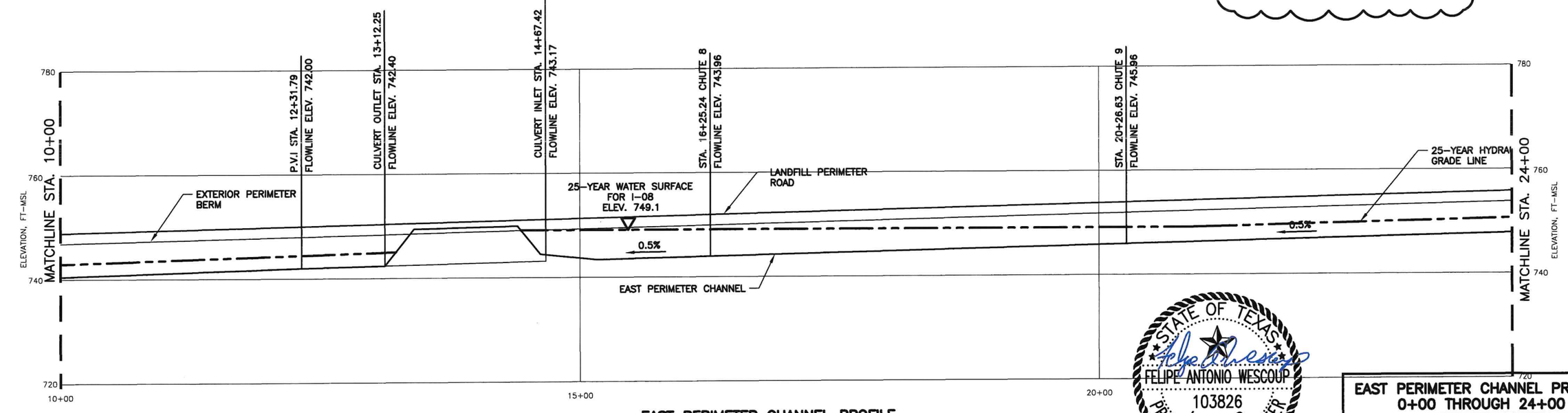
STA. 0+00 TO 10+00

0 50 100 HORIZONTAL SCALE

0 10 20 VERTICAL SCALE

REVISION NOTES:

1. POND 1 REDESIGN.



EAST PERIMETER CHANNEL PROFILE

STA. 10+00 TO 24+00

0 50 100 HORIZONTAL SCALE

0 10 20 VERTICAL SCALE

25-YEAR HYDRAULIC ANALYSIS

STATION		BOTTOM SLOPE (%)	BOTTOM WIDTH (ft)	CHANNEL DEPTH (ft)	FLOW DEPTH (ft)	FREE-BOARD (ft)	FLOW RATE (cfs)	FLOW VELOCITY (fps)	EROSION PROTECTION
2+29	2+98	0.0066	20	6	2.99	3.01	636.9	6.68	TURF MAT
2+98	13+12	0.0066	20	6	2.78	3.22	557.1	6.43	TURF MAT
13+12	16+25	0.0050	20	6	3.29	2.71	669.1	6.13	TURF MAT
16+25	20+26	0.0050	20	6	3.08	2.92	587.1	5.91	TURF MAT
20+26	24+00	0.0050	20	6	2.83	3.17	501.2	5.65	TURF MAT

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EAST PERIMETER CHANNEL PROFILE 0+00 THROUGH 24+00

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DISPOSAL AND RECYCLING FACILITY PERMIT AMENDMENT

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C3.5

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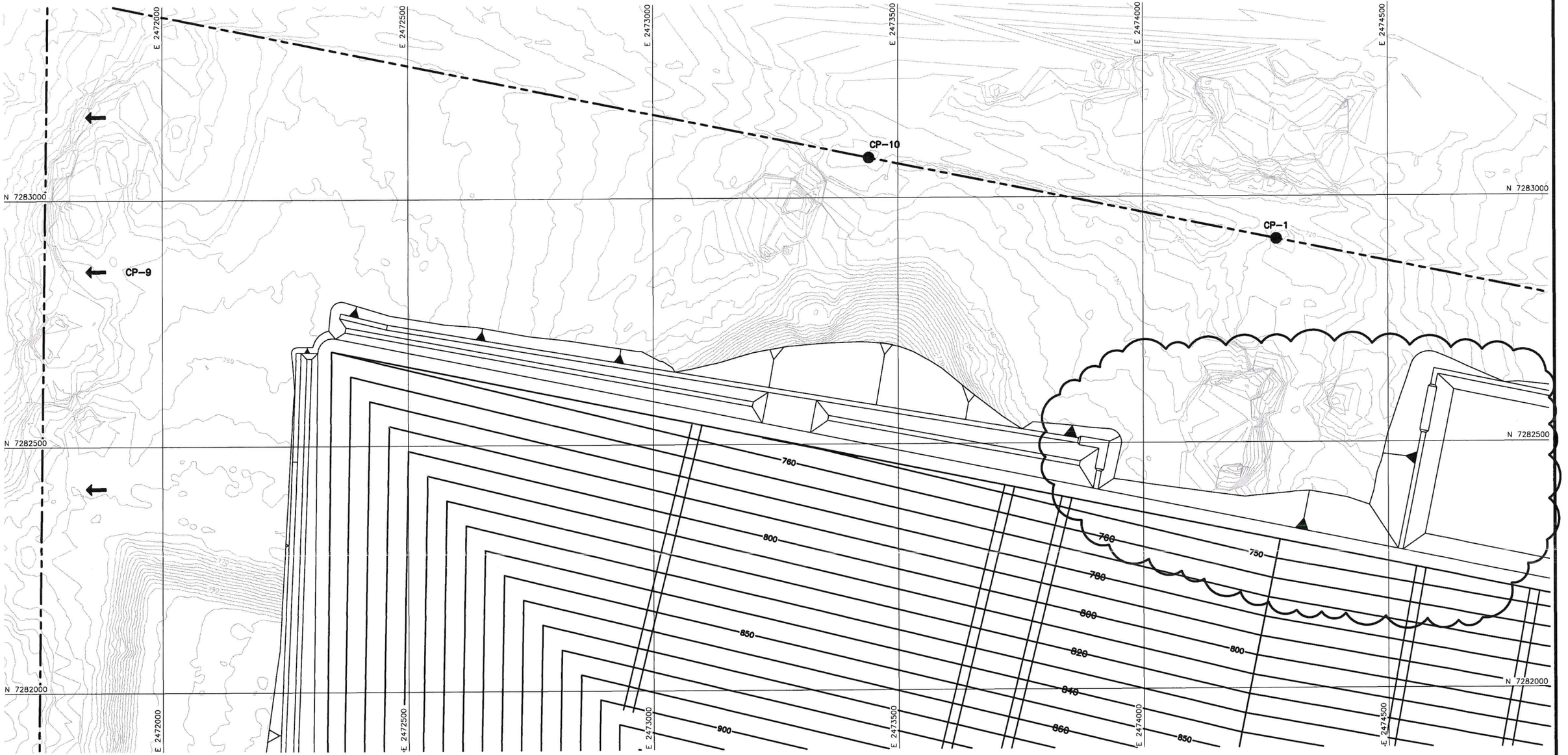

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- DA01 DRAINAGE AREA DESIGNATION
- COMPARISON POINT–POINT DISCHARGE
- FLOW DIRECTION

NOTE(S):

1. 7.5 MINUTE TOPOGRAPHIC BASE MAPS SADLER, TEX AND ETHEL, TEX DOWNLOADED FROM USGS WEBSITE ON FEBRUARY 10, 2022.
2. CONTOURS WITHIN LANDFILL FOOTPRINT DEPICT FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

REVISION NOTES:

1. POND 1 REDESIGN.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED
PROFESSIONAL ENGINEER

6/11/2025

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

CP–1, CP–9 AND CP–10

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DISPOSAL AND RECYCLING FACILITY PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817–563–1144
TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

C3.29

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

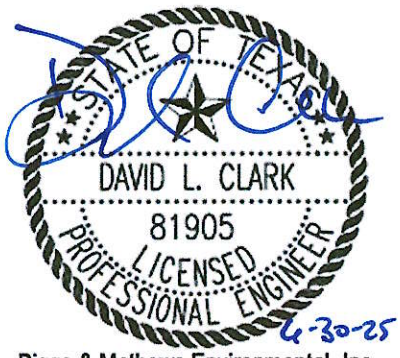
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT D
WASTE MANAGEMENT UNIT DESIGN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

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1700 Robert Road, Suite 100 ◆ Mansfield, Texas 76063 ◆ 817-563-1144

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TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256
30 TAC §330.63(d)

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Attachment D4 – Site Life

Attachment D5 – Geotechnical Design

Attachment D6 – Contaminated Water Management Plan

Attachment D7 – Liner Quality Control Plan

Attachment D8 – Final Cover Quality Control Plan

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

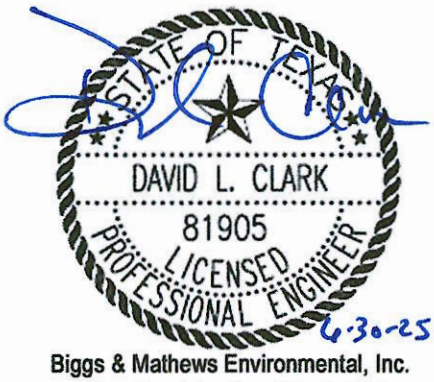
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D1
SITE LAYOUT PLANS

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

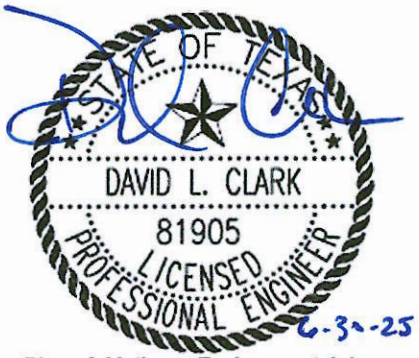
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D2
CROSS SECTIONS

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

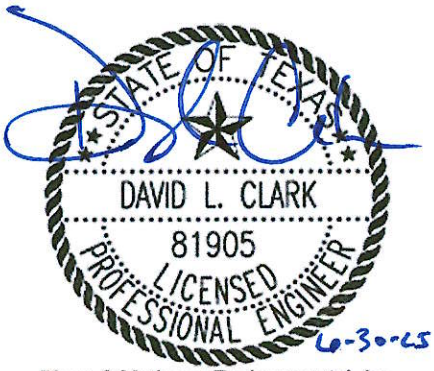
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D3
CONSTRUCTION DESIGN DETAILS

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D4
SITE LIFE

Prepared for

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February 2025
Revised June 2025

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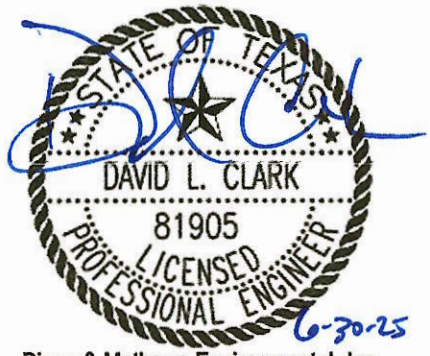

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

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30 TAC §330.63(d)(4)(D)

1 SITE LIFE 1

TABLES AND CALCULATION SHEETS

Capacity and Site Life D4.2

CAPACITY AND SITE LIFE

Required:

1. Estimate the remaining site life for the TASWA Facility.

Assumptions:

1. The waste acceptance rate will increase at an annual rate of 2%.
2. Beginning Waste Accepted = 270,000 tons
3. Airspace Utilization Factor = 0.4
4. The facility accepts waste 312 days per year (6 days a week).

Solution:

		Total Capacity =	183,500,000 cy
AUF:	0.4	Approximate Capacity Used =	7,000,000 cy
Year 1 Waste:	270,000 tons	Total remaining waste volume =	176,500,000 cy
Days Operating	312	Total remaining waste tonnage =	70,600,000 tons

Year	Annual Waste (tons)	Daily Waste (tons/day)	Accumulated Waste (tons)	Remaining Capacity (tons)	Annual Waste (cy)	Accumulated Waste (cy)	Remaining Capacity (cy)
1	270,000	865	270,000	70,330,000	675,000	675,000	175,825,000
2	275,400	883	545,400	70,054,600	688,500	1,363,500	175,136,500
3	280,908	900	826,308	69,773,692	702,270	2,065,770	174,434,230
4	286,526	918	1,112,834	69,487,166	716,315	2,782,085	173,717,915
5	292,257	937	1,405,091	69,194,909	730,642	3,512,727	172,987,273
10	322,675	1,034	2,956,425	67,643,575	806,687	7,391,062	169,108,938
20	393,339	1,261	6,560,290	64,039,710	983,348	16,400,725	160,099,275
30	479,478	1,537	10,953,381	59,646,619	1,198,695	27,383,453	149,116,547
40	584,481	1,873	16,308,535	54,291,465	1,461,203	40,771,339	135,728,661
50	712,479	2,284	22,836,438	47,763,562	1,781,198	57,091,096	119,408,904
60	868,508	2,784	30,793,916	39,806,084	2,171,270	76,984,789	99,515,211
70	1,058,707	3,393	40,494,036	30,105,964	2,646,766	101,235,090	75,264,910
80	1,290,557	4,136	52,318,429	18,281,571	3,226,394	130,796,072	45,703,928
90	1,573,182	5,042	66,732,297	3,867,703	3,932,956	166,830,743	9,669,257
91	1,604,646	5,143	68,336,943	2,263,057	4,011,615	170,842,358	5,657,642
92	1,636,739	5,246	69,973,682	626,318	4,091,847	174,934,205	1,565,795
93	1,669,474	5,351	71,643,156	-1,043,156	4,173,684	179,107,889	-2,607,889

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

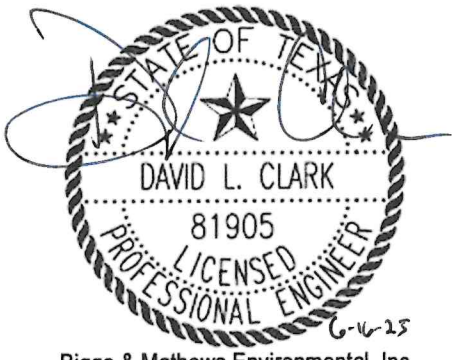
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT D6
LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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Prepared by

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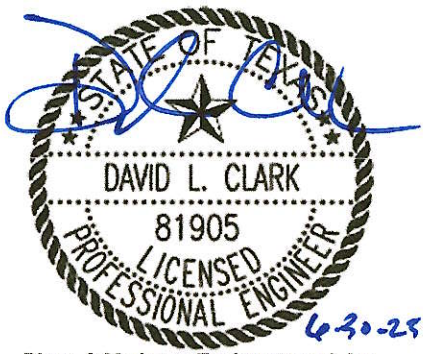

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APPENDIX D6D
Secondary Containment Volume Calculations

APPENDIX D6C
CONTAINMENT/DIVERSION BERM DESIGN

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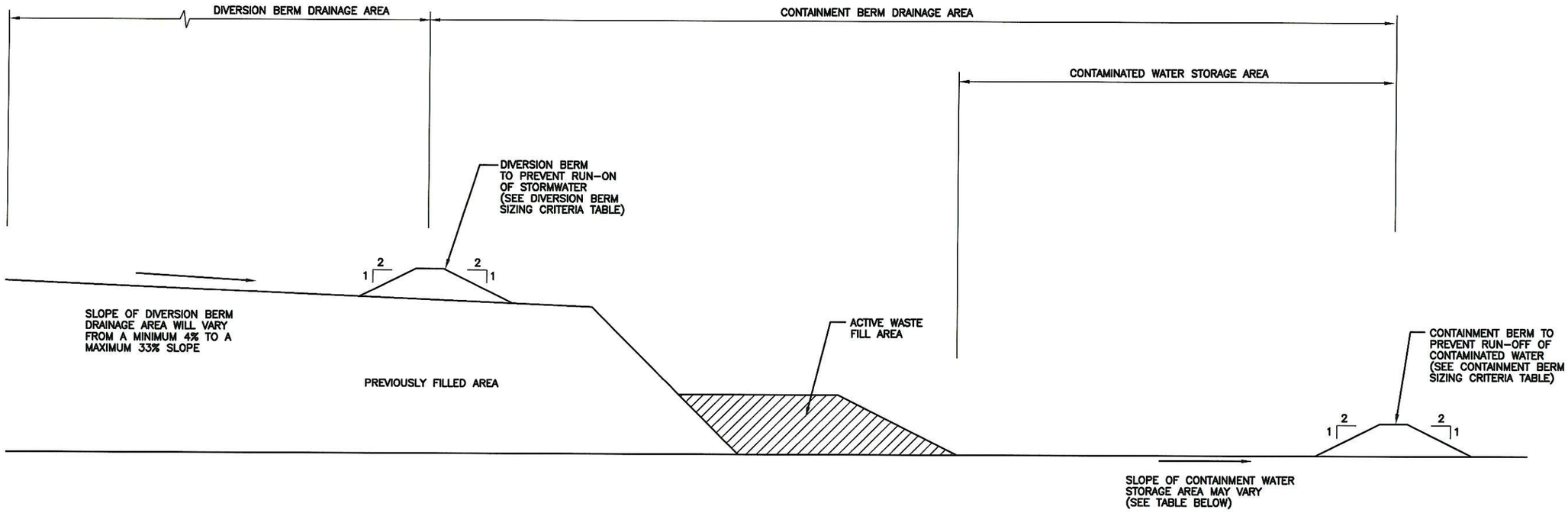

DIVERSION BERM SIZING CRITERIA

DIVERSION BERM DRAINAGE AREA (ACRES)	4%			33%		
	FLOW RATE (CFS)	FLOW DEPTH (FT)	REQUIRED MINIMUM DIVERSION BERM HEIGHT (FT)	FLOW RATE (CFS)	FLOW DEPTH (FT)	REQUIRED MINIMUM DIVERSION BERM HEIGHT (FT)
0.5	4.7	0.5	1.5	4.0	0.9	1.9
1.0	7.6	0.6	1.6	6.8	1.1	2.1
1.5	11.5	0.7	1.7	10.6	1.3	2.3

NOTE: DIVERSION BERMS WILL BE SIZED TO DIVERT STORMWATER FROM THE 25 YEAR, 24 HOUR STORM EVENT WITH A FREEBOARD OF 1 FT.

CONTAINMENT BERM SIZING CRITERIA

CONTAINMENT BERM DRAINAGE AREA (ACRES)	CONTAINMENT WATER STORAGE AREA (ACRES)	FLOOR SLOPE OF CONTAMINATED WATER STORAGE AREA	REQUIRED MINIMUM HEIGHT OF CONTAINMENT BERM (FT)
0.5	0.35	1 %	2.5
	0.25	2 %	3.2
	0.20	4 %	4.5
1.0	0.50	1 %	3.2
	0.35	2 %	4.0
	0.25	4 %	5.4
1.5	0.60	1 %	3.6
	0.40	2 %	4.5
	0.30	4 %	6.2

NOTE: CONTAINMENT BERMS WILL BE SIZED TO CONTAIN STORMWATER FROM THE 25 YEAR, 24 HOUR STORM EVENT. THE CRITERIA ARE BASED ON A MINIMUM DOWNSLOPE CONTAINMENT BERM LENGTH OF 100 FEET WITH A FREEBOARD OF 1.0 FT.

STATE OF TEXAS
DAVID L. CLARK
81905
PROFESSIONAL ENGINEER
6-16-25

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS			
1	08/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

CONTAIMINATED WATER RUNON/RUNOFF DETAILS

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
D6-C1

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Containment Berm Design

Required: Size containment berms to contain contaminated water around the working face.

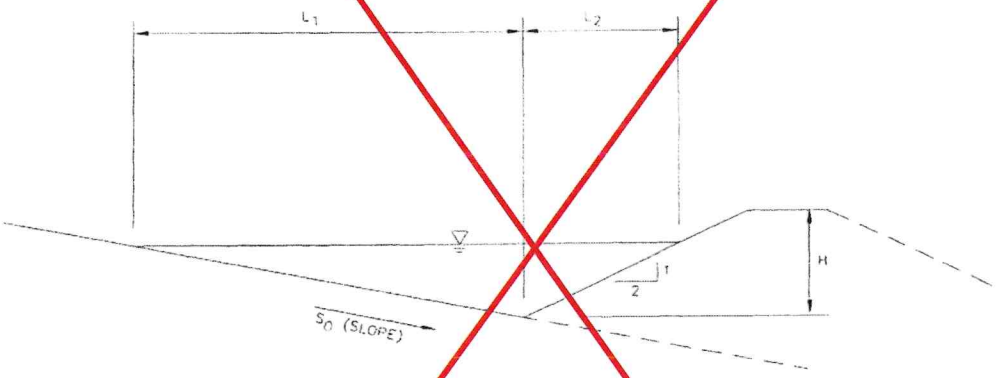
References:
1) Texas Department of Transportation, Hydraulic Design Manual, Revised October 2011.
2) NOAA Atlas 14 Point Precipitation Frequency Estimates: Sherman, TX

Solution: Determine the storage volume required for the 25-year rainfall for Grayson County.

$V_R = CAR$

where: V_R = required storage volume (cf)
C = runoff coeffecient = 0.7
A = drainage area (acres)
R = 25-year rainfall = 8 in (24 hr)

Size the storage area from the following figure:



$A_s = (L_1 + L_2)H / 2$ Storage Area = $W(L_1 + L_2)$

where: A_s = cross section area (sf) W = storage width (ft)
$L_1 = H / S_o$
$L_2 = 2H$

Drainage area ac	Required Volume cf	W ft	Storage Area ac	S_o ft/ft	L_1 ft	L_2 ft	H ft	As sf	Vs cf
0.5	10,164	100	0.35	0.01	152	3.0	1.5	118.5	11,854
0.5	10,164	100	0.25	0.02	109	4.4	2.2	123.3	12,334
0.5	10,164	100	0.20	0.04	87	7.0	3.5	163.9	16,394
1	20,328	100	0.50	0.01	218	4.4	2.2	241.9	24,193
1	20,328	100	0.35	0.02	152	6.1	3.0	241.7	24,174
1	20,328	100	0.25	0.04	109	8.7	4.4	256.2	25,616
1.5	30,492	100	0.60	0.01	261	5.2	2.6	348.4	34,838
1.5	30,492	100	0.40	0.02	174	7.0	3.5	315.7	31,574
1.5	30,492	100	0.30	0.04	131	10.5	5.2	368.9	36,887

Containment Berm Design

Required: Size containment berms to contain contaminated water around the working face.

References:
1) Texas Department of Transportation, Hydraulic Design Manual, Revised May 2014.
Note: The *Hydraulic Design Manual*, Revised September 2019, uses a different equation to
2) NOAA Atlas 14, Precipitation-Frequency Atlas of the United States, Volume 11 Version 2.0: Texas, 2018.

Solution: Determine the storage volume required for the 25-year, 24-hour rainfall event using the NRCS

$$P_e = \frac{(P - I_a)^2}{(P - Ia) + S} \qquad \text{(Ref. 1)}$$

where:

P =	7.45	in	total depth of rainfall, Ref. 2
S = z (100/CN - 1)			potential maximum depth of water retained in the watershed (in)
z =	10	unitless	z = 10 for English units
CN =	87	unitless	See page C1-C-7, Attachment C

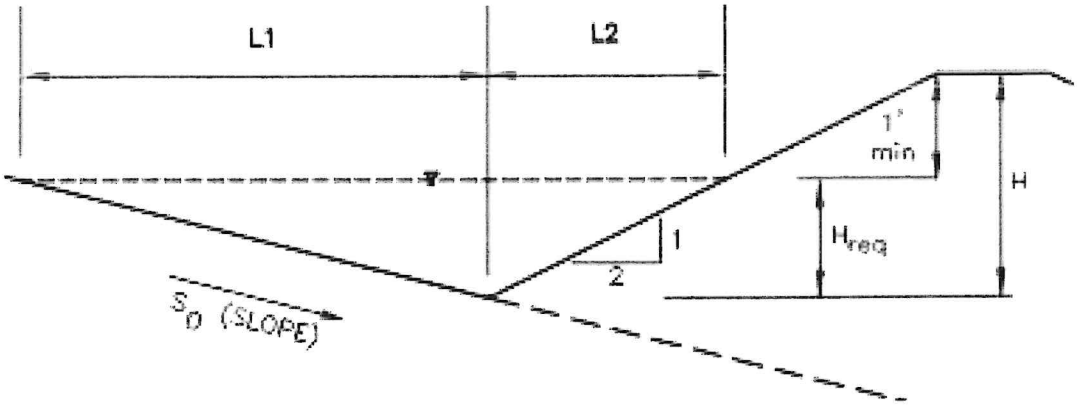
$S = 1.494$ in

$I_a = 0.2\ S$ = initial abstraction before ponding (in)

$I_a = 0.299$ in

$P_e = 5.915$ in accumulated excess rainfall (in)

Size the storage area from the following figure:



$A_s = (L_1 + L_2)H / 2$ Storage Area = $W(L_1 + L_2)$

where: A_s = cross section area (sf) W = storage width (ft)

$L_1 = H / S_o$

$L_2 = 2H$

Drainage area	Required Volume	H_{req}	H Provided	S_o	L_1	L_2	W	As
ac	cf	ft	ft	ft/ft	ft	ft	ft	sf
0.5	10,736	2.03	3.03	0.02	152	4.06	100	236.0
1	21,472	2.87	3.87	0.02	194	5.75	100	386.3
1.5	32,208	3.52	4.52	0.02	226	7.04	100	526.6

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT D7
LINER QUALITY CONTROL PLAN

Prepared for

Texoma Area Solid Waste Authority

February 2025
Revised June 2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

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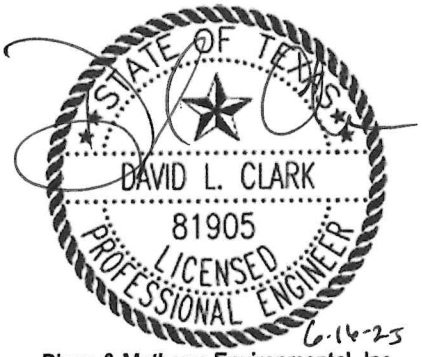

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Firm Registration No. F-256

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30 TAC §§330.63(d)(4)(G), 330.331, 330.337, 330.339, 330.341

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Ballast Calculations

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APPENDIX D7E
GRI-GM13

1 INTRODUCTION

30 TAC §330.339

1.1 Purpose

This Liner Quality Control Plan (LQCP) has been prepared in accordance with 30 TAC §330.339 to establish procedures for the design, construction, testing, and documentation of the liner and leachate collection system. Quality control (QC) of construction and quality assurance (QA) of sampling should follow the latest technical guidelines of the executive director unless guideline is obsolete and/or more recent QA/QC standards are available.

1.2 Definitions

Specific terms and acronyms that are used in this LQCP are defined below.

ASTM – American Society for Testing and Material

BER – Ballast Evaluation Report

Construction Quality Assurance (CQA) – CQA is a planned system of activities that provides the owner and permitting agency assurance that the facility was constructed as specified in the design. CQA includes the observations, evaluations, and testing necessary to assess and document the quality of the constructed facility. CQA includes measures taken by the CQA organization to assess whether the work is in compliance with the plans, specifications, and permit requirements for a project.

GLER – Geomembrane Liner Evaluation Report

Geotechnical Professional (GP) – The GP is the authorized representative of the operator who is responsible for all CQA activities for the project. The GP must be registered as a Professional Engineer in Texas. Experience and education should include geotechnical engineering, engineering geology, soil mechanics, geotechnical laboratory testing, construction quality assurance and quality control testing, and hydrogeology. The GP must also have competency and experience in certifying similar projects.

The GP may also be known in applicable regulations and guidelines as the CQA engineer, resident project representative, geotechnical quality control/quality assurance professional (GQCP), or professional of record (POR).

CQA Monitors – CQA monitors are representatives of the GP who work under direct supervision of the GP. The CQA monitor is responsible for quality assurance monitoring

and performing on-site tests and observations. The CQA monitor must be NICET-certified at Level 2 for soils and geosynthetics, an engineering technician with a minimum of four years directly related experience, or a graduate engineer or geologist with one year of directly related experience.

Quality Assurance – Quality assurance is a planned program that is designed to assure that the work meets the requirements of the plans, specifications, and permit for a project. Quality assurance includes procedures, quality control activities, and documentation that are performed by the GP and CQA monitor.

Quality Control – Quality control includes the activities that implement the quality assurance program. The GP, CQA monitor, and contractor will perform quality control.

Seasonal High Water Table – The seasonal high water table is the highest measured water level within the construction area.

SLER – Soil Liner Evaluation Report

1.3 Sequence of Construction Activities

Construction of lined areas at the TASWA DRF will generally proceed in the following sequence of activities:

- The area will be excavated to the proposed subgrade elevations.
- A temporary dewatering system, if required, will be installed as described in Section 3.3.
- The subgrade elevations will be verified.
- The compacted soil liner will be constructed, tested, and verified in accordance with Section 4.
- The geomembrane liner will be constructed, tested, and verified in accordance with Section 5.
- The leachate collection system will be constructed and verified in accordance with Section 6. All soil testing and evaluation of constructed soil liners will be complete prior to installing the leachate collection system.
- The protective cover will be constructed and verified in accordance with Section 7.
- The Soils and Liner Evaluation Report will be submitted to the TCEQ.
- The Geomembrane Liner Evaluation Report will be submitted to the TCEQ.

Daily and Intermediate Cover

Daily and intermediate cover materials consist of soil that has not been previously mixed with solid waste.

Topsoil

Topsoil consists of soil that is capable of sustaining vegetation and is free of debris, rubbish, and solid waste.

Unsuitable Materials

Unsuitable materials consist of any material that is determined by the GP to not be suitable for use as classified above.

3.3 Construction Below Groundwater

3.3.1 Highest Measured Water Elevations

The highest measured water elevations in the upper (Layer II) zone and lower (Layer V) zone will be used as the design groundwater elevations. The most recent groundwater elevations must be reviewed before the construction of each cell and, if necessary, the highest measured water elevations will be adjusted upward.

3.3.2 Temporary Dewatering

Groundwater is potentially contained in Layer II sand and sandstone and the Layer V sandstone/shaly sand shale with sand. If present, groundwater found in the upper part of Layer III is apparently in direct communication with groundwater in Layer II and acts as one hydrogeologic unit. Layer IV acts as a lower confining unit for groundwater in Layer II and III and as an upper confining unit to groundwater in Layer V.

If groundwater is encountered during excavation, lined areas will be dewatered during and after construction by a temporary dewatering system. The temporary dewatering system will consist of a network of underdrains consisting of HDPE panel-shaped pipe wrapped in geotextile encased in sand-filled trenches or perforated pipe encased in an aggregate trench wrapped in geotextile. The underdrains will discharge into open sumps beyond the lined areas or into closed sumps beneath the lined areas. The groundwater will be pumped from the sumps into the perimeter drainage system. Automated submersible pumps will be installed in closed sumps. The temporary dewatering system will be operated until sufficient ballast has been placed to offset the hydrostatic forces, ~~and~~ the ballast has been documented in the BER and approval of the BER is received from TCEQ or 14 days have lapsed from receipt of the BER by the TCEQ.

The design procedures and typical details of the temporary dewatering system are provided in Appendix D7B – Temporary Dewatering System. Design and installation of the temporary dewatering system will be documented in the SLER in accordance with

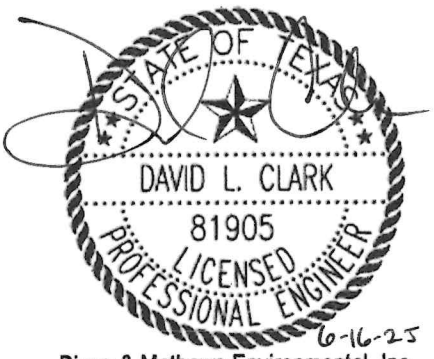
Section 9.2. ~~The facility will submit a BER to the TCEQ once it is determined that ballasting or dewatering is no longer necessary.~~

3.4 Excavation

A description of the materials that will be encountered in the excavations is provided in Attachment D5.

The slope stability analyses are provided in Attachment D5. The slope stability analyses are only valid for the conditions that were analyzed. Any changes to the excavation plan, dewatering system, ballast system, liner system, final cover system, or landfill completion plan will necessitate that the slope stability analyses be revised to reflect the actual conditions.

APPENDIX D7C
BALLAST CALCULATIONS



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Temporary Dewatering Drawdown Curve

Required: Determine the drawdown curve when the dewatering system is active.

References: *Dewatering and Groundwater Control*, UFC 3-220-05, January 2004 (supercedes TM 5-818-5).

Assumptions:
The temporary dewatering system will be designed for the highest recorded water levels.
The dewatering system plan and details are in provided in Attachment D3.
The boundary of the ground water bearing unit (GWBU) is at the top of Layer VI as demonstrated in Attachment E.
Groundwater inflow to the dewatering trench as calculated in Appendix D7-B.
Insitu hydraulic conductivity of Stratum I material as demonstrated in Att. E.

Solution: Use equations for gravity flow and drawdown from Ref 1, Fig 4-1 "Flow and Head for fully penetrating line slot"

Using known values for flow rate and hydraulic conductivity, solve for drawdown length.

$$Q = \left(\frac{kx}{2L}\right)(H^2 - h_o^2)$$

Where:

Q =	Inflow Rate =	2.58E-04	cfs
k =	hydraulic conductivity =	4.44E-07	fps
x =	length of dewatering trench=	1550	ft
H =	design water height =	9	ft
h_o =	toe/trench drain height =	3	ft

Solve for drawdown length: L

$$L = \left(\frac{kx}{2Q}\right)(H^2 - h_o^2)$$

L = 96 ft

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

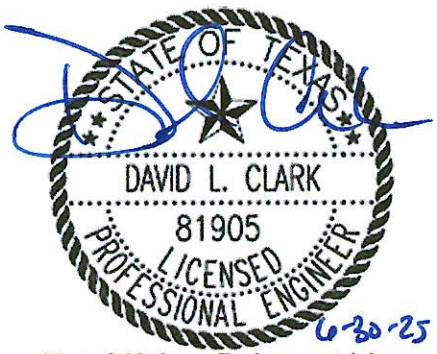
PERMIT AMENDMENT APPLICATION

VOLUME 3 OF 4

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised March 2025
Revised June 2025



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VOLUME 3 OF 4

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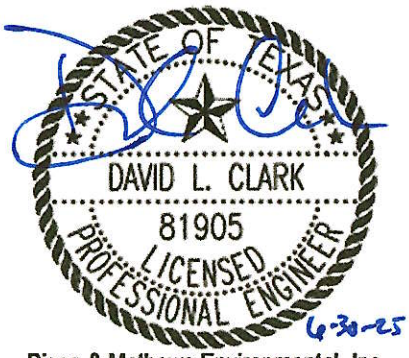
Attachment F – Groundwater Monitoring Plan



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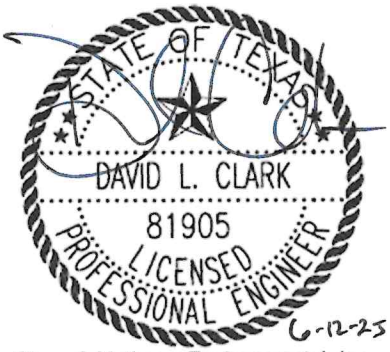
PART III – SITE DEVELOPMENT PLAN
ATTACHMENT E
GEOLOGY REPORT

Prepared for:

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised June 2025



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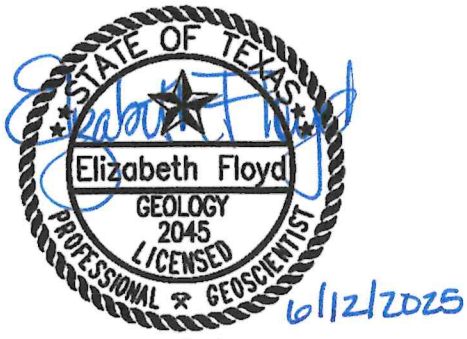
For Sections 2.3, 5.1-5.3



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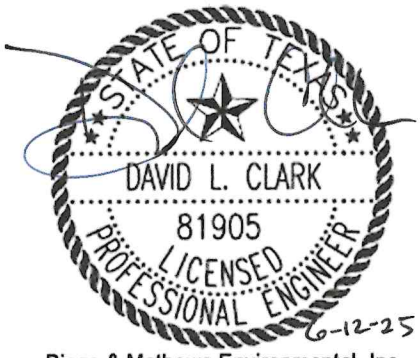

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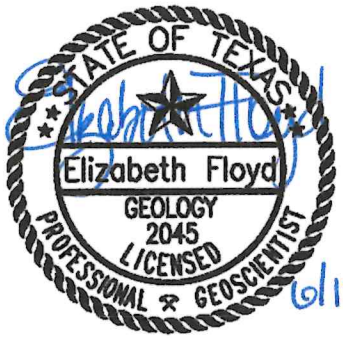

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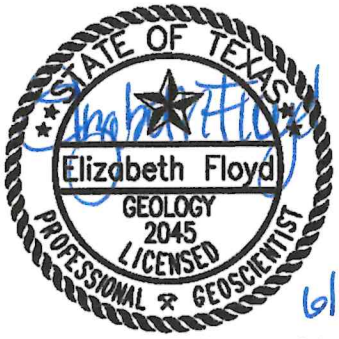

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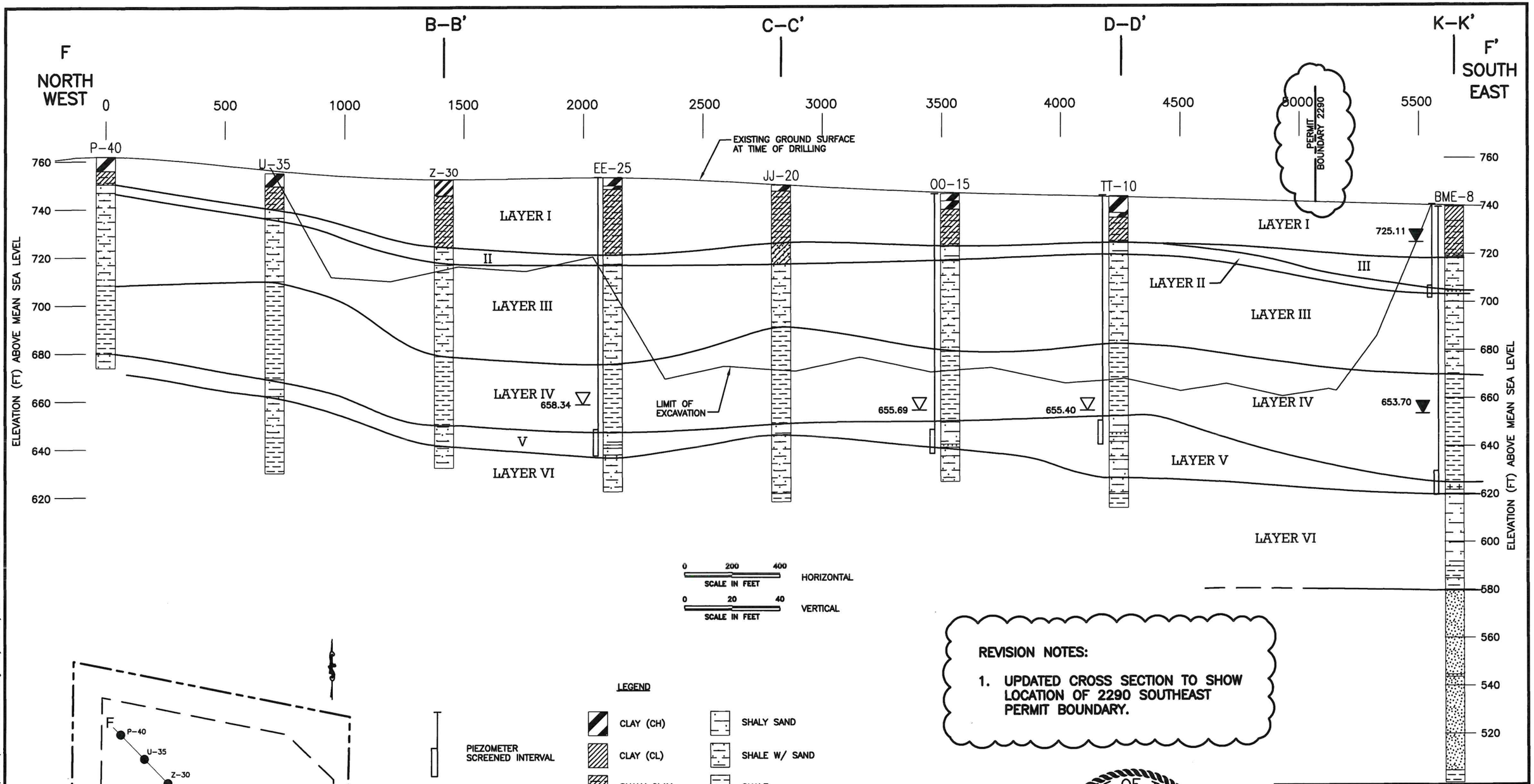
Monitoring Well and Piezometer Details

Well No.	Date Installed	Total Depth (ft)	Surface Elevation (ft/msl)	Top of Casing Elevation (ft/msl)	Filter Pack Elevation (ft/msl)	Screen Elevation (ft/msl)	Layer Screened
Monitoring Wells							
MW-1	8/12/04	32.0	765.00	767.85	746.50 - 733.50	743.50 - 733.50	Layer II & III
MW-2	8/31/04	22.5	760.21	760.87	746.21 - 738.21	743.21 - 738.21	Layer II & III
MW-3	8/26/04	26.5	749.36	749.97	731.36 - 723.36	728.36 - 723.36	Layer II & III
MW-4	8/12/04	18.5	739.61	742.34	729.61 - 721.61	726.61 - 721.61	Layer II & III
MW-5	8/17/04	12.5	728.60	731.01	723.54 - 717.54	722.54 - 717.54	Layer II & III
MW-6	8/17/04	32.5	744.65	747.44	725.65 - 712.64	722.65 - 712.65	Layer II & III
MW-7	8/17/04	32.9	746.84	749.14	723.00 - 715.00	720.00 - 715.00	Layer II & III
MW-12	8/25/04	20.5	758.36	760.32	752.71 - 739.71	749.71 - 739.71	Layer II & III
MW-13	8/26/04	89.5	729.54	732.02	653.54 - 640.54	650.54 - 640.54	Layer V
MW-14	8/24/04	107.5	744.65	747.30	650.65 - 637.65	647.65 - 637.65	Layer V
MW-15	8/29/04	114.5	747.37	749.63	646.37 - 633.37	643.37 - 633.37	Layer V
MW-16	8/14/04	106.0	742.12	744.96	649.62 - 636.62	646.62 - 636.62	Layer V
MW-17	8/12/04	133.5 ~~32.0~~	749.76	752.16	629.76 - 616.76	626.76 - 616.76	Layer V
MW-18	8/13/04	130.5	747.85	750.38	630.85 - 617.85	627.85 - 617.85	Layer V
MW-19	8/12/22	122.0 ~~32.0~~	749.30	752.18	642.30 - 629.30	639.30 - 629.30	Layer V
MW-26	8/26/22	90.5	759.76	762.20	682.76 - 669.76	679.76 - 669.76	Layer V
Piezometers							
L35(S)	4/4/00	25.0	765.6	768.62	748.8 - 740.6	746.7 - 741.7	Layer II
L35(D)	4/13/00	96.0	765.3	768.24	678.6 - 669.3	675.3 - 670.3	Layer V
P10	4/19/00	109.0	766.3	765.70	666.5 - 657.3	663.3 - 658.3	Layer V
P20(S)	4/4/00	46.0	761.9	764.73	729.9 - 715.9	726.9 - 716.9	Layer III
P20(D)	4/11/00	99.0	761.8	764.78	680.2 - 662.8	675.8 - 665.8	Layer V
U30	4/4/00	45.0	757.9	760.94	726.9 - 712.9	723.1 - 713.1	Layer III
Z20	4/12/00	113.5	763.7	766.47	658.7 - 650.2	655.7 - 650.7	Layer V
EE15	4/17/00	122.0	762.8	765.73	665.3 - 640.8	656.6 - 641.6	Layer V
EE25	4/14/00	117.0	453.0	756.01	655.3 - 636.0	648.0 - 637.0	Layer V
EE35(S)	4/5/00	21.0	737.3	740.19	725.3 - 713.3	722.3 - 713.7	Layer II & III
EE35(D)	4/10/00	101.0	737.2	740.10	650.2 - 636.2	647.2 - 637.2	Layer V
JJ10(S)	4/3/00	41.5	764.4	767.18	737.7 - 723.9	734.4 - 724.4	Layer II
JJ10(D)	4/18/00	119.0	764.6	767.60	659.7 - 645.9	656.6 - 645.6	Layer V
OO15	4/20/00	112.0	748.6	751.40	651.3 - 636.6	647.6 - 637.6	Layer V



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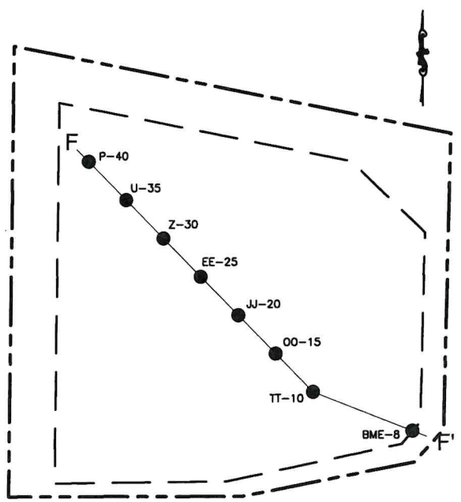

KEY MAP

LEGEND

- PIEZOMETER SCREENED INTERVAL
- GROUNDWATER LEVEL ON JUNE 29, 2000
- GROUNDWATER LEVEL ON MARCH 19, 2024
- CLAY (CH)
- CLAY (CL)
- SHALY CLAY
- SANDY CLAY
- SHALY SAND
- SHALE W/ SAND
- SHALE
- SANDSTONE

NOTES:

1. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
2. CROSS-SECTION LOCATION MAP IS FIGURE E3-1.
3. ALL BOREHOLES WERE DRILLED USING METHODS THAT USED WATER IN THE DRILLING PROCESS. STABLE WATER LEVELS SHOWN ARE FROM THE INSTALLED WATER LEVEL PIEZOMETER OR ESTABLISHED MONITORING WELL.

REVISION NOTES:

1. UPDATED CROSS SECTION TO SHOW LOCATION OF 2290 SOUTHEAST PERMIT BOUNDARY.

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2045
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CROSS SECTION F – F'

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817-563-1144

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DRAWING
E3.6

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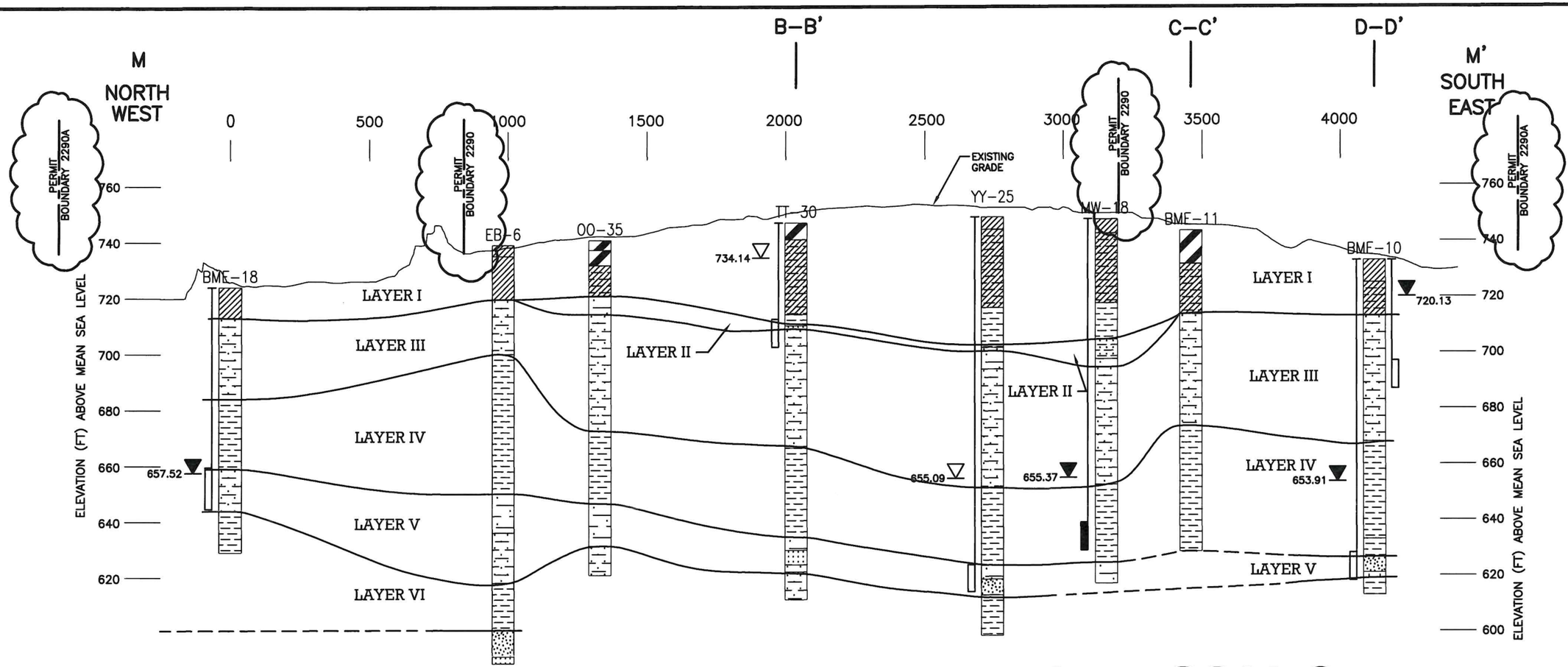

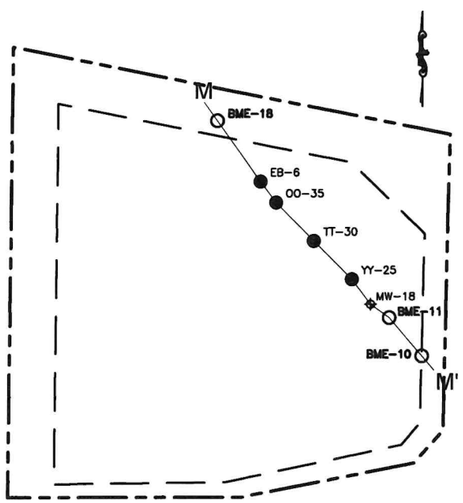

KEY MAP

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HORIZONTAL

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VERTICAL

REVISION NOTES:

1. UPDATED CROSS SECTION TO SHOW LOCATIONS OF 2290 AND 2290A PERMIT BOUNDARIES.

LEGEND

- PIEZOMETER SCREENED INTERVAL
- MONITORING WELL SCREENED INTERVAL
- GROUNDWATER LEVEL ON JUNE 29, 2000
- GROUNDWATER LEVEL ON MARCH 19, 2024
- CLAY (CH)
- CLAY (CL)
- SHALY CLAY
- SANDY CLAY
- SHALY SAND
- SHALE W/ SAND
- SHALE
- SANDSTONE
- SANDSTONE W/ SHALE
- SAND
- SILTSTONE

NOTES:

1. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
2. CROSS–SECTION LOCATION MAP IS FIGURE E3–1.
3. BOREHOLES DRILLED WITH MUD ROTARY. STABLE WATER LEVELS SHOWN ARE FROM THE INSTALLED WATER LEVEL PIEZOMETER OR ESTABLISHED MONITORING WELL.

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CROSS SECTION M – M'

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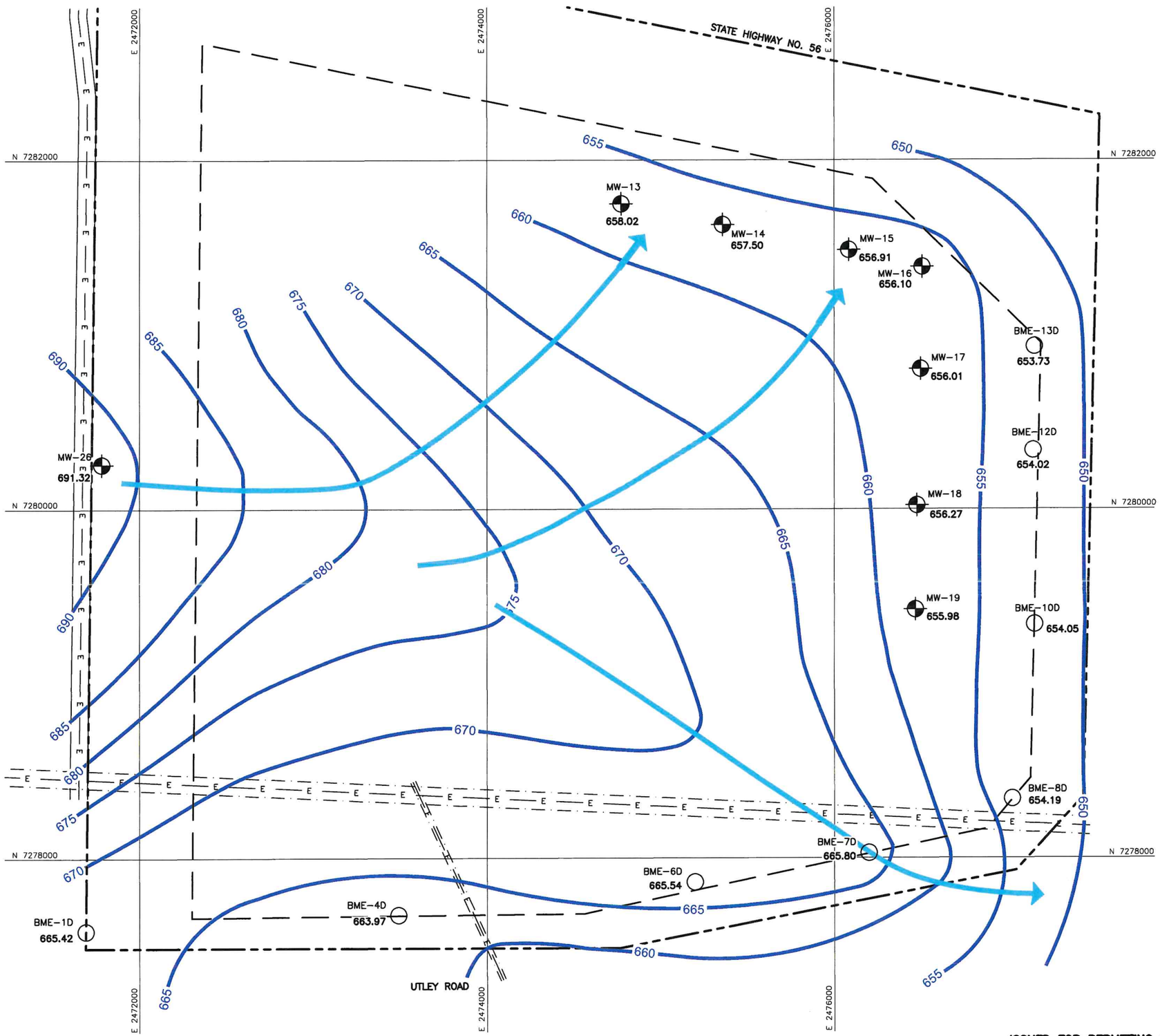

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LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

REVISION NOTES:

1. UPDATED POTENTIOMETRIC SURFACE CONTOUR DESCRIPTION TO INDICATE LAYER V.
2. UPDATED PAGE NUMBER.

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MARCH 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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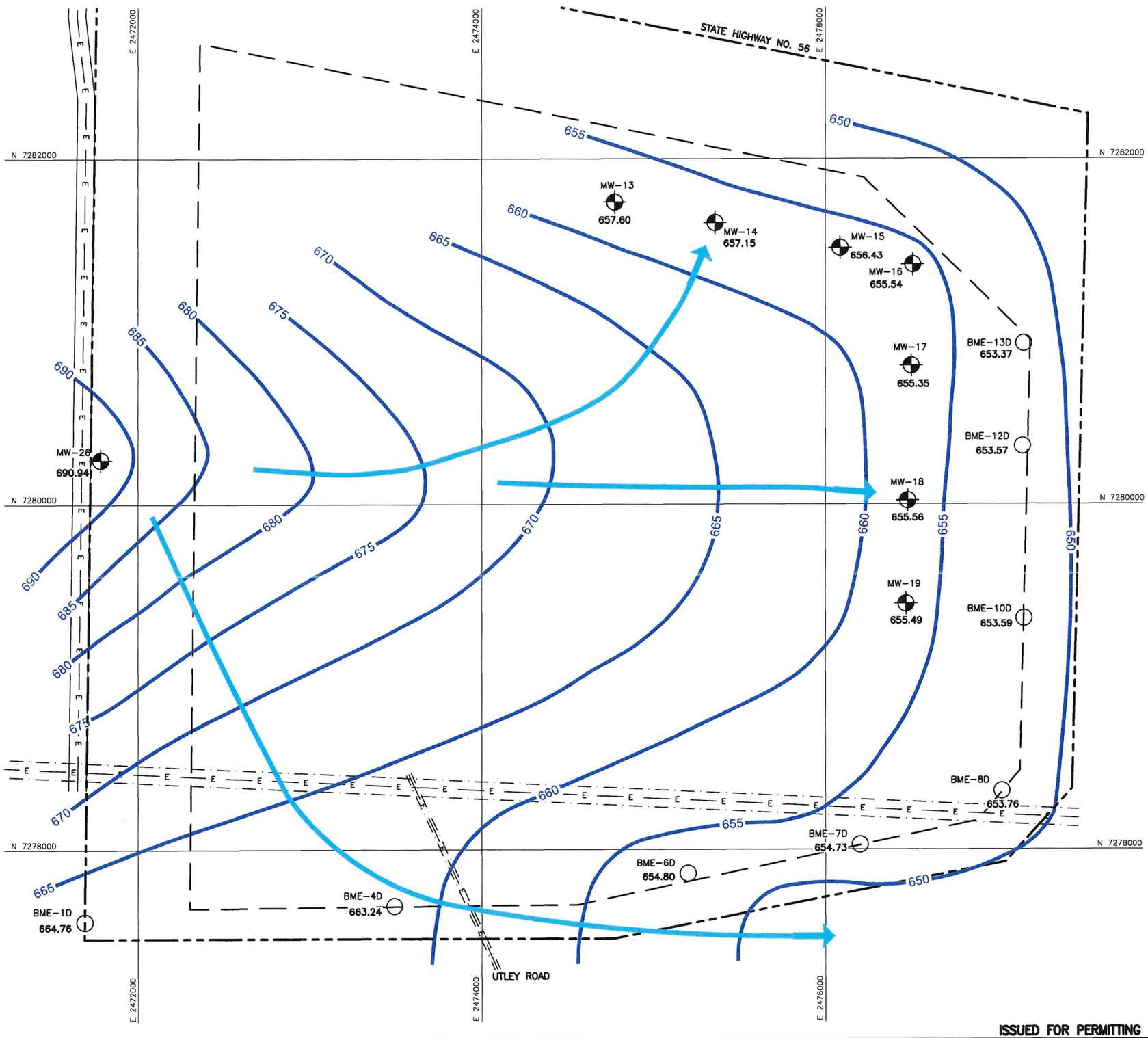

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

REVISION NOTES:

1. UPDATED POTENTIOMETRIC SURFACE CONTOUR DESCRIPTION TO INDICATE LAYER V.
2. UPDATED PAGE NUMBER.

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APRIL 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY
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BME
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DRAWING
E6.2b

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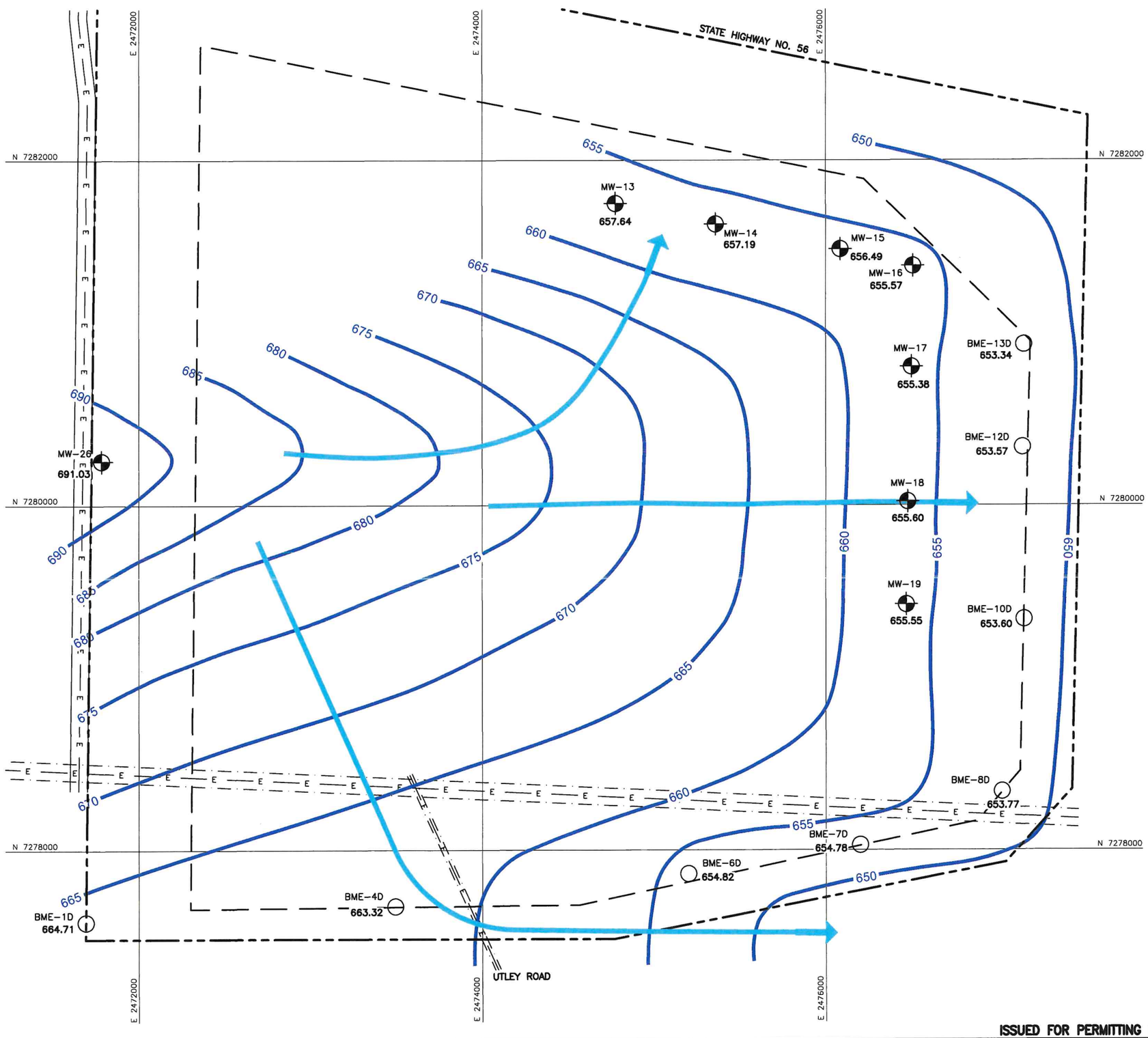

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

REVISION NOTES:

1. UPDATED POTENTIOMETRIC SURFACE CONTOUR DESCRIPTION TO INDICATE LAYER V.
2. UPDATED PAGE NUMBER.

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MAY 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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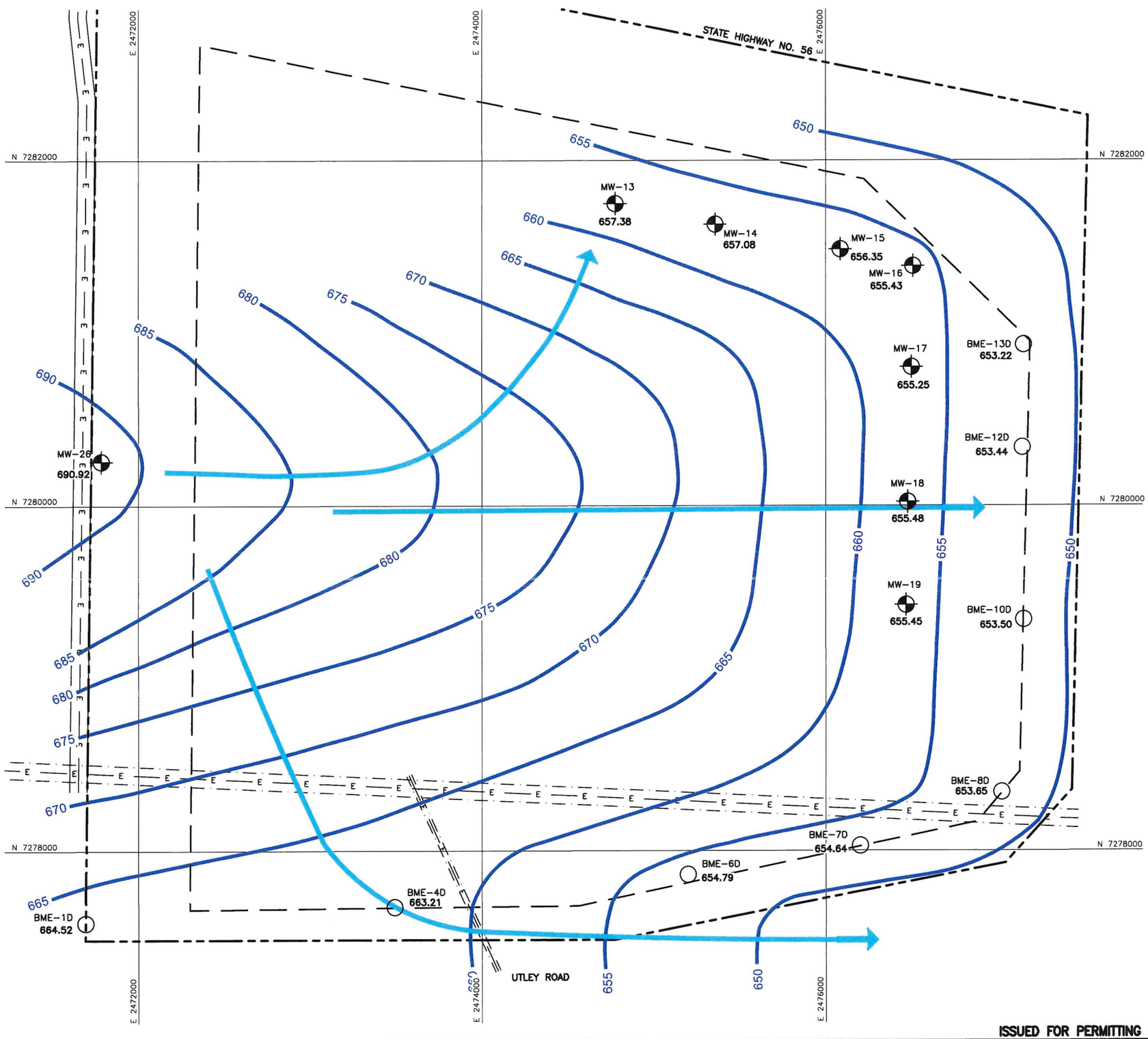

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

REVISION NOTES:

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JUNE 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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DRAWING
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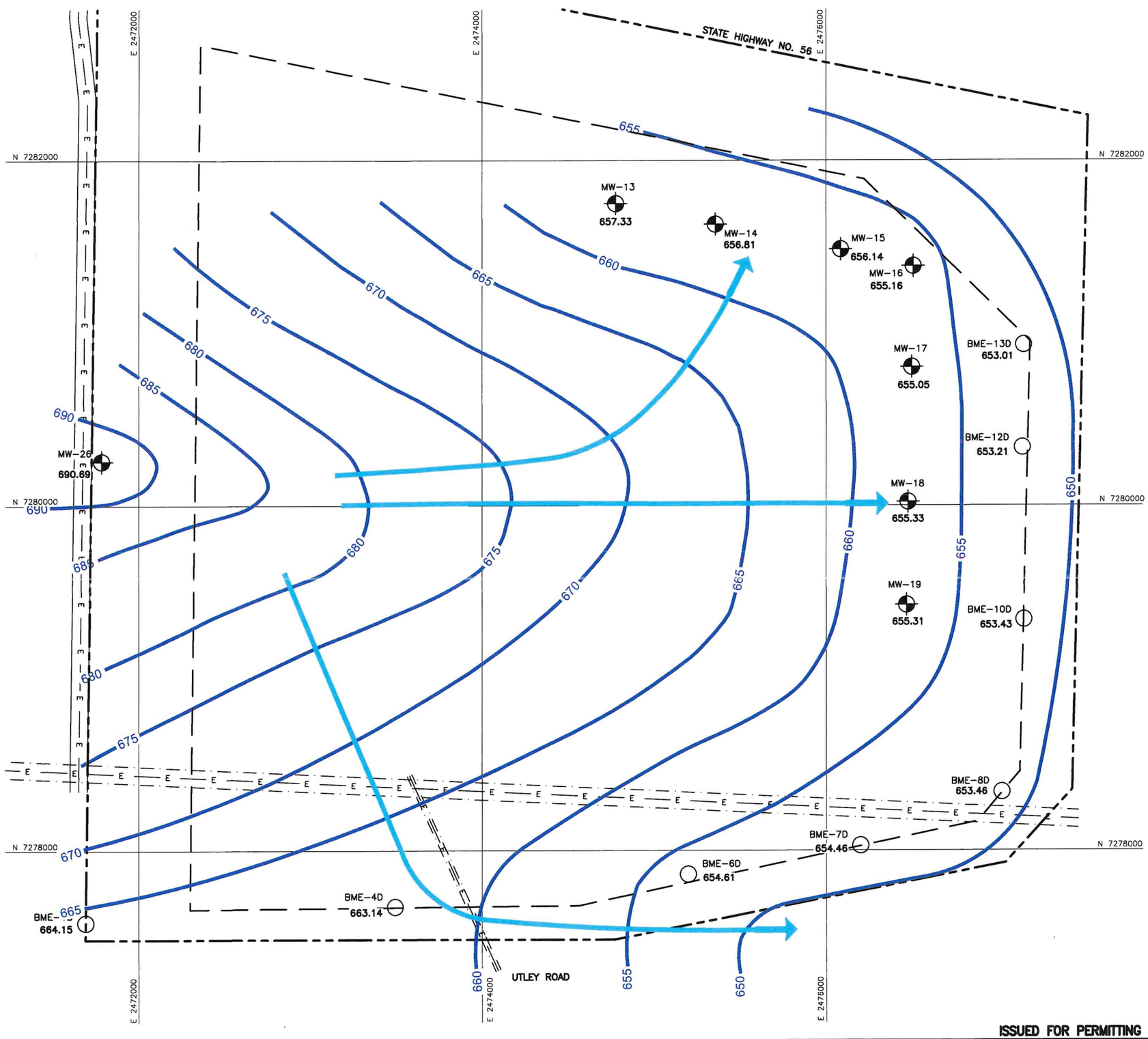

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
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REVISION NOTES:

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JULY 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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DRAWING
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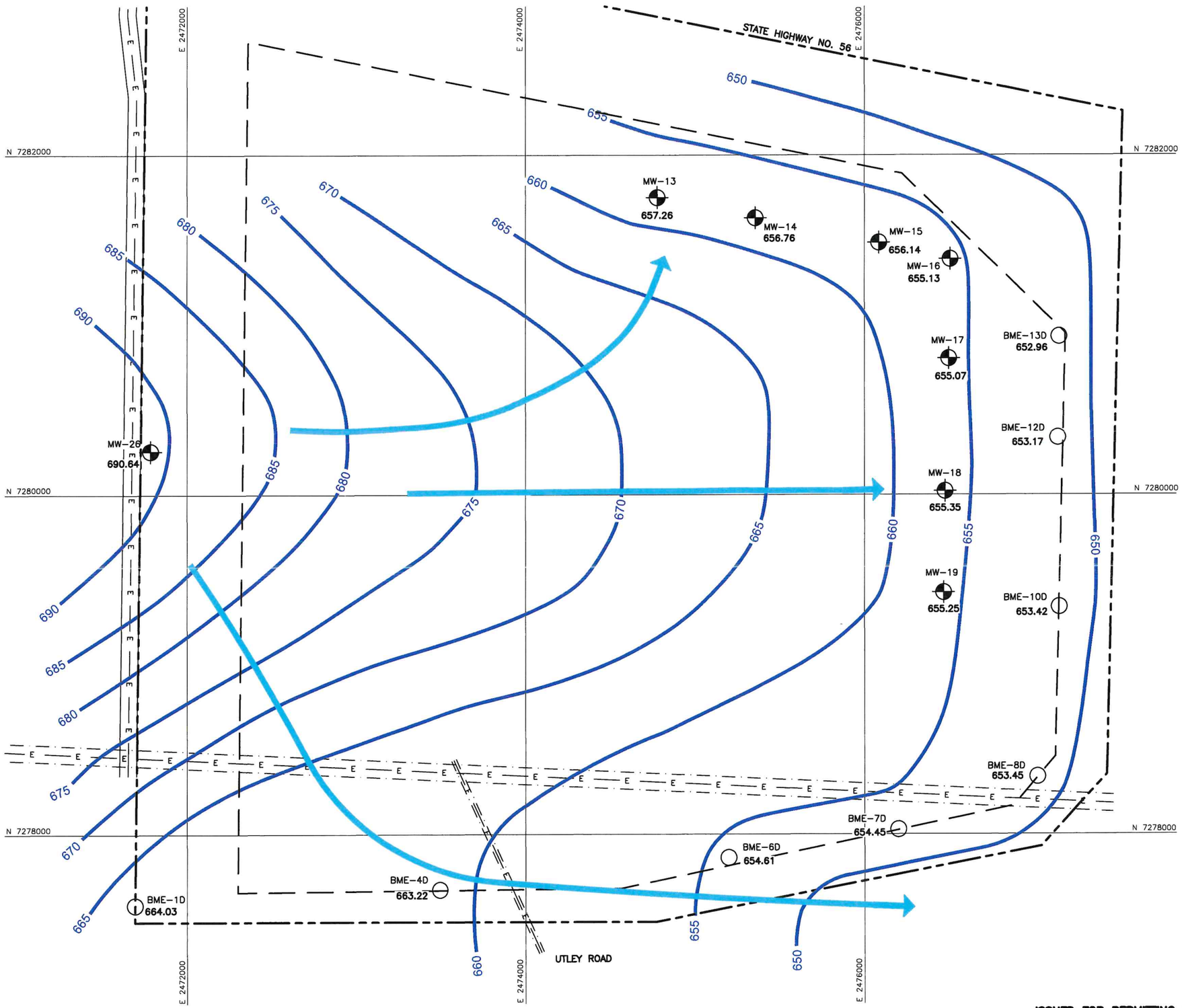

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
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AUGUST 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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DRAWING
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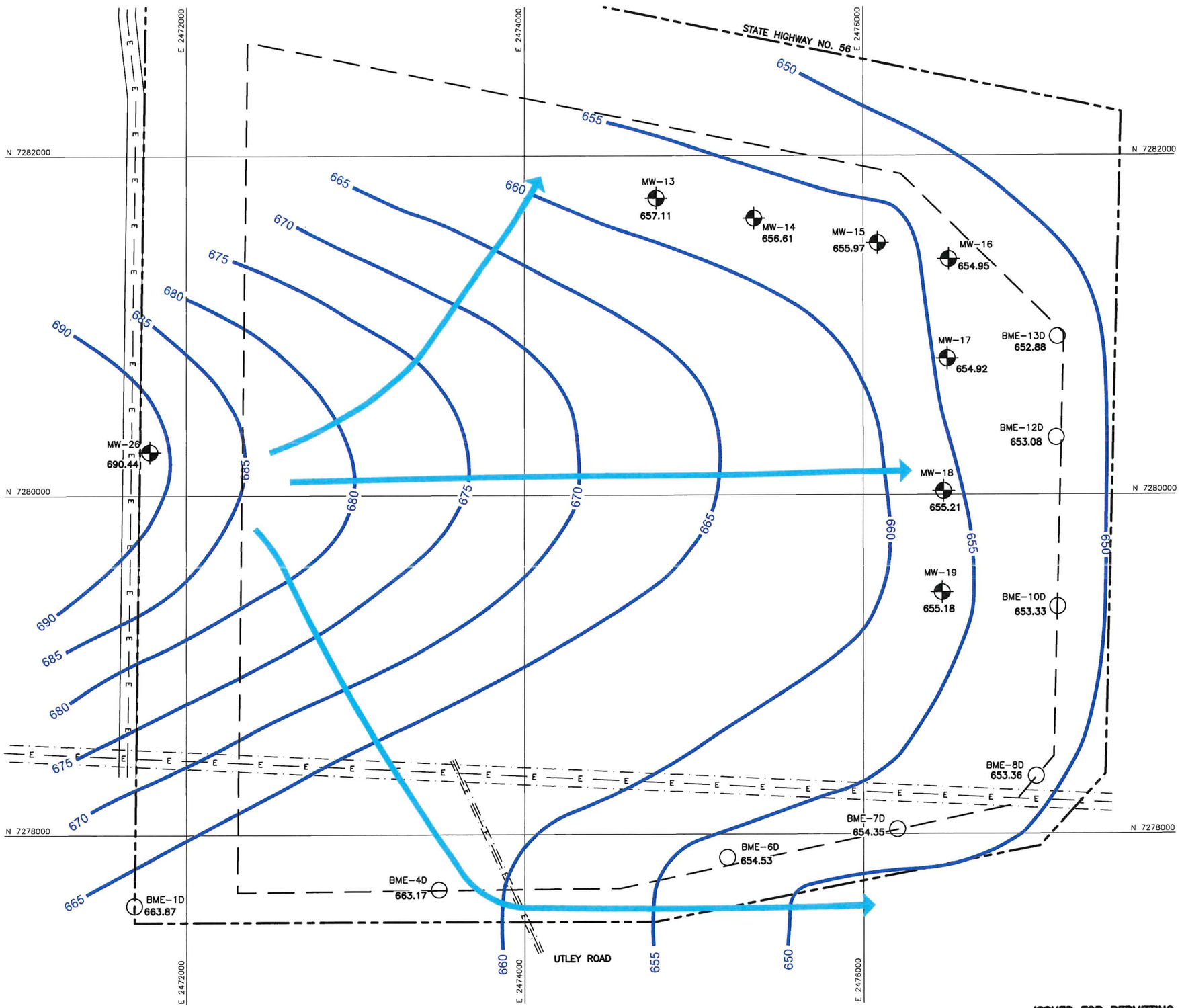

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
- MW-1 MONITOR WELL LOCATION AND ID NUMBER
- BME-15 PIEZOMETER LOCATION AND ID NUMBER
- 654.05 WATER LEVEL ELEVATION
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E6.2g

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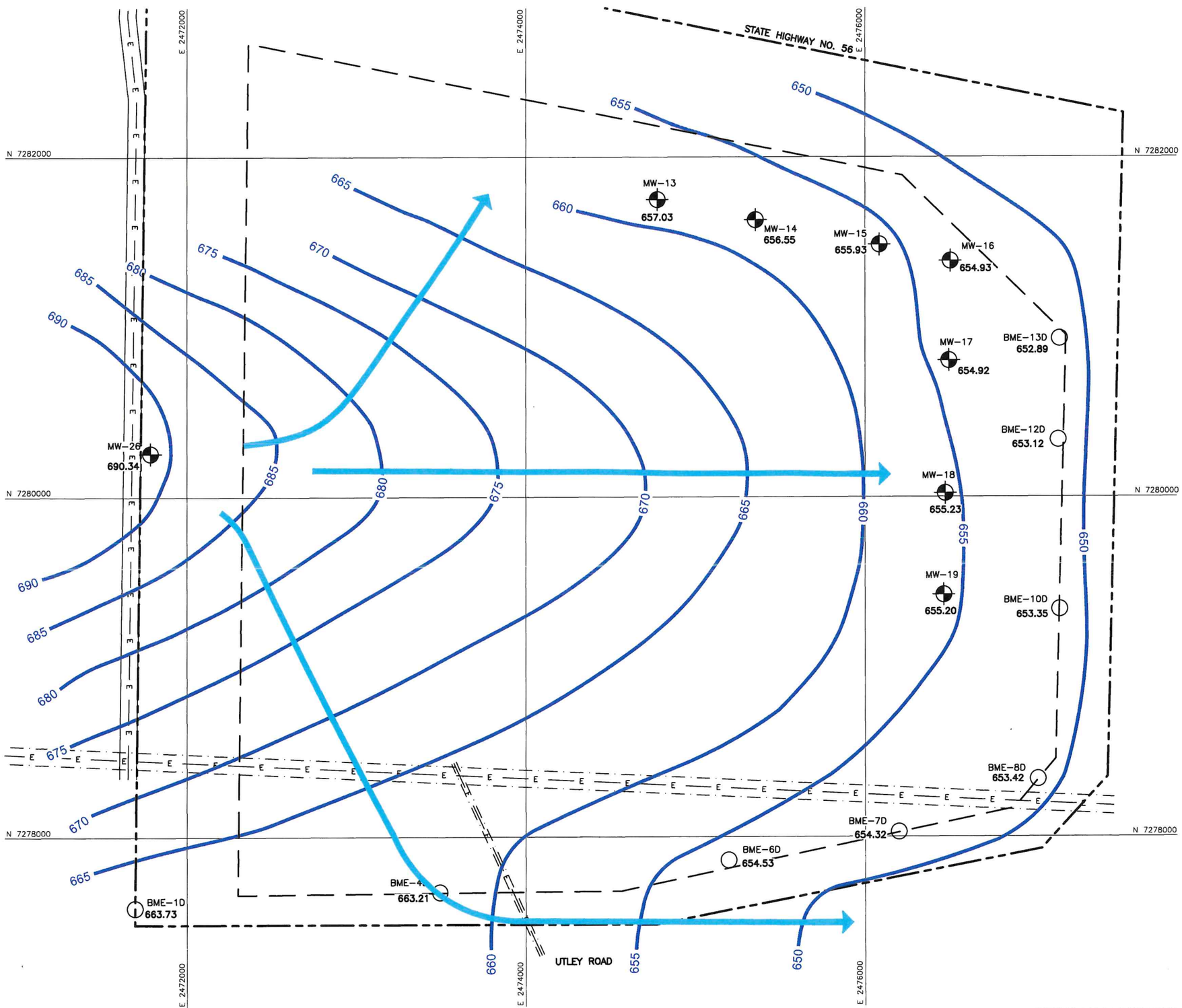
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685
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MW-14
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MW-15
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MW-16
654.93
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MW-18
655.23
MW-19
655.20
MW-26
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653.35
BME-8D
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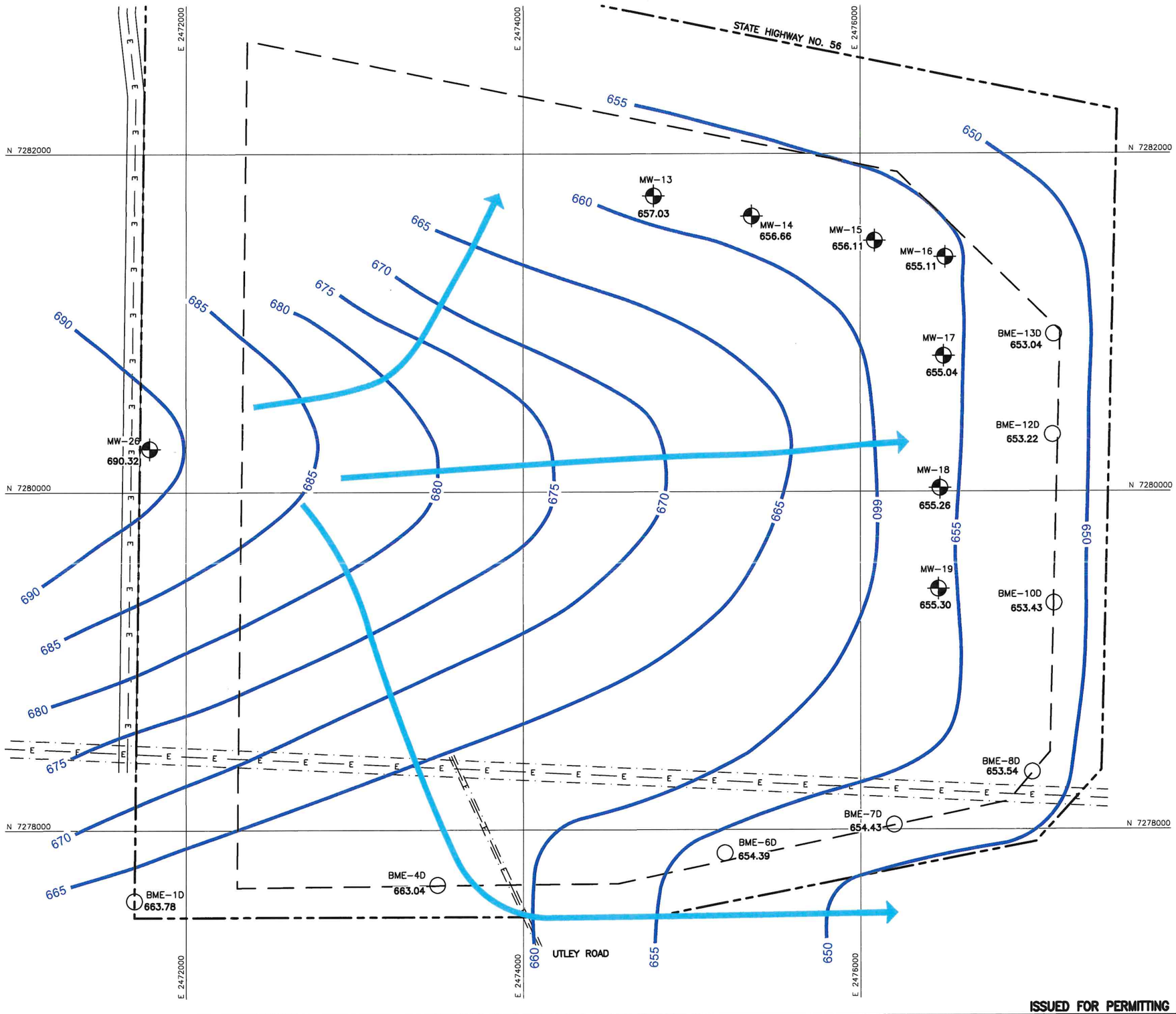
UTLEY ROAD
E E E



0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
- MW-1 MONITOR WELL LOCATION AND ID NUMBER
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- 735 CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

REVISION NOTES:

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NOVEMBER 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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DRAWING
E6.2i

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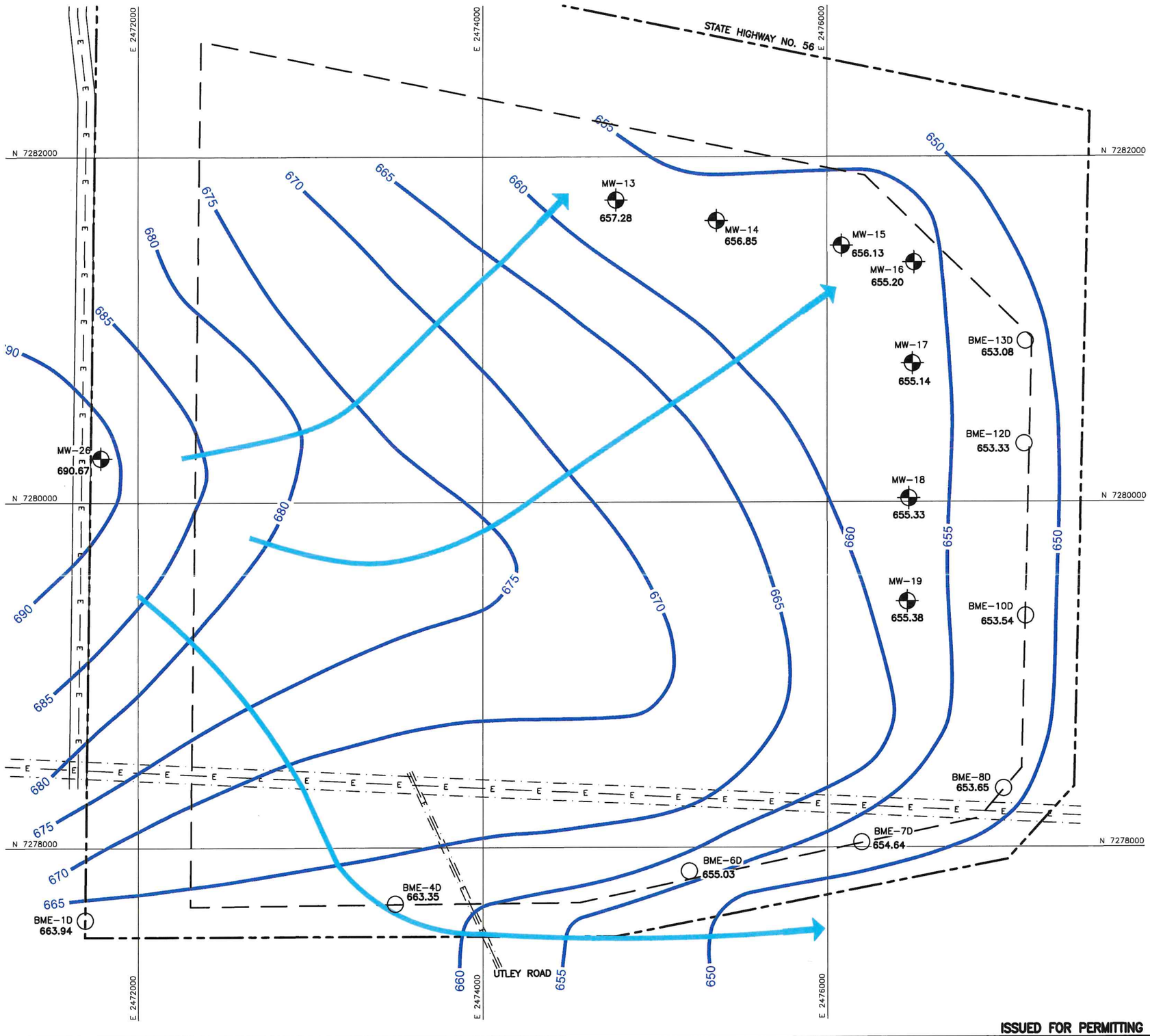

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
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DECEMBER 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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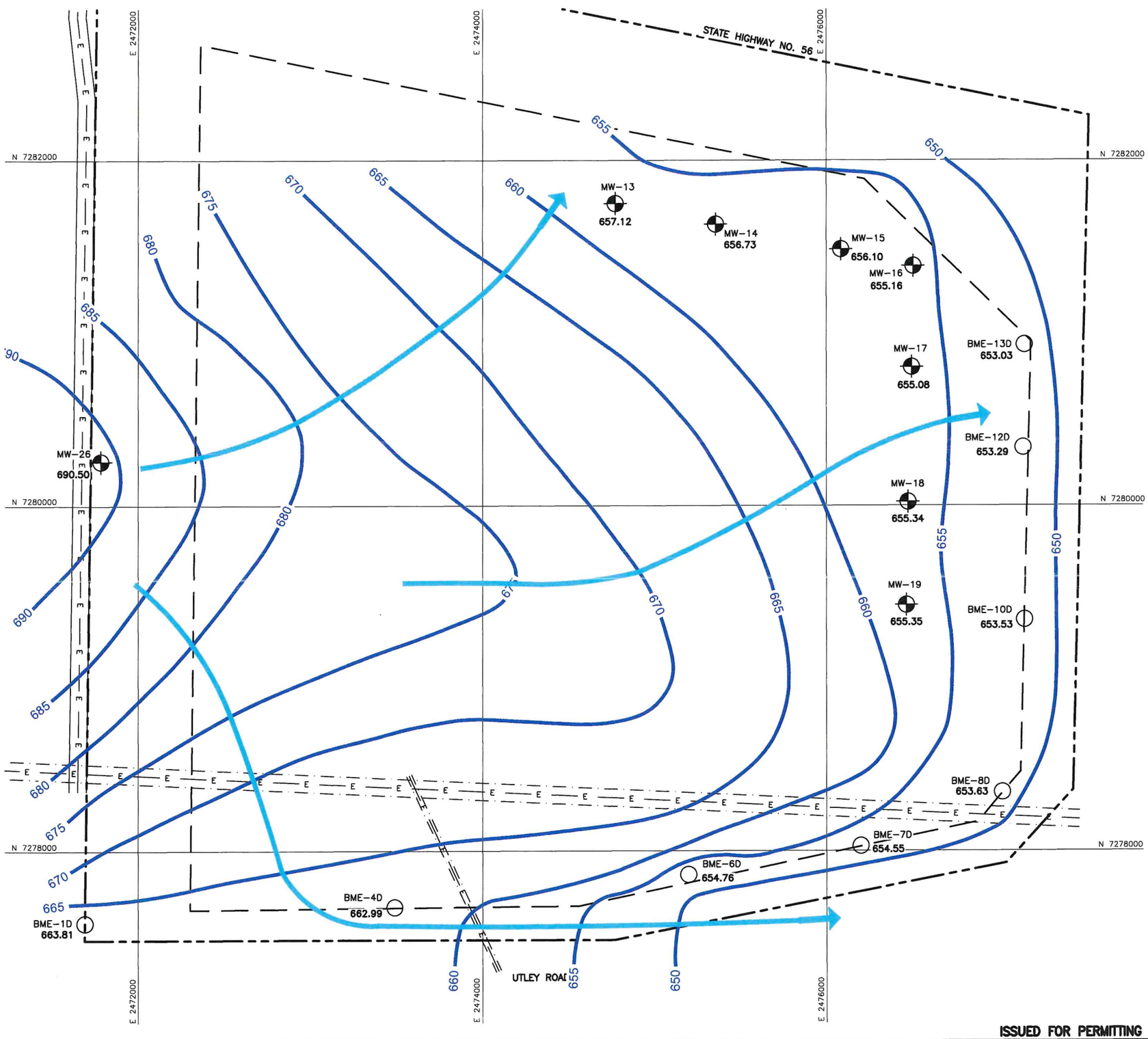

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
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REVISION NOTES:

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JANUARY 2023 – LAYER V POTENTIOMETRIC SURFACE MAP

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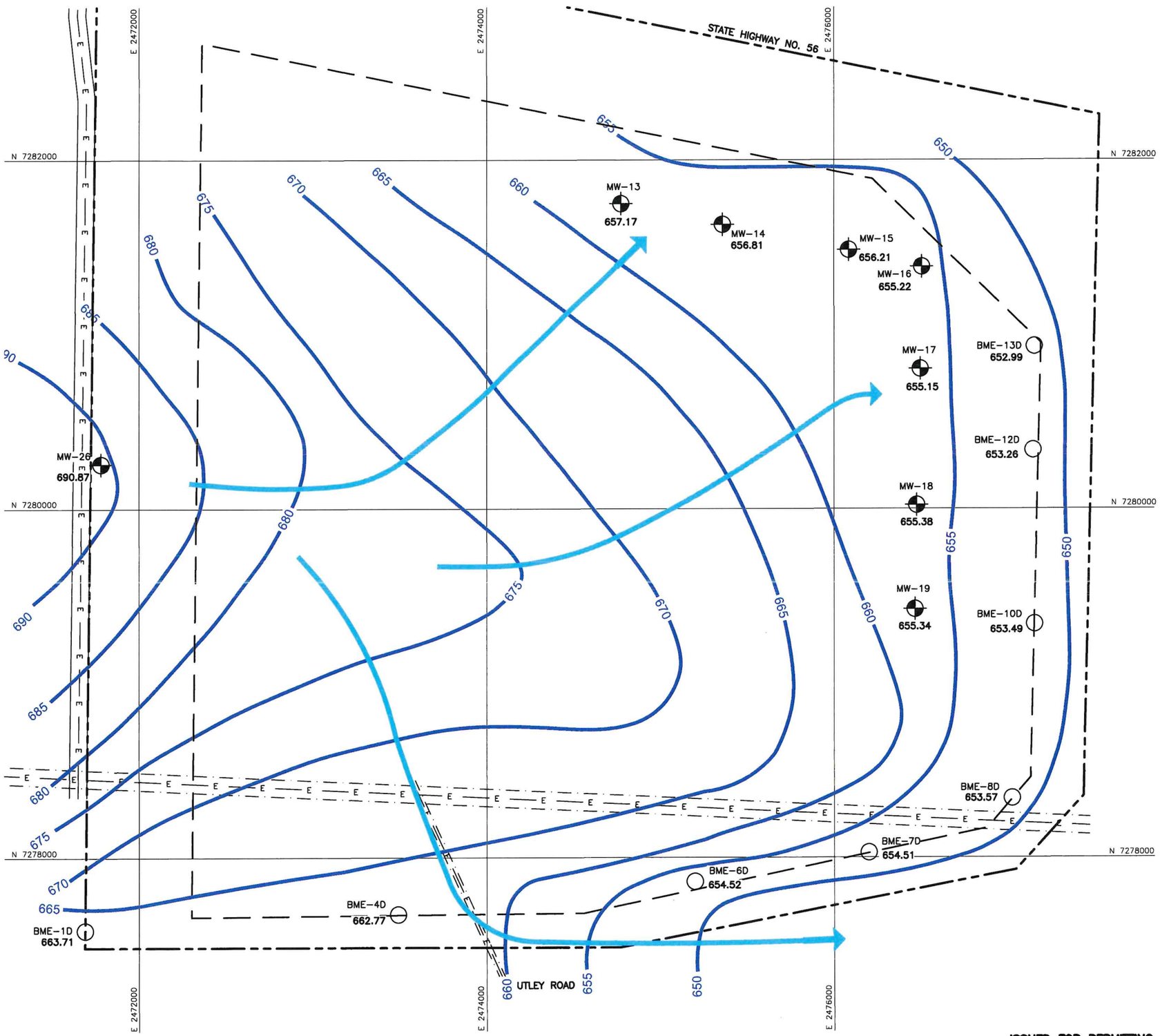

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
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FEBRUARY 2023 – LAYER V POTENTIOMETRIC SURFACE MAP

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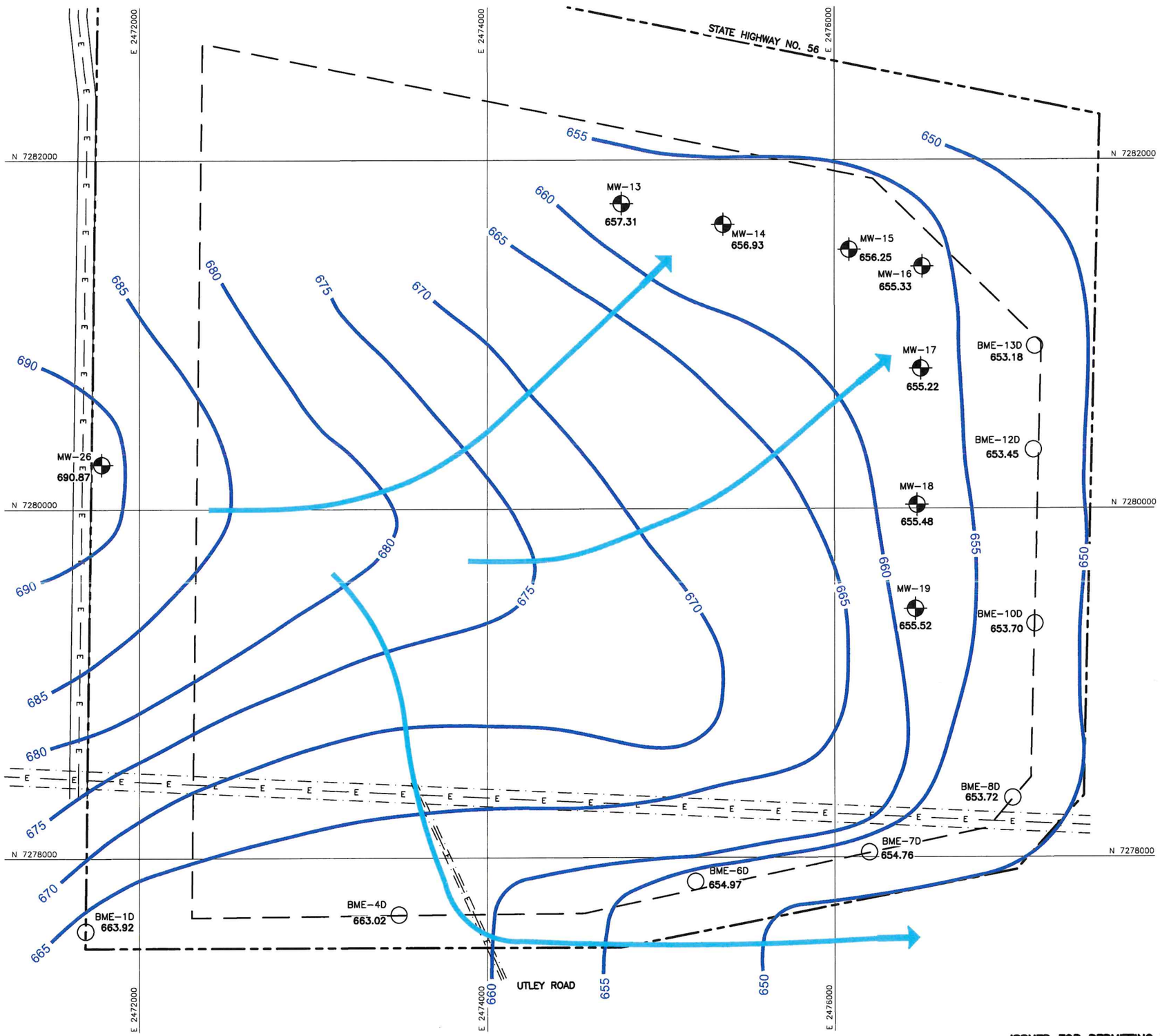

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
- MW-1 MONITOR WELL LOCATION AND ID NUMBER
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REVISION NOTES:

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MARCH 2023 – LAYER V POTENTIOMETRIC SURFACE MAP

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DRAWING E6.2m

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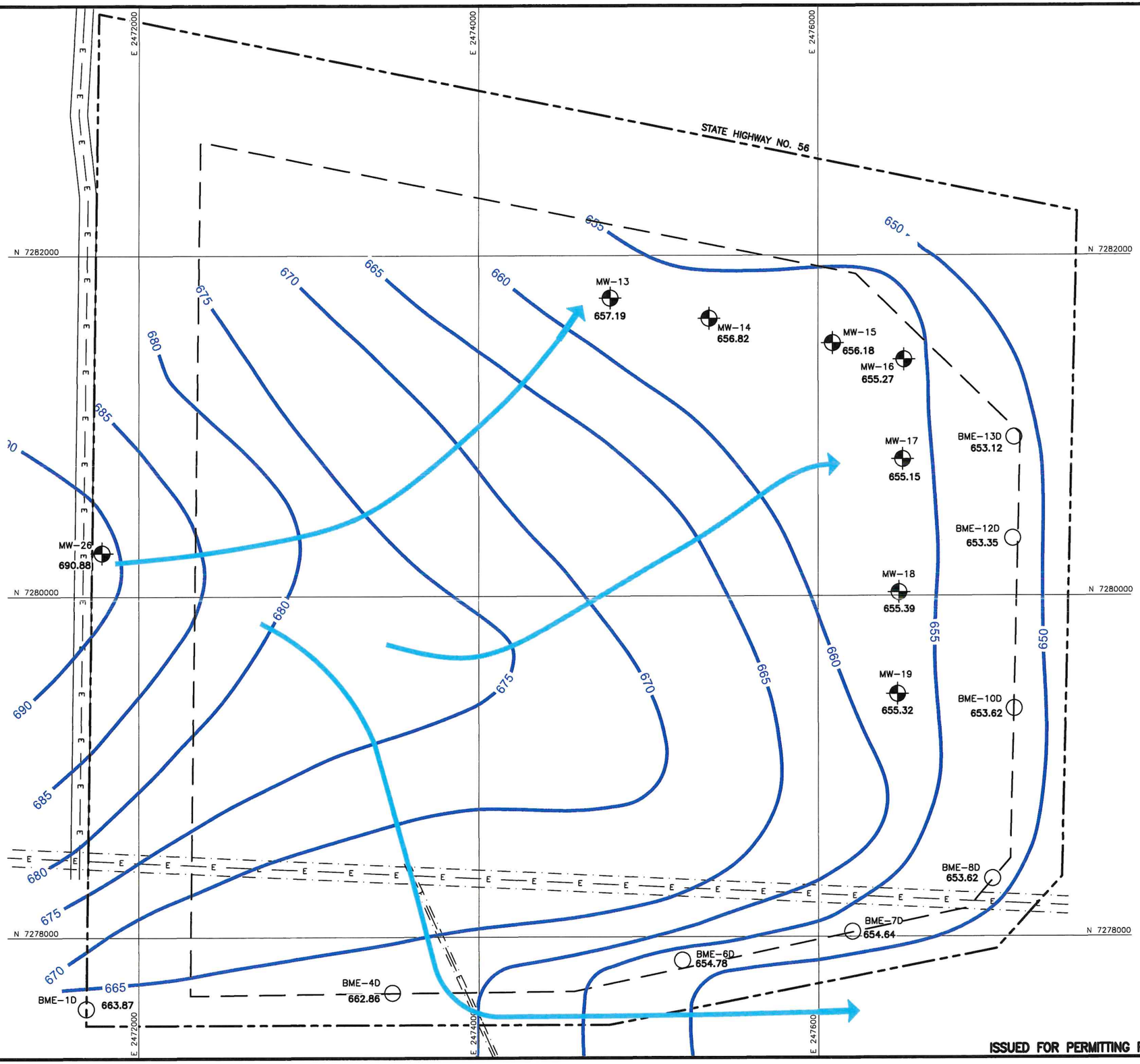

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
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APRIL 2024–LAYER V POTENTIOMETRIC SURFACE MAP

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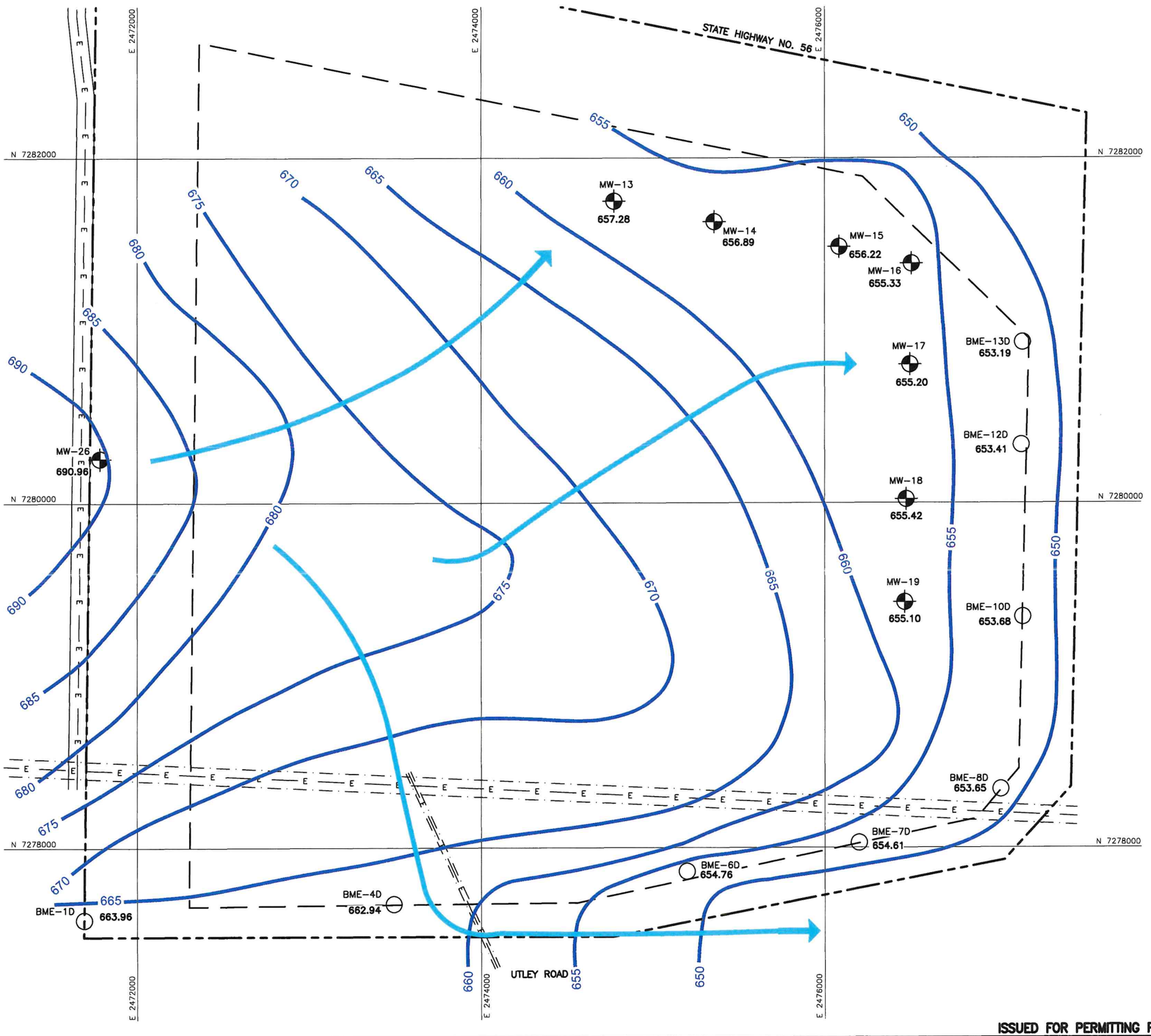

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
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MAY 2023 – LAYER V POTENTIOMETRIC SURFACE MAP

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E6.2o

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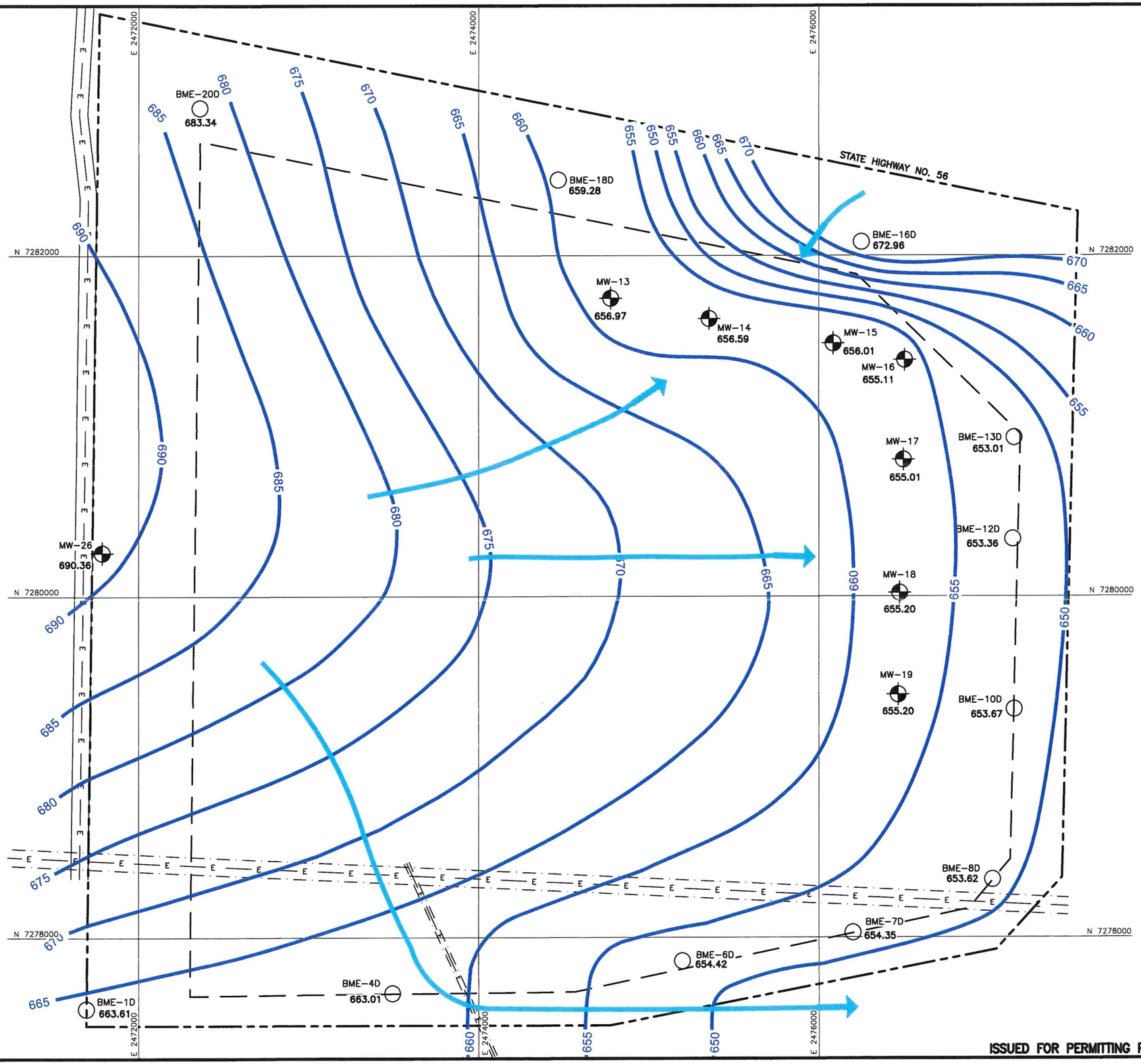

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
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DECEMBER 2023 – LAYER V POTENTIOMETRIC SURFACE MAP

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TBPG FIRM NO. 50222

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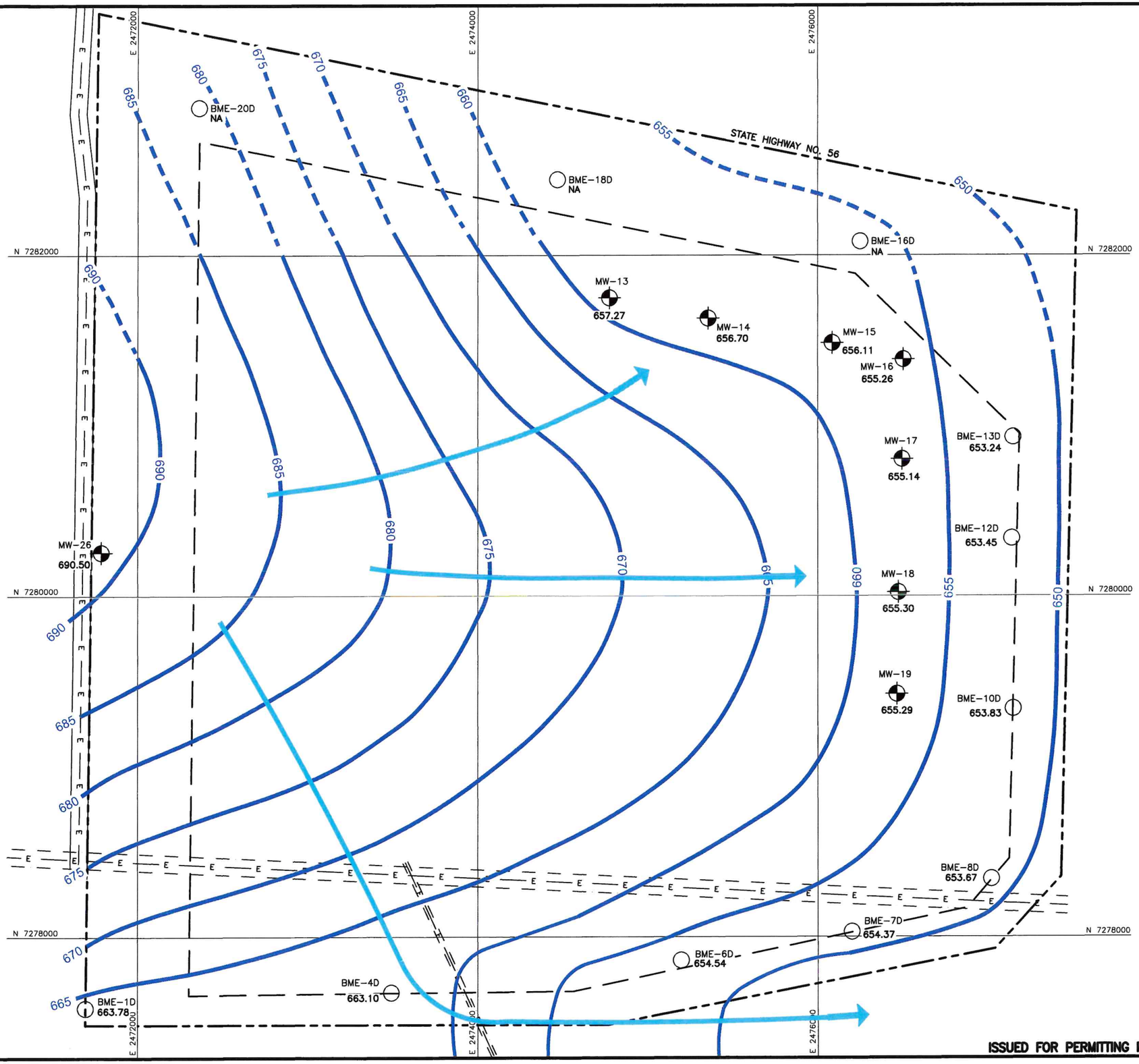

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
- MW-1 MONITOR WELL LOCATION AND ID NUMBER
- BME-15 PIEZOMETER LOCATION AND ID NUMBER
- 654.05 WATER LEVEL ELEVATION
- 735 CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

REVISION NOTES:

1. UPDATED POTENTIOMETRIC SURFACE CONTOUR DESCRIPTION TO INDICATE LAYER V.
2. UPDATED PAGE NUMBER.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
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JANUARY 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY
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PERMIT AMENDMENT

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TBPG FIRM NO. 50222

DRAWING
E6.2q

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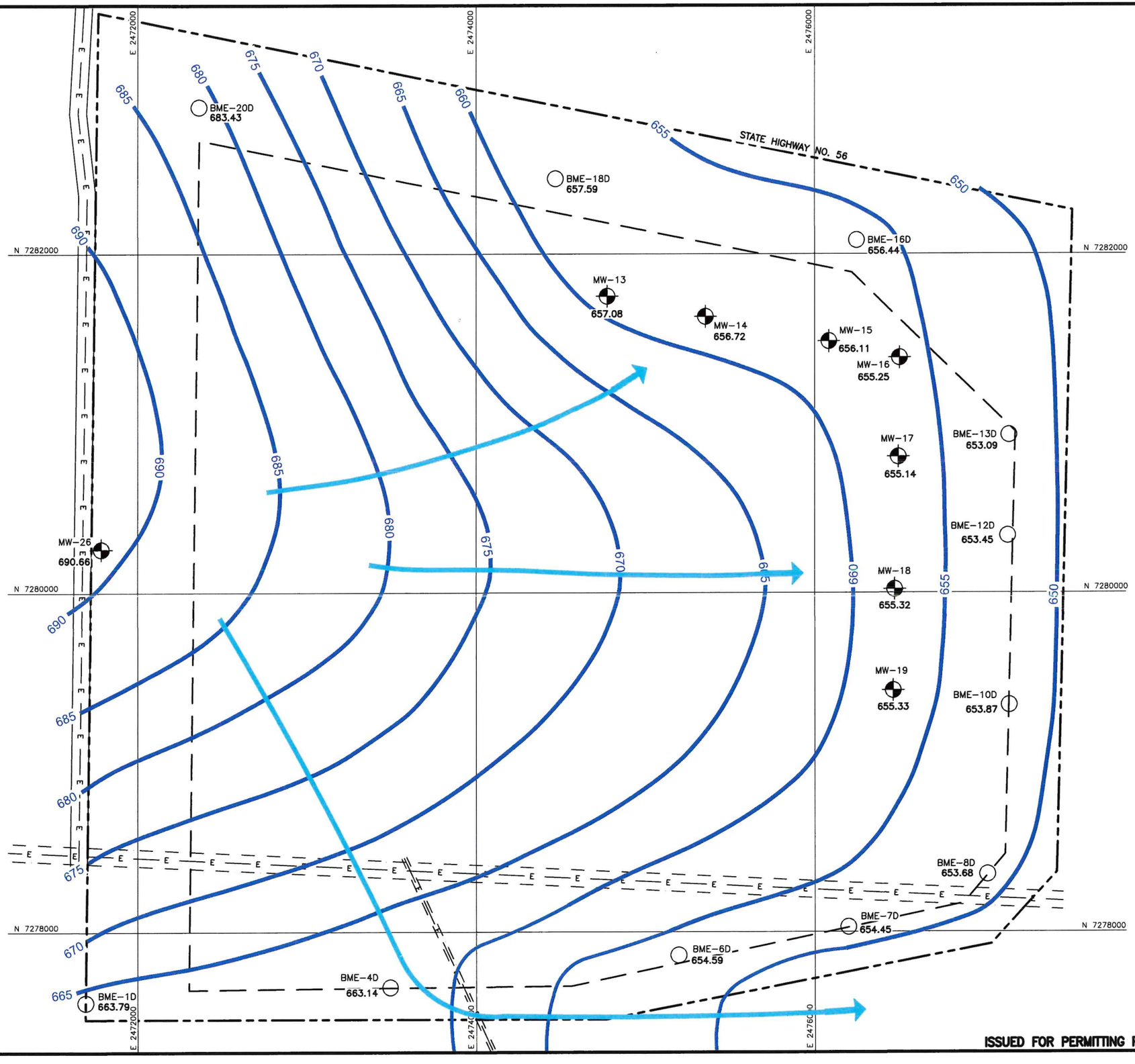

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SCALE IN FEET

LEGEND

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- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
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FEBRUARY 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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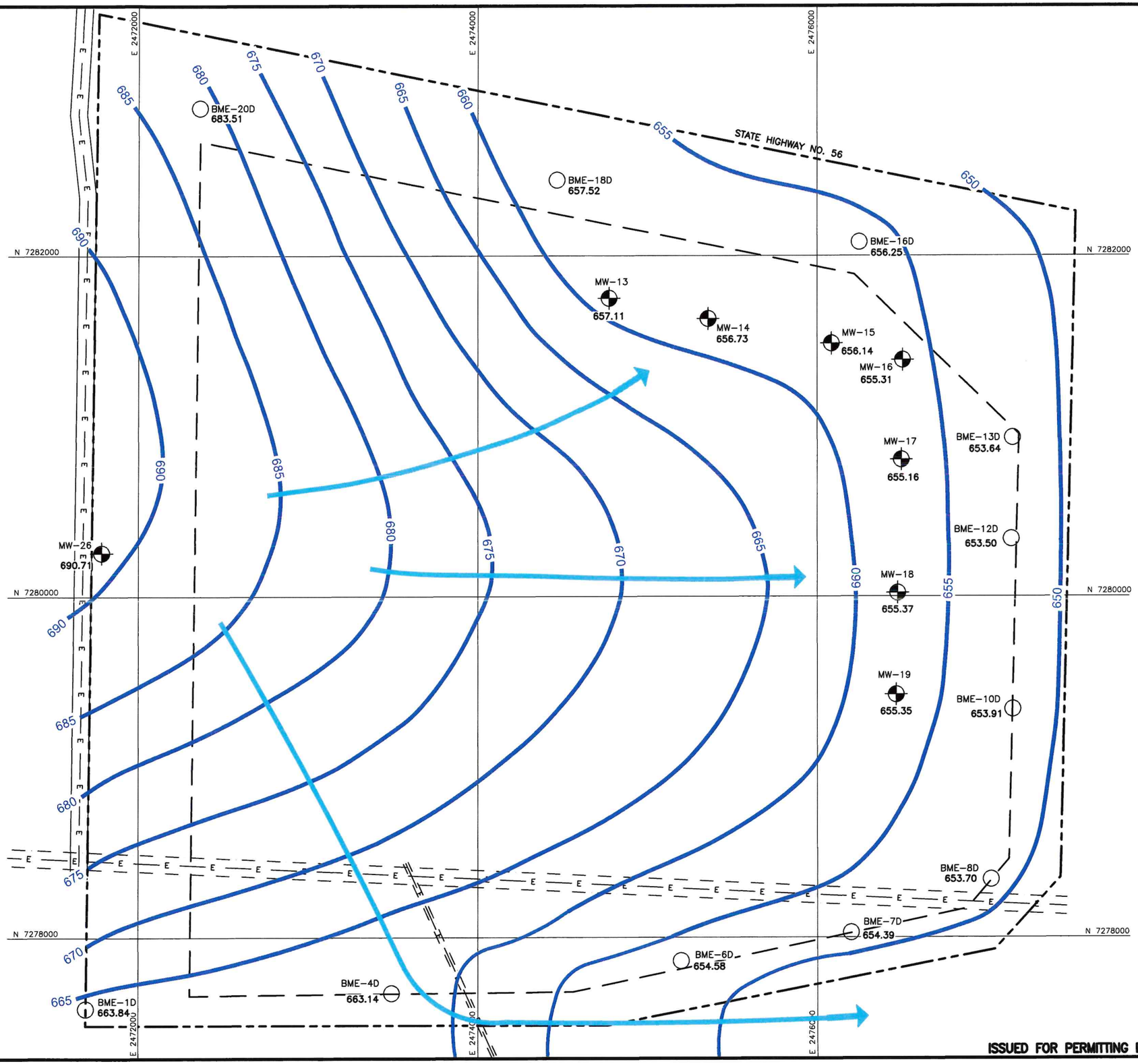

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MARCH 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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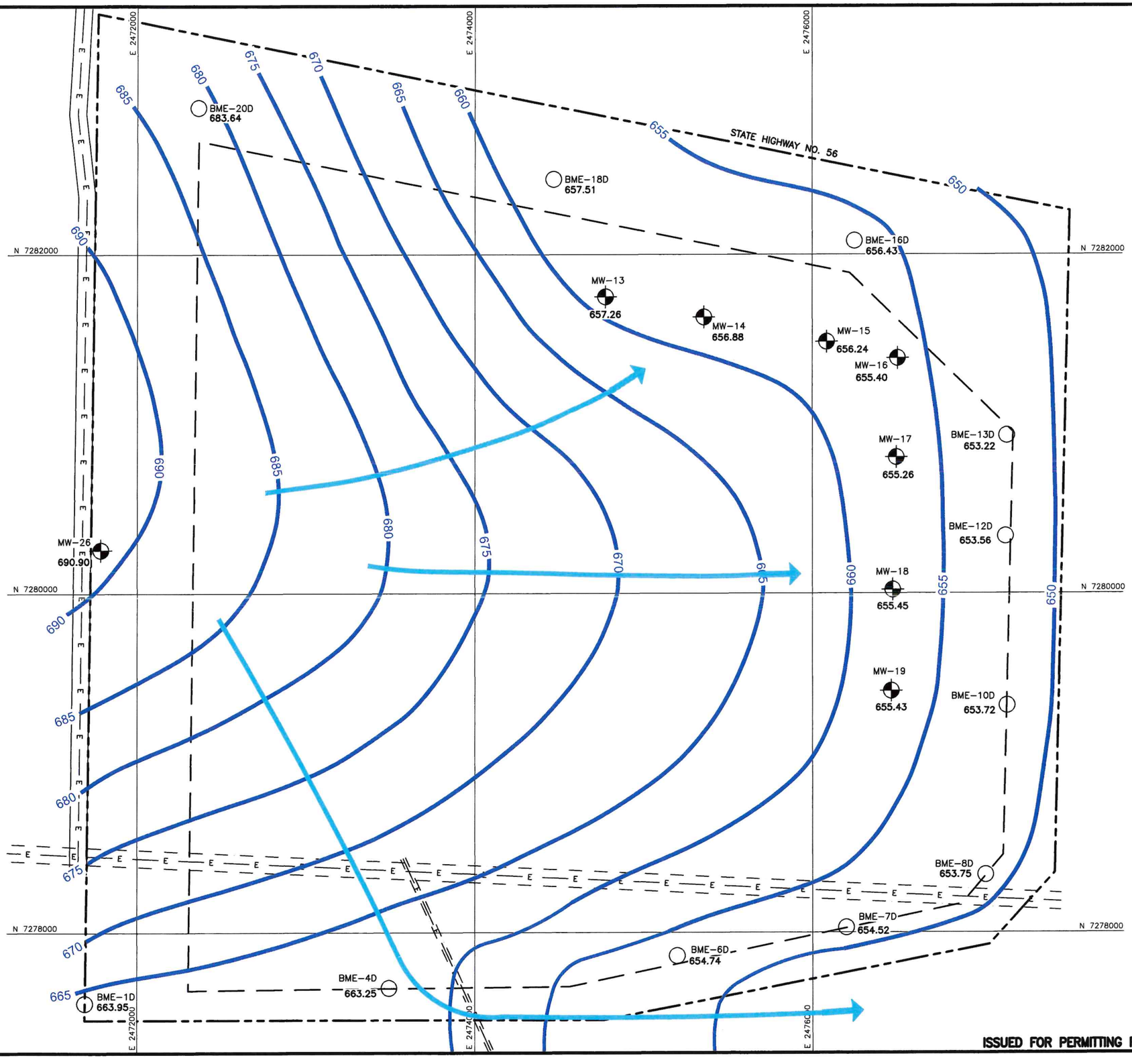

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APRIL 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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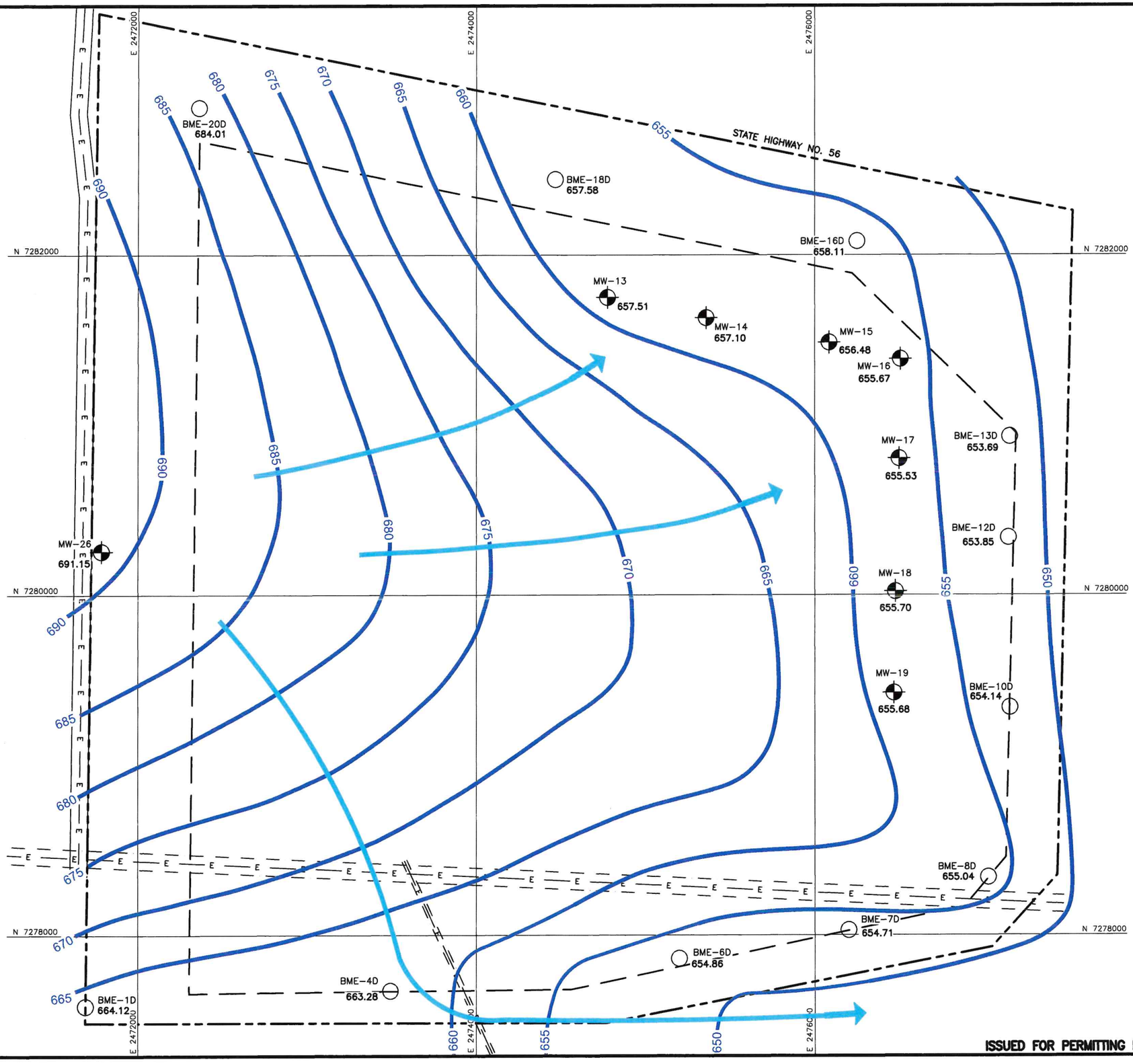

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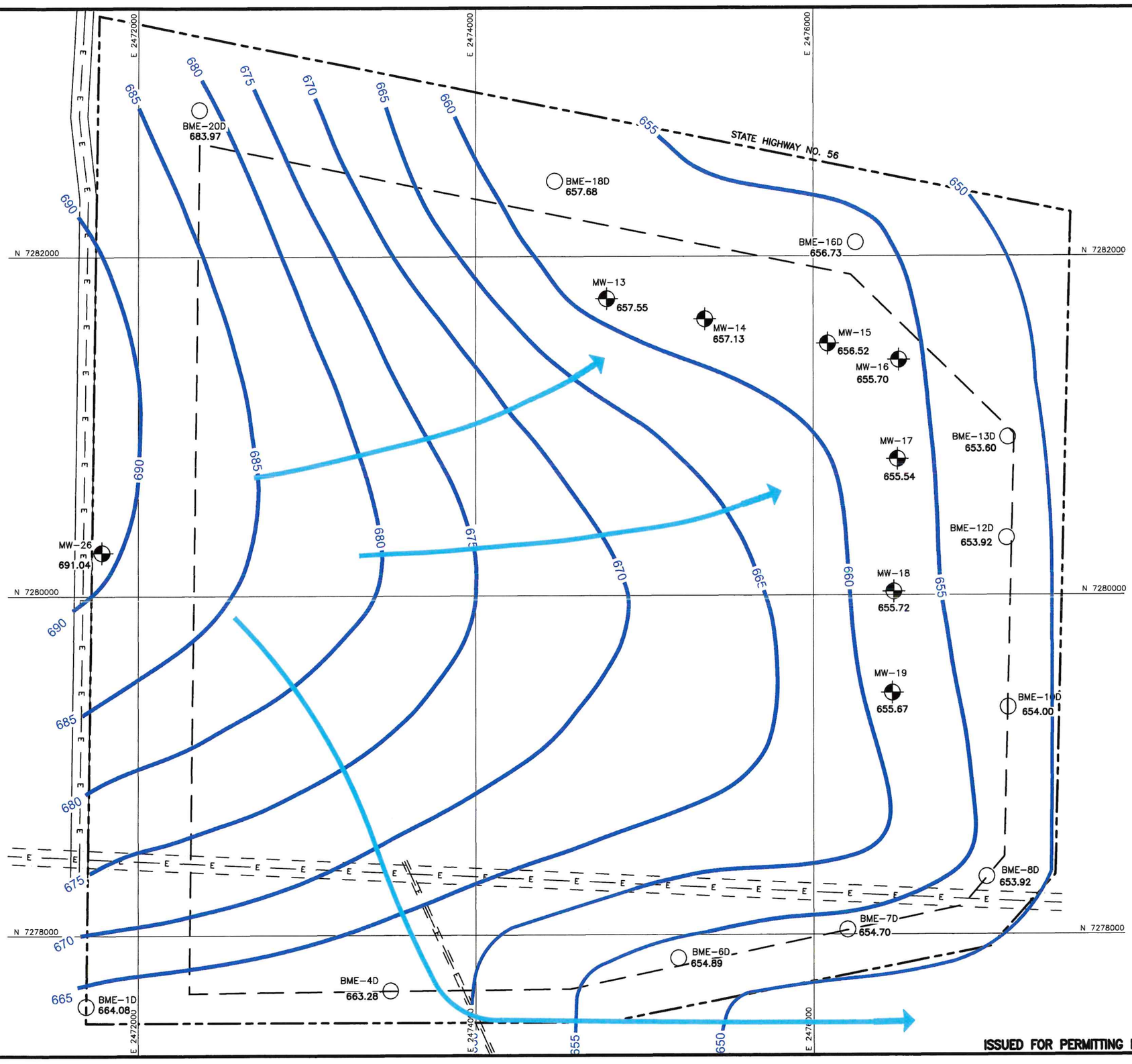

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JULY 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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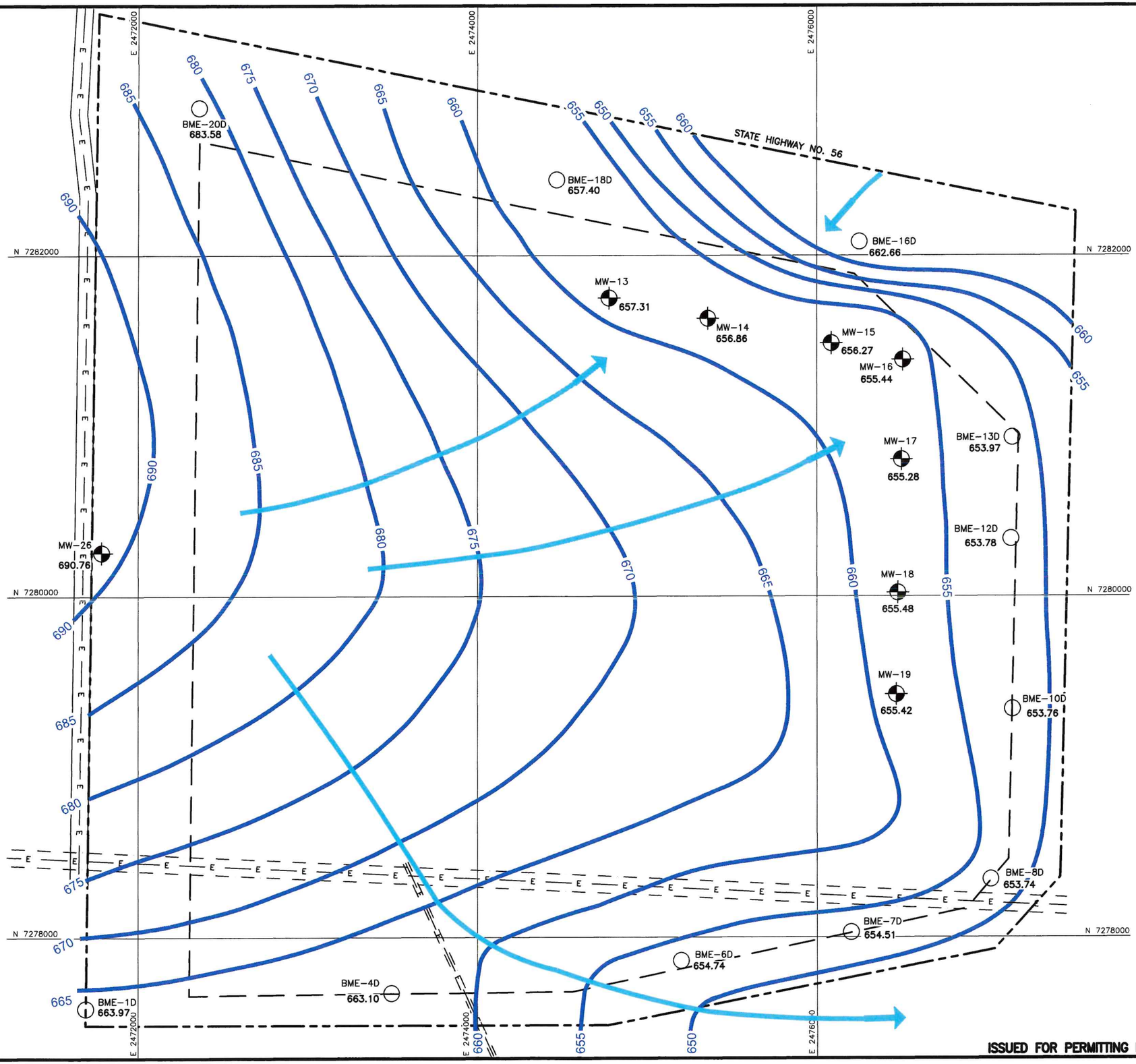

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AUGUST 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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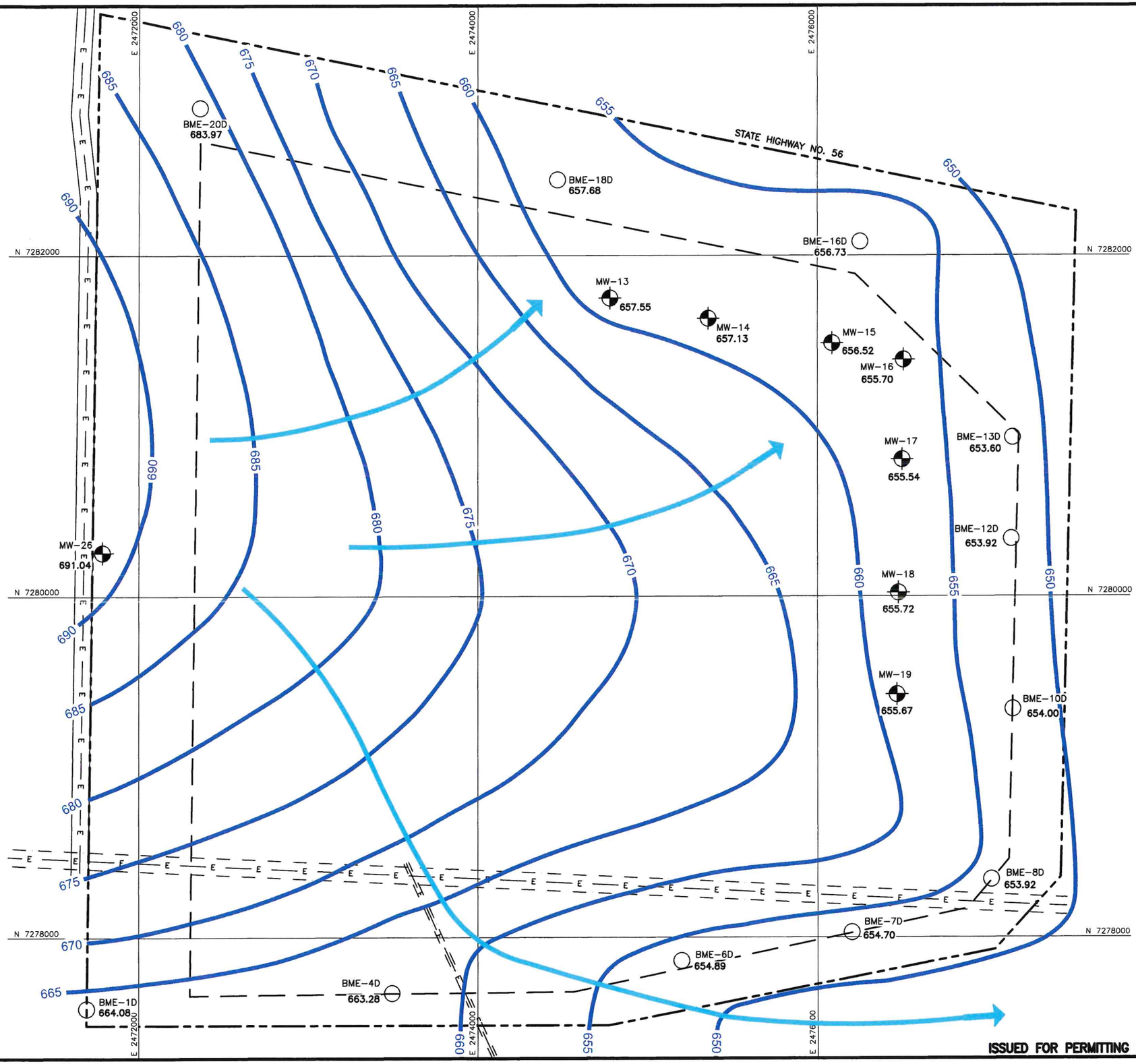

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SEPTEMBER 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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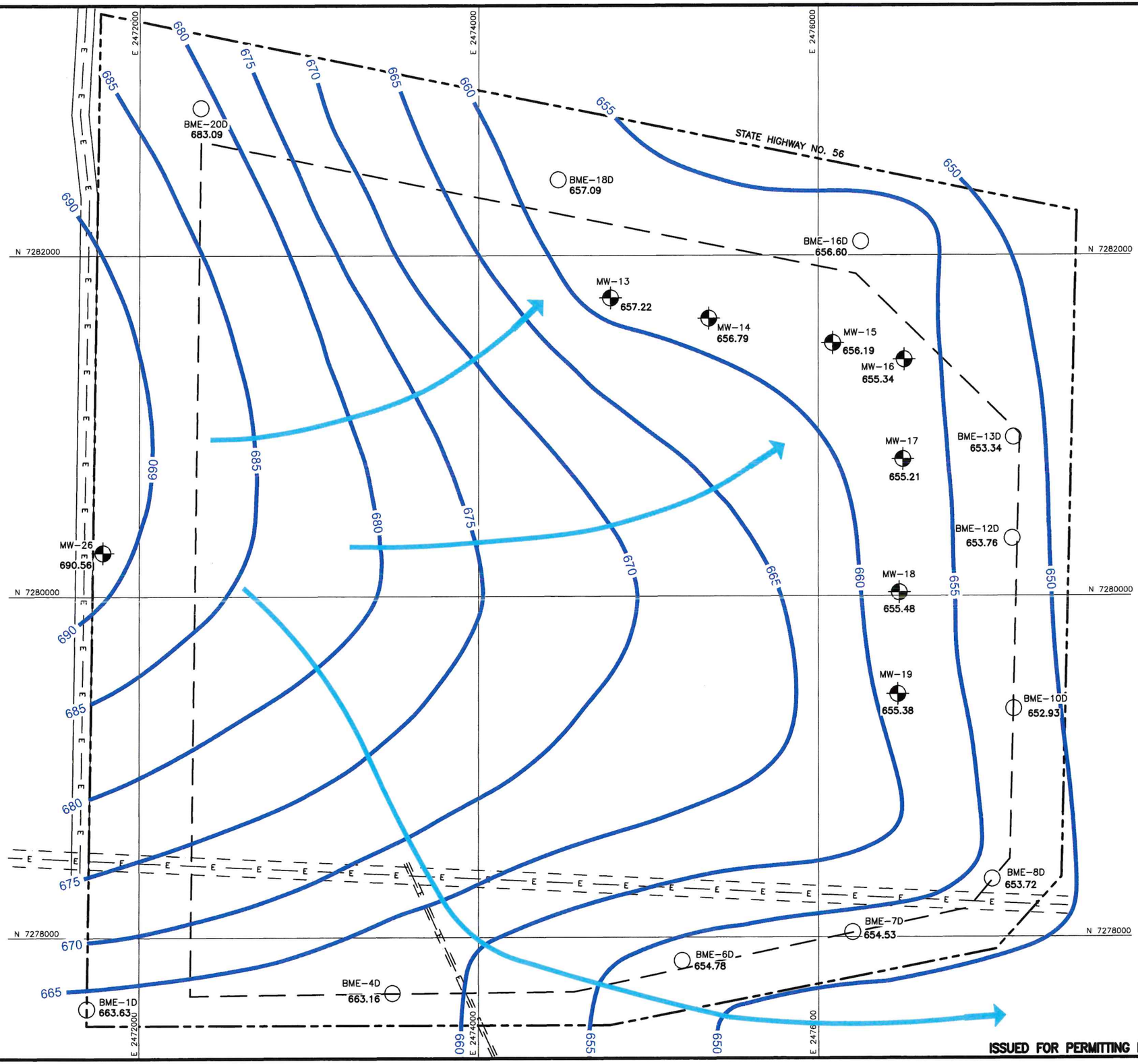

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OCTOBER 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
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817-563-1144
TBPE FIRM NO. F-256
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DRAWING E6.2y

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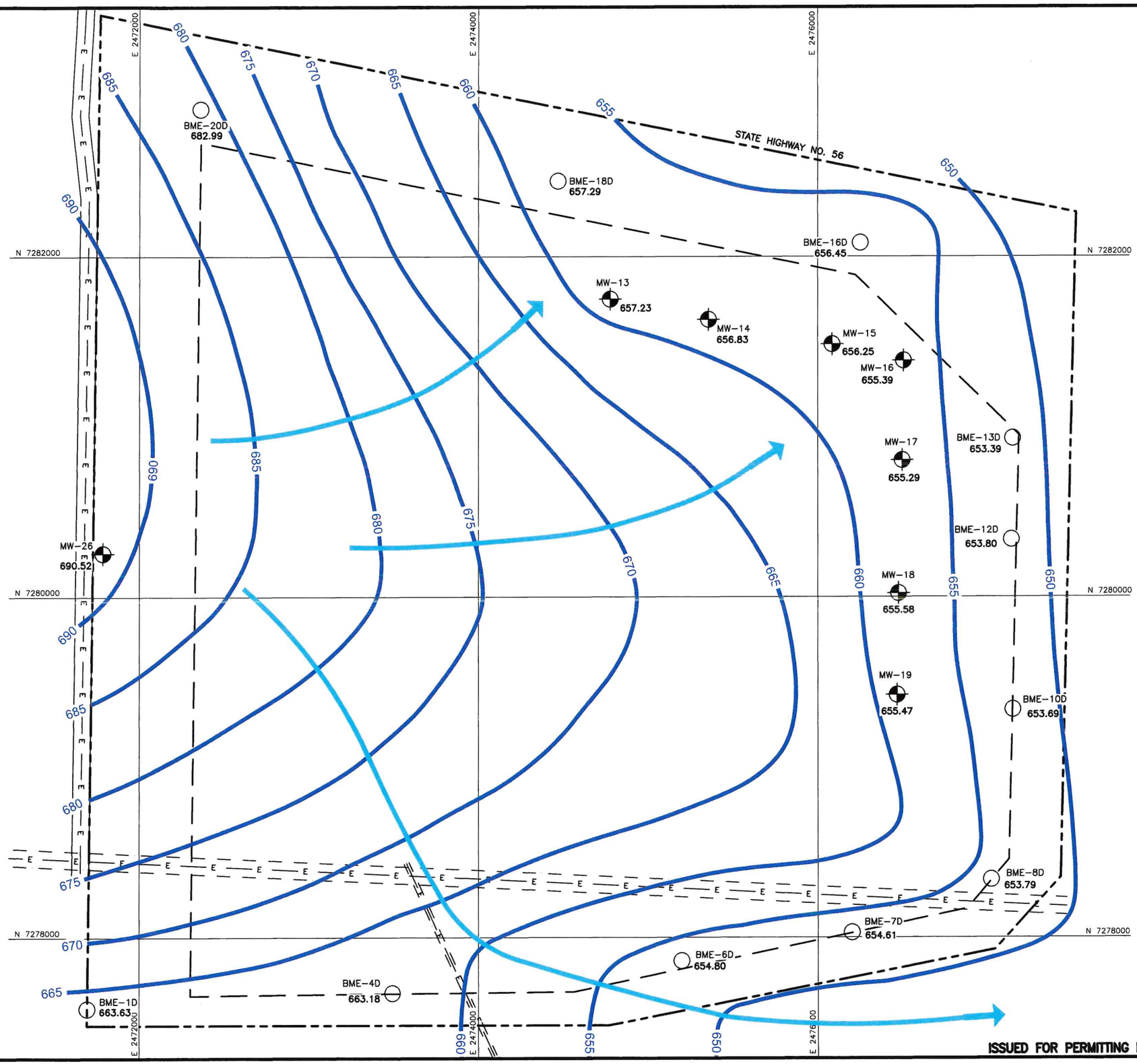
E 2472000
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STATE HIGHWAY NO. 56
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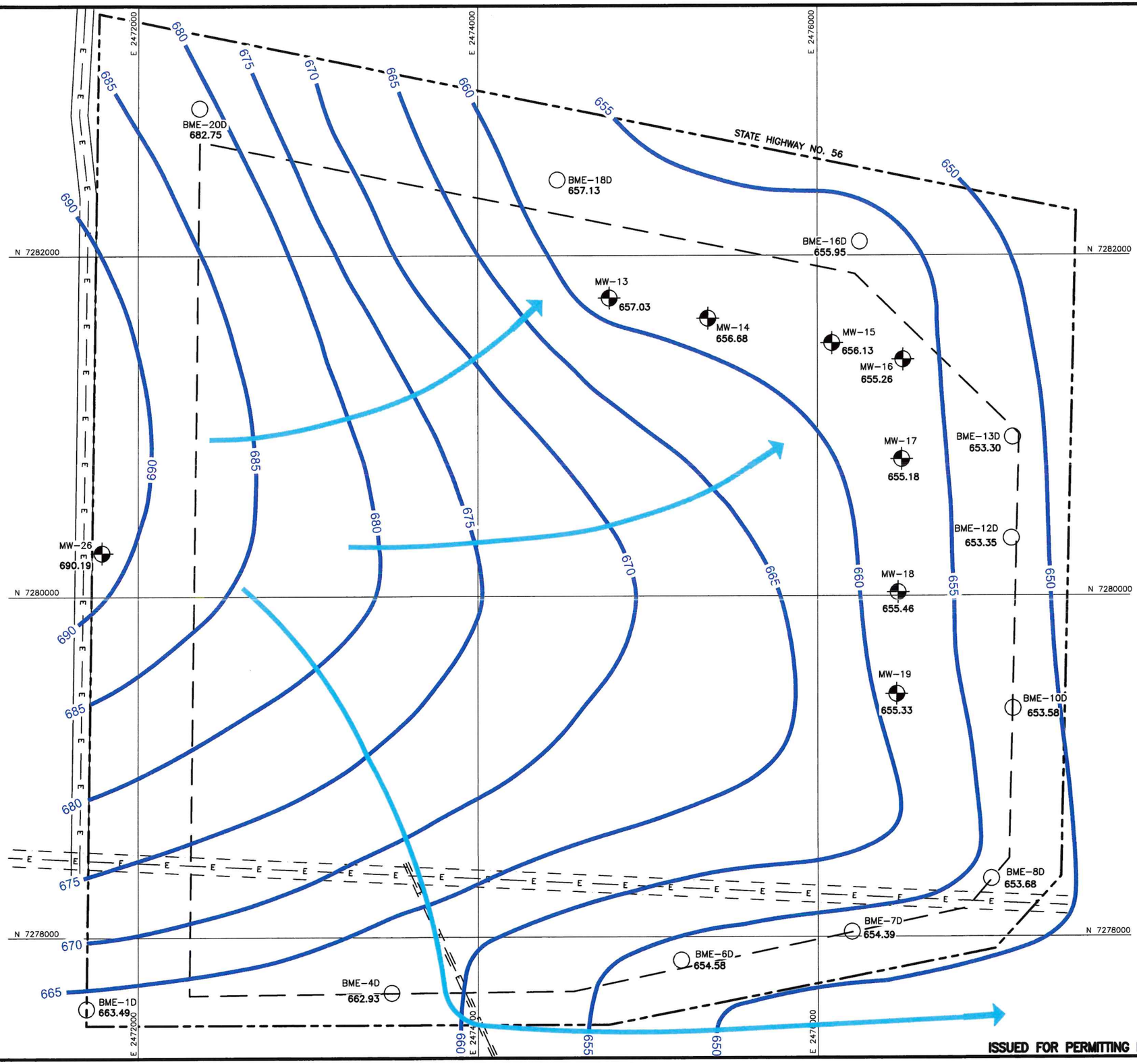

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DECEMBER 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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DRAWING E6.2aa

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
MSW PERMIT NO. 2290A

PERMIT AMENDMENT APPLICATION

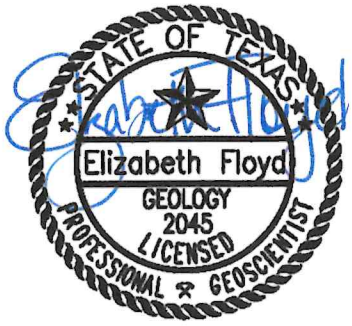
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT F
GROUNDWATER CHARACTERIZATION REPORT

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised June 2025



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Prepared by

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1700 Robert Road • Mansfield, Texas 76063 • 817-563-1144

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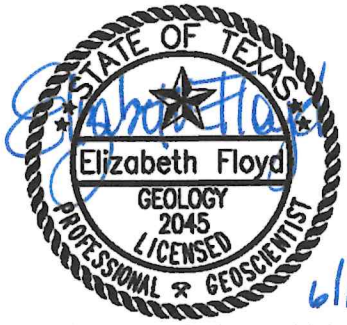

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CONTENTS

Groundwater Monitoring System Design Certifcation ii

1 SITE HYDROGEOLOGY 1

2 GROUNDWATER MONITORING SYSTEM 4

3 GROUNDWATER QUALITY 10

APPENDIX F1
Permit 2290 Groundwater Monitoring Network Layer II/III F1.1
Permit 2290 Groundwater Monitoring Network Layer V F1.2
Permit 2290A Groundwater Monitoring Network Layer II/III F1.3
Permit 2290A Groundwater Monitoring Network Layer V F1.4
Monitoring Well Detail F1.5

APPENDIX F2
Groundwater Sampling and Analysis Plan

GROUNDWATER MONITORING SYSTEM DESIGN CERTIFICATION

General Site Information

Site: TASWA Disposal and Recycling Facility

Site Location: Grayson County, Texas

MSW Permit No.: 2290A

Qualified Groundwater Scientist Statement

I, Elizabeth Floyd, am a licensed professional geoscientist in the State of Texas and a qualified groundwater scientist as defined in §330.3. I have reviewed the groundwater monitoring system and supporting data contained herein. In my professional opinion, the groundwater monitoring system is in compliance with the groundwater monitoring requirements specified in 30 TAC §330.401 through §330.421. This system has been designed for specific application to the TASWA Disposal and Recycling Facility (Permit No. MSW 2290A). 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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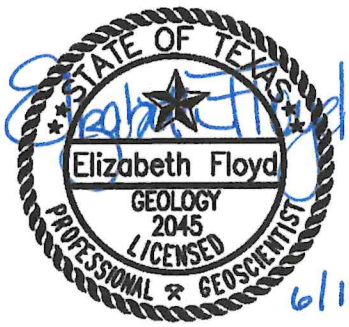
Mansfield, Texas 76063



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side of the site, the excavation bottoms in the very lowest portions of the shaly clays of Layer I, just above the Layer II sand. Layer I permeability was found to be 3.84 $x10^{-8}$ cm/sec. If leachate were to escape the bottom of the excavation in this area it would move slowly downward into the more permeable sand of Layer II where it would be detected in Layer II/III monitoring wells. Groundwater and potential contaminants are not likely to move laterally in Layer I. If leachate were to escape the bottom of the facility below the Layer II sandstone, it would move slowly downward in Layer III and would attempt to migrate through the low permeability shale of Layers III and IV. Groundwater in Layers II and III is separated from groundwater in Layer V by the very low permeability Layer IV shale. Recharge to Layer V comes from its outcrop west of the site as opposed to infiltration through overlying materials. However, because Layer V is a part of a minor aquifer in the area, groundwater monitoring wells are proposed for this zone. Because groundwater flow in Layer V is generally to the east, a contaminant entering the groundwater in Layer V would move downgradient laterally to the east.

2.3.3 Monitoring Well Locations

The uppermost aquifer beneath the TASWA DRF has been identified as Layer V and is the uppermost part of the Woodbine aquifer. Layer V at the site consists of cemented sandstone, interbedded with shaly sandstones. As shown in the cross-sections (Drawings E3.2 through E3.10 in Appendix E3 of Attachment E), Layer V is present and correlatable across the site.

The monitoring network for Permit 2290 consists of 16 monitoring wells. Eight monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, and MW-12) monitor the Layer II/III groundwater zone, and eight monitoring wells (MW-13, MW-14, MW-15, MW-16, MW-17, MW-18, MW-19, and MW-20) monitor the Layer V, the uppermost aquifer. Monitoring well locations are shown on Drawings F1.1 and F1.2.

The groundwater monitoring network for Permit 2290A network will consist of ~~39~~ 42 monitoring wells. ~~Sixteen~~ Eighteen monitoring wells (MW-3R, MW-3A, MW-4R, MW-5R, MW-6R, MW-6A, MW-7R, MW-7A, MW-8, MW-8A, MW-9, MW-9A, MW-10, MW-10B, MW-10A, MW-11, MW-12, and MW-12A) will monitor the Layer II/III groundwater zone. While ~~23~~ 24 monitoring wells (MW-13R, MW-14R, MW-14A, MW-15R, MW-16R, MW-16A, MW-17R, MW-18R, MW-19R, MW-20, MW-21, MW-22, MW-23, MW-24, MW-25, MW-26, MW-26A, MW-27, MW-28, MW-29, MW-30, MW-31, MW-32, and MW-33) will monitor Layer V, the uppermost aquifer. ~~Two~~ Three monitoring wells will be considered upgradient: MW-12 and MW-12A monitor~~s~~ Layer II/III and monitoring well MW-26 monitors Layer V. To accommodate the proposed expansion, seven monitoring wells will be plugged (MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, and MW-7) in Layer II/III, and an additional five monitoring wells (MW-13, MW-14, MW-17, MW-18, and MW-19) will be plugged in Layer V. Twelve replacement wells (MW-3R, MW-4R, MW-5R, MW-6R, MW-7R, MW-13R, MW-14R, MW-15R, MW-16R, MW-17R, MW-18R, and MW-19R) will be installed along the point of compliance. Layer II/III proposed monitoring wells (MW-3R, MW-3A, MW-4R, MW-5R, MW-6R, MW-6A, MW-7R, ~~and~~ MW-11, and MW-12A) and Layer V proposed monitoring wells (MW-13R, MW-14R, MW-14A, MW-15R, MW-16R, MW-16A, MW-17R, MW-18R, MW-19R, MW-20, MW-31, MW-32, and MW-33) will be installed within 180 days of permit approval. The remaining 18 monitoring wells in both Layer II/III and V will be installed prior to waste being accepted in Sector 6 (Phase II).

In summary, the groundwater monitoring system for the TASWA DRF will consist of a total of ~~39~~ 42 monitoring wells, ~~16~~ 18 wells will monitor Layer II/III and ~~23~~ 24 wells will monitor Layer V. The groundwater monitoring system has been designed so that monitoring wells have been placed downgradient of each of the leachate sumps. In some cases, downgradient wells are actually on similar flow paths and will monitor more than on sump.

The proposed monitoring system for Permit 2290A is shown on Drawings F1.3 and F1.4. As shown in the table below, the system will ultimately consist of ~~39~~ 42 wells of which ~~two~~ three are upgradient wells and ~~37~~ 39 are downgradient wells. Details of the construction of all monitoring wells included in the groundwater monitor network for Permit 2290A are shown on Drawing F1.5.

Proposed Groundwater Monitoring System

Upgradient Monitoring Wells	Downgradient Monitoring Wells				
Layer II/III					
MW-12 & MW-12A	MW-3R	MW-6R	MW-7A*	MW-9*	MW-10A*
	MW-3A	MW-6A	MW-8*	MW-9A*	MW-10B*
	MW-4R	MW-7R	MW-8A*	MW-10*	MW-11
	MW-5R				
Layer V					
MW-26	MW-13R	MW-16A	MW-21*	MW-26A*	MW-31
	MW-14R	MW-17R	MW-22*	MW-27*	MW-32
	MW-14A	MW-18R	MW-23*	MW-28*	MW-33
	MW-15R	MW-19R	MW-24*	MW-29*	
	MW-16R	MW-20	MW-25*	MW-30*	

* Monitoring well proposed to be installed during Phase II.

2.3.4 Monitoring Well Construction

All monitoring well design and construction will be done in accordance with §330.421. As such, a licensed Texas driller will install monitoring wells. Wells will be drilled by a method that will not introduce contaminants into the borehole or casing. A licensed professional geoscientist or engineer who is familiar with the geology of the area will supervise monitoring well installation and development and will provide a log of the boring. Equivalent alternatives to commission rules may be used if prior written approval is obtained from the Executive Director. Monitoring well construction details, including the protective collar and protective barrier, are shown on Drawing F1.5.

In accordance with 30 TAC §330.421(a), monitoring wells will be constructed in such a manner as to provide integrity, representative samples, prevent migration of water in borehole, and well construction must follow prescribed specifications.

All wells will be drilled by a qualified Texas licensed driller and will be supervised by a licensed professional geologist (P.G.) or professional engineer (P.E.).

If any fluid is required in the drilling of monitoring wells, clean, treated city water shall be used and a chemical analysis provided to the Executive Director. No glue or solvents will be used in monitoring well construction.

After installation, monitoring wells will be developed to remove drilling artifacts and open the water-bearing zone for maximum flow into the well. Development should continue until all water used or affected during drill activities is removed and field measurements of pH, specific conductance, and temperature ~~are~~ have stabilized.

Within 60 days of completion of a monitoring well or any other part of a monitoring system, an installation report will be submitted. The report will include construction and installation details for each well on forms available from the commission, a site map drawn to scale showing the location of all monitoring wells and the relevant point(s) of compliance, well elevations to the nearest 0.01 foot above msl (with year of datum shown), latitude and longitude or landfill grid location of each well, copies of detailed geologic logs including soil sample data, and copies of drillers reports required by other agencies.

As part of each monitoring well installation report, a boring log will be included and will be signed, sealed, and dated by a P.G. or P.E.

Damaged monitoring wells that are no longer usable will be reported to the Executive Director for a determination whether to replace or repair the well. In accordance with 30 TAC §305.70, if a compromised well requires replacement a permit modification request will be submitted within 45 days of the discovery.

Plugging and abandonment of monitoring wells will be performed in accordance with 16 TAC §76.702 and §76.104. No abandonment will be performed without prior written authorization.

All parts of the groundwater monitoring system will be operated and maintained so that they perform at least to design specifications through ~~the life of the groundwater monitoring program~~the active life and any required post-closure care period of that solid waste management unit.

When monitoring wells are installed in unusual conditions, all aspects must be approved in writing by the Executive Director.

The facility must notify the Executive Director and local pollution agency with jurisdiction that has requested to be notified, in writing, if changes in site 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 the facility~~.~~ and that may require installation of additional monitoring wells or sampling points. Such additional wells or sampling points require a modification of the site development plan.

2.4 Sampling and Analysis Procedures

A Groundwater Sampling and Analysis Plan is included in Appendix F2. This plan contains the general requirements, sampling procedures and methods required in 30

TAC §330.405(a)(f). A copy of the approved plan will be placed in the site operating record.

Alternate Source Demonstrations Submitted

Event	Well	Constituent	ASD dated	ASD approved
11/2007	MW-15	Chloride	4/10/2008	6/27/2008
11/2007	MW-15	Sulfate	4/10/2008	6/27/2008
6/2008	MW-15	Chloride	11/4/2008	1/2/2009
6/2008	MW-15	Sulfate	11/4/2008	1/2/2009
11/2012	MW-7	Nickel*	1/28/2013	3/27/2013
3/2016	MW-13	Barium*	5/17/2016	6/24/2016
3/2016	MW-17	Barium	5/17/2016	6/24/2016
3/2016	MW-19	Barium*	5/17/2016	6/24/2016
9/2016	MW-3	Barium*	11/8/2016	1/2/2017
3/2018	MW-16	Barium*	5/21/2018	7/17/2018
9/2020	MW-6	Selenium*	11/6/2020	12/11/2020
2/2023	MW-17	Barium*	4/17/2023	8/2/2023
8/2023	MW-6	Selenium	3/11/2024	4/8/2024

*Due to demonstrated natural variability, an ASD was prepared and submitted in lieu of completing a verification re-sampling event.

3.4 Assessment Monitoring

All detections at the facility of hazardous constituents in 40 CFR Part 258, Appendix I, and 30 TAC §330.419 have been either unverified one-time detections, occurred in upgradient wells not located on the facility's point of compliance, or have been demonstrated to have been caused by a source other than the MSW unit. Should such hazardous constituents be detected in the future, and should such detections support the implementation of assessment monitoring, information to establish an assessment monitoring program under §330.409 will be submitted~~., including a description of special wastes previously handled at the landfill and a characterization of the contaminated groundwater, including any detected concentration(s) of assessment constituents defined in §330.409.~~

~~Detailed plans and an engineering report describing the groundwater monitoring program under §330.405 are included in this plan as well as the sampling, analysis, and statistical comparison procedures.~~

~~Should statistically significant increases or increasing trends of hazardous constituents be detected in point of compliance wells in the future groundwater monitoring events and absent an approved alternate source demonstration, the TASWA DRF will establish an assessment monitoring program under §330.409 in accordance with the procedures described in Appendix F2 that will include sampling for Appendix II constituents.~~

3.5 Corrective Action Program

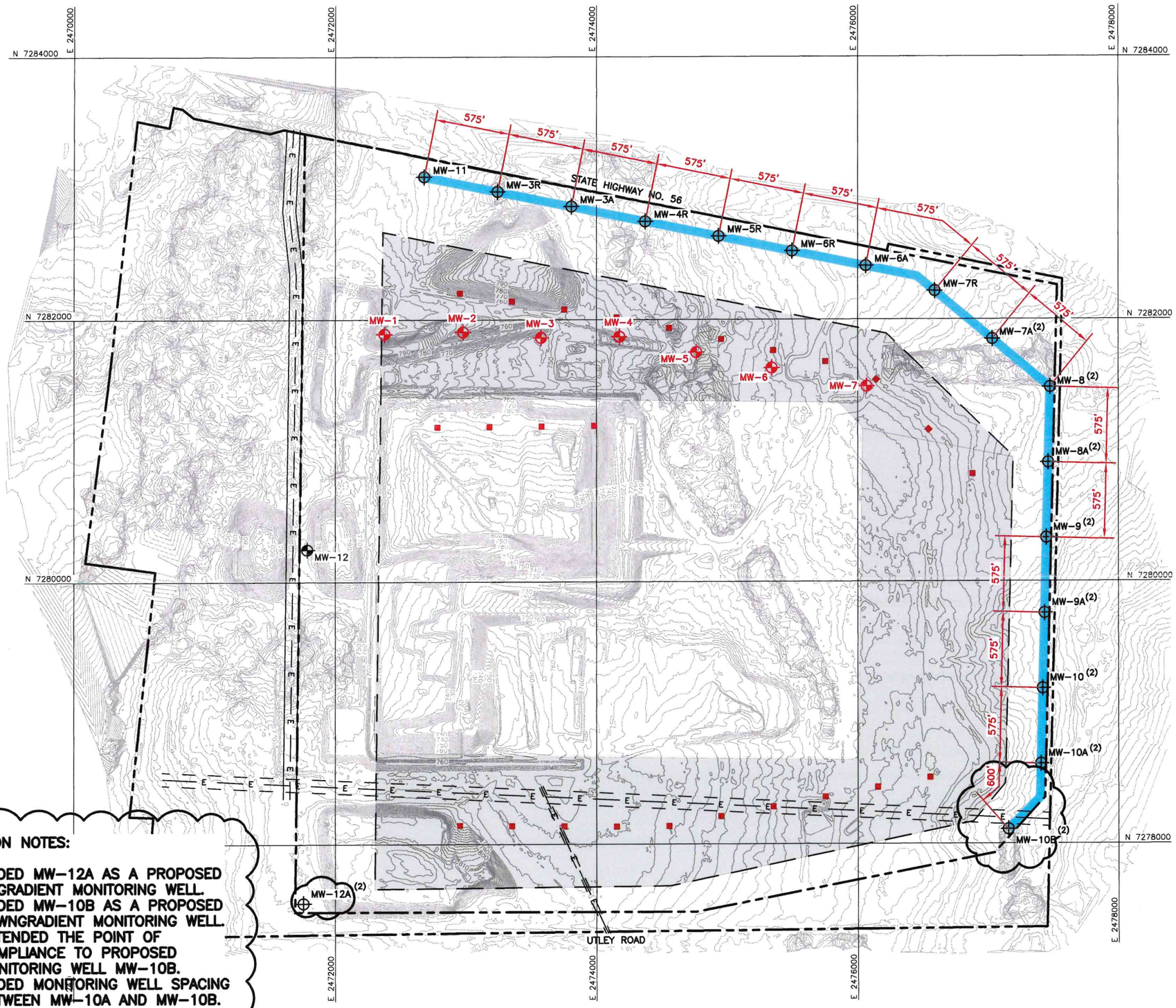
In accordance with §330.63(f)(7), the required information is provided. Should such hazardous constituents be detected in point of compliance wells in the future groundwater monitoring events above the concentration limits established in 30 TAC §330.409, and absent an approved alternate source demonstration, information, data, and analysis to establish a corrective action program meeting the requirements of §330.411 and §330.413 will be submitted, including a description of special wastes previously handled at the landfill and a characterization of the contaminated groundwater, including any detected concentration(s) of assessment constituents defined in §330.409.

Detailed plans and an engineering report describing the corrective action to be taken will be addressed if hazardous constituents have been measured in the groundwater at levels exceeding the limits established in 30 TAC §330.409. The following will be submitted to comply with 30 TAC §330.411:

- Characterization of the contaminated groundwater, including concentrations of assessment constituents as defined by 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.
- A schedule for a submittal of the information required.

APPENDIX F1

Permit 2290 Groundwater Monitoring Network Layer II/III F1.1
Permit 2290 Groundwater Monitoring Network Layer V F1.2
Permit 2290A Groundwater Monitoring Network Layer II/III F1.3
Permit 2290A Groundwater Monitoring Network Layer V F1.4
Monitoring Well Detail F1.5



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SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PROPERTY BOUNDARY
- LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
- MW-12 EXISTING MONITORING WELL
- MW-11 PROPOSED MONITORING WELL
- MW-1 MONITORING WELL TO BE PLUGGED OR RELOCATED
- LEACHATE SUMP LOCATION
- POINT OF COMPLIANCE
- EXPANSION AREA

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL FROM DRONE SURVEY FLOWN ON JUNE 1, 2022.
2. MONITORING WELL TO BE INSTALLED IN THE FUTURE IN ACCORDANCE WITH PHASING PLAN DISCUSSED IN ATTACHMENT F.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
LICENSED
PROFESSIONAL GEOSCIENTIST

6/12/2025

REVISION NOTES:

1. ADDED MW-12A AS A PROPOSED UPGRADIENT MONITORING WELL.
2. ADDED MW-10B AS A PROPOSED DOWNGRADIENT MONITORING WELL.
3. EXTENDED THE POINT OF COMPLIANCE TO PROPOSED MONITORING WELL MW-10B.
4. ADDED MONITORING WELL SPACING BETWEEN MW-10A AND MW-10B.

ISSUED FOR PERMITTING PURPOSES ONLY

PERMIT 2290A GROUNDWATER MONITORING NETWORK LAYER II/III

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DRF PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING F1.3

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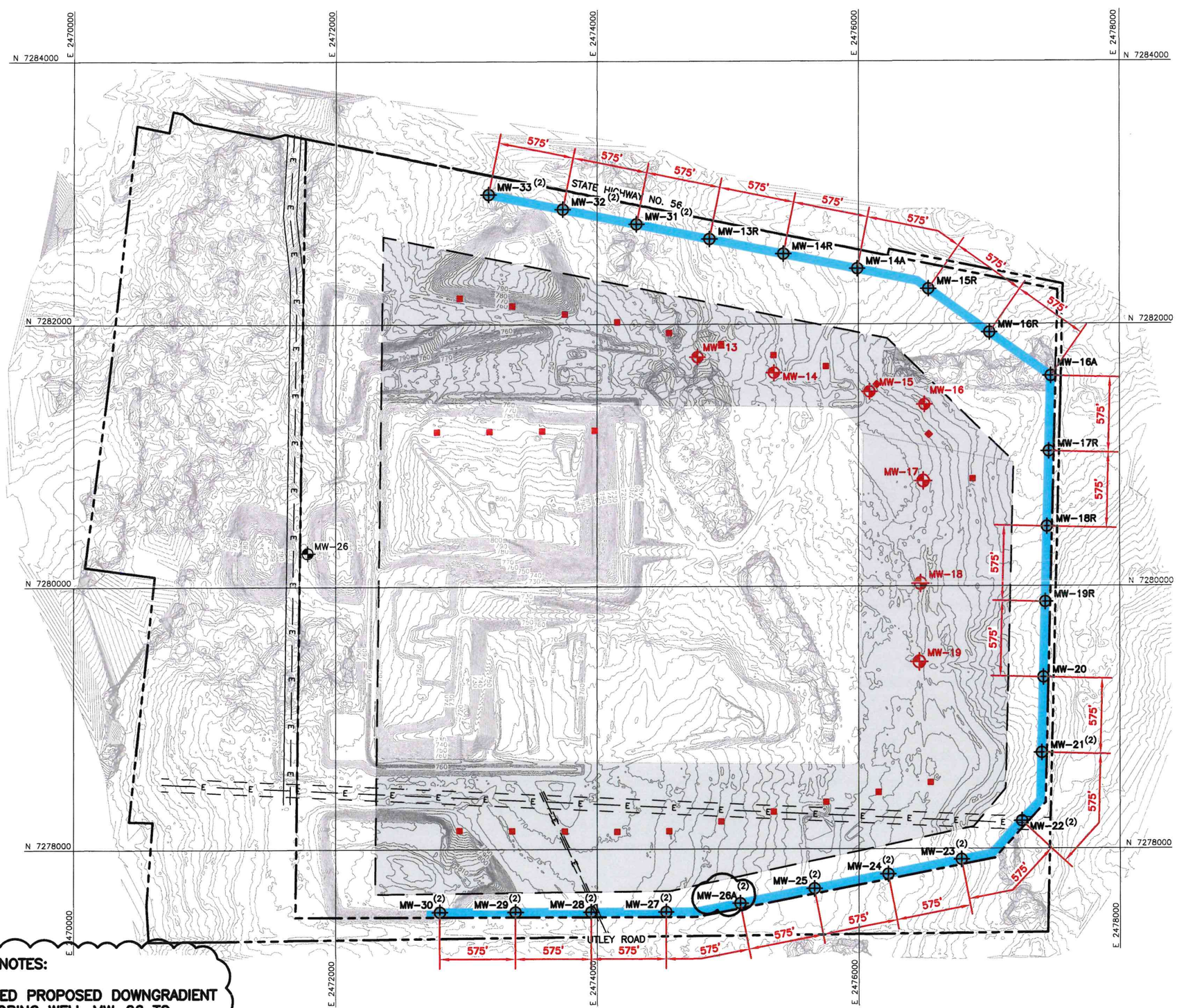

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SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PROPERTY BOUNDARY
- LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
- MW-26 EXISTING MONITORING WELL
- MW- PROPOSED MONITORING WELL
- MW-13 MONITORING WELL TO BE PLUGGED OR RELOCATED
- LEACHATE SUMP LOCATION
- POINT OF COMPLIANCE
- EXPANSION AREA

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL FROM DRONE SURVEY FLOWN ON JUNE 1, 2022.
2. MONITORING WELL TO BE INSTALLED IN THE FUTURE IN ACCORDANCE WITH PHASING PLAN DISCUSSED IN ATTACHMENT F.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
LICENSED
PROFESSIONAL GEOSCIENTIST

6/12/2025

REVISION NOTES:

1. UPDATED PROPOSED DOWNGRADIENT MONITORING WELL MW-26 TO MW-26A.

ISSUED FOR PERMITTING PURPOSES ONLY

PERMIT 2290A GROUNDWATER MONITORING NETWORK LAYER V

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DRF PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING F1.4

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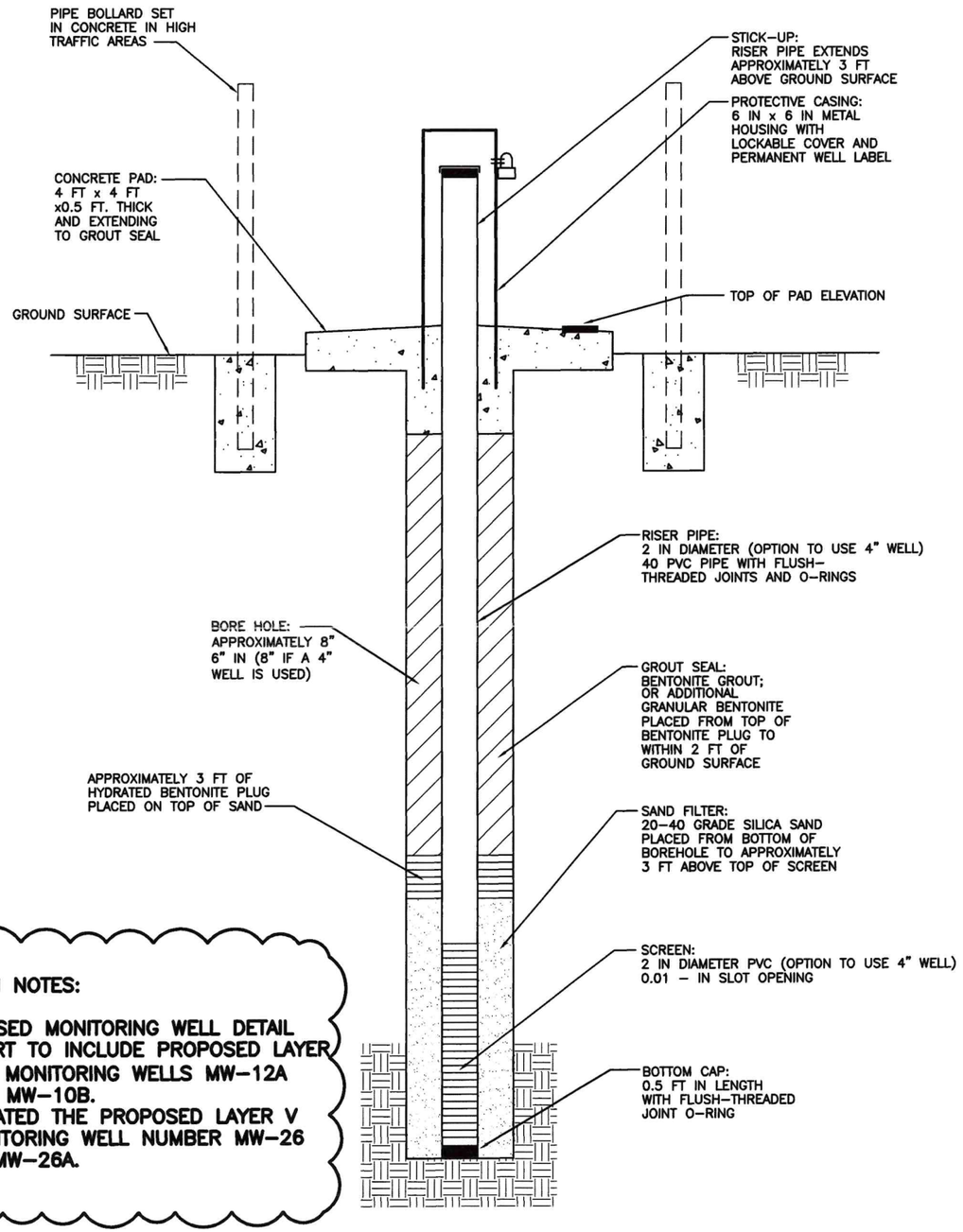

Monitoring Well No.	Northing	Easting	Ground Elevation	Total Depth	Top of Casing Elevation	"Screened Interval (ft/msl)"		"Filter Pack Interval (ft/msl)"	
			(ft/msl)	(ft bgs)	(ft/msl)	From	To	From	To
Existing Layer II/III Monitoring Wells									
MW-12	7280247.1	2471785.4	758.36	20.00	760.32	749.71	739.71	752.71	739.71
Existing Layer V Monitoring Wells									
MW-26	7280247.1	2471785.4	759.76	90.00	762.20	679.76	669.76	682.76	669.76
Proposed Layer II/III Monitoring Wells									
MW-3A	7282862.60	2473807.10	732.50	30.50	735.00	712.00	702.00	715.00	702.00
MW-3R	7282976.20	2473243.40	749.10	44.10	751.60	715.00	705.00	718.00	705.00
MW-4R	7282749.0	2474370.80	720.50	20.50	723.00	710.00	700.00	713.00	700.00
MW-5R	7282635.4	2474934.40	744.00	44.00	746.50	710.00	700.00	713.00	700.00
MW-6A	7281845.5	2475876.3	750.00	33.00	752.50	722.00	717.00	725.00	717.00
MW-6R	7282521.9	2475498.100	752.60	37.60	755.10	725.00	715.00	728.00	715.00
MW-7A	7281375.6	2476631.5	741.00	33.00	743.50	713.00	708.00	716.00	708.00
MW-7R	7282216.4	2476588.1	743.10	38.10	745.60	715.00	705.00	718.00	705.00
MW-8	7281260.6	2477194.9	735.50	33.00	737.00	707.00	702.00	710.00	702.00
MW-8A	7280907.4	2477459.1	727.50	36.00	729.00	696.50	691.50	699.50	691.50
MW-9	7280332.6	2477445.0	737.00	36.00	739.50	706.00	701.00	709.00	701.00
MW-9A	7279757.7	2477431.0	725.00	36.00	727.50	694.00	689.00	697.00	689.00
MW-10	7279182.9	2477416.9	728.00	30.00	730.50	703.00	698.00	706.00	698.00
MW-10A	7278608.1	2477402.8	731.00	35.00	733.50	701.00	696.00	704.00	696.00
MW-10B	7278109.2	2477152.7	744.00	44.00	746.50	695.00	700.00	692.00	700.00
MW-11	7283089.7	2472679.8	750.90	40.90	753.40	720.00	710.00	723.00	710.00
MW-12A	7277551.1	2471757.7	774.99	38.99	777.49	746.00	736.00	749.00	736.00
Proposed Layer V Monitoring Wells									
MW-13R	7282649.7	2474863.7	742.30	99.80	744.80	652.50	642.50	655.50	642.50
MW-14A	7281706.3	2475926.8	749.00	110.00	751.50	649.00	639.00	652.00	639.00
MW-14R	7282536.1	2475427.3	752.30	110.30	754.80	652.00	642.00	655.00	642.00
MW-15R	7282268.9	2476537.4	745.20	105.20	747.70	650.00	640.00	653.00	640.00
MW-16A	7281604.7	2477476.2	736.00	113.00	738.50	633.00	523.00	636.00	623.00
MW-16R	7281936.8	2477006.8	727.80	95.80	730.30	642.00	632.00	645.00	632.00
MW-17R	7281029.9	2477460.3	726.50	120.00	729.00	616.50	606.50	619.50	606.50
MW-18R	7280455.1	2477446.2	736.00	120.00	738.50	626.00	616.00	629.00	616.00
MW-19R	7279880.3	2477432.2	726.00	115.00	728.50	621.00	611.00	624.00	611.00
MW-20	7279305.4	2477418.1	727.00	120.00	729.50	617.00	607.00	620.00	607.00
MW-21	7278730.6	2477404.0	732.00	120.00	734.50	622.00	612.00	625.00	612.00
MW-22	7278211.2	2477252.3	731.00	120.00	733.50	621.00	611.00	624.00	611.00
MW-23	7277918.9	2476790.1	748.00	115.00	750.50	643.00	633.00	646.00	633.00
MW-24	7277808.9	2476325.7	758.50	115.00	761.00	658.00	643.50	661.00	643.50
MW-25	7277698.9	2475661.3	750.00	115.00	752.50	645.00	635.00	648.00	635.00
MW-26A	7277588.9	2475097.0	757.00	115.00	759.50	612.00	602.00	615.00	602.00
MW-27	7277523.7	2474528.3	764.00	125.00	767.50	649.00	639.00	652.00	639.00
MW-28	7277523.7	2473953.3	772.00	125.00	775.50	657.00	647.00	660.00	647.00
MW-29	7277523.7	2473378.3	778.00	125.00	780.50	663.00	653.00	666.00	653.00
MW-30	7277523.7	2472803.3	806.00	125.00	808.50	691.00	681.00	694.00	681.00
MW-31	7282096.3	2473083.5	755.50	96.00	757.00	670.00	660.00	673.00	660.00
MW-32	7281981.3	2473646.9	752.00	112.00	754.50	650.00	640.00	653.00	640.00
MW-33	7281866.4	2474210.3	740.00	90.00	742.50	660.00	650.00	663.00	650.00

NOTES:

1. SCREEN ELEVATIONS AND FILTER PACK ELEVATIONS SHOWN FOR THE PROPOSED WELLS ARE ESTIMATES. ACTUAL ELEVATIONS WILL BE DETERMINED BY LOCATION OF LAYER II AND LAYER V SANDS AS DETERMINED DURING INSTALLATION. WELL CONSTRUCTION MAY VARY IN ORDER TO MEET LOCAL CONDITION; INCLUDING USING A 5 FOOT SCREEN IN LAYER V INSTEAD OF A 10 FOOT SCREEN.
2. LAYER II WELLS WILL HAVE FILTER PACKS PLACED IN THE SATURATED ZONE NEAR THE TOP OF LAYER II. ACTUAL PLACEMENT WILL BE FIELD DETERMINED AT THE TIME OF WELL INSTALLATION.

REVISION NOTES:

1. REVISED MONITORING WELL DETAIL CHART TO INCLUDE PROPOSED LAYER II/III MONITORING WELLS MW–12A AND MW–10B.
2. UPDATED THE PROPOSED LAYER V MONITORING WELL NUMBER MW–26 TO MW–26A.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
LICENSED
PROFESSIONAL GEOSCIENTIST
6/12/2025

ISSUED FOR PERMITTING PURPOSES ONLY

MONITORING WELL DETAIL

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817–563–1144
TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

DRAWING
F1.5

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TASWA SOLID WASTE DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMMENDMENT APPLICATION

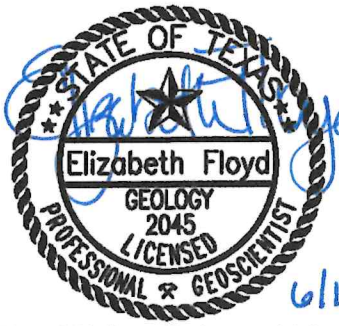
ATTACHMENT F

APPENDIX F2
GROUNDWATER SAMPLING AND ANALYSIS PLAN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
June 2025

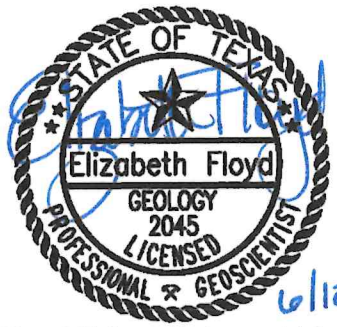


6/12/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. 50222

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144



6/12/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. 50222

CONTENTS

1 GROUNDWATER SAMPLING PROCEDURES 1

2 GROUNDWATER ANALYSIS PROCEDURES 8

3 GROUNDWATER MONITORING REQUIREMENTS 11

6. Identification and explanation of problems associated with the sample results, along with the limitations these problems have on data usability.

7. A statement on the estimated uncertainty of analytical results of the samples when appropriate and/or when requested.

8. A statement of compliance and/or noncompliance with the requirements and specifications. Exceedance of holding times and identification of matrix interferences must be identified. Dilutions shall be identified and if dilutions are necessary, they must be done to the smallest dilution possible to effectively minimize matrix interferences and bring the sample into control for analysis.

9. Identification of any and all applicable quality assurance and quality control samples that will require special attention by the reviewer.

10. A statement on the quality control of the analytical method of the permit and the analytical recoveries information shall be provided when appropriate and/or when requested.

In addition to the LCN, the following information must be submitted for all analytical data:

1. A laboratory checklist. The Laboratory Data Package Cover Page and Data Review Checklist may be included with the TCEQ-0312 forms for each groundwater monitoring event. For every response of "No, NA, or NR" that is reported on the checklist, the permittee will ensure the laboratory provides a detailed description of the "exception report" in the summary of the LCN. The permittee will require the laboratory to do an equivalent of an EPA Level 3 review regarding quality control analysis.

2. Chain of custody.

3. Analytical report that documents the results and methods for each sample and analyte to be included for every analytical testing event. These test reports must document the reporting limit/method detection limit the laboratory used.

Reporting Limits: Practical Quantitation Limits (PQL)

Reporting limits will be quantitation limits that meet the requirements of 30 TAC §330.405(f)(5). Analytical results must be reported to the lowest concentration levels that can be reliably quantified (practical quantitation limits). Practical quantitation limit (PQL) is defined as the lowest concentration reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. ~~and is considered equivalent to the limit of quantitation (LOQ) described in the most recent NELAC Standard (www.nemc.us/epal2/2003 standards.html)~~. The PQL is method, instrument, and analyte specific and may be updated as more data becomes available.

- The PQL will be at or below the groundwater protection standard established for each analyte in accordance with 30 TAC §330.409(h) unless approved otherwise by the TCEQ.

- The precision and accuracy of the PQL initially will be determined from the PQLs reported over the course of a minimum of eight groundwater monitoring events. The results obtained from these events will be used to demonstrate that the PQLs meet the specified precision and accuracy:

Constituents/Chemicals of Concern	Precision (percent RSD)	Accuracy (percent recovery)
Metals	10	70-130
Volatiles	20	50-150
Semi- Volatiles	30	50-150

- The PQL will be supported by analysis of a PQL check sample, consisting of a laboratory reagent grade sample matrix spiked with constituents/chemicals of concern at concentrations equal to or less than the PQL. At a minimum, a PQL check sample will be performed quarterly during the calendar year to demonstrate that the PQL continues to meet the specified limits for precision and accuracy.

- Analytical results for data below the limit of detection ("non-detect" results) must be reported as less than the established PQL limit that meets those precision and accuracy requirements.

If a PQL cannot ~~be established according to the~~meet specified precision and accuracy limits, the owner or operator will ensure that the laboratory provides sufficient documentation to justify the alternate precision and accuracy limits. This information will be reported to the TCEQ by the owner or operator and will be evaluated on a case-by-case basis.

3 GROUNDWATER MONITORING REQUIREMENTS

Groundwater monitoring for the current and proposed monitoring well system is to follow the TCEQ requirements for background, detection, assessment, and corrective action monitoring as outlined in applicable parts of 30 TAC §§330.4015-421.

3.1 Background and Detection Monitoring Parameters and Analytical Methods

In accordance with §330.419, all monitoring wells at the site are to be sampled and analyzed for the total metals and VOCs listed in 40 CFR Part 258, Appendix I. EPA methods are listed for each constituent in the Background and Detection Monitoring Constituents; equivalent or better methods may be substituted. The analytical method used must be able to attain the reporting limits (PQLs), as defined in Section 2.

The water quality parameters, listed in the Water Quality Parameters List, may be sampled and analyzed at the discretion of the facility operator, but the results will not be subject to statistical evaluation.

Background groundwater quality will be established for all new and replacement upgradient and downgradient wells in the groundwater monitoring system.

In accordance with §330.407(a)(1), upon completion of background monitoring and during background updates, the facility will evaluate the background data to ensure that the data are representative of background groundwater constituent concentrations unaffected by waste disposal activities or other sources of contamination. The evaluation will be documented in a report and submitted to the TCEQ before the next subsequent groundwater monitoring event following the updated (or initial) background period.

Once monitoring wells are approved for detection monitoring, those constituents “not reasonably expected to be in or derived from the waste contained in the unit” may be deleted from the detection monitoring list with approval from the executive director, in accordance with 30 TAC §330.419(b). At a future date, when leachate data are further evaluated, the detection monitoring parameter list may be revised to exclude compounds not found in the site leachate in sufficient quantity for statistical contrast.

3.2 Monitoring Frequency

Background sampling will consist of eight background samples taken from each well at approximately three-month intervals. This interval is estimated to be sufficient to obtain "statistically independent" samples. For slow recovery wells that have not completed background collection within two years (due to lack of sufficient groundwater for sampling), the wells will then be sampled, or attempted to be sampled, for background during the subsequent regularly scheduled semiannual events.

Background sampling, as described above, will be implemented for new wells or wells that have had major repairs not later than the calendar quarter after installation or repair, except as may be otherwise required by the TCEQ.

Semiannual detection monitoring of the groundwater monitoring wells will begin about six months after the last background sampling event. An effort will be made to sample consistently in the same two quarters each year.

3.3 Statistical Methods

Statistical evaluation of detection groundwater-monitoring constituents is required by 30 TAC §330.405(e) and (f). Statistical analysis will be performed on each of the analyzed constituents, except as may be otherwise approved by the TCEQ, using methods appropriate for the distribution of the concentration values of the constituents. An appropriate statistical method will be selected once the background samples have been collected and approved. The method selected will be based upon the nature of the constituent, the data available, and the site conditions. In selecting an appropriate statistical test, the following criteria will be met:

1. The statistical method used will be appropriate for the distribution of the data.

2. Multiple comparison procedures (excluding tolerance or prediction intervals and control charts) will use a Type-I error rate of no less than 0.05 for each sampling period, and comparisons between individual wells and background concentrations or groundwater protection standards will use a Type-I error rate of no less than 0.01.

3. If a control-chart approach is used, the control chart parameter values will be protective of human health and the environment.

4. If a tolerance or prediction interval is used, the levels of confidence and/or the percentage of the population that the interval must contain, will be protective of human health and the environment.

5. The statistical test will account for data below the detection limit with procedure(s) that are protective of human health and the environment. Any PQL

used will be the lowest concentration reliably achievable with routine laboratory levels of precision and accuracy.

6. The statistical test will control or correct for seasonal and spatial variability, if necessary, and for temporal correlation in the data.

Figures 1-6 at the end of this section, diagram the decision points and the rational which will be used in selecting an appropriate statistical test for each monitored constituent. ~~Statistical analysis will commence upon completion of the first detection monitoring event.~~

3.4 Reporting Requirements

In accordance with 30 TAC §330.407(a)(1), upon completion of background monitoring and during background updates, TASWA will evaluate the background data to ensure that the data are representative of background groundwater constituent concentrations unaffected by waste management activities or other sources of contamination. The evaluation will be documented in a report and submitted to the executive director before the next subsequent groundwater monitoring event following the updated (or initial) background period.

Within 60 days of each groundwater sampling event, a determination will be made whether an apparent or verified exceedance of a statistically calculated background limit has occurred. The terms "apparent SSI", "apparent exceedance", and “initial exceedance” all correspond to the statistically significant increase (SSI) referred to in the first sentence of 30 TAC §330.407(b) and are based on the statistical evaluation of an initial sample during a detection monitoring event that has not yet been confirmed by verification resampling. Timelines for actions listed in the subsections of §330.407(b) are counted from the date of the initial sampling event. An SSI over background of any tested constituent at any monitoring well, including background wells, is not recorded until the initial exceedance has been verified with verification re-sampling. If an apparent SSI is observed, the executive director and any local pollution agency with jurisdiction that has requested notification, will be notified in writing within 14 days of the apparent SSI determination. If an apparent SSI of any tested constituent at any monitoring well has occurred, the following actions will be initiated, as appropriate for each separate apparent SSI incident, in accordance with 30 TAC §330.407(b).

(1) The facility shall immediately place a notice in the site operating record describing the release and establish an assessment monitoring program meeting the requirements of §330.409, for the well(s) exhibiting the SSI and at the immediately adjacent wells on each side of the well(s) exhibiting the SSI, unless an alternative subset of wells is designated by the executive director, within 90 days of the date of the notice to the TCEQ, except as provided in (2) and (3) below:

(2) The facility shall submit results of resampling as appropriate for the statistical method within 60 days of determining the apparent SSI. The resample data may be used to statistically confirm or disprove the apparent SSI. Resampling will be completed, and the results submitted to the executive director within 60 days of the determination of an initial exceedance.

(3) If there is reasonable cause to think that another source or an error(s) in sampling, analysis, statistical evaluation, or natural variation in groundwater quality caused the SSI, then the facility may submit a report documenting the error or alternate source in accordance with §330.407(b)(3), as follows:

(A) Notify, in writing, the executive director and any local pollution agency with jurisdiction that has requested to be notified within 14 days of determining the SSI.

(B) Submit the demonstration, prepared and certified by a qualified groundwater scientist, within 90 days of SSI determination.

(C) Do not filter the sample for constituents addressed by the demonstration prior to laboratory analysis.

(D) Continue detection monitoring.

If the report is approved, then the monitoring well may remain in detection monitoring. If the owner/operator does not make a demonstration satisfactory to the executive director within 90 days after the date of notice, as evidenced by a letter of denial from the TCEQ, the owner/operator shall initiate an assessment monitoring program within 90 days of the date of the notice, in accordance with §330.409. If the owner/operator receives a response from the executive director that a demonstration is not satisfactory after the deadline for initiating assessment monitoring, then assessment monitoring will be initiated at the next regularly scheduled semiannual monitoring event following receipt of the response.

3.4.1 Assessment Monitoring and Corrective Action

Groundwater sampling for assessment monitoring and corrective action will be done in accordance with 30 TAC 330 Subchapter J rules.

Assessment monitoring is required whenever the owner or operator determines there has been a statistically significant increase over background for one or more of the constituents listed in 30 TAC §330.419.

Within 90 days of determining that an SSI has occurred, the owner or operator must sample and analyze each affected well and the two wells adjacent to each affected well for the full set up constituents listed in Appendix II to 40 CFR Pa 258. After sampling for the full set of Appendix II constituents, the executive director may delete any of Appendix II constituents.

If any new constituents are detected in the well as a result of the Appendix II analysis, a background level must be established for the additional constituents. This background level consists of four statistically independent samples from each background well.

If the concentration of any 40 CFR Part 258, Appendix II constituent is above its respective background limit, but below its GWPS, the facility must continue assessment monitoring. If the concentrations of all 40 CFR Part 258, Appendix II

constituents are shown to be at or below background values for two (2) consecutive sampling events, the owner or operator may return the well to detection monitoring status, after notifying the executive director and receiving approval.

If any 40 CFR Part 258, Appendix II constituents were detected at statistically significant levels above the groundwater protection standard, the facility must notify the executive director and appropriate local government officials within 7 days of the determination.

Groundwater protection standards will be established for Appendix II constituents in the point of compliance monitoring wells. Groundwater protection standards will be provided for constituents for which a maximum (MCL) has been promulgated under 40 CFR Part 141, Safe Drinking Water Act Maximum Contaminant Level (MCL). Groundwater protection standards will be provided for constituents for which no MCL is promulgated. Groundwater protection standards will be provided for background constituents that are higher than MCL or health-based level. The Executive Director may establish alternative groundwater protection standards in accordance with 30 TAC §330.409(i).

The owner or operator shall also install any additional monitoring wells necessary to characterize the nature and extent of the release, notify in writing all persons that own or occupy the land that directly overlies any part of the plume of contamination, and initiate an assessment of corrective measures within 90 days of the notice to the executive director.

The owner or operator shall also install any additional monitoring wells necessary to characterize the nature and extent of the release and install at least one additional monitoring well between the monitoring well with the statistically significant level and the next adjacent wells along the point of compliance before the next sampling event.

Within 90 days of reporting Appendix II results, and semiannually thereafter, all wells will be resampled for Appendix I and any new constituent detected from Appendix II. The results of resampling will be submitted within 60 days after each sampling event.

An annual assessment monitoring report will be submitted within 60 days of 2nd semiannual sampling event that includes the following information;

1. A Statement of any statistically significant exceedances of groundwater protection standards in accordance with 30 TAC §330.409(i).

2. Groundwater monitoring results, summary of background, statistical calculations, graphs, and drawings.

3. Groundwater flow rate and direction based on data from sampling events and supporting documentation.

4. A piezometric water level contour map and supporting documentation.

5. Recommendations for any changes.

6. Any other information required by the Executive Director.

If the owner or operator determines that the assessment monitoring program no longer satisfies the requirements of this section, the owner or operator must, within 90 days, submit an application for a permit amendment or modification to make any appropriate changes to the program.

~~3.4.1~~3.4.2 Annual Report

In accordance with 30 TAC §330.407(c), the annual report will include the results of all groundwater monitoring, testing, and analytical work obtained or prepared under the requirements of the permit (that is, all facility groundwater sample and field quality control sample analytical data in hard-copy format on form TCEQ- 0312, Groundwater Sampling Report, and in any other format requested by the executive director, for example, electronic format). The annual report will include a summary of background groundwater quality values, groundwater monitoring analyses, and statistical calculations, as well as graphs, and drawings.

Annually, within 90 days after the facility's last groundwater monitoring event in a calendar year, a report will be submitted that includes the following information gathered since the previous annual report:

(1) A statement regarding SSI(s) in any well and the status of same.

(2) The facility will submit the laboratory case narrative and either a laboratory checklist or a copy of the laboratory QA/QC and analytical data. The analytical data will be submitted in either electronic or in hard copy format, as requested by the executive director.

(3) The facility will explain any problems encountered in the laboratory analysis, either by adding additional explanations to the laboratory checklist or by extending the laboratory case narrative.

(4) Any information required in the laboratory case narrative that cannot be completed by the laboratory will be completed by the permittee.

(5) Groundwater flow rate and direction in the uppermost aquifer, using the previous year's data collected, including documentation used to determine the flow rate and direction.

(6) Contour map(s) of piezometric water levels in the uppermost aquifer based on concurrent measurements at all monitoring wells, including supporting data.

(7) Any recommendations for changes to the groundwater monitoring program.

(8) Any other items requested by the executive director.

Recommended Containers, Preservation, and Storage for Groundwater Monitoring

Parameter	Recommended Containers	Preservation	Maximum Holding Time	Minimum Volume
pH	P, G	None	Analyze immediately	25 ml
Spec. cond.	P, G	None	Analyze immediately	100 ml
Temperature	P, G	None	Analyze immediately	
Heavy metals (includes iron and manganese)	P, G	Acidify w/HNO_3 to pH<2, 4°C	6 months except 28 days for Hg	1 liter
Calcium, magnesium, sodium, potassium, fluoride, sulfate, chloride, and hardness	P, G	4°C	28 days	1 liter
TDS (may be included with above parameters)	P, G	4°C	7 days	1 liter
Nitrate	P, G	4°C	48 hrs	100 ml
Ammonia	P, G	Acidify w/H_2SO_4 to pH<2, 4°C	7 days; 28 days if acidified	500 ml
Alkalinity	P, G	4°C	14 days	200 ml
NPOC	G amber, T-lined caps	Acidify w/HCl to pH<2, 4°C	48 hrs; 28 days if acidified	100 ml/replicate
COD	P, G	Acidify w/H_2SO_4 to pH<2, 4°C	48 hrs; 28 days if acidified	100 ml
SVOC	G, T-lined caps	4°C	7 days until extraction, then analyze within 40 days	1 liter
BOD	P, G	4°C	24 hrs	1 liter
VOC	G, T-lined septa	Acidify w/HCl to pH<2, 4°C	14 days	2 x 40 ml
P = Polyethylene, G = Glass, T = Teflon				

Background and Detection Monitoring Constituents

Parameter	CAS RN	Method[1]
Appendix I Metals:		
Antimony	Total	EPA 6010B
Arsenic	Total	EPA 6010B
Barium	Total	EPA 6010B
Beryllium	Total	EPA 6010B
Cadmium	Total	EPA 6010B
Chromium	Total	EPA 6010B
Cobalt	Total	EPA 6010B
Copper	Total	EPA 6010B
Lead	Total	EPA 6010B
Nickel	Total	EPA 6010B
Selenium	Total	EPA 6010B
Silver	Total	EPA 6010B
Thallium	Total	EPA 6010B
Vanadium	Total	EPA 6010B
Zinc	Total	EPA 6010B
Appendix I Volatile organic compounds:		
Acetone	67-64-1	EPA 8260B
Acrylonitrile	107-13-1	EPA 8260B
Benzene	71-43-2	EPA 8260B
Bromochloromethane	74-97-5	EPA 8260B
Bromodichloromethane	75-27-4	EPA 8260B
Bromoform (tribromomethane)	75-25-2	EPA 8260B
Carbon disulfide	75-15-0	EPA 8260B
Carbon tetrachloride	56-23-5	EPA 8260B
Chlorobenzene	108-90-7	EPA 8260B
Chloroethane (ethyl chloride)	75-00-3	EPA 8260B
Chloroform (tichloromethane)	67-66-3	EPA 8260B
Dibromochloromethane (chlorodibromomethane)	124-48-1	EPA 8260B

Background and Detection Monitoring Constituents (continued)

Parameter	CAS RN	Method[1]
1,2-Dibromo-3-chloropropane (DBCP)[2]	96-12-8	EPA 8260B
1,2-Dibromoethane (ethylene dibromide, EDB)[2]	106-93-4	EPA 8260B
o-Dichlorobenzene (1,2-dichlorobenzene)	95-50-1	EPA 8260B
p-Dichlorobenzene (1,4-dichlorobenzene)	106-46-7	EPA 8260B
trans-1, 4-Dichloro-2-butene	110-57-6	EPA 8260B
1,1-Dichlorethane (ethylidene chloride)	75-34-4	EPA 8260B
1,2-Dichlorethane (ethylene dichloride)	107-06-2	EPA 8260B
1,1-Dichloroethylene (1,1-dichloroethene, vinylidene chloride)	75-35-4	EPA 8260B
cis-1,2-Dichloroethylene (cis-1,2-dichloroethene)	156-59-2	EPA 8260B
trans-1, 2-Dichloroethylene (trans-1,2-dichloroethene)	156-60-5	EPA 8260B
1,2-Dichloropropane (propylene dichloride)	78-87-5	EPA 8260B
cis-1,3-Dichloropropene	10061-01-5	EPA 8260B
trans-1,3-Dichloropropene	10061-02-6	EPA 8260B
Ethylbenzene	10041-4	EPA 8260B
2-Hexanone (methyl butyl ketone)	591-78-6	EPA 8260B
Methyl bromide (bromomethane)	74-83-9	EPA 8260B
Methyl chloride (chloromethane)	74-87-3	EPA 8260B
Methylene bromide (dibromomethane)	74-95-3	EPA 8260B
Methylene chloride (dichloromethane)	75-09-2	EPA 8260B
Methyl ethyl ketone (MEK, 2-butanone)	78-93-3	EPA 8260B
Methyl iodide (iodomethane)	74-88-4	EPA 8260B
4-Methyl-2-pentanone (methyl isobutyl ketone)	108-10-1	EPA 8260B
Styrene	100-42-5	EPA 8260B
1,1,1,2-Tetrachloroethane	630-20-6	EPA 8260B
1,1,2,2-Tetrachloroethane	79-34-5	EPA 8260B
Tetrachloroethylene (tetrachloroethene, perchloroethylene)	127-18-4	EPA 8260B
Toluene	108-88-3	EPA 8260B
1,1,1-Trichloroethane (methychloroform)	71-55-6	EPA 8260B

Background and Detection Monitoring Constituents (continued)

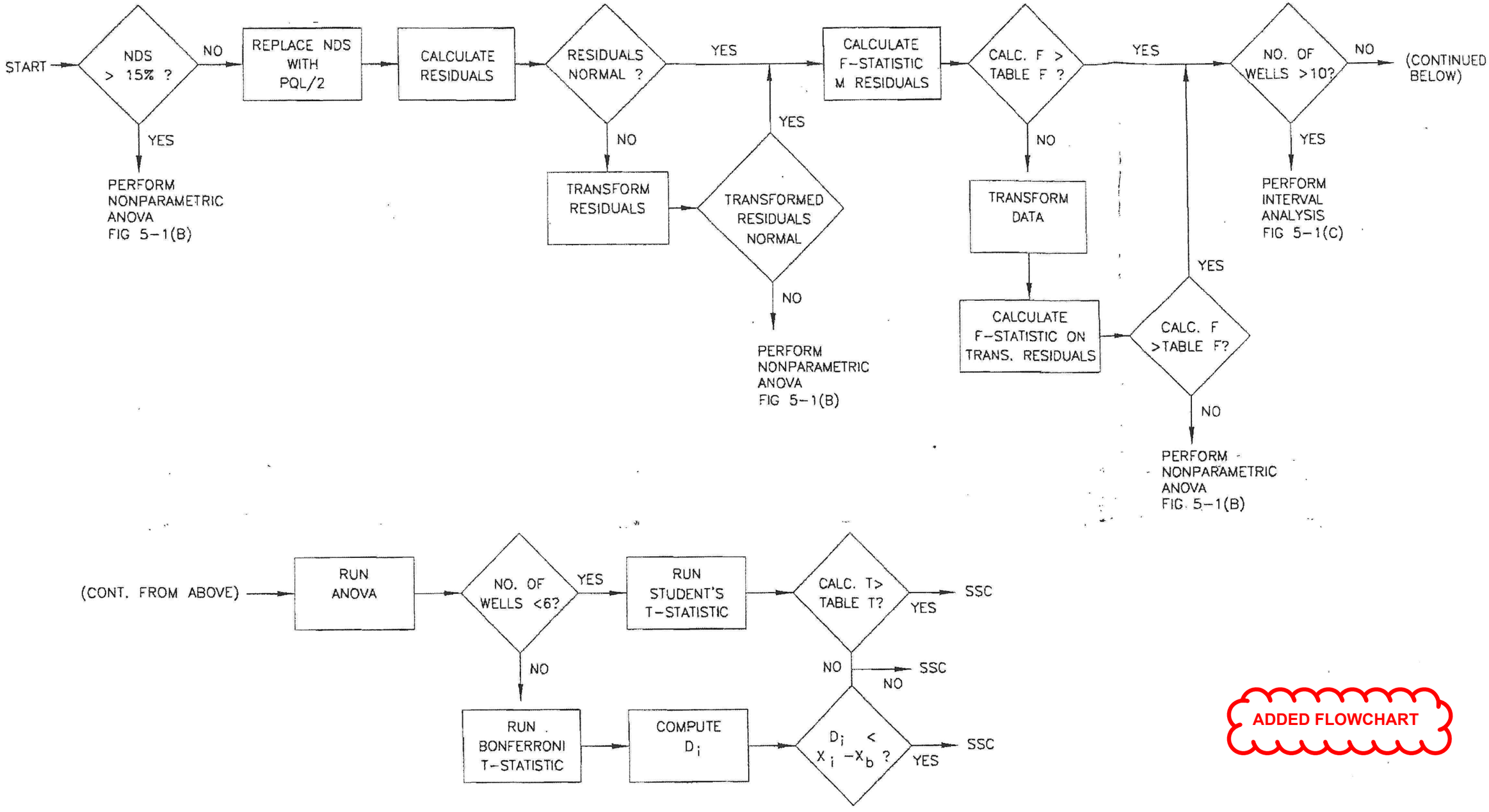
Parameter	CAS RN	Method[1]
1,1,2-Trichloroethane	79-00-5	EPA 8260B
Trichloroethylene (trichloroethene)	79-01-6	EPA 8260B
Trichlorofluoromethane (CFC-11)	75-69-4	EPA 8260B
1,2,3-Trichloropropane	96-18-4	EPA 8260B
Vinyl acetate	108-05-4	EPA 8260B
Vinyl chloride	75-01-4	EPA 8260B
Xylenes	1330-20-7	EPA 8260B

Notes:
[1] Equivalent or better methods may be substituted.
[2] For DBCP and EDB, any detections between the MDL (method detection limit) and PQL will be reported and flagged as estimated values.

Water Quality Parameters List

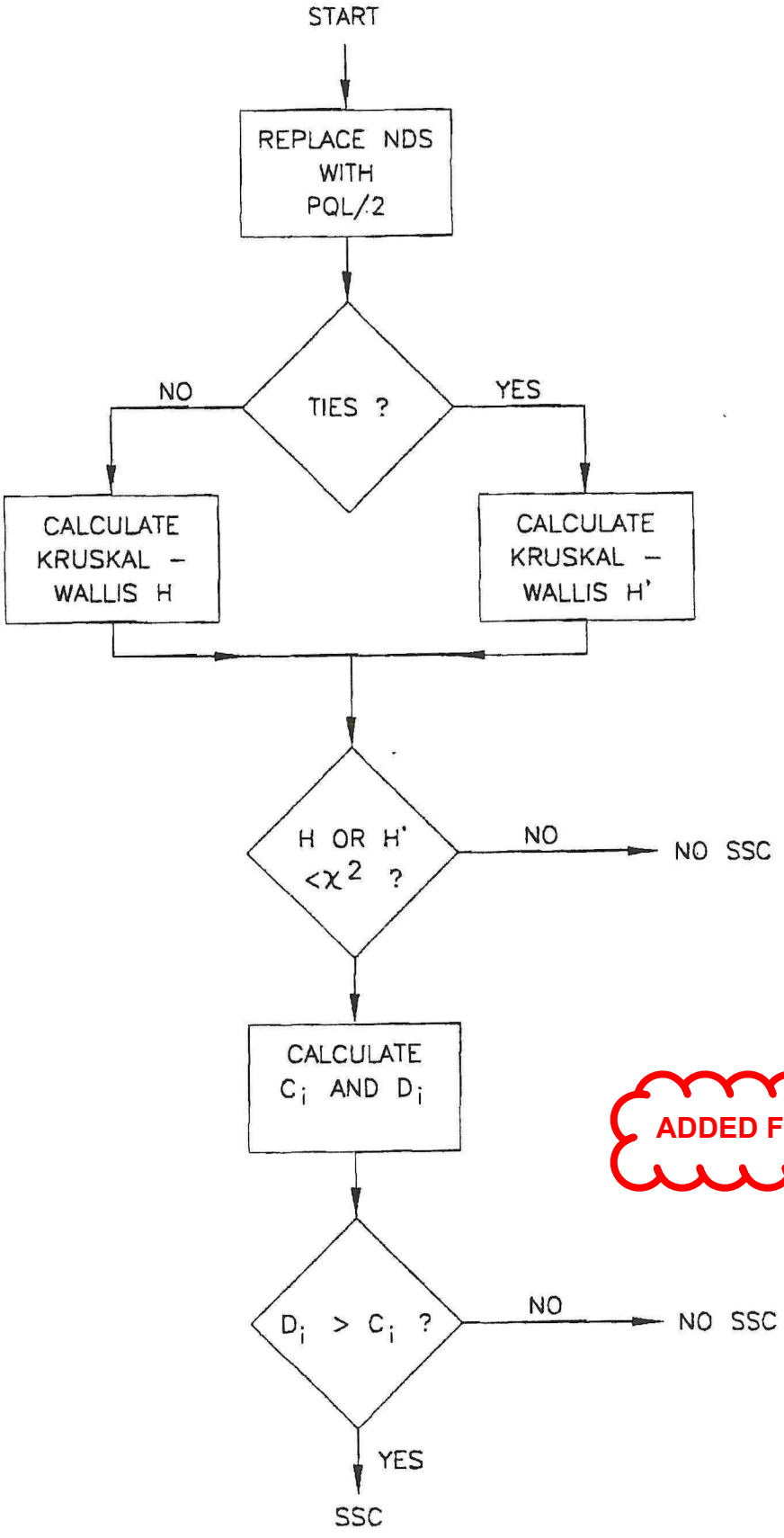
Parameter	Method[1]	CAS RN
Inorganic Indicator Constituents:		
Ammonia	EPA 350.1	Total
Calcium	EPA 6010	Total
Magnesium	EPA 6010	Total
Sodium	EPA 6010	Total
Potassium	EPA 6010	Total
Chloride	EPA 300.0	
Sulfate	EPA 300.0	
Alkalinity	EPA 310.1	Total

Notes:
[1] Equivalent or better methods may be substituted.



ADDED FLOWCHART

ANOVA FLOWCHART I
(PARAMETRIC ONE-WAY ANOVA)
FIGURE 1



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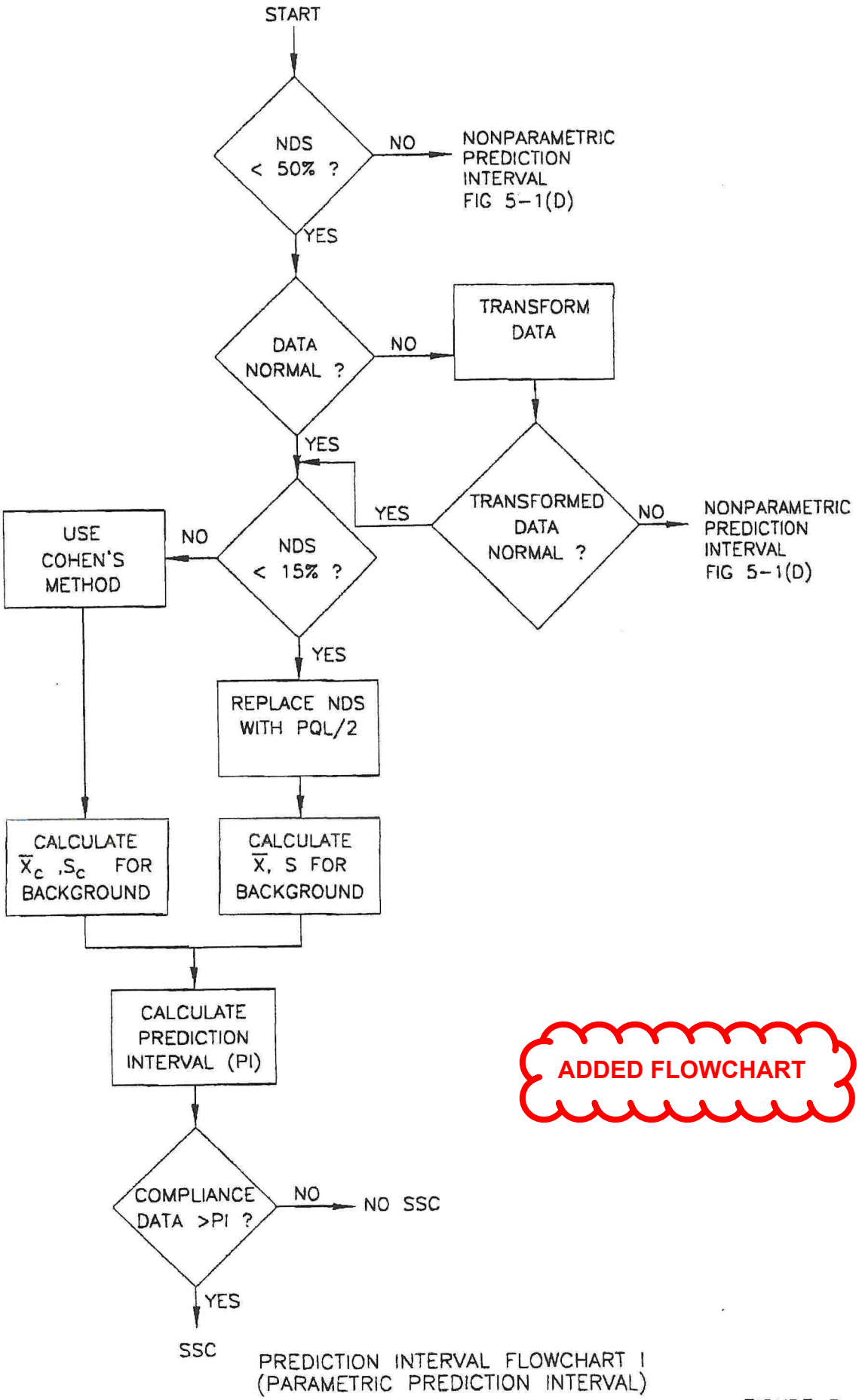
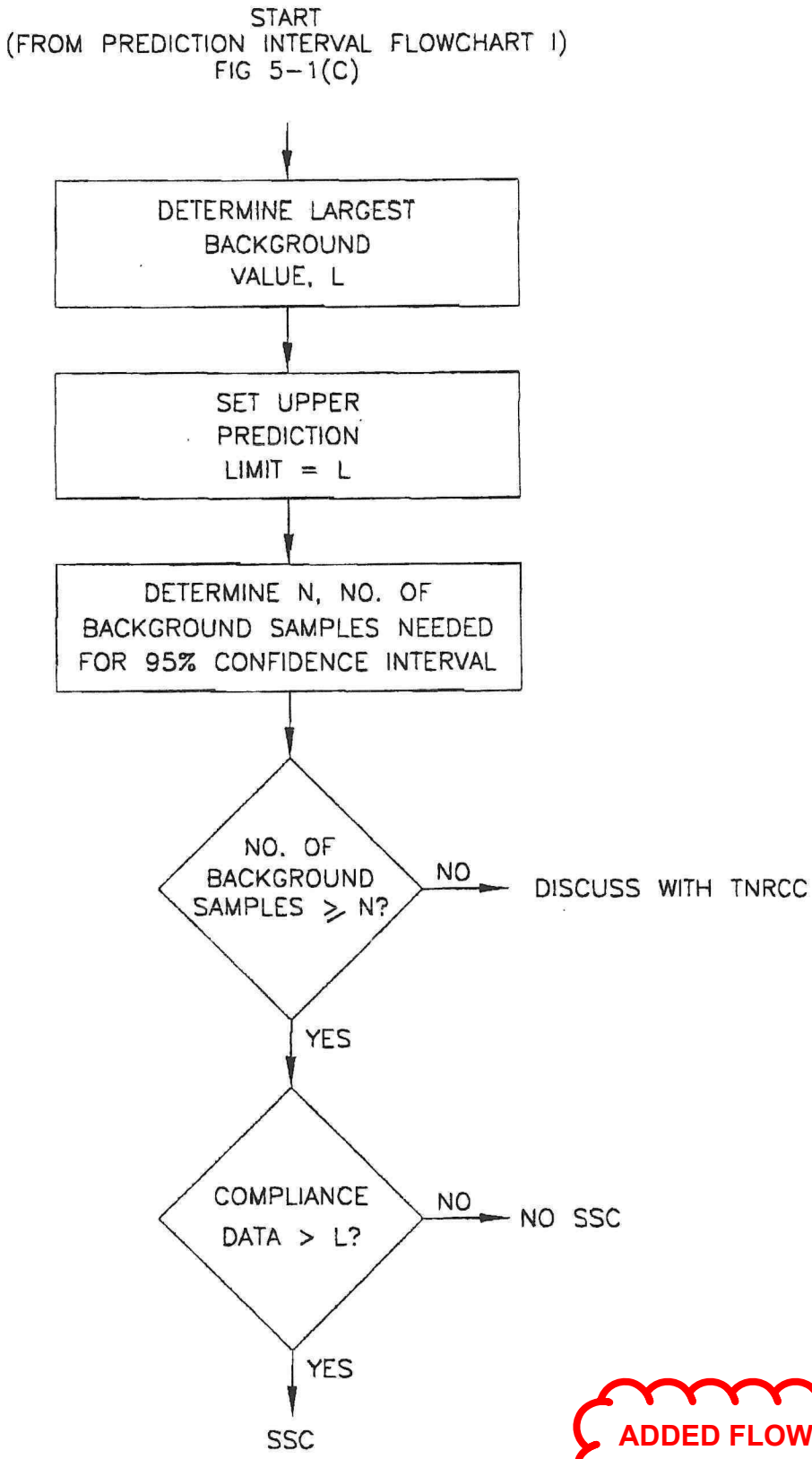
ANOVA FLOWCHART II
(NONPARAMETRIC ONE–WAY ANOVA)

FIGURE 2



PREDICTION INTERVAL FLOWCHART I
(PARAMETRIC PREDICTION INTERVAL)

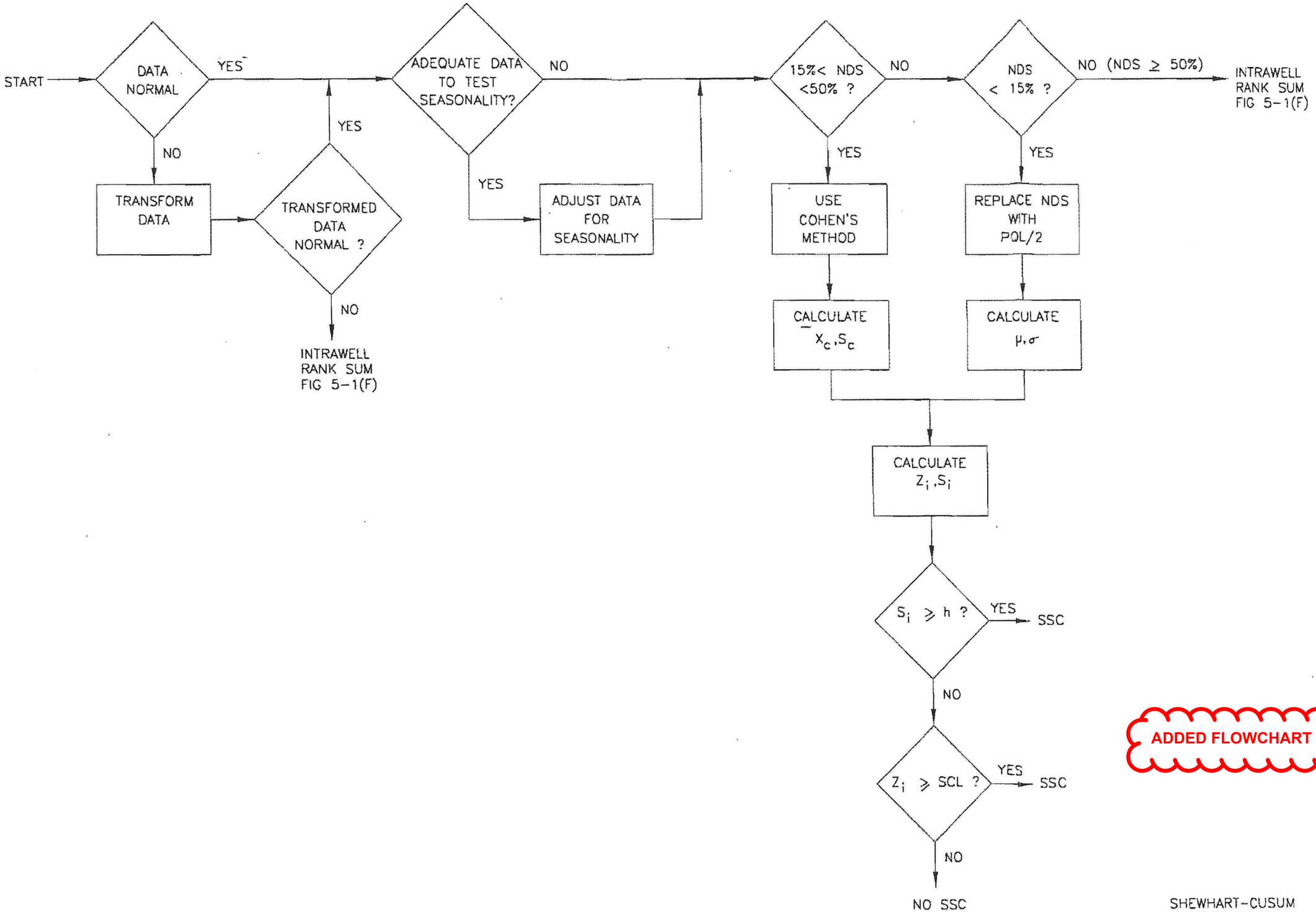
FIGURE 3



ADDED FLOWCHART

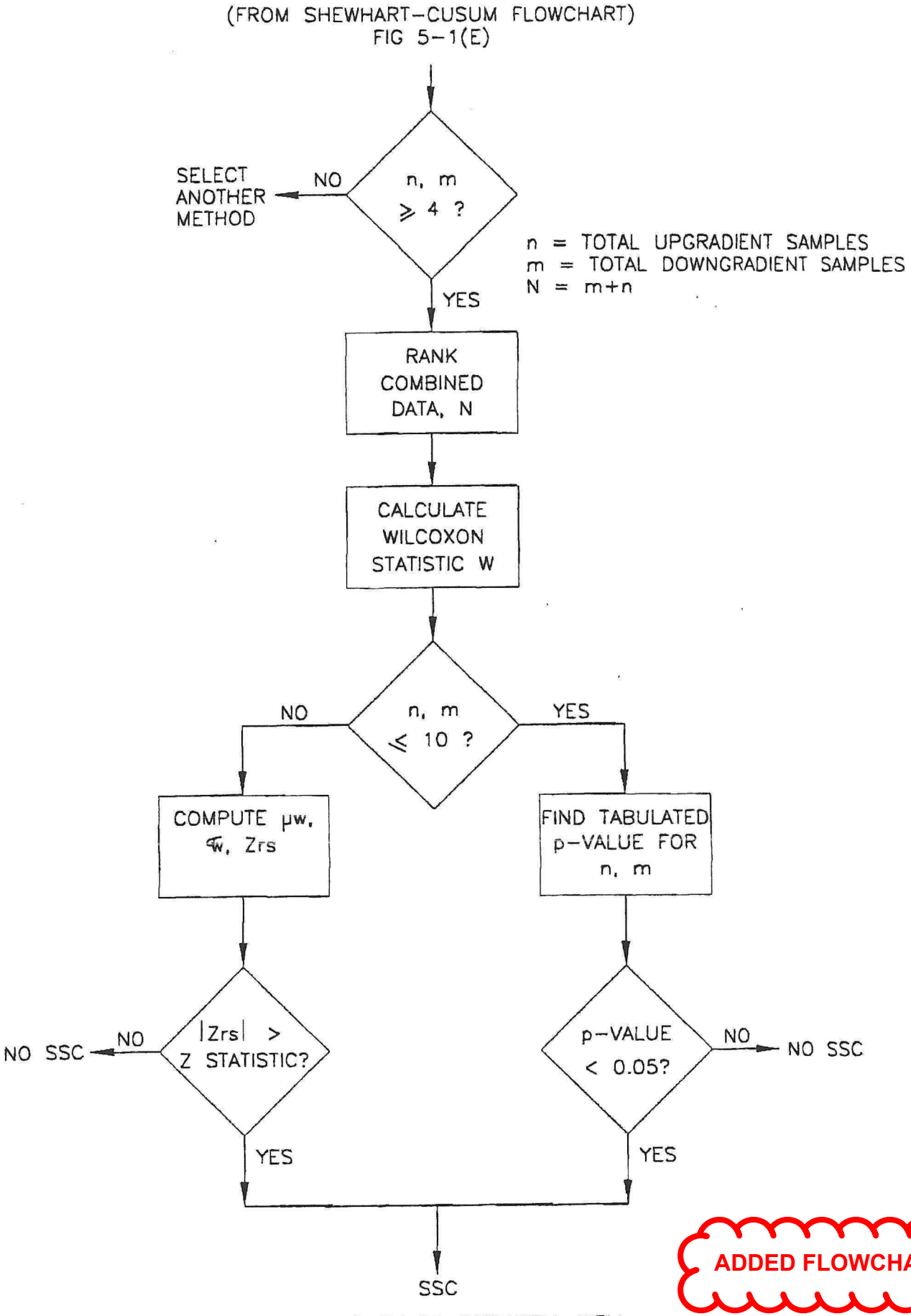
PREDICTION INTERVAL FLOWCHART II
(NONPARAMETRIC PREDICTION INTERVAL)

FIGURE 4



ADDED FLOWCHART

SHEWHART-CUSUM FLOWCHART
FIGURE 5



ADDED FLOWCHART

FIGURE 6

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

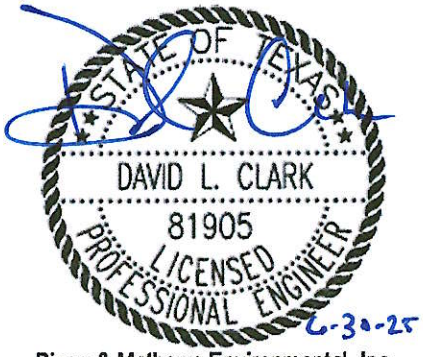
PERMIT AMENDMENT APPLICATION

VOLUME 4 OF 4

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised March 2025
Revised June 2025



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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
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PERMIT AMENDMENT APPLICATION

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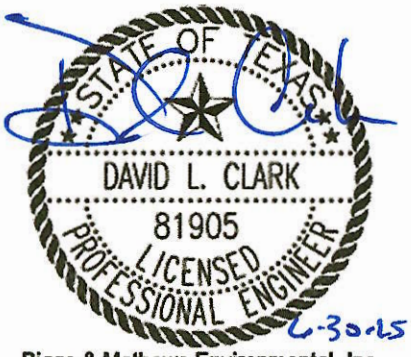
Attachment J – Cost Estimates for Closure and Postclosure Care

PART IV SITE OPERATING PLAN



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GRAYSON COUNTY, TEXAS
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PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT G
LANDFILL GAS MANAGEMENT PLAN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025

06/30/2025

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TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

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06/30/2025

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2290A

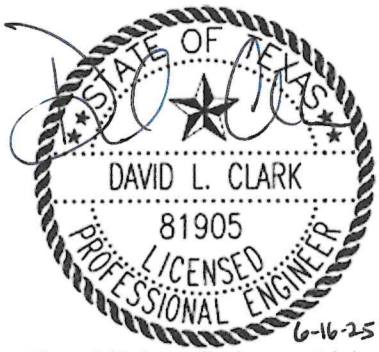
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT H
CLOSURE PLAN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised March 2025
Revised June 2025



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FIRM REGISTRATION NO. F-256 AND NO. 10194895

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FIRM REGISTRATION NO. 50222

Landfill Unit Name or Descriptor	Type of Final Cover System	Final Cover System Components Description	Other Information (Enter other information as applicable)

B. Design Details

Table 6. Design Details of the Final Cover Top and Side Slopes for the Landfill Units.

Landfill Unit Name or Descriptor	Maximum Final Elevation of Waste (feet above mean sea level [ft-msl])	Maximum Elevation of Top of Final Cover (ft-msl)	Minimum Grade of the Final Cover Top Slope (%)	Maximum Grade of the Final Cover Side Slope (%)	Other Information (enter other information as applicable, e.g. above-grade Class 1 Cell Dikes)
TASWA DRF	1102.2	1106.7	<4	25 ~~4~~	

C. Final Cover Drainage Features

Storm water drainage and erosion and sediment control features incorporated on the final cover of the landfill units to protect the integrity and effectiveness of the final cover system include *(please list and describe the drainage features to be installed on the final cover at or prior to closure for each landfill unit, or list the drainage features and provide cross references on the location(s) of the descriptive and details (drawing) information in other parts of the SDP)*:

Vegetation, Swales, downchutes, perimeter drainage channel and detention ponds as designed and detailed in Part III, Attachment C3.

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

PART IV

SITE OPERATING PLAN

Prepared for

Texoma Area Solid Waste Authority

February 2025
Revised June 2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

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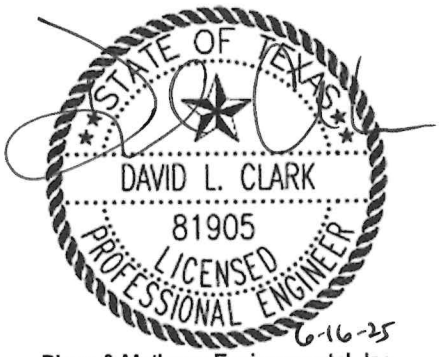
TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222



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Firm Registration No. F-256

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delivery routes within two miles of the entrance on SH56 and FM 901 when the facility is in operation. Cleanup of the spilled materials will be performed once per day for the following regular delivery routes:

- SH56 – two miles east of the site entrance and two miles west of the site entrance
- FM 901 North – one mile north of the intersection with SH56

TASWA DRF will consult with officials of TxDOT concerning the cleanup of state highways and right-of-ways consistent with §330.145.

8.9 Disposal of Large Items

An area designated for large items and white goods staging and salvage will be provided near the scalehouse as shown on Part III, Attachment 1B. The large items and white goods include items such as ovens, dishwashers, freezers, air conditioners, and other large items. These items will be recycled or disposed of at the working face to prevent a nuisance and to preclude discharge but will not be staged in excess of 180 days.

Refrigerators, freezers, air conditioning units, or other items containing chlorinated fluorocarbon (CFC) refrigerant will be handled in accordance with 40 CFR §82.156(f).

Items which may contain PCBs will be excluded from waste fill. Procedures for detecting and excluding PCBs are provided in Section 5.

Large items that are not recycled will be disposed of at the working face. Care will be taken during disposal of large items to ensure that: (1) large items and/or brush are excluded from the initial 5 feet of waste placed over the protective cover of a liner, (2) large items are placed such that they do not interfere with continued waste filling, and (3) that other smaller municipal solid waste is placed and compacted around them.

8.10 Odor Management Plan

The TASWA DRF will manage odors associated with waste acceptance and disposal operations, and operation of the storage and processing areas consistent with this Odor Management Plan. This plan addresses sources of odors and includes general instructions to control odors or sources of odors.

Measures to control odors and sources of odors may include, but are not limited to, the following items:

- The facility will accept wastes that may generate odors including stabilized liquid wastes, Type I municipal solid waste, and dead animals. The stabilized liquid wastes are required to pass a paint filter test prior to disposal at the active working face.
- Other sources of odors may include ponded water, decomposition of wastes, leachate, contaminated water, and landfill gas (LFG).

8.20.2 Dead Animals

The site may receive dead animals or slaughterhouse wastes that are delivered to the site independent of other wastes. Dead animals and slaughterhouse wastes will be buried and covered with a minimum of 3 feet of other solid wastes or a minimum of 2 feet of earthen material immediately upon arrival in accordance with §330.171(c)(2).

8.20.3 Empty Containers

Empty containers, which have been used for pesticides, herbicides, fungicides, or rodenticides, may be accepted and disposed of in accordance with 30 TAC §330.171(c)(5). Empty containers will be disposed if they have been triple rinsed prior to receipt, rendered unusable prior to receipt, and covered by the end of the same working day with solid waste or daily cover.

8.20.4 Nonregulated Asbestos-Containing Materials

Non-regulated asbestos-containing materials (non-RACM) may be accepted for disposal provided the wastes are placed on the active working face and covered in accordance with §330.171(c)(4) and Section 8.18. Under no circumstances shall any material containing non-RACM be placed on any surface or roadway which is subject to vehicular traffic or disposed of by any other means by which the material could be crumbled into a friable state.

8.20.5 Used Oil Filters

Used oil filters from internal combustion engines must not be intentionally and knowingly accepted for disposal unless conditions are met in accordance with 330.171(d).

8.20.6 Regulated Asbestos-Containing Materials

Regulated asbestos-containing materials (RACM) may not be accepted for disposal.

8.21 Disposal of Industrial Waste

Industrial waste is defined by §330.3 as solid waste resulting from or incidental to any process of industry or manufacturing, or mining or agricultural operations. Class 2 and Class 3 industrial solid wastes may be accepted at the facility, provided disposal of these wastes does not interfere with proper operation of the facility. Class 1 industrial solid waste will not be accepted. Refer to Section 5 and Section 8.2 for waste screening procedures.

8.22 Visual Screening of Deposited Waste

Existing topography and vegetation provide natural screening of deposited waste. Visual screening of deposited waste is provided as part of normal waste disposal and cover placement operations and sequence of development. Final cover will be placed as the landfill reaches final contours. As the site is developed, the visual effect of the disposal activities will be minimized through the use of screening provided by fencing, constructed berms, planted vegetation, and natural vegetation located within the buffer zone.

8.23 Leachate and Gas Condensate Recirculation

The TASWA DRF may recirculate leachate and landfill gas condensate in accordance with Part III, Attachment D6. Consistent with Subtitle D regulations, recirculation of leachate will only occur within the active waste fill area over the areas underlain by a Subtitle D liner system. In addition to the above, 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, leachate will be applied to that no seeps or ponding is observed in the vicinity of the recirculation area.

- 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.

Refer to Part III, Attachment D6 for additional information regarding the leachate collection system and leachate recirculation.

8.24 Contaminated Water Discharge

The TASWA DRF will take all steps necessary to control and prevent the discharge of contaminated water from the facility. Should the discharge of contaminated water become necessary, the landfill will obtain specific written authorization from the TCEQ prior to discharge. All water coming in contact with 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 Part III, Attachment D6. The landfill will be operated consistent with §330.15(h)(1)-(4) regarding discharge of solid wastes or pollutants into waters of the United States.

8.25 Processing and/or Storage Units Operations

8.25.1 Large Item Staging Area

A staging area for large items and white goods may be provided near the active working face. Large items and white goods include overs, dishwashers, freezers, air conditioners, and other large items. These items will be recycled every 180 days or less or disposed at the active working face within 180 days of acceptance at the facility. The procedures for the acceptance, storage, processing, and disposal of large items are addressed in Section 8.9.

A staging area for large items and white goods may be provided near the citizen's convenience area. The large items and white goods are transferred into steel roll-off containers for storing until transport to an off-site recycler or disposed of. Surface water runoff will be diverted around the large item staging area by placement of earthen diversion berms. Surface water runoff from the large item storage area will be managed

as contaminated water and contained by placement of earthen containment and diversion berms to preclude discharge from this area. Containment and diversion berms will be placed consistent with Part III, Attachment D6.

8.25.2 Recyclable Materials Staging Area

Inert materials such as brick, concrete, etc., and non-inert materials such as asphalt may be received and staged at the facility for use as roadbase materials for facility access roads and staging areas or erosion control in drainage structures. Asphalt pavement will not be used for erosion control in drainage structures. The size of the stockpiles may vary depending on the amount of inert materials received at any given time. Since the brick and concrete materials are inert, runon and runoff from rainfall will not be controlled in a special manner for these materials. Since asphalt pavement or asphaltic concrete is not an inert material, it will be managed in a manner that will prevent runoff of contaminated water, discharge of waste, or creation of nuisance conditions. These inert and non-inert materials will continuously be reused for site operations, and there is no time limit on the staging of these materials.

A recyclable materials staging area may be provided for source-separated recyclable materials, including asphalt and other materials.

8.25.3 Citizen's Convenience Center

A citizen's drop-off and recyclable area is provided which is separate from the landfill operation. Citizen's drop off boxes and covered storage pads may be provided for household waste, source-separated recyclable materials, large items/white goods, batteries, used oil and oil filters, scrap metal, and whole tires. Used oil and oil filters are stored in leakproof, durable containers with secondary containment such as prefabricated secondary containment, plastic liners, concrete vaults, or other suitable containment designed for the safe handling of used oil and oil filters. The containers for used oil and oil filter storage will be located to minimize potential for damage due to vehicle or equipment traffic. Should an oil spill occur, the procedures identified in the facility's Stormwater Pollution Prevention Plan (SWPPP) will be implemented to contain and clean up a spill. Tires will be staged in enclosed, lockable trailers and no more than 2,000 tires will be on-site at any time. The TASWA DRF will provide a sufficient number of drop-off boxes for the citizen's drop-off and recyclable area consistent with the amount of incoming waste/recyclables. A sign will be displayed at the scalehouse which states who may use the citizen's drop-off and recyclable area, what may or may not be accepted, and fees for disposal (if applicable). The maximum time that recyclables will remain at the citizen's drop-off and recyclable area is 180 days. Supervision of the citizen's drop-off recyclable area will be provided to prevent nuisance conditions from developing.

Control will be used to confine the citizen's drop-off and recyclable area to a minimum size consistent with the rate of incoming recyclables, while allowing for safe and efficient operation. The large items/white goods staging area is further discussed in Section 8.9.

Signs with directional arrows and portable traffic barricades will help to restrict traffic to designated disposal locations. Signs will be placed along the access route to the current

disposal area or other designated disposal areas that may be established. In addition, rules for waste disposal and prohibited waste will be prominently displayed on signs at the site entrance. Refer to Section 5 for additional waste handling procedures.

8.25.4 Woodwaste/Brush Mulching Area

Source separated yard trimmings, clean wood materials, and vegetative material may be directed to the woodwaste/brush mulching area. The woodwaste/brush mulching area will be located within the waste footprint and will process yard trimmings, clean wood materials and vegetative materials, which will include trees and brush, into mulch after visual inspection. The resulting wood chips and mulch will only be used on-site and will be staged in the processing area for a maximum time of 60 days after being processed. The average length of time that wood chips and mulch is 30 days after being processed. The resulting wood chips and mulch will be staged in small piles within the processing area so as not to result in litter and will be managed to prevent fire, safety, or health hazards in accordance with 30 TAC §330.209(a).

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised March 2025
Revised June 2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

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FIRM REGISTRATION NO. F-256

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

VOLUME 1 OF 4

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
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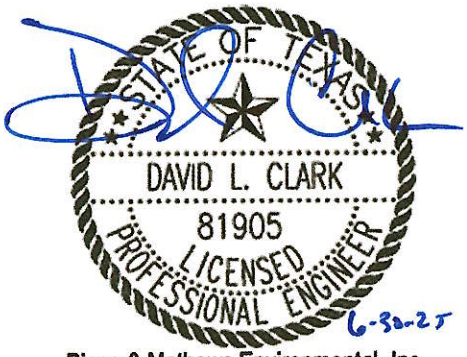

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION
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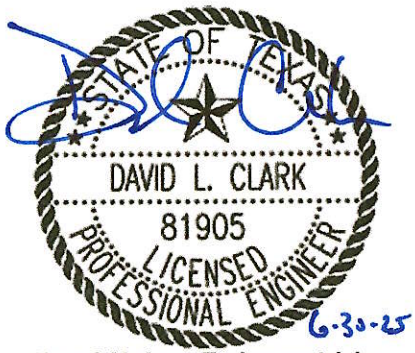
Part II – Existing Conditions and Character of the Facility and Surrounding Area



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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

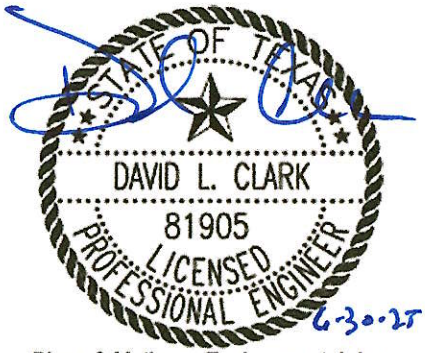
PERMIT AMENDMENT APPLICATION

PART I
SITE AND APPLICANT INFORMATION
SUPPLEMENTARY TECHNICAL REPORT

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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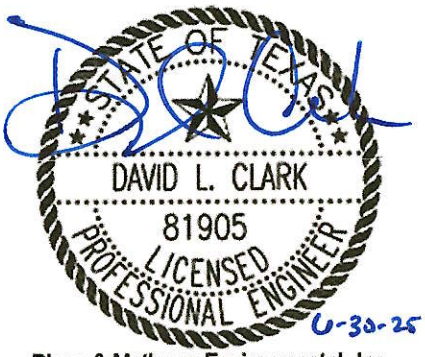

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

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APPENDIX IE – APPOINTMENTS

Texas Commission on Environmental Quality

Part I Application Form for New Permit, Permit Amendment, or Registration for a Municipal Solid Waste Facility

Instructions for completing this Part I Application Form are provided in TCEQ 00650-instr[1]. Include a Core Data Form (TCEQ 10400)[2] with the application for the facility owner, and Core Data Forms for the operator and property owner if different from the facility owner. If you have questions, contact the Municipal Solid Waste (MSW) Permits Section by email to mswper@tceq.texas.gov, or by phone at 512-239-2335. Rules cited on this form are in Title 30 Texas Administrative Code (30 TAC) and may be viewed online at www.tceq.texas.gov/goto/view-30tac.

Application Tracking Information

Facility Regulated Entity Name[3]:
TASWA Disposal and Recycling Facility

Site Operator (Permittee or Registrant Name)[4]:
Texoma Area Solid Waste Authority

MSW Authorization Number: 2290A

Initial Submission Date: 2/3/2025

Revision Date: 06/30/2025

Application Data

1. Submission Type	
☒ Initial Submission	☐ Notice of Deficiency (NOD) Response

2. Authorization Type	
☒ Permit	☐ Registration

3. Application Type	
☐ New Permit	
☒ Permit Major Amendment	☐ Permit Limited Scope Major Amendment
☐ New Registration	

[1] www.tceq.texas.gov/downloads/permitting/waste-permits/msw/forms/00650-instr.pdf
[2] www.tceq.texas.gov/goto/coredata
[3] Facility Regulated Entity Name must match the Regulated Entity Name indicated on the TCEQ Core Data Form.
[4] Site Operator is defined in 30 TAC 330.3(148) as the holder of, or the applicant for, an authorization (or license) for a municipal solid waste facility.

Applicant Signature Page

Site Operator (Permittee or Registrant Name) or Authorized Signatory

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name: John O'Steen Title: Executive Director

Email Address: josteen@taswa.com

Signature: _____ Date: 6-30-25

Authorization by Facility Owner for Operator to Submit Application

To be completed by the facility owner if the application is submitted by an operator who is not the facility owner.

I am the owner of the facility that is the subject of this application, and authorize the operator, N/A to submit this application pursuant to 30 TAC 305.43(c).

Name: _____ Title: _____

Email Address: _____

Signature: _____ Date: _____

Notary

SUBSCRIBED AND SWORN to before me by the said John O'Steen

On this 30th day of June, 2025

My commission expires on the 6th day of September, 2028

JOANNE HIXSON
Notary Public, State of Texas
Comm. Expires 09-06-2028
Notary ID 1524951

Jo Anne Hixson

Notary Public in and for

Grayson County, Texas (notary's jurisdiction, including county and state)

Note: Application Must Bear Signature & Seal of Notary Public

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

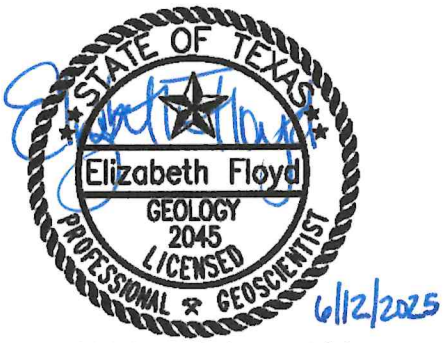
PART II
EXISTING CONDITIONS AND
CHARACTER OF THE FACILITY AND SURROUNDING AREA

PART II NARRATIVE

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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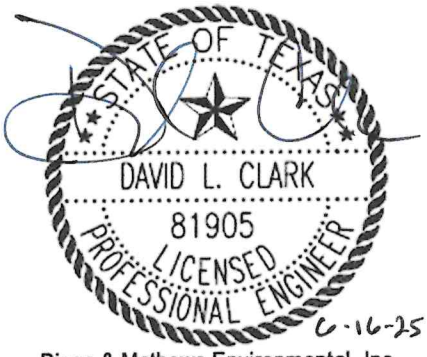

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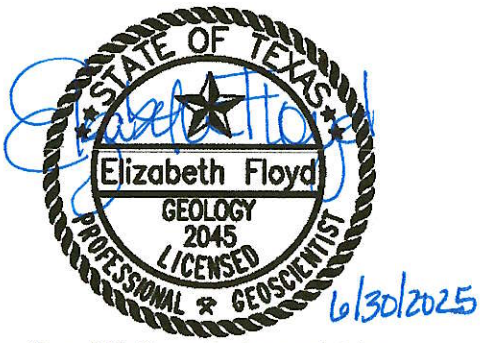

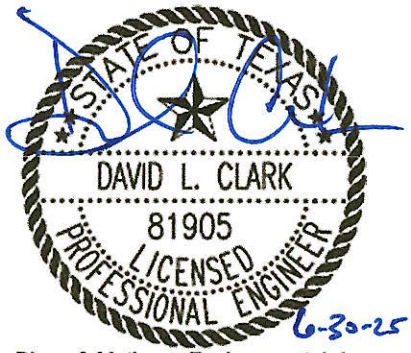

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Firm Registration No. F-256

For Sections 8.1, 10.1, 10.2, 10.3, 10.4, 11.1, 12.1 and 12.2

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APPENDIX IIB
LAND USE ANALYSIS

Land Use Analysis

Texoma Area Solid Waste Authority Landfill

Type 1 Facility

January 27, 2025

Prepared by:

Integrated Environmental Solutions, LLC.

310 W Eldorado Pkwy; Suite 101

McKinney, TX 75069

972-562-7672

INTRODUCTION

The Texoma Area Solid Waste Authority (TASWA) is currently a Type 1 municipal solid waste facility with a proposed on-site expansion. The current facility encompasses 920+ acres in a rural area in Grayson County, approximately 3 miles east of the City of Whitesboro (**Attachment A, Figure 1**). The proposed facility expansion would expand the current landfill footprint to 475 acres, an increase of 247 acres.

The purpose of this land use evaluation is to address land use issues as required by the Texas Commission on Environmental Quality (TCEQ) in support of an application for TCEQ municipal solid waste facility authorization for the TASWA Landfill expansion. Specifically, this evaluation addresses those portions of the TCEQ rules pertaining to land use compatibility. The relevant rule portions, as excerpted from 30 Texas Administrative Code (TAC) § 330.61, are:

> *(g) Land-use map. This is a constructed map of the facility showing the boundary of the facility and any existing zoning on or surrounding the property and actual uses (e.g., agricultural, industrial, residential, etc.) both within the facility and within one mile of the facility. The owner or operator shall make every effort to show the location of residences, commercial establishments, schools, licensed day-care facilities, churches, cemeteries, ponds or lakes, and recreational areas within one mile of the facility boundary...*
>
> *(h) Impact on surrounding area. A primary concern is that the use of any land for a municipal solid waste facility not adversely impact human health or the environment. The owner or operator shall provide information regarding the likely impacts of the facility on cities, communities, groups of property owners, or individuals by analyzing the compatibility of land use, zoning in the vicinity, community growth patterns, and other factors associated with the public interest. To assist the commission in evaluating the impact of the site on the surrounding area, the owner or operator shall provide the following:*
>
> > *(1) if available, a published zoning map for the facility and within two miles of the facility for the county or counties in which the facility is or will be located. If the site requires approval as a nonconforming use or a special permit from the local government having jurisdiction, a copy of such approval shall be submitted;*
> >
> > *(2) information about the character of surrounding land uses within one mile of the proposed facility;*
> >
> > *(3) information about growth trends within five miles of the facility with directions of major development;*
> >
> > *(4) the proximity to residences and other uses (e.g., schools, churches, cemeteries, historic structures and sites, archaeologically significant sites, sites having exceptional aesthetic quality, etc.) within one mile of the facility. The owner or operator shall provide the approximate number of residences and commercial establishments within one mile of the proposed facility including the distances and directions to the nearest residences and commercial establishments. Population density and proximity to residences and other uses described in this paragraph may be considered for assessment of compatibility...*

LIST OF FIGURES

1 General Location Map

2 Land Use –1 Mile

3 Growth Trends – 5 Miles

ZONING

Because the site is not in an incorporated area, there is no zoning. Moreover, the site is more than 2 miles from any incorporated city; hence there is no zoning within 2 miles.

The site is not within the extraterritorial jurisdiction of any incorporated city and is therefore not subject to the subdivision regulations of any city. The site does not require approval as a nonconforming use or a special permit from any local government.

CHARACTER OF SURROUNDING LAND USES

The predominant land use within 1 mile of the permit boundary is classified as *Other* (open, agricultural, vacant, floodplain). This land use comprises 94.8 percent of the land area within 1 mile of the facility boundary (**Attachment A, Figure 2**). Nearly all of this open land is agricultural pastureland or wooded floodplains.

Table 1. Land Use within 1 Mile from the TASWA Facilities

Land Use	Acres	Percentage	Remarks
Other	4,395	94.8	Open, agricultural, vacant, floodplain
Water Bodies	77	1.6	2022 surface area
Residential	139	3.0	139 residences
Commercial	27	0.6	5 establishments
Total	4,638	100	Not including permit boundary

Source: 2022 Aerial Photography

There are approximately 77 acres of *Water Bodies* within 1 mile of the permit boundary, representing approximately 1.6 percent within 1 mile. The water bodies consist of impoundments, stock ponds, and ornamental water features. (Water surface area was calculated based on 2022 aerial photographic interpretation).

All the *Residential* land (139 estimated acres) is rural, single-family residential, consisting of 139 residences and representing an estimated 3.0 percent within 1 mile of the permit boundary. (In the case of rural residences, 1 acre is attributed to each residence.)

Commercial land use (five establishments) makes up only 0.6 percent of the land area within 1 mile of the permit boundary.

GROWTH TRENDS

The TASWA site is in western Grayson County, approximately 2 miles southeast of Sadler, the nearest community. The site is approximately 3 miles east of Whitesboro and 3 miles west of Southmayd. Projected growth patterns for the nearest zip codes and counties (Grayson, Cooke) are listed below.

Table 2. Projected Population Growth, by Zip Code and County

	2021 Population	2026 Population Estimate	% Growth 2021-2026
Zip Code			
Gainesville - 76240	29,881	30,795	0.60
Whitesboro - 76273	10,514	11,094	1.08
Sherman - 75092	27,345	29,064	1.23
Sadler - 76264	1,721	1,851	1.47
County			
Cooke County	43,588	45,039	0.66
Grayson County	142,442	151,576	1.25

Source: Esri's U.S. Updated Demographic (2021/2026) Data

Grayson County, where TASWA is located, is the dominant county in terms of population size and growth. For purposes of comparison, the State of Texas is projected to grow 1.54 percent from 2021 through 2026.

Attachment A, Figure 3 depicts growth trends within 5 miles of the site, as well as regional growth trends for the projected period of 2021 through 2026. Within 5 miles of the site, population growth in the census block group immediately north and south of the site is projected to grow by 1.42 and 2.29 percent, respectively from 2021 through 2026. To the far east and north of the site the census blocks are projected to grow by more than 1.4 percent from 2021 through 2026.

Within the region, the highest growth is occurring within the census block groups between the Cities of Whitesboro and Sherman.

PROXIMITY

As of May 2022, there are 139 residences within 1 mile of the facility boundary. The nearest residence to the proposed facility is at 1274 Utley Road, estimated to be approximately 259 feet south of the permit boundary, and approximately 440 feet south of the limit of fill.

There are five business establishments within 1 mile of the permit boundary. The most proximate business establishment is a concrete contractor outside of the western limits of the property boundary, approximately 500 feet west of the facility boundary and 2,600 feet from the limit of fill.

The Texas Historic Sites Atlas of the Texas Historical Commission identified one Texas State Historical marker located on the south side of SH 5 approximately 0.5 mile east of the site entrance. The historical marker denotes the Sanborn Ranch, which was one of the first ranches in Texas to be fenced with barbed wire. There are no additional historic structures or archeologically significant sites within one mile of the facility boundary.

There are no hospitals, churches, licensed day-care facilities, cemeteries, schools, recreational areas, or sites having exceptional aesthetic quality within one mile of the facility boundary.

ATTACHMENT A

Figures

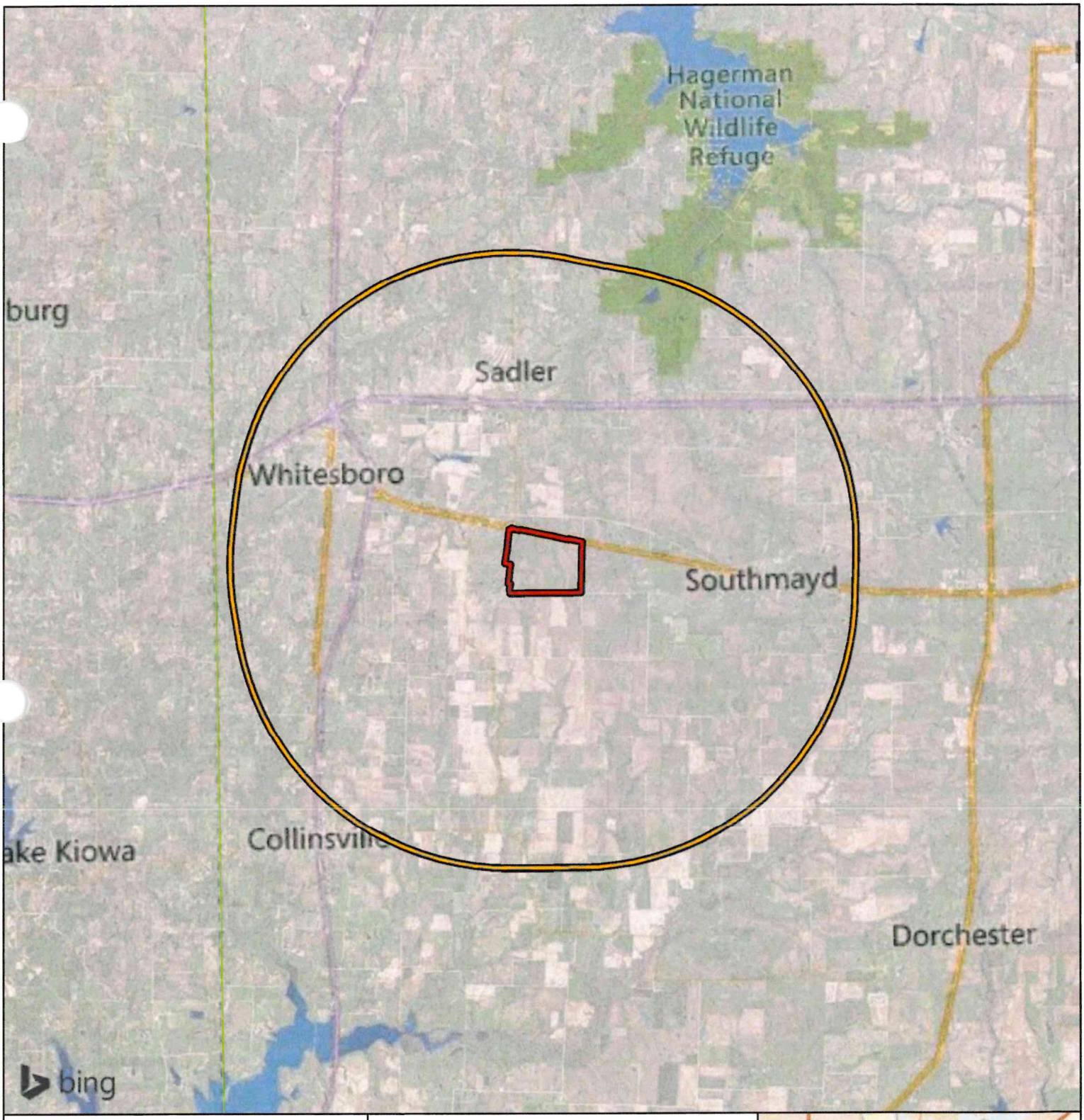


Figure 1.
General Location Map

TASWA
City of Whitesboro
Grayson County, Texas

1 in = 12,500 feet

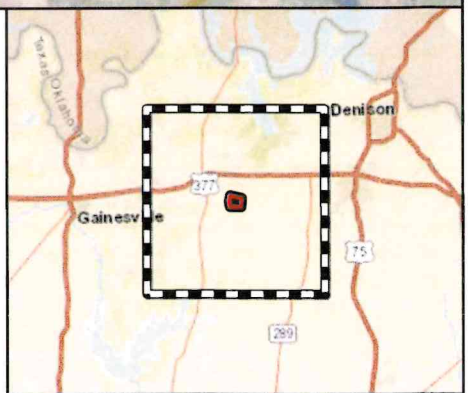
Feet
0 12,500

N
W E
S

File Ref. 04.240.095
Date: 5/20/2022

Survey Area
5 Mile Buffer

IIB.6



Area of Detail Scale: 1 inch equals 20 miles

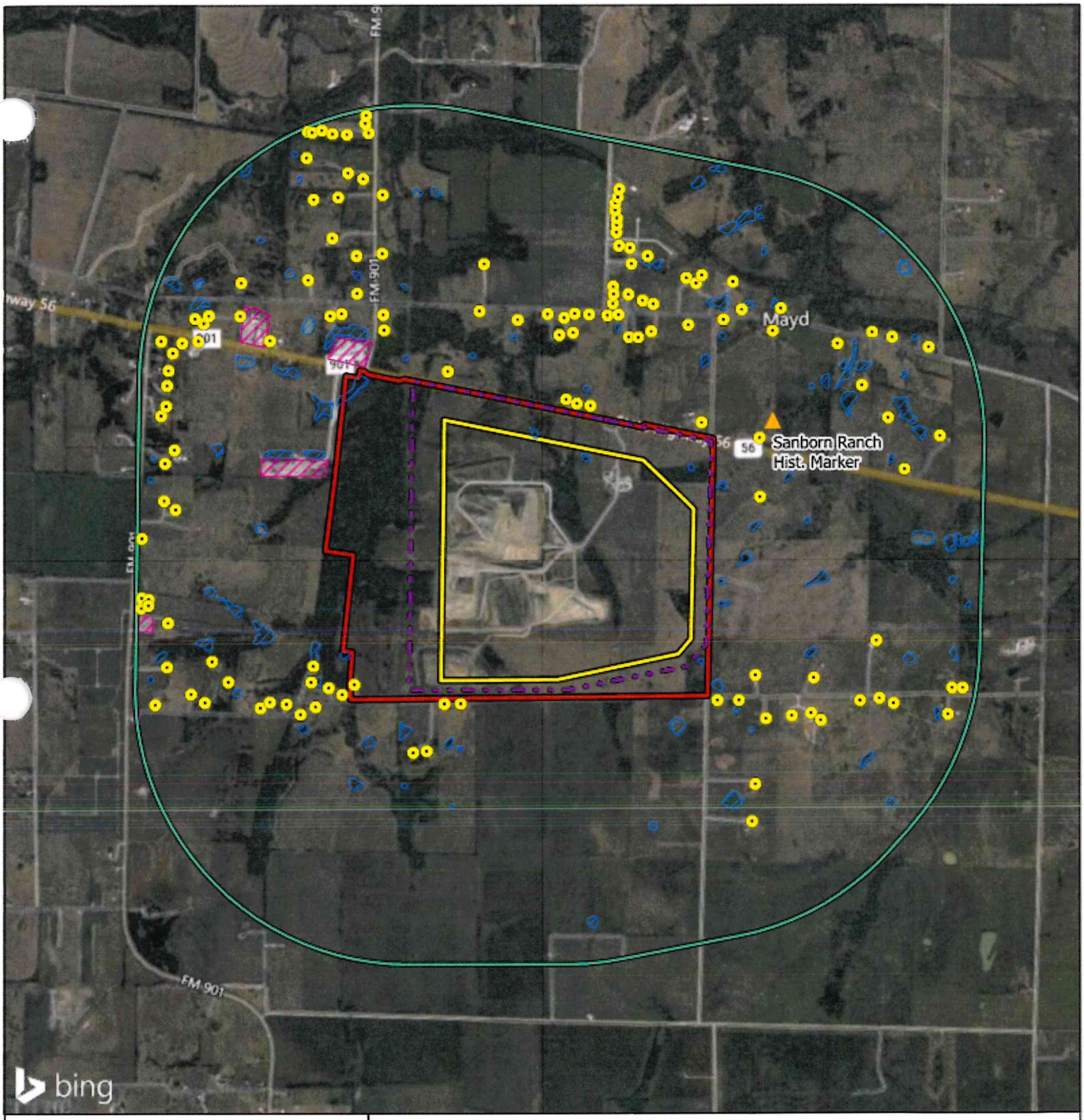


Figure 2.
Land Use Within 1 Mile of Permit Boundary

TASWA
City of Whitesboro
Grayson County, Texas

1 in = 2,500 ft
Feet
0
2,500

File Ref: 04 240 095
Date: 1/27/2025

N
W E
S

- Property Boundary
- Permit Boundary
- Waste Footprint (Limit of Fill)
- Permit Boundary 1 Mile Radius

Land Use

- Residential (139 units)
- Commercial (5 units)
- Open Water
- Other: Open, Agricultural, Vacant, Floodplain
- Historical Marker

- No hospitals, churches, licensed day-care facilities, cemeteries, schools, recreational areas, archaeologically significant sites, or sites having exceptional aesthetic quality within one mile of the facility boundary.

- Reference survey for drainage, pipeline and utility easements.

Figure 3. Growth Trends - 5 Miles
Change in Population Projection 2021-2026 - By Census Block Group

County: Grayson
State: Texas
Date map created: January / 27 / 2025
Source: (c) 2009 Microsoft Corporation
and its data suppliers; ESRI 10.6
Exported at 24in by 36in

TASWA Landfill Site
5 Mile Landfill Radius

Block Group
-2.8 to -1.9%
-1.9% to -1.25%
-1.25% to 0%
0% to 1.25%
1.25% to 1.9%
1.9 - 195.0 %

N
W E
S

1 inch = 6,250 feet

0 6,250 12,500 Feet

Data Source: Esri's U.S. Updated Demographic (2021/2026) Data - http://maps.arcgis.com/home/webmap/viewer.html

1,682+128 = 1,810
1.48% Growth

2,859+211 = 3,070
1.43% Growth

1,650+133 = 57
0.68% Growth

1,808+133 = 1,941
1.43% Growth

1,355+25 = 1,380
0.37% Growth

1,942+155 = 2,097
1.55% Growth

3,080+225 = 3,305
1.42% Growth

5,407+649 = 6,056
2.29% Growth

2,016+209 = 2,225
1.11% Growth

bing

APPENDIX IID
WETLANDS DOCUMENTATION

David Clark

From: Carraway, David W CIV USARMY CESWT (USA) [redacted]
Sent: Wednesday, July 3, 2024 10:45 AM
To: Karisa Fenton
Cc: Rudi Reinecke; David Clark; [redacted] Parisotto, Edward M CIV USARMY CESWT (USA)
Subject: RE: TASWA Credit Demand Total - SWT-0-10175

Karisa,

As discussed, we've evaluated the total credit demand and find it satisfactory. Please let me know if you have any questions, thanks!

V/r,

David W. Carraway, AWB, PWS
Regulatory Project Manager
Tulsa District, U.S. Army Corps of Engineers
Govt. Cell: (918) 857-8075
2488 E 81st Street
Tulsa, OK 74137-4290

From: Karisa Fenton [redacted]
Sent: Tuesday, July 2, 2024 1:36 PM
To: Carraway, David W CIV USARMY CESWT (USA) [redacted]
Subject: [Non-DoD Source] TASWA Credit Demand Total - SWT-0-10175

David,

Good afternoon, the RES team is looking to move forward with planning for the TASWA off-site mitigation and would like to solidify the total credit demand. I have attached a document and series of maps detailing the proposed credit demand for the remaining jurisdictional tributary and the currently constructed mitigation areas. Please let me know if you have any questions or comments on the document, and if you agree with the total credit demand total.

Thank you,

Karisa Fenton
Integrated Environmental Solutions, LLC
301 W Eldorado Parkway, Ste. 101
McKinney, Texas 75069
972-562-7672 (o) 937-725-6307 (m)
[redacted]

26 June 2024

Mr. David Carraway
Regulatory Division – USACE Tulsa District
2488 E 81st Street
Tulsa, Oklahoma 74137

RE: Texoma Area Solid Waste Authority (TASWA) Off-Site Credit Demand Total - SWT-0-10175

Dear Mr. Carraway,

Integrated Environmental Solutions, LLC. (IES), as the environmental consultant for TASWA on this project, is requesting a review of the proposed credit demand for jurisdictional aquatic features and currently constructed mitigation areas within the TASWA property boundary. TAWSA is seeking to permit the largest landfill applicable on the site to prevent any foreseeable modifications to the permit in the future based on capacity needs. This approach will result in increasing the impacts to waters of the United States from what was previously approved under the 09 October 2000 Mitigation Plan as an additional segment of the intermittent drainage oriented north-to-south will be filled within the waste boundary and the two constructed mitigation areas will be impacted. The TASWA board has approved the use of RES to purchase an off-site property to develop a mitigation plan, construct and manage the mitigation area for all unavoidable impacts. Prior to moving forward with the permitting and mitigation plan, IES requests a review of the credit demand generated for each of the currently constructed mitigation areas, the wetland, and the intermittent drainage that has not been impacted to date. The goal of this submittal is to solidify the total off-site credit demand so RES can move forward with mitigation planning.

The following provides a description of each of the **Attachment A** figures in the sequence that was used to generate the total credit demand:

Figure 1 - The proposed waste boundary comprises approximately 504 acres located southeast of the intersection of Texas State Highway 56 and Farm-to-Market Road 901, Grayson County, Texas.

Figure 2 - Under the 09 October 2000 Mitigation Plan submitted to the USACE (Project No. 10175) titled Mitigation Plan for T.A.S.W.A., Grayson County, Texas, impacts to 3,340.6 linear feet (LF) of intermittent tributary and 0.09 acre of forested wetland were approved. Impact 1 (Tributary 2) accounted for 1,547.6 LF of intermittent tributary impact, Impact 2 (Tributary 5) accounted for 1,793.0 LF of intermittent tributary impact, and Impact 3 accounted for 0.09 acre of forested wetland impact.

Figure 3 - Under the 2000 Mitigation Plan, four compensatory mitigation areas were located on-site around the perimeter of the landfill permit boundary. To date, the mitigation areas to the northwest and southwest have been constructed and are functioning while the mitigation areas to the northeast and southeast have not been constructed.

Figure 4 – The landfill is divided into a series of cells that are utilized over a period of time. Therefore, rather than clearing the full site once the 2000 Plan was approved, cells have been excavated accordingly to match the community's needs. To date, Tributary 5 and the wetland at the headwaters of Tributary 5 have been impacted. The northwestern and southwestern mitigation areas have been constructed and evaluated in accordance with the 2000 Mitigation Plan to provide compensatory mitigation for the currently impacted features.

Figure 5 - The remaining drainage (Tributary 2), impacted wetland, and the constructed compensatory mitigation areas were assessed using the Texas Rapid Assessment Methodology (TxRAM Version 2.0) to ensure that the proposed off-site compensatory mitigation balances the functions and values associated with the loss of waters of the United States. As Tributary 5 was impacted previously, the mitigation demand was calculated based on the TxRAM scores and lengths of the existing mitigation areas which were constructed to offset the Tributary 5 impacts. As Tributary 2 has not been impacted to date, a TxRAM score was generated for Tributary 2 rather than the northeastern and southeastern mitigation areas which would have been constructed to satisfy compensatory mitigation requirements under the 2000 Plan. This method directly evaluates Tributary 2 rather than providing speculative TxRAM values based on the two eastern 2000 Plan mitigation areas. Nearby wetlands on site were used to generate a TxRAM score for the wetland at the headwaters of Tributary 5.

The total credit demand for each mitigation area or exiting drainage is as follows:

Table 1. Compensatory Mitigation Demand Using TxRAM

Water Identification		Impacted Length/Area	Existing TxRAM Score	Compensatory Mitigation Demand
Tributary 2 Impact		3,178.0 LF	70.45	2,238.9
NW Mitigation Area		1,055.7 LF	37.26	393.4
SW Mitigation Area – Zone A		909.0 LF	41.32	375.6
SW Mitigation Area – Zone B		2,800.4 LF	39.7	1,111.8
Wetland 2		0.09 AC	64.2	0.06
Totals	Tributary	3,340.6 LF	---	**4,119.7 intermittent stream credits**
	Wetlands	0.09 AC	---	**0.06 wetland credits**

If you have any questions regarding the project or would like any additional information, please do not hesitate to contact me at 972-562-767[redacted]

Sincerely,

Integrated Environmental Solutions, LLC

Karisa Fenton

Karisa Fenton
Biologist

CC: David Clark, Biggs and Mathews Env.
John Osteen, TASWA
Mr. Brandon Hall, RES

Enclosure

ATTACHMENT A
Figures

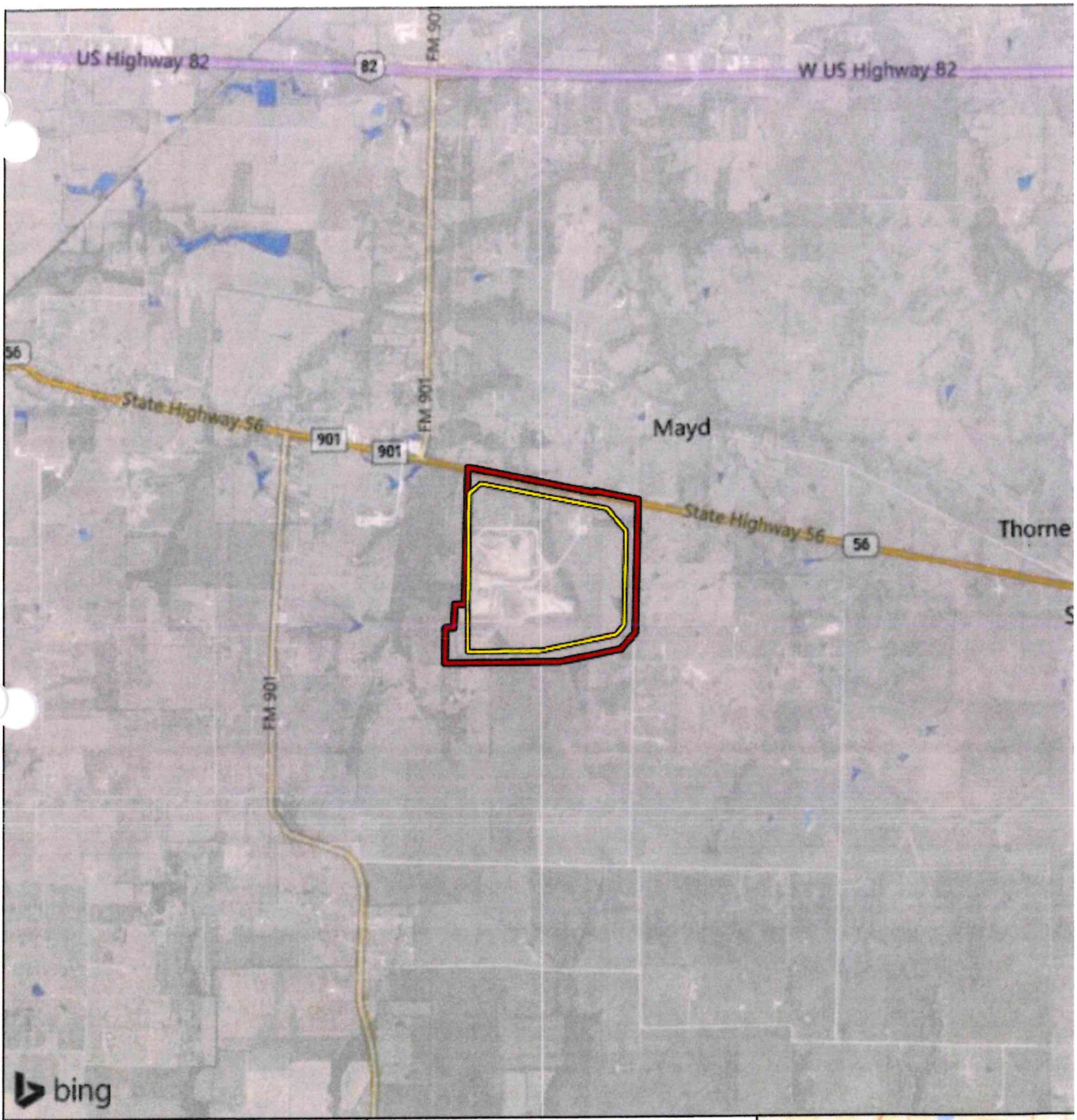
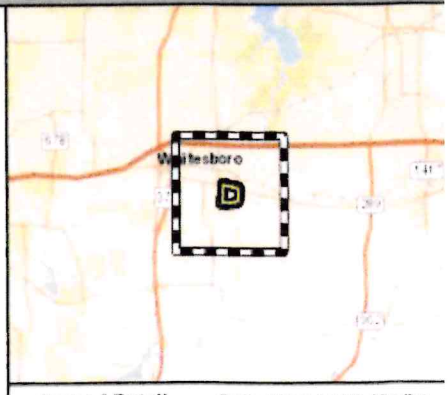


Figure 1.
General Location Map

TASWA Expansion
Grayson County, Texas

Permit Boundary

Waste Boundary (Limits of Disturbance)



1 in = 4,000 ft

Feet
0
4,000

N
W
E
S

File Ref. 04.240.095
Date: 6/20/2024

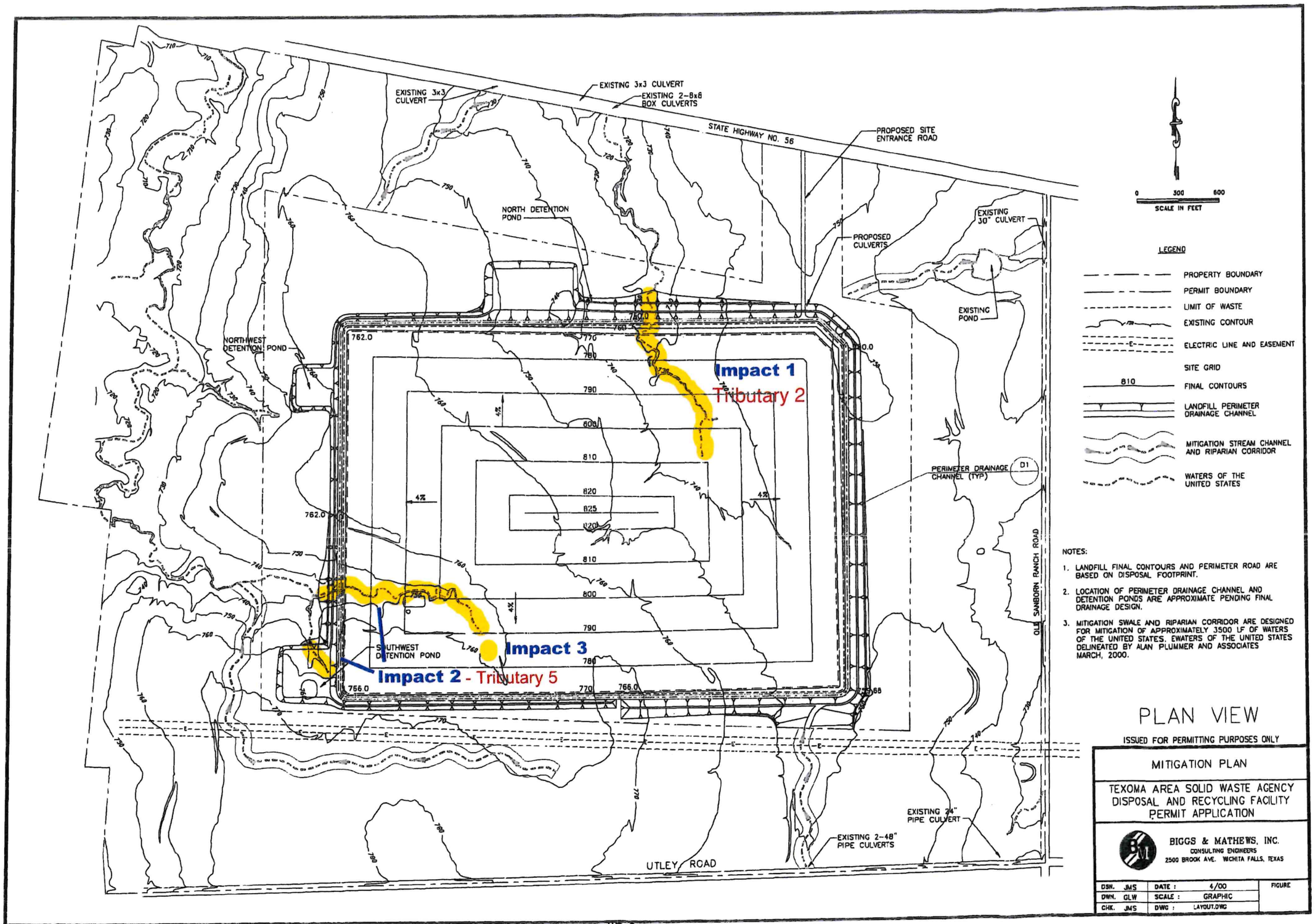


Figure 2. 2000 Plan Impact Areas shown in yellow.

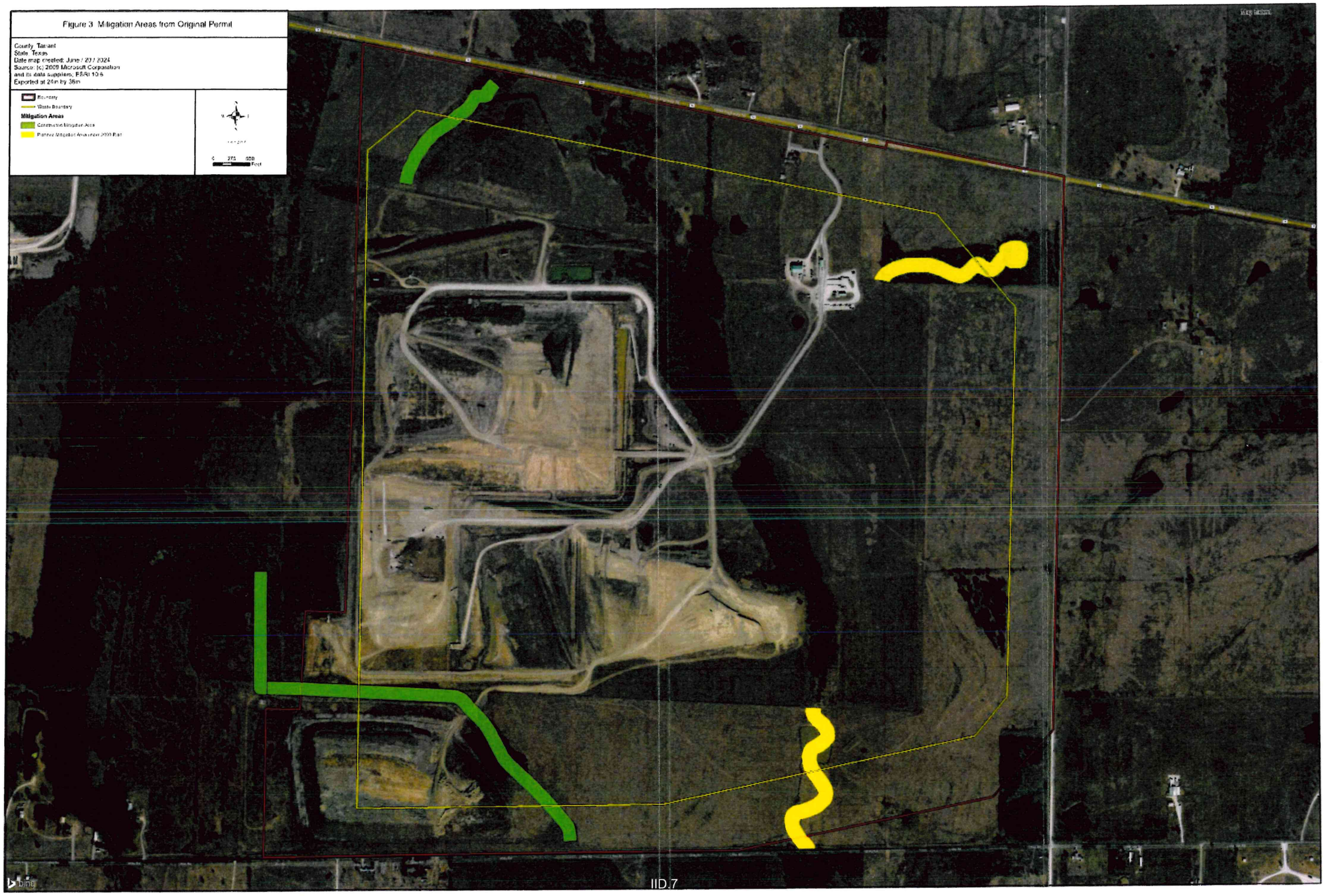


Figure 3 Mitigation Areas from Original Permit
County Tarrant
State Texas
Date map created: June / 20 / 2024
Source: (c) 2009 Microsoft Corporation
and its data suppliers, ESRI 10.6
Exported at 24in by 36in
Boundary
Waste Boundary
Mitigation Areas
Construction Mitigation Area
Planned Mitigation Area under 2009 Plat
0 275 550
Feet
bing

Figure 4. Completed Actions From Original Permit

County: Tarrant
State: Texas
Date map created: June / 20 / 2024
Source: (c) 2009 Microsoft Corporation
and its data suppliers, ESRI 10.6
Exported at 24in by 36in

Figure 5. Off-Site Credit Demand

County: Tarrant
State: Texas
Date map created: June / 19 / 2024
Source: (c) 2009 Microsoft Corporation and its data suppliers, ESRI 10.5
Exported at 24h by 36m

Boundary
Waste Boundary (Limits of Disturbance)
Constructed Mitigation Area
Aquatic Features
RPW Intermittent Tributary

0 250 500 Feet

NW Mitigation Site
TxRAM = 37.26
1,055.7 LF

Constructed to mitigate for
Tributary 5 and a portion of Tributary 2

Credit Demand - 393.4

Tributary 2
TxRAM = 70.45
3,476.24 LF

This tributary has not been impacted yet.

Proposed Total Impacts -
0.454 acre
3,178 LF

Original 2000 Mitigation Plan Impact -
1,547.6 LF

Credit Demand - 1,090.3

Additional Impact Under Update-
1,630.4 LF

Credit Demand - 1,148.6

Total Off-Site Mitigation Credit Demand:

4,119.7 stream credits

0.79 acre wetland credit (wetland credit demand from 2000 permit)

SW Mitigation Site
Zone A
TxRAM = 41.32
909 LF

Constructed to mitigate for
Tributary 5

Credit Demand - 375.6

SW Mitigation Site
Zone B
TxRAM = 39.7
2,800.4 LF

Constructed to mitigate for
Tributary 5

Credit Demand - 1,111.8

State Highway 56

Utley Rd

bing

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, TULSA DISTRICT
2488 EAST 81ST STREET
TULSA, OKLAHOMA 74137-4290

May 20, 2024

Regulatory Office

Ms. Karisa Fenton
Integrated Environmental Solutions, LLC
301 W Eldorado Parkway, Ste. 101
McKinney, TX 75069

Dear Ms. Fenton:

Please reference the request for a Delineation Concurrence, referenced May 6, 2024, regarding the Texoma Area Solid Waste Authority's 731 acre site located southeast of the intersection of Texas State Highway 56 and Farm-to-Market Road 901, Grayson County, Texas.

Based on a review of the information submitted, the delineated boundaries depicted on the enclosed map titled, Figure 5. Aquatic Features Identified within the Survey Area, is a reasonable representation of the aquatic resources located onsite.

This information is sufficient for planning and permitting purposes with our office. Unless otherwise requested, no further correspondence will be forthcoming regarding this request.

Your request has been assigned Identification Number SWT-0-10175. Please refer to this number during future correspondence. If further assistance is required, please contact Mr. David Carraway at (918) 857-8075.

Sincerely,

Andrew R. Commer
Chief, Regulatory Office

Enclosure

02 January 2024

Mr. David Carraway
U.S. Army Corps of Engineers – Tulsa District
2488 E. 81st Street
Tulsa, Oklahoma 74137-4290

Re: Texoma Area Solid Waste Authority (TASWA) - Approved Jurisdictional Determination (AJD) Request
Approximately 731 acres located southeast of the intersection of Texas State Highway (SH) 56 and Farm-to-Market Road (FM) 901, Grayson County, Texas.

Dear Mr. Carraway,

Integrated Environmental Solutions, LLC (IES) performed a site survey to identify any aquatic features that meet a definition of a water of the United States on approximately 731 acres located southeast of the intersection of SH 56 and FM 901, Grayson County, Texas (**Attachment A, Figure 1**). This report will ultimately assess and delineate potentially jurisdictional aquatic features to ensure compliance with Clean Water Act (CWA) Sections 401 and 404.

TASWA is a solid waste authority formed by the cities of Sherman, Gainesville, and Denison. TASWA is a publicly operated solid waste facility, located approximately 3 miles east of the City of Whitesboro, that is intended to provide long-term public waste disposal services. The TASWA owns 920+ acres and is looking to expand the footprint of their current landfill to increase the capacity and lifespan to accommodate area growth. Within the 920+ acres, the proposed facility expansion permit boundary will encompass approximately 731 acres. The landfill disposal footprint will cover approximately 504 acres within the facility permit boundary. The full 920+ acre property boundary is not included in this AJD request as landfill expansion to the west is not feasible due to drainage requirements; however, it should be noted that impacts to the western region have been avoided and minimized. The permit and waste boundaries have been included in the report attachments to indicate the limits for the AJD request (Permit Boundary) as well as show the limits where additional impacts will occur for the expansion (Waste Boundary). **As there are aquatic features within the proposed expansion limits, IES is requesting that the USACE review our delineation and provide an Approved Jurisdictional Determination (AJD) to ensure that the project is planned and developed in compliance with the CWA.**

INTRODUCTION

Waters of the United States are protected under guidelines outlined in CWA Sections 401 and 404, in Executive Order (EO) 11990 (Protection of Wetlands), and by the review process of the Texas Commission on Environmental Quality (TCEQ). Agencies that regulate impacts to the nation's water resources within Texas include the U.S. Army Corps of Engineers (USACE), the U.S. Environmental Protection Agency (USEPA), the U.S. Fish and Wildlife Service (USFWS), and the TCEQ. The USACE has the primary regulatory authority for enforcing CWA Section 404 requirements for waters of the United States.

The decision for whether a CWA Section 404 permit is required on a property is determined if there are waters of the United States present and the extent of losses of those features. The USACE and USEPA have gone through rulemaking to define what is a water of the United States, independently and jointly, several times since the initial CWA. The longest standing definitions of waters of the United States were those published in 1986; however, these definitions were challenged in 2001, 2007, and 2023 U.S. Supreme Court (SCOTUS) decisions. In addition to this, the

Obama, Trump, and Biden administrations completed rulemaking to modify the definitions of waters of the United States. The 2023 SCOTUS decision defined a water of the United States as "a relatively permanent body of water connected to traditional interstate navigable waters." The SCOTUS also included wetlands that have a continuous surface connection with that water, in the definition of a water of the United States. This wetland connection was described as the boundary where it was difficult to determine where the 'water' ends, and the 'wetland' begins.

This 2023 SCOTUS decision is consistent with the relatively permanent water (RPW) standard identified in the previous 2007 SCOTUS decision. Until further guidance is published from the USACE or USEPA, the 2007 USACE and EPA guidance defining a "relatively permanent water" will be used. According to this guidance, RPW are non-navigable tributaries of traditional navigable waters (TNW) that flow year-round or have continuous flow at least seasonally (e.g., typically 3 months). In addition to this, the guidance also stipulated regulation over wetlands that directly abut such tributaries.

METHODOLOGY

Prior to conducting fieldwork, the U.S. Geological Survey (USGS) topographic map (**Attachment A, Figures 2A** and **2B**), the *Soil Survey of Grayson County, Texas*, and the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) digital soil databases for Grayson County (**Attachment A, Figure 3**), the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) (**Attachment A, Figure 4**), and recent and historic aerial photographs of the proposed survey area were studied to identify possible aquatic features that could meet the definition of waters of the United States and areas prone to wetland development. Ms. Karisa Fenton of IES conducted the initial delineation in the field in accordance with the USACE procedures on 11, and 15 February 2022, and conducted site revisits to collect additional data 02 May 2022, and 16 November 2023.

Wetland determinations and delineations were performed on location using the methodology outlined in the 1987 Corps of Engineers Wetland Delineation Manual and the Regional Supplement to the Corps of Engineer Wetland Delineation Manual: Great Plains Region (Version 2.0). The presence of a wetland is determined by the positive indication of three criteria (i.e., hydrophytic vegetation, hydrology, and hydric soils). Potential jurisdictional boundaries for other water features (i.e., non-wetland) were delineated in the field at the ordinary high-water mark (OHWM). The 33 CFR 328.3 (c)(7) defines OHWM as the line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Water feature boundaries were recorded on a Trimble GeoExplorer XT Global Positioning System (GPS) unit capable of sub-meter accuracy. Photographs were also taken at representative points within the survey area (**Attachment B**). Routine wetland determination data forms are provided in **Attachment C**.

RESULTS

Background Review

Topographic Setting

The USGS topographic maps (Sadler 7.5' Quadrangle 1982, revised 1983; and Ethel 7.5' Quadrangle 1982, revised 1983) illustrate four blue line features and five ponds. The first blue line feature is depicted bisecting the site, oriented south-to-north. The second blue line feature is depicted originating in the west and exiting via the western boundary, oriented east-to-west. The third and fourth blue line features are illustrated in the northeastern and southeastern corner, respectively, oriented southwest-to-northeast. Two isolated ponds are depicted west of the first blue line feature and a third pond is shown south of the second blue line feature. A fourth pond is illustrated at the start of the third blue line feature and a fifth pond is shown west of the fourth blue line feature, along the eastern boundary (*see* **Attachment A, Figure 2A**). The 2022 Sadler and Ethel 7.5' Quadrangle maps illustrate the blue line features in similar alignment; however, a relatively large pond is depicted west of the first blue line feature and the southern pond west of the first blue line feature is no longer depicted. Additionally, the fourth blue line feature has been partially channelized and the pond in the southeastern corner is now on-channel. Another isolated pond is depicted near the southern boundary, between the first and fourth blue line features (*see* **Attachment A, Figure 2B**). The overall site topography was illustrated with slopes oriented east-to-west in the west, south-to-north centrally,

and southwest-to-northeast in the east. The maximum site elevation was approximately 800 feet above mean sea level (amsl) with a minimum site elevation of approximately 720 feet amsl.

Soils

The USDA NRCS Web Soil Survey identified nine soil map units within the survey area, Bunyan and Whitesboro soils, frequently flooded; Elbon soils, frequently flooded; Heiden clay, 1 to 3 percent slopes; Heiden clay, 3 to 5 percent slopes; Normangee clay loam, 1 to 3 percent slopes; Normangee clay loam, 4 to 8 percent slopes; Vertel clay, 3 to 5 percent slopes; Vertel clay, 5 to 12 percent slopes; and Wilson silty clay loam, 1 to 3 percent slopes. Elbon soils, frequently flooded, located in depressions, was listed as a hydric soil on the Hydric Soils of Texas list prepared by the National Technical Committee for Hydric Soils (accessed 27 December 2023, Grayson County, Texas) (*see* **Attachment A, Figure 3**). Hydric soils are described as soils that are sufficiently wet in the upper part to develop anaerobic conditions during the growing season.

FEMA FIRM

The FEMA FIRM (Grayson County; Map Panels 48181C0250F and 48181C0375F; effective 29 September 2010) shows the entire survey area is within Zone X (Areas determined to be outside the 0.2 percent annual chance floodplain) (*see* **Attachment A, Figure 4**).

Weather History

The weather history for Wunderground.com JML Enterprises WX weather station (KTXWHITE107) recorded 0.32 inch of precipitation during the 7-day period and a total of 8.30 inches during the 30-day period, prior to the 16 November 2023 site visit. The Antecedent Precipitation Tool (APT) indicated that the conditions on-site at the time of the evaluation were considered hydrologically "normal" based on the 30-year climactic average (33.631703N, -96.841006W).

Field Investigation

The TASWA property was comprised of five vegetation communities including **non-maintained grassland, maintained grassland, disturbed urban matrix,** and **forested riparian corridor** with small regions of **forested upland** scattered across the site.

The **non-maintained grassland** vegetation community was predominantly observed in undeveloped regions that experienced low traffic with little access. These areas were observed in transition between strictly grasslands to savannah or shrubland habitat types. The maintenance regimes for these parcels were either limited or apparently non-existent beyond utility line rights-of-way (ROW) that were observed crossing some parcels. Though species dominance fluctuated, the species composition was relatively consistent. Grass and forbs species observed included Bermudagrass (*Cynodon dactylon*), Johnsongrass (*Sorghum halepense*), little bluestem (*Schizachyrium scoparium*), common sunflower (*Helianthus annuus*), giant ragweed (*Ambrosia trifida*), spreading hedge-parsley (*Torilis arvensis*), prairie broomweed (*Amphiachyris dracunculoides*), prairie threeawn (*Aristida oligantha*), sumpweed (*Iva annua*), white tridens (*Tridens albescens*), and goldenrod (*Solidago gigantea*). The lack of a maintenance regime frequently allows thickets of shrub species to inhabit the grassland habitats. The shrub species observed included eastern redcedar (*Juniperus virginiana*), honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), and honey locust (*Gleditsia triacanthos*). Trees of the same species were also observed in clusters and along the established forested areas, frequently creating a transitional area between grassland and forestland consisting of sporadic trees and shrubs in a savannah-like habitat.

The **maintained grassland** vegetation community was characterized by the presence of short turf grasses and sporadic forbs frequently maintained by mowing for hay production, landscaping, or active grazing. The dominant vegetation type in these areas was Bermudagrass with various other grasses and forbs, including Johnsongrass, white tridens, common sunflower, and goldenrod scattered throughout. The maintained grasslands were often bisected or bordered by paved/ gravel roads or buildings.

The **disturbed urban matrix** vegetation community was associated with the landfill footprint and was characterized by the presence of paved roads, parking lots, frequently traveled gravel or dirt roads, relocated fill dirt, and dump

sites. While most of the vegetation had been cleared from this area, maintained Bermudagrass was observed surrounding buildings and roads.

The **forested riparian corridor** was predominantly observed along the central, unnamed tributary of Mustang Creek. The forested riparian corridor areas were dominated by sugarberry, cedar elm (*Ulmus crassifolia*), and Osage orange (*Maclura pomifera*). Other tree and shrub species observed included common persimmon (*Diospyros virginiana*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), post oak (*Quercus stellata*), rough leaf dogwood (*Cornus drummondii*), honey locust, and coralberry (*Symphoricarpos orbiculatus*). Ground cover was dominated by inland wood oats (*Chasmanthium latifolium*), eastern woodland sedge (*Carex blanda*), and Virginia wildrye (*Elymus virginicus*).

The **forested upland** vegetation community was observed in relatively small regions near the northern and eastern boundaries. The forested upland areas were dominated by eastern redcedar, sugarberry, and honey locust with an understory of common greenbrier (*Smilax bona-nox*), sedge (*Carex spp.*), and poison-ivy (*Toxicodendron radicans*).

Water from the survey area flows north into an unnamed tributary of Mustang Creek, which flows into Big Mineral Creek. Big Mineral Creek flows in the Red River, a TNW. **Table 1** and the following paragraphs detail the aquatic features identified within the survey area at the time of evaluation (**Attachment A, Figure 5**).

Table 1. Aquatic Features Identified within the Survey Area

Water Identification	Hydrology Characteristics	Area (Acre)	Length (Linear Feet)	Water Classification
Tributary 1	Intermittent	0.57	3,818	RPW
Tributary 2	Ephemeral	0.08	699	Non-RPW
Wetland 1	Seasonally Saturated	0.08	---	No Continuous Surface Connection to a RPW
Wetland 2	Seasonally Saturated	0.09	---	No Continuous Surface Connection to a RPW
Wetland 3	Seasonally Saturated	0.06	---	No Continuous Surface Connection to a RPW
Pond 1	Seasonally Inundated	0.47	---	No Continuous Surface Connection to a RPW
Pond 2	Seasonally Inundated	0.04	---	No Continuous Surface Connection to a RPW
Pond 3	Seasonally Inundated	0.40	---	No Continuous Surface Connection to a RPW
Pond 4	Semi-Permanently Inundated	0.85	---	No Continuous Surface Connection to a RPW
Pond 5	Seasonally Inundated	0.14	---	No Continuous Surface Connection to a RPW
Pond 6	Seasonally Inundated	0.22	---	No Continuous Surface Connection to a RPW
Pond 7	Semi-Permanently Inundated	1.35	---	No Continuous Surface Connection to a RPW
Pond 8	Seasonally Inundated	0.23	---	No Continuous Surface Connection to a RPW
EF 1	Ephemeral	0.04	332	Non-RPW

Tributary 1 was identified meandering through the northern region. Tributary 1 originated centrally, downslope of the southern landfill section, pastureland, and a forested region, and flowed northwest, exiting via a culvert under SH 56. Tributary 1 was identified by OHWM characteristics that included the destruction of terrestrial vegetation, the presence of litter and debris, sediment sorting, a water line, and a bed and bank. The channel's substrate was comprised of silt, sand, clay, gravel, and cobble. Tributary 1 was incised into the landscape 3 to 8 feet with average widths of 5 to 12 feet. Given the tributary's relatively low location in the watershed and the presence of flowing and ponded water at the time of evaluation, it is IES's professional opinion that Tributary 1 would be considered to have at least seasonal, intermittent flow.

Tributary 2 was a relatively small, discontinuous tributary identified in the southeastern corner. Tributary 2 entered via a culvert under Utley Road, oriented southwest-to-northeast. Tributary 2 was identified and delineated by OHWM characteristics that included the destruction of terrestrial vegetation, the presence of litter and debris, and a bed and bank. The channel's substrate was composed of silt and clay sediment. Tributary 2 was incised into the landscape between 1 to 3 feet with average OHWM widths between 2 to 6 feet. Given the tributary's relatively high location in the local watershed, small size, and the absence of flowing water at the time of evaluation, it is IES's professional opinion that Tributary 2 would be considered to have ephemeral flow.

Wetlands 1 through **3** were identified as emergent wetlands located within shallow, depressional regions. The wetlands were dominated by small-fruit spikerush (*Eleocharis microcarpa*), giant ragweed, Raven's foot sedge (*Carex crus-corvi*), and common spikerush (*Eleocharis palustris*). Hydric soil for Wetlands 1 through 3 was indicated by Redox Dark Surface with a matrix of 10YR 3/1 with redoximorphic concentrations in the pore linings and matrix. Hydrologic indicators consisted of saturation, inundation, crayfish burrows, and a positive FAC-neutral test. Given their relatively high location in the watershed and the hydrology observed, these wetlands would be considered seasonally saturated.

Ponds 1 through **8** were identified as isolated, artificially excavated ponds. The ponds were formed by excavating a depression into the landscape and placing an earthen embankment in such a manner to capture direct rainfall and sheet flow. The ponds' limits were identified and delineated by OHWM characteristics that included a natural line impressed in the bank, a wrack line, and a water line. No features with OHWM characteristics were observed entering or exiting the limits of Ponds 1 through 6, or 8 at the time of evaluation. EF 1 was observed entering the limits of Pond 7; however, no features were observed exiting Pond 7. A review of aerial imagery indicates Ponds 4 and 7 have minor water level fluctuations while water levels in the remaining ponds fluctuate seasonally. As such, it is IES's professional opinion that Ponds 4 and 7 would be considered semi-permanently inundated, and Ponds 1 through 3, 5, 6, and 8 would be considered seasonally inundated.

EF 1 was an inconsistent, poorly defined, eroded channel identified within a hillside swale upslope of Pond 7. The feature lacked consistent OHWM characteristics, and a review of aerial imagery indicates that the feature formed over the last decade. EF 1 was predominantly dry at the time of evaluation with sporadic segments of ponded water observed along the feature. Given the lack of flowing water and seasonal hydrology indicators, it is IES's professional opinion that EF 1 would be considered to have ephemeral flow.

To summarize the delineation, 2 tributaries, 3 wetlands, 8 ponds, and an erosion feature were identified and delineated within the survey area. The activities in support of the landfill expansion will impact some of these aquatic features and will require a CWA Section 404 permit. IES is requesting that the USACE review this report and provide an Approved Jurisdictional Determination for the permit boundary project limits.

IES appreciates the opportunity to work with you and the Tulsa Regulatory Branch on this project and look forward to your review. If you have any comments, questions, or concerns, please do not hesitate to contact myself or Rudi Reinecke at 972-562-7672 (kfenton@intenvsol.com or rreinecke@intenvsol.com).

Sincerely,

Integrated Environmental Solutions, LLC.

Karisa Fenton

Ms. Karisa Fenton
Biologist

Attachments

File ref: 04.240.095

ATTACHMENT A
Figures

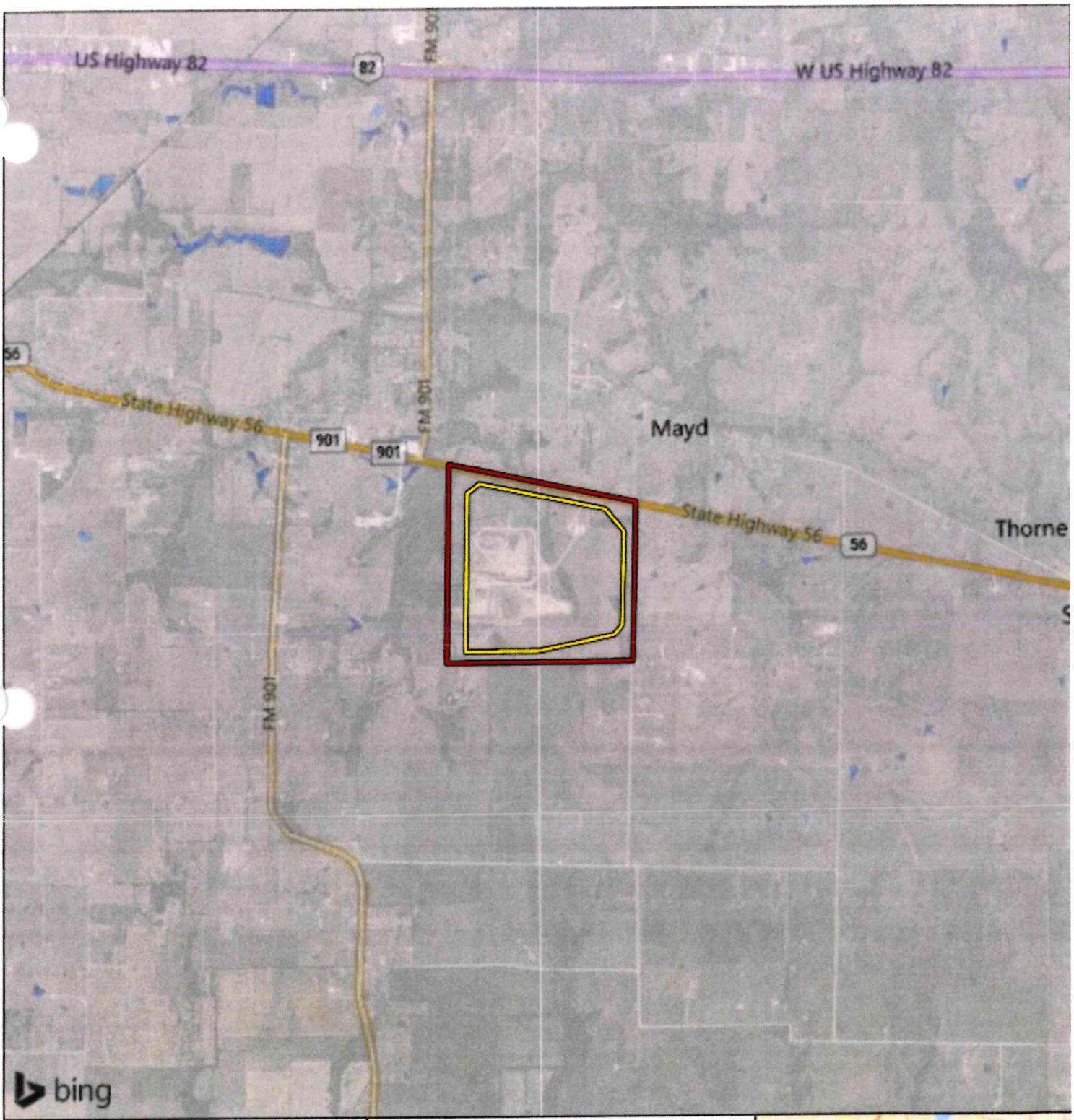


Figure 1.
General Location Map

TASWA Expansion
Grayson County, Texas

Waste Boundary

Permit Boundary

1 in = 4,000 ft

Feet

0 4,000

N

W E

S

File Ref. 04.240.095
Date: 12/27/2023

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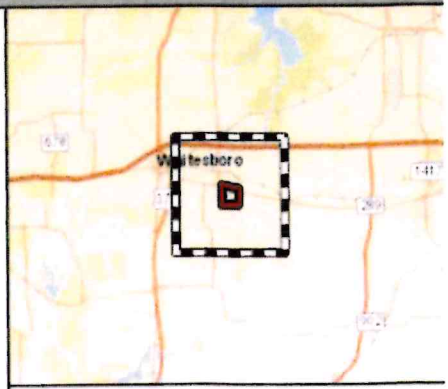


Area of Detail Scale: 1 inch equals 10 miles

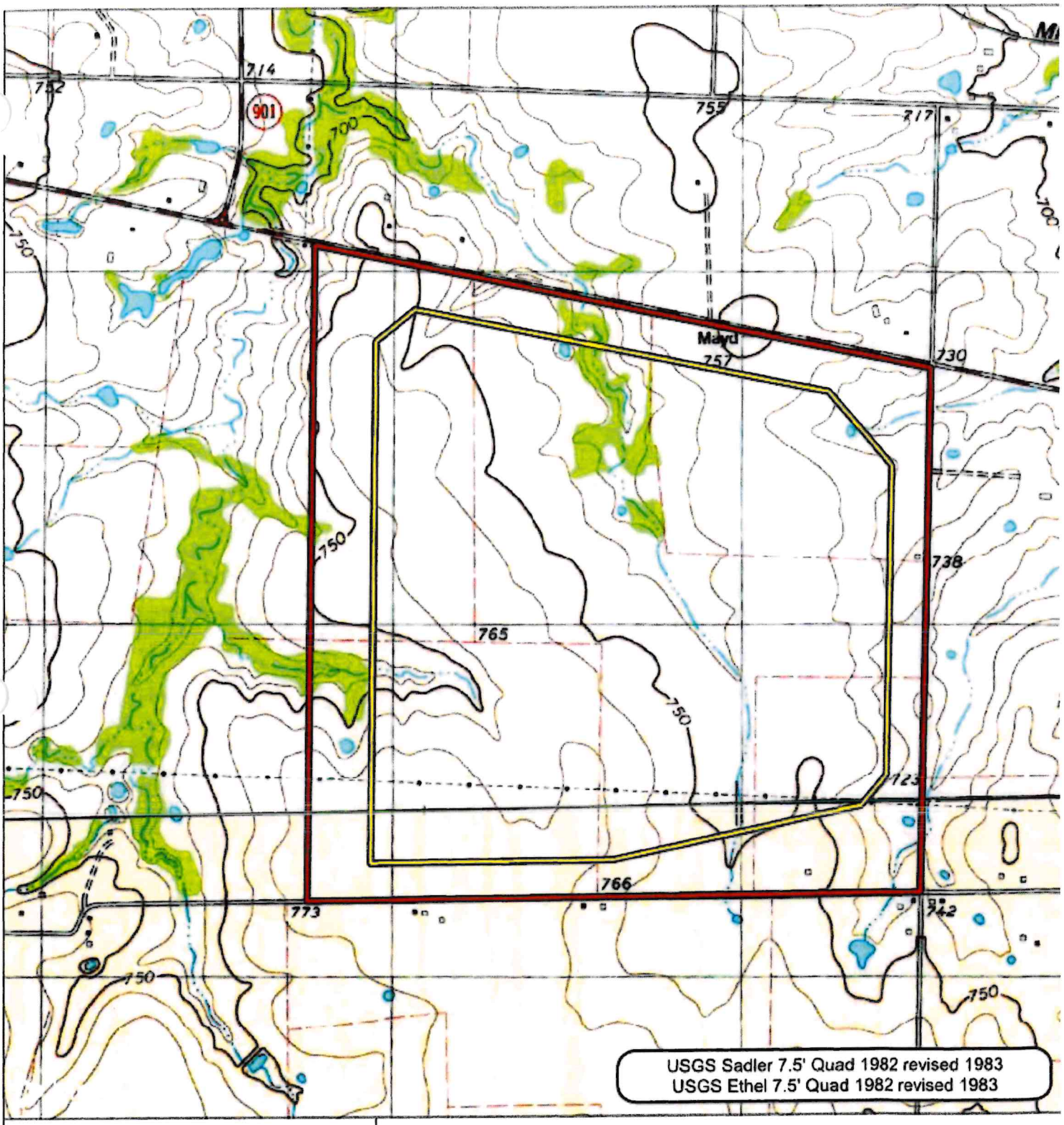


Figure 2A.
Topographic Setting

TASWA Expansion
Grayson County, Texas

Waste Boundary

Permit Boundary

1 in = 1,200 ft

Feet
0 1,200

N
W E
S

File Ref. 04.240.095
Date: 12/27/2023

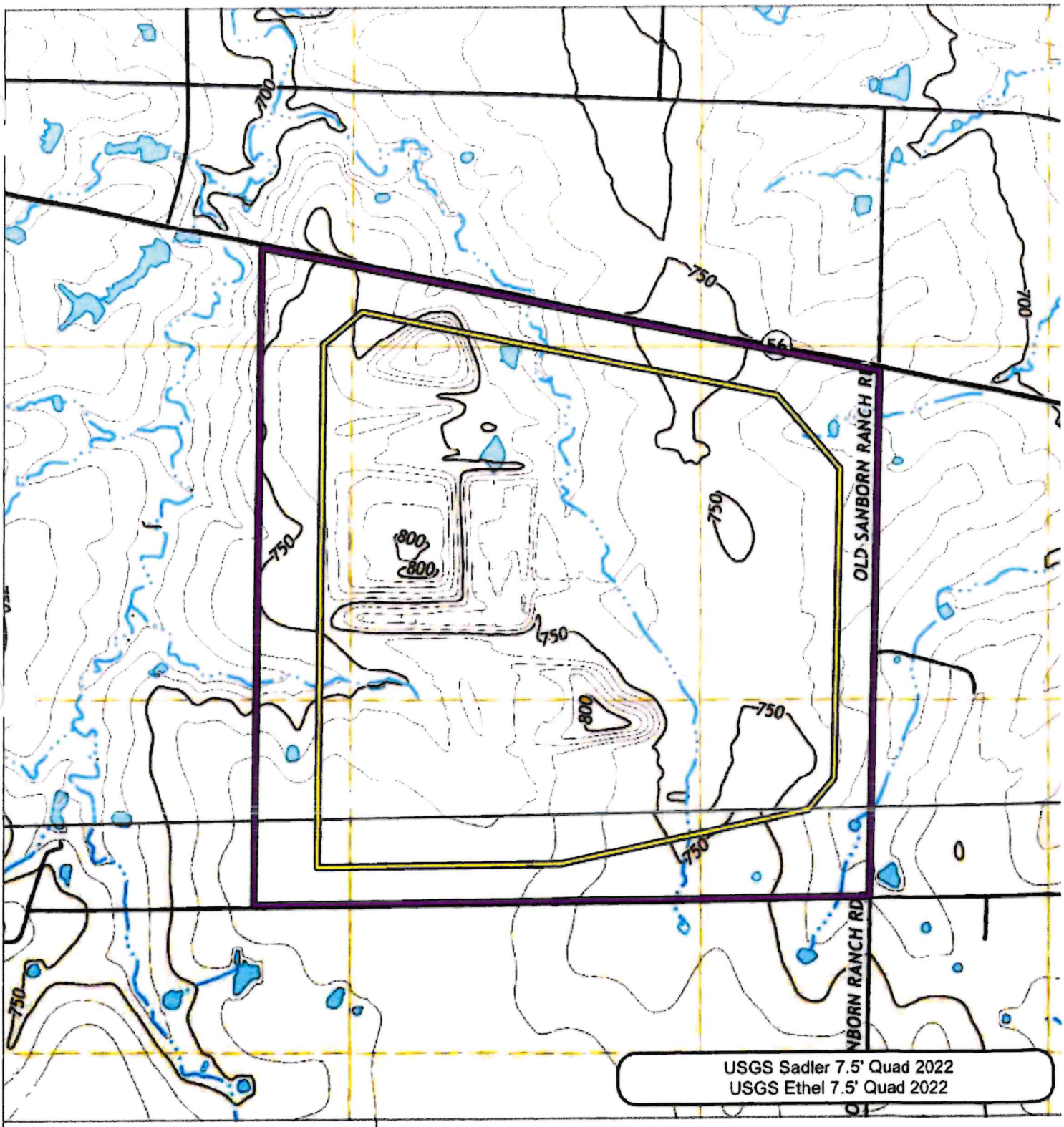


Figure 2B.
Topographic Setting

TASWA Expansion
Grayson County, Texas

1 in = 1,200 ft

Feet
0 1,200

N
W E
S

File Ref. 04.240.095
Date: 12/27/2023

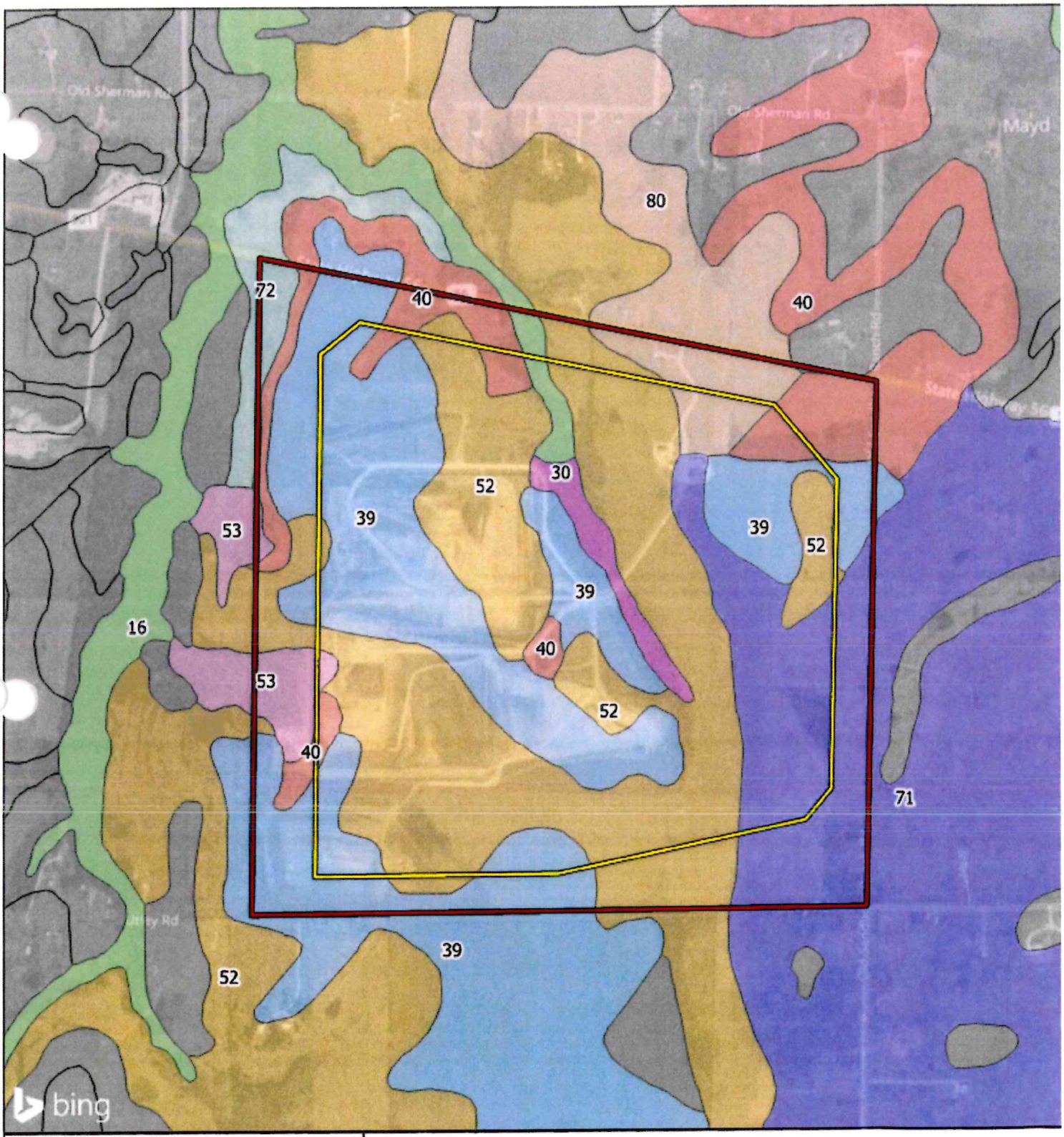


Figure 3.
Soils Map

TASWA Expansion
Grayson County, Texas

1 in = 1,200 ft

Feet
0
1,200

N
W
E
S

File Ref. 04.240.095
Date: 12/27/2023

Waste Boundary
Permit Boundary
Soil map units outside survey area

Soil Map Units

16 - Bunyan and Whitesboro soils, frequently flooded
30 - Elbon soils, frequently flooded
39 - Heiden clay, 1 to 3 percent slopes
40 - Heiden clay, 3 to 5 percent slopes
52 - Normangee clay loam, 1 to 3 percent slopes
53 - Normangee clay loam, 4 to 8 percent slopes
71 - Vertel clay, 3 to 5 percent slopes
72 - Vertel clay, 5 to 12 percent slopes
80 - Wilson silty clay loam, 1 to 3 percent slopes

Figure 4.
Federal Emergency Management Agency Flood Insurance Rate Map

TASWA Expansion
Grayson County, Texas

1 in = 1,200 ft

Feet
0 1,200

File Ref. 04.240.095
Date: 12/27/2023

N
W E
S

Waste Boundary

Permit Boundary

FEMA FIRM Zone Descriptions

Zone X - Areas determined to be outside the 0.2% annual chance floodplain

Zone X - Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood

Zone A - Special Flood Hazard Areas subject to inundation by the 1% annual chance flood; No base flood elevations determined

Zone AE - Special Flood Hazard Areas subject to inundation by the 1% annual chance flood; Base flood elevations determined

Zone AE - Floodway areas in Zone AE

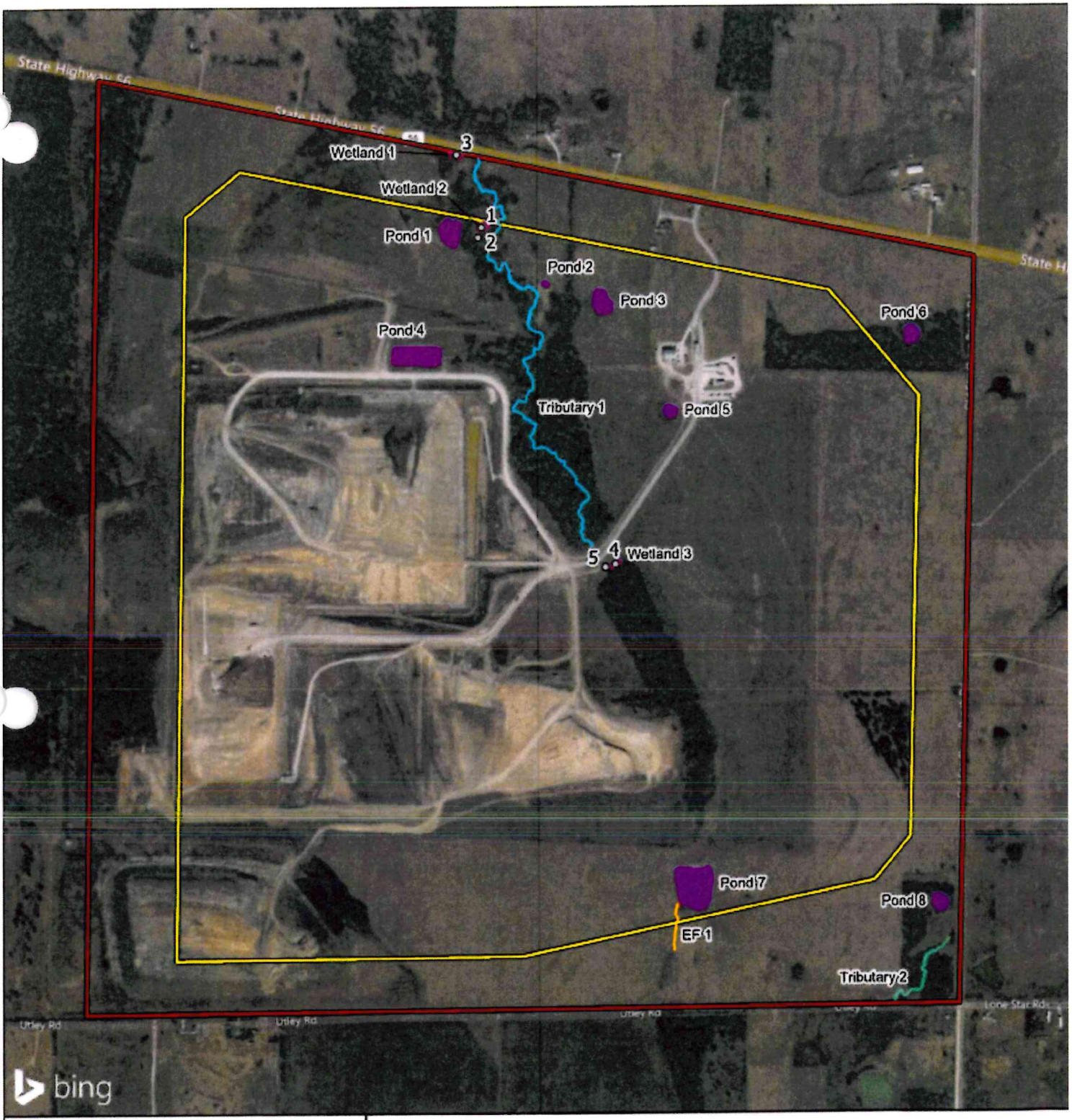


Figure 5.
Aquatic Features Identified within the Survey Area

TASWA Expansion
Grayson County, Texas

1 in = 850 ft

Feet
0 850

N
W E
S

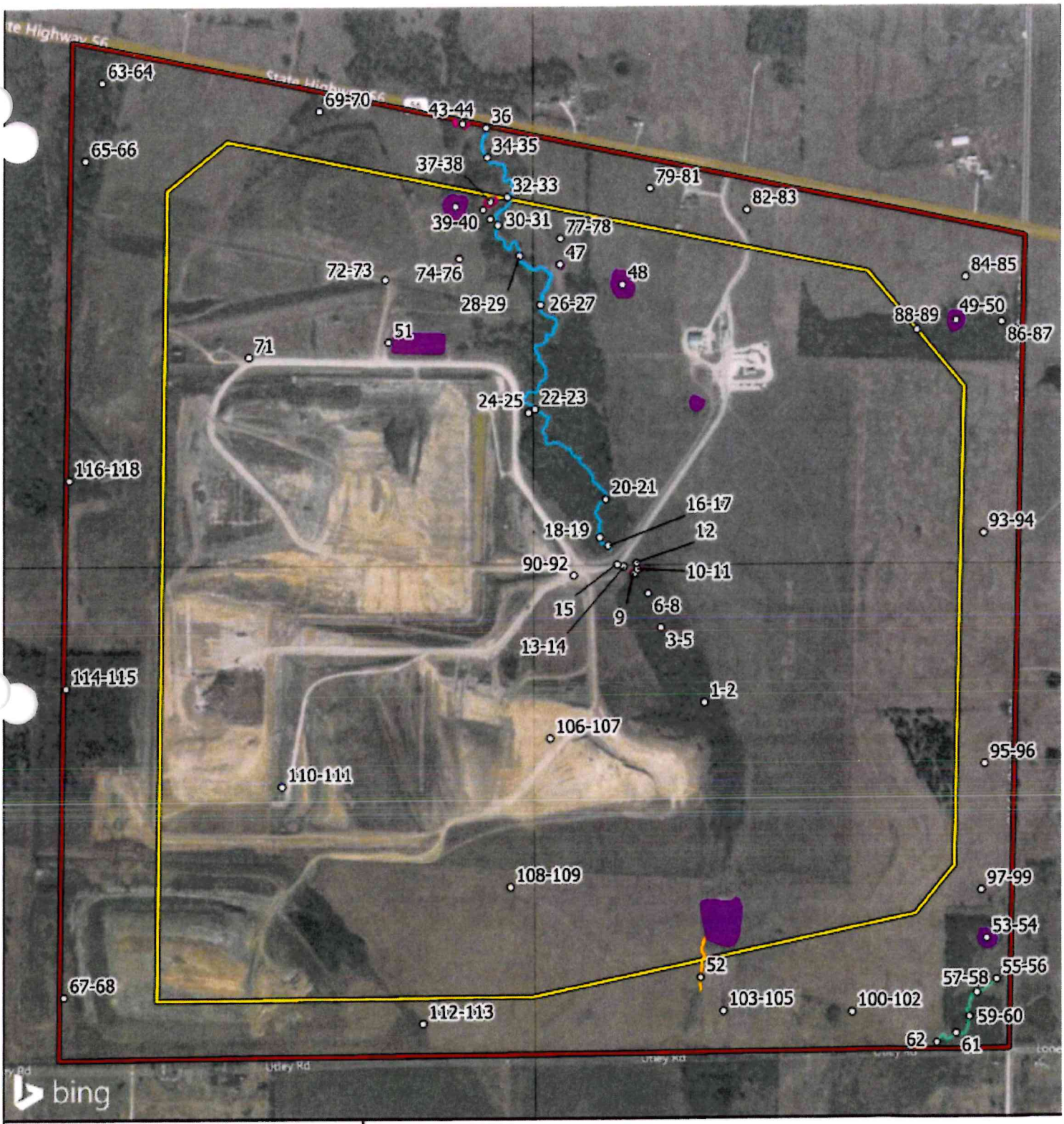
File Ref. 04.240.095
Date: 12/27/2023

- Waste Boundary
- Permit Boundary
- Wetland Determination Data Form

Aquatic Features

- RPW, Intermittent Tributary
- Non-RPW, Ephemeral Tributary
- Non-RPW, Erosion Feature
- Pond, Isolated
- Wetland, Isolated

ATTACHMENT B
Site Photographs



Photograph Location Map

TASWA Expansion
Grayson County, Texas

1 in = 775 ft

Feet
0
775

N
W
E
S

File Ref. 04.240.095
Date: 12/27/2023

- Waste Boundary
- Permit Boundary
- Photograph Location

Aquatic Features

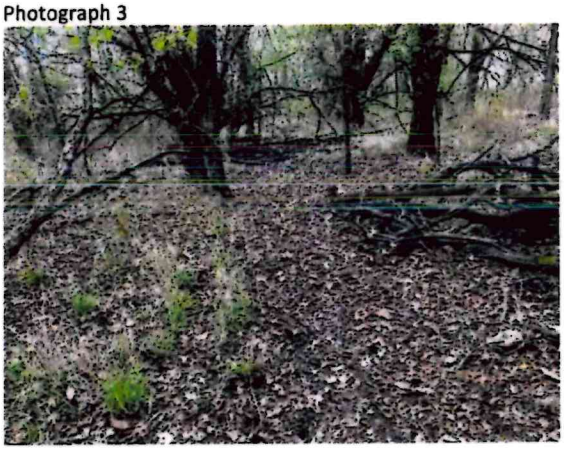
- RPW, Intermittent Tributary
- Non-RPW, Ephemeral Tributary
- Non-RPW, Erosion Feature
- Pond, Isolated
- Wetland, Isolated

Photograph 1

Photograph 2

Photograph 3

Photograph 4



Photograph 5

Photograph 6

Photograph 7

Photograph 8

Photograph 9

Photograph 10

Photograph 11

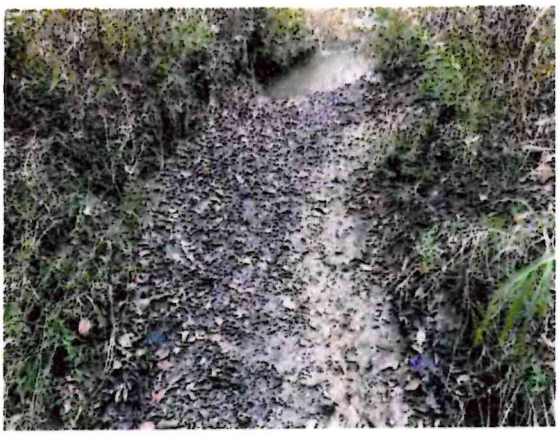
Photograph 12

Photograph 13

Photograph 14

Photograph 15

Photograph 16



Photograph 17

Photograph 18

Photograph 19

Photograph 20

Photograph 21

Photograph 22

Photograph 23

Photograph 24

Photograph 25

Photograph 26

Photograph 27

Photograph 28

Photograph 29

Photograph 30

Photograph 31

Photograph 32

Photograph 33

Photograph 34

Photograph 35

Photograph 36

Photograph 37

Photograph 38

Photograph 39

Photograph 40

Photograph 41

Photograph 42

Photograph 43

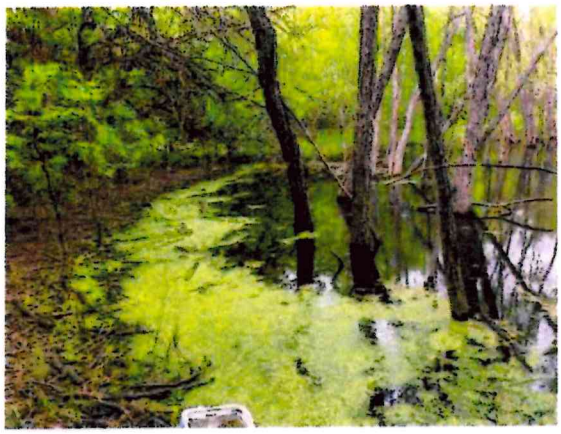
Photograph 44

Photograph 45

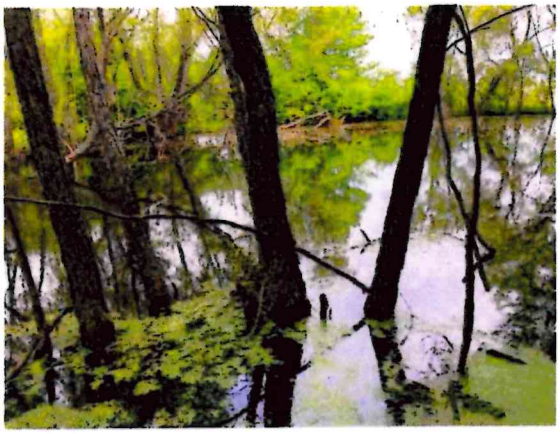
Photograph 46

Photograph 47

Photograph 48



Photograph 49



Photograph 50

Photograph 51

Photograph 52

Photograph 53

Photograph 54

Photograph 55

Photograph 56

Photograph 57

Photograph 58

Photograph 59

Photograph 60

Photograph 61

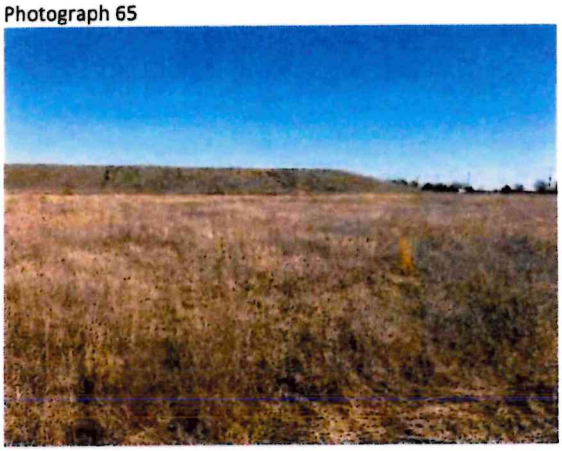
Photograph 62

Photograph 63

Photograph 64

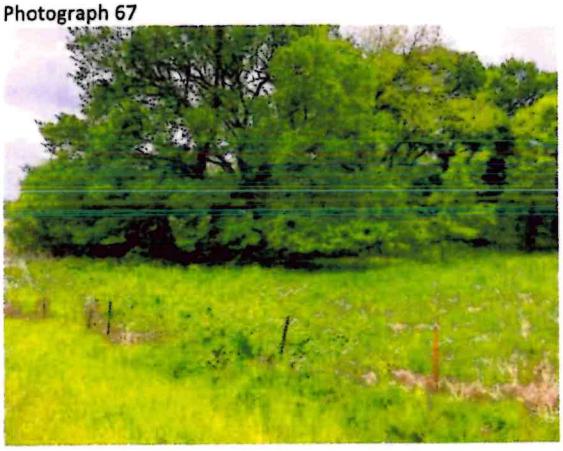
Photograph 65

Photograph 66



Photograph 67

Photograph 68



Photograph 69

Photograph 70

Photograph 71

Photograph 72

Photograph 73

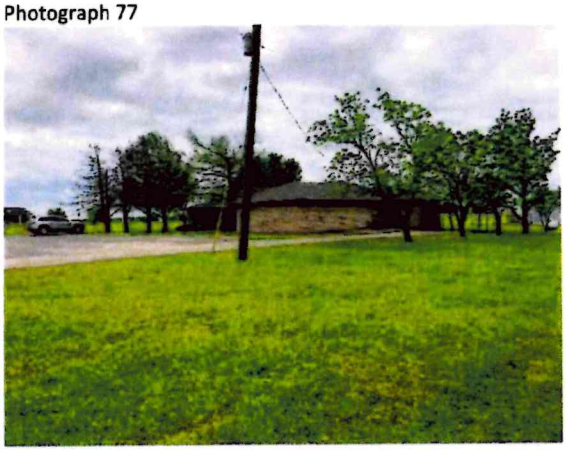
Photograph 74

Photograph 75

Photograph 76

Photograph 77

Photograph 78



Photograph 79

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Photograph 82

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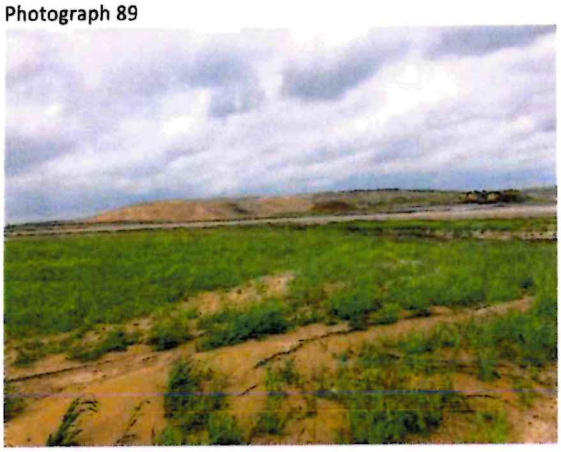
Photograph 87

Photograph 88

Photograph 89

Photograph 90



Photograph 91

Photograph 92

Photograph 93

Photograph 94

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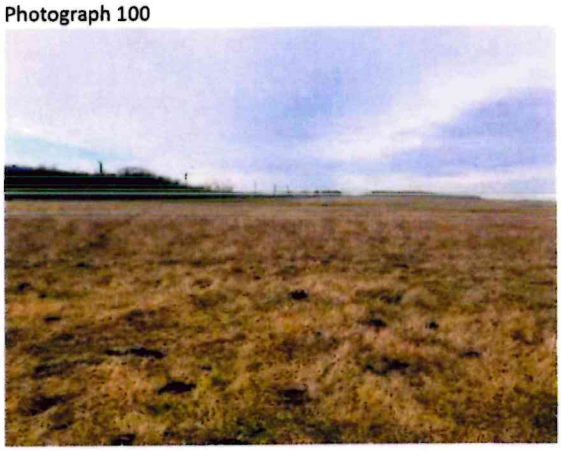
Photograph 97

Photograph 98

Photograph 99

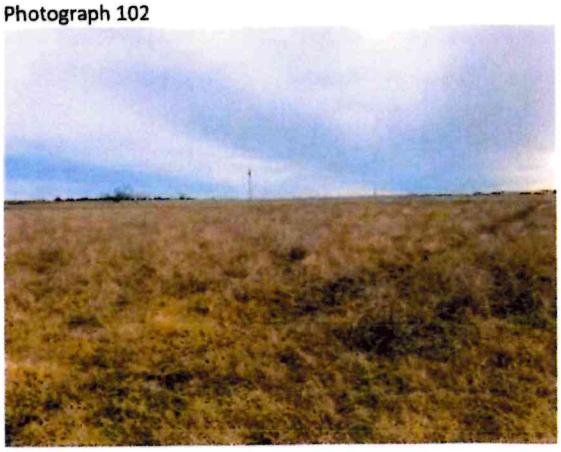
Photograph 100

Photograph 101



Photograph 102

Photograph 103



Photograph 104

Photograph 105

Photograph 106

Photograph 107

Photograph 108

Photograph 109

Photograph 110

Photograph 111

Photograph 112

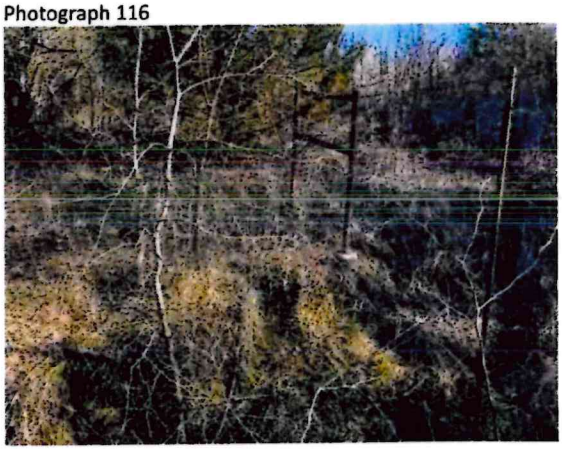
Photograph 113

Photograph 114

Photograph 115

Photograph 116

Photograph 117



Photograph 118

ATTACHMENT C
Routine Wetland Determination Data Forms

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: TASWA City/County: Grayson Sampling Date: 11/16/23

Applicant/Owner: TASWA State: TX Sampling Point: 1

Investigator(s): Karisa Fenton, Rudi Reinecke Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope %: 2-3

Subregion (LRR): J Lat: 33.63683932 N Long: -96.83808372 W Datum: NAD 1983

Soil Map Unit Name: Bunyan and Whitesboro soils, frequently flooded NWI Classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area within a wetland?	Yes ☒ No ☐
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks: Depression upslope of intermittent tributary

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot Size: Depression)	Absolute % Coverage	Dominant Species?	Indicator Status
1. NA			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot Size: Depression)			
1. NA			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot Size: Depression)			
1. *Eleocharis microcarpa*	90	Y	OBL
2. *Ambrosia trifida*	35	Y	FAC
3. *Iva annua*	30	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	155 = Total Cover		

Woody Vine Stratum (Plot Size: Depression)			
1. NA			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum NA

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 2 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply By:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A= _____

Hydrophytic Vegetation Indicators:

_____ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is > 50%

_____ 3 - Prevalence Index is ≤ 3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: NL - Not Listed. When the indicator status is Not Listed, the species is assumed to be Upland.
Indicator Statuses have been provided by the US Army Corps of Engineers - https://wetland-plants.usace.army.mil/nwpl_static/v34/home/home.html
Updated scientific names have been provided by the USDA - https://plants.usda.gov/home

SOILS

Sampling Point: 1

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	97	5YR 4/6	3	C	PL/M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR F)
- ☐ 1 cm Muck (A9) (LRR F, G, H)
- ☐ Depleted below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 CM Muck (A9) (LRR I, J)
- ☐ Coast Prairie Redox (A16) (LRR F, G, H)
- ☐ Dark Surface (S7) (LRR G)
- ☐ High Plains Depressions (F16) (LRR H outside of MLRA 72 & 73)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distributed or problematic.

Restrictive Layer (if present):

Type: NA

Depth (inches): NA

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage patterns (B10)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ☒ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface Water Present?	Yes? ☐	No? ☒	Depth (inches): NA
Water Table Present?	Yes? ☐	No? ☒	Depth (inches): NA
Saturation Present? (includes capillary fringe)	Yes? ☐	No? ☒	Depth (inches): NA

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: TASWA City/County: Grayson Sampling Date: 11/16/23

Applicant/Owner: TASWA State: TX Sampling Point: 2

Investigator(s): Karisa Fenton, Rudi Reinecke Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope %: 1-2

Subregion (LRR): J Lat: 33.6366598 N Long: -96.83815024 W Datum: NAD 1983

Soil Map Unit Name: Bunyan and Whitesboro soils, frequently flooded NWI Classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒	Is the Sampled Area within a wetland?	Yes ☐	No ☒
Hydric Soil Present?	Yes ☒	No ☐			
Wetland Hydrology Present?	Yes ☐	No ☒			

Remarks: Hillslope within larger depression

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot Size: Depression)	Absolute % Coverage	Dominant Species?	Indicator Status
1. NA			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot Size: Depression)			
1. *Carya illinoinensis*	10	Y	FAC
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot Size: Depression)			
1. *Festuca arundinacea*	95	Y	NL
2. *Cardiospermum halicacabum*	5	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot Size: Depression)			
1. NA			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum NA

Remarks: NL - Not Listed. When the indicator status is Not Listed, the species is assumed to be Upland.
Indicator Statuses have been provided by the US Army Corps of Engineers - https://wetland-plants.usace.army.mil/nwpl_static/v34/home/home.html
Updated scientific names have been provided by the USDA - https://plants.usda.gov/home

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply By:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A=

Hydrophytic Vegetation Indicators:

- 1 - Rapid Test for Hydrophytic Vegetation
- 2 - Dominance Test is > 50%
- 3 - Prevalence Index is ≤ 3.0[1]
- 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

SOILS

Sampling Point: 2

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	98	5YR 4/6	2	C	PL/M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) **(LRR F)**
- ☐ 1 cm Muck (A9) (**LRR F, G, H)**
- ☐ Depleted below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ☐ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16 **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 CM Muck (A9) **(LRR I, J)**
- ☐ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ☐ Dark Surface (S7) **(LRR G)**
- ☐ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distributed or problematic.

Restrictive Layer (if present):

Type: NA

Depth (inches): NA

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage patterns (B10)
- ☐ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes? ☐	No? ☒	Depth (inches): NA
Water Table Present?	Yes? ☐	No? ☒	Depth (inches): NA
Saturation Present? (includes capillary fringe)	Yes? ☐	No? ☒	Depth (inches): NA

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: TASWA City/County: Grayson Sampling Date: 11/16/23

Applicant/Owner: TASWA State: TX Sampling Point: 3

Investigator(s): Karisa Fenton, Rudi Reinecke Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope %: 1-2

Subregion (LRR): J Lat: 33.63814678 N Long: -96.83859409 W Datum: NAD 1983

Soil Map Unit Name: Bunyan and Whitesboro soils, frequently flooded NWI Classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area within a wetland?	Yes ☒ No ☐
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks: Depression along fenceline by roadside ditch

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot Size: Depression)	Absolute % Coverage	Dominant Species?	Indicator Status
1. NA			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot Size: Depression)			
1. NA			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot Size: Depression)			
1. *Carex crus-corvi*	90	Y	OBL
2. *Cardiospermum halicacabum*	20	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	110 = Total Cover		

Woody Vine Stratum (Plot Size: Depression)			
1. NA			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum NA

Remarks: NL - Not Listed. When the indicator status is Not Listed, the species is assumed to be Upland.
Indicator Statuses have been provided by the US Army Corps of Engineers - https://wetland-plants.usace.army.mil/nwpl_static/v34/home/home.html
Updated scientific names have been provided by the USDA - https://plants.usda.gov/home

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply By:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A=

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is > 50%
- ☐ 3 - Prevalence Index is ≤ 3.0[1]
- ☐ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

SOILS

Sampling Point: 3

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	96	5YR 4/6	4	C	PL/M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) **(LRR F)**
- ☐ 1 cm Muck (A9) **(LRR F, G, H)**
- ☐ Depleted below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 cm Mucky Peat or Peat (S2) **(LRR G, H)**
- ☐ 5 cm Mucky Peat or Peat (S3) **(LRR F)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16 **(MLRA 72 & 73 of LRR H)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 CM Muck (A9) **(LRR I, J)**
- ☐ Coast Prairie Redox (A16) **(LRR F, G, H)**
- ☐ Dark Surface (S7) **(LRR G)**
- ☐ High Plains Depressions (F16) **(LRR H outside of MLRA 72 & 73)**
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distributed or problematic.

Restrictive Layer (if present):

Type: NA

Depth (inches): NA

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (minimum of one required; check all that apply)

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres on Living Roots (C3) **(where not tilled)**
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage patterns (B10)
- ☐ Oxidized Rhizospheres on Living Roots (C3) **(where tilled)**
- ☒ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) **(LRR F)**

Field Observations:

Surface Water Present?	Yes? ☒	No? ☐	Depth (inches):	1-2
Water Table Present?	Yes? ☐	No? ☒	Depth (inches):	NA
Saturation Present? (includes capillary fringe)	Yes? ☒	No? ☐	Depth (inches):	0

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: TASWA City/County: Grayson Sampling Date: 11/16/23

Applicant/Owner: TASWA State: TX Sampling Point: 4

Investigator(s): Karisa Fenton, Rudi Reinecke Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Depression Local relief (concave, convex, none): Concave Slope %: 1-2

Subregion (LRR): J Lat: 33.630752 N Long: -96.835269 W Datum: NAD 1983

Soil Map Unit Name: Elbon soils, frequently flooded NWI Classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☒	No ☐	Is the Sampled Area within a wetland?	Yes ☒ No ☐
Hydric Soil Present?	Yes ☒	No ☐		
Wetland Hydrology Present?	Yes ☒	No ☐		

Remarks: Depression downslope of wooded section and culvert

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot Size: Depression)	Absolute % Coverage	Dominant Species?	Indicator Status
1. NA			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot Size: Depression)			
1. NA			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot Size: Depression)			
1. *Eleocharis palustris*	90	Y	OBL
2. *Paspalum dilatatum*	10	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 = Total Cover		

Woody Vine Stratum (Plot Size: Depression)			
1. NA			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum NA

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply By:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A=

Hydrophytic Vegetation Indicators:

- ____ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is > 50%
- ____ 3 - Prevalence Index is ≤ 3.0[1]
- ____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☒ No ☐

Remarks: NL - Not Listed. When the indicator status is Not Listed, the species is assumed to be Upland.
Indicator Statuses have been provided by the US Army Corps of Engineers - https://wetland-plants.usace.army.mil/nwpl_static/v34/home/home.html
Updated scientific names have been provided by the USDA - https://plants.usda.gov/home

SOILS

Sampling Point: 4

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	97	5YR 4/6	3	C	PL/M	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR F)
- ☐ 1 cm Muck (A9) (LRR F, G, H)
- ☐ Depleted below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☒ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 CM Muck (A9) (LRR I, J)
- ☐ Coast Prairie Redox (A16) (LRR F, G, H)
- ☐ Dark Surface (S7) (LRR G)
- ☐ High Plains Depressions (F16) (LRR H outside of MLRA 72 & 73)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distributed or problematic.

Restrictive Layer (if present):

Type: NA

Depth (inches): NA

Hydric Soil Present? Yes ☒ No ☐

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one required; check all that apply)

- ☒ Surface Water (A1)
- ☐ High Water Table (A2)
- ☒ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage patterns (B10)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ☒ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☒ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface Water Present?	Yes? ☒ No? ☐	Depth (inches):	2-3
Water Table Present?	Yes? ☐ No? ☒	Depth (inches):	NA
Saturation Present? (includes capillary fringe)	Yes? ☒ No? ☐	Depth (inches):	0

Wetland Hydrology Present? Yes ☒ No ☐

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

WETLAND DETERMINATION DATA FORM – Great Plains Region

Project/Site: TASWA City/County: Grayson Sampling Date: 11/16/23

Applicant/Owner: TASWA State: TX Sampling Point: 5

Investigator(s): Karisa Fenton, Rudi Reinecke Section, Township, Range: N/A

Landform (hillslope, terrace, etc.): Hillslope Local relief (concave, convex, none): None Slope %: 1-2

Subregion (LRR): J Lat: 33.630702 N Long: -96.835493 W Datum: NAD 1983

Soil Map Unit Name: Bunyan and Heiden clay, 1 to 3 percent slopessoils, frequently flooded NWI Classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes ☒ No ☐ (If no, explain in Remarks.)

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Significantly disturbed? Are "Normal Circumstances" present? Yes ☒ No ☐

Are vegetation, ☐ Soil, ☐ Or hydrology ☐ Naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ☐	No ☒	Is the Sampled Area within a wetland?	Yes ☐ No ☒
Hydric Soil Present?	Yes ☐	No ☒		
Wetland Hydrology Present?	Yes ☐	No ☒		

Remarks: Hillslope between wetland and culvert

VEGETATION – Use scientific names of plants.

Tree Stratum (Plot Size: 30' Radius)	Absolute % Coverage	Dominant Species?	Indicator Status
1. NA			
2.			
3.			
4.			
	= Total Cover		

Sapling/Shrub Stratum (Plot Size: 15' Radius)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

Herb Stratum (Plot Size: 5' Radius)			
1. *Cynodon dactylon*	40	Y	FACU
2. *Paspalum dilatatum*	8	N	FAC
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	48 = Total Cover		

Woody Vine Stratum (Plot Size: 30' Radius)			
1. NA			
2.			
	= Total Cover		

% Bare Ground in Herb Stratum 52

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC (excluding FAC-): 0 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 0 (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply By:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A= _____

Hydrophytic Vegetation Indicators:

_____ 1 - Rapid Test for Hydrophytic Vegetation

_____ 2 - Dominance Test is > 50%

_____ 3 - Prevalence Index is ≤ 3.0[1]

_____ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

_____ Problematic Hydrophytic Vegetation[1] (Explain)

[1] Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ☐ No ☒

Remarks: NL - Not Listed. When the indicator status is Not Listed, the species is assumed to be Upland.
Indicator Statuses have been provided by the US Army Corps of Engineers - https://wetland-plants.usace.army.mil/nwpl_static/v34/home/home.html
Updated scientific names have been provided by the USDA - https://plants.usda.gov/home

SOILS

Sampling Point: 5

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix

Hydric Soil indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5) (LRR F)
- ☐ 1 cm Muck (A9) (LRR F, G, H)
- ☐ Depleted below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Sandy Mucky Mineral (S1)
- ☐ 2.5 cm Mucky Peat or Peat (S2) (LRR G, H)
- ☐ 5 cm Mucky Peat or Peat (S3) (LRR F)
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Loamy Mucky Mineral (F1)
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ High Plains Depressions (F16 (MLRA 72 & 73 of LRR H)

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 CM Muck (A9) (LRR I, J)
- ☐ Coast Prairie Redox (A16) (LRR F, G, H)
- ☐ Dark Surface (S7) (LRR G)
- ☐ High Plains Depressions (F16) (LRR H outside of MLRA 72 & 73)
- ☐ Reduced Vertic (F18)
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless distributed or problematic.

Restrictive Layer (if present):

Type: NA

Depth (inches): NA

Hydric Soil Present? Yes ☐ No ☒

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary indicators (minimum of one required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water Stained Leaves (B9)
- ☐ Salt Crust (B11)
- ☐ Aquatic Invertebrates (B13)
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Dry-Season Water Table (C2)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (where not tilled)
- ☐ Presence of Reduced Iron (C4)
- ☐ Thin Muck Surface
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage patterns (B10)
- ☐ Oxidized Rhizospheres on Living Roots (C3) (where tilled)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ FAC-Neutral Test (D5)
- ☐ Frost-Heave Hummocks (D7) (LRR F)

Field Observations:

Surface Water Present?	Yes? ☐	No? ☒	Depth (inches): NA
Water Table Present?	Yes? ☐	No? ☒	Depth (inches): NA
Saturation Present? (includes capillary fringe)	Yes? ☐	No? ☒	Depth (inches): NA

Wetland Hydrology Present? Yes ☐ No ☒

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

APPENDIX IIE
ENDANGERED OR THREATENED SPECIES DOCUMENTATION

BIGGS & MATHEWS ENVIRONMENTAL, INC
TBPE No. F-256 TBPG No. 50222

June 24, 2022

Karen Hardin
Texas Parks and Wildlife Department
Wildlife Division - Wildlife Habitat Assessment Program
4200 Smith School Road
Austin, TX 78744

Re: Threatened and Endangered Species Assessment
TASWA Disposal and Recycling Facility, TCEQ Permit MSW 2290
Grayson County, Texas

On behalf of the Texoma Solid Waste Authority (TASWA), Biggs & Mathews Environmental, Inc. is preparing a permit amendment application to expand the existing TASWA Disposal and Recycling Facility (TCEQ Permit MSW 2290) located in Grayson County, Texas. The amendment application will request a vertical and horizontal expansion of the existing waste disposal boundary. The purpose of this letter is to document coordination with the Texas Parks and Wildlife Department consistent with the requirements of the municipal solid waste regulations, 30 Texas Administrative Code Chapter 330 (30 TAC §330.61(n)) for locations and specific data relating to endangered and threatened species in Texas.

TASWA has commissioned Integrated Environmental Solutions (IES) to perform a site specific evaluation for Protected Species Habitat Assessment. IES has completed the site work and prepared a draft assessment to be included in the permit amendment application. The IES draft assessment is included as an attachment to this correspondence. Please review the attached IES assessment and confirm concurrence with their assessment and conclusions and/or provided any additional information relating to endangered and threatened species in Texas that should be considered.

Please call or e-mail me at 817-563-1144 o[redacted]f you have any questions or need additional information

Sincerely,

BIGGS & MATHEWS ENVIRONMENTAL

David Clark, P.E.
Principal

Attachments: Protected Species Habitat Assessment (IES draft dated May 23, 2022)

O:\TASWA\P\TPWD COORD.docx

BIGGS & MATHEWS ENVIRONMENTAL, INC
TBPE No. F-256 TBPG No. 50222

June 24, 2022

U.S. Fish and Wildlife Service
Arlington Ecological Services Field Office
2005 NE Green Oaks Boulevard
Arlington, TX 76006-6247

Re: Threatened and Endangered Species Assessment
TASWA Disposal and Recycling Facility, TCEQ Permit MSW 2290
Grayson County, Texas

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Please call or e-mail me at 817-563-1144 or [redacted] if you have any questions or need additional information.

Sincerely,

BIGGS & MATHEWS ENVIRONMENTAL

David Clark, P.E.
Principal

Attachments: Protected Species Habitat Assessment (IES draft dated May 23, 2022)

O:\TASWA\P\USFWS Coord.docx

29 January 2025

Mr. John O'Steen
Texoma Area Solid Waste Authority, Inc.
25090 State Highway 56
Whitesboro, Texas 76273

Re: Texoma Area Solid Waste Authority - Protected Species Habitat Assessment
Approximately 920 acres located southeast of the intersection of Texas State Highway 56 and Farm-to-Market Road 901, Grayson County, Texas

Dear Mr. O'Steen,

Integrated Environmental Solutions, LLC (IES) performed a protected species habitat assessment on approximately 920 acres located southeast of the intersection of Texas State Highway (SH) 56 and Farm-to-Market (FM) Road 901, Grayson County, Texas (**Attachment A, Figure 1**). This habitat assessment was performed to satisfy the requirements regarding the Endangered Species Act (ESA). The following report is a list of the federally listed protected species for Grayson County and their preferred vegetation assemblages, a summary of the vegetation communities identified on the site, an evaluation of whether the communities present on the site could support a protected species, and whether future proposed actions would affect listed species.

INTRODUCTION

Protected Species

Federal

The ESA of 1973 (Public Law [P.L.] 93-205) and the amendments of 1988 (P.L. 100-578) were enacted to provide a program of preservation for endangered and threatened species and to provide protection for ecosystems upon which these species depend for their survival. The ESA requires all federal agencies to implement protection programs for designated species and to use their authorities to further the purposes of the Act. Responsibility for the listing of an endangered or threatened species and for the development of recovery plans lies with the Secretary of Interior and Secretary of Commerce. The U.S. Fish and Wildlife Service (USFWS) is responsible for implementing the ESA within the United States.

An endangered species is a species, which is in danger of extinction throughout all or a significant portion of its range. A threatened species is a species likely to become endangered within the near future throughout all or a significant portion of its range. Proposed species are those, which have been formally submitted to Congress for official listing as endangered or threatened.

In addition, the USFWS has identified species, which are candidates for possible addition to the list of Endangered and Threatened Wildlife and Plants (50 Code of Federal Regulations [CFR] 17.11 and 17.12) under the ESA. The USFWS maintains a candidate list to: (1) provide advance knowledge of potential listings that could affect land planning decisions, (2) solicit input to identify candidates not requiring protection or additional species that may require protection under the ESA, and (3) solicit information needed to prioritize the order in which species will be proposed for listing. Candidate species have no legal protection under the ESA.

The Migratory Bird Treaty Act of 1918 states that it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any migratory bird, nest, young, feather, or egg in part or in whole, without a federal permit issued in accordance with the Act's policies and regulations. However, in a recent decision the U.S. Court of Appeals for the Fifth Circuit found that for an unlawful "taking" to occur, a "deliberate act done directly and intentionally to migratory birds" would need to occur. (United States v. CITGO Petroleum Corp., No. 14-40128 [5th Cir. Sept. 4, 2015]).

State

The Texas Parks and Wildlife Department (TPWD) Wildlife Diversity Program (WDP) maintains computerized records of state-listed threatened and endangered species by county. The State of Texas does not list threatened and endangered species using the same criteria as the federal government. When the USFWS lists a plant species, the State of Texas then lists that plant. Thus, the list of threatened and endangered plants in Texas is the same as the Federal list. The state has separate laws governing the listing of animal species as threatened or endangered. Threatened and endangered animal species in Texas are those species so designated according to Chapters 67 and 68 of the Texas Parks and Wildlife Code and Section 65.171 - 65.184 of Title 31 of the Texas Administrative Code. Species that are not currently listed by the Federal government may be listed as threatened or endangered by the TPWD.

TAWSA Background

The Texoma Area Solid Waste Agency (TASWA) is a solid waste authority formed by the cities of Sherman, Gainesville, and Denison. TASWA is a publicly operated solid waste facility, located approximately three miles east of the City of Whitesboro, that is intended to provide long-term waste disposal services to the public. The TASWA authority owns 920+ acres and is looking to expand the footprint of their current landfill to increase the capacity and lifespan in order to accommodate growth in the area. Within the 920+ acres, the proposed facility expansion permit boundary will encompass approximately 689 acres. The landfill disposal footprint will cover approximately 475 acres within the facility permit boundary.

METHODOLOGY

Prior to conducting fieldwork, the list of Endangered and Threatened Wildlife and Plants under the ESA was obtained through the USFWS Information, Planning, and Conservation System (IPaC) and from the Texas Natural Diversity Database (TXNDD). The vegetation communities used by each species were obtained and are detailed below. During the field survey, vegetation composition within and adjacent to the project area was noted to determine whether there was any potential for protected species habitat. This survey was not designed to identify the presence of protected species; however, if any species were observed, they were recorded. Photographs were taken at representative points, illustrating common vegetation communities within the survey area (**Attachment B**).

RESULTS

Literature Review

According to the USFWS, three species; Piping Plover (*Charadrius melodus*), Red Knot (*Calidris canutus rufa*), and Whooping Crane (*Grus americana*) are listed as federally protected (i.e., threatened or endangered) with the potential to occur within Grayson County. Two of these species are conditionally listed as threatened within Grayson County on the basis that the proposed project is for wind energy production, Red Knot, and Piping Plover. The monarch butterfly (*Danaus plexippus*) and alligator snapping turtle (*Macrochelys temminckii*) are listed as proposed threatened with the potential to occur in Grayson County. No federally listed critical habitat for these species is located within the survey area vicinity. The TPWD lists 14 state protected species that could occur within Grayson County, three of which are also federally listed species. The review of the TXNDD files did not indicate any unique vegetation communities, state or federal parks or state or federal natural/managed areas within the survey area.

Attachment C identifies the federally protected species that could potentially occur within Grayson County from the IPAC list and Rare and Threated Endangered Species of Texas (RTEST) lists.

Site Survey

Ms. Karisa Fenton of IES evaluated the survey area on 10 February 2022. This survey was designed to provide a habitat evaluation of the overall survey area with the primary focus on the plant community. The TASWA property was comprised of five vegetation communities including **non-maintained grassland**, **maintained grassland, disturbed urban matrix**, and **forested riparian corridor** with small regions of **forested upland** scattered across the site. The following provide detailed descriptions of the habitat in each of these vegetation communities which are mapped in **Attachment A, Figure 2**.

The **non-maintained grassland** vegetation community was predominantly observed in undeveloped survey area portions that experienced low traffic with little access. These areas were observed in transition between strictly grasslands to savannah or shrubland habitat types. The maintenance regimes for these parcels were either limited or apparently non-existent beyond utility line rights-of-way (ROW) that were observed crossing some parcels. Though species dominance fluctuated, the species composition was relatively consistent. Grass and forbs species observed included Bermudagrass (*Cynodon dactylon*), Johnsongrass (*Sorghum halepense*), little bluestem (*Schizachyrium scoparium*), common sunflower (*Helianthus annuus*), giant ragweed (ambrosia t*rifida*), spreading hedge-parsley (*Torilis arvensis*), prairie broomweed (*Amphiachyris dracunculoides*), prairie threeawn (*Aristida oligantha*), sumpweed (*Iva annua*), white tridens (*Tridens albescens*), and goldenrod (*Solidago gigantea*). The lack of a maintenance regime frequently allows thickets of shrub species to inhabit the grassland habitats. The shrub species observed included eastern redcedar (*Juniperus virginiana*), honey mesquite (*Prosopis glandulosa*), sugarberry (*Celtis laevigata*), and honey locust (*Gleditsia triacanthos*). Trees of the same species were also observed in clusters and along the established forested areas, frequently creating a transitional area between grassland and forestland consisting of sporadic trees and shrubs in a savannah-like habitat.

The **maintained grassland** vegetation community was characterized by the presence of short turf grasses and sporadic forbs frequently maintained by mowing for hay production, landscaping, or active grazing. The dominant vegetation type in these areas was Bermudagrass with various other grasses and forbs, including Johnsongrass, white tridens, common sunflower, and goldenrod scattered throughout. The maintained grasslands were often bisected or bordered by paved/ gravel roads or buildings.

The **disturbed urban matrix** vegetation community was associated with the landfill footprint and was characterized by the presence of paved roads, parking lots, frequently traveled gravel or dirt roads, relocated fill dirt, and dump sites. While most of the vegetation had been cleared from this area, maintained Bermudagrass was observed surrounding buildings and roads.

The **forested riparian corridor** was predominantly observed to the northwest along an unnamed tributary of Mustang Creek. This vegetation community was also observed along drainages in the central, northeastern, and southeastern regions. The forested riparian corridor areas were dominated by sugarberry (*Celtis laevigata*), cedar elm (*Ulmus crassifolia*), and Osage orange (*Maclura pomifera*). Other tree and shrub species observed included common persimmon (*Diospyros virginiana*), green ash (*Fraxinus pennsylvanica*), American elm (*Ulmus americana*), post oak (*Quercus stellata*), rough leaf dogwood (*Cornus drummondii*), honey locust (*Gleditsia triacanthos*), and coralberry (*Symphoricarpos orbiculatus*). Ground cover was dominated by inland wood oats (*Chasmanthium latifolium*), eastern woodland sedge (*Carex blanda*), and Virginia wildrye (*Elymus virginicus*).

The **forested upland** vegetation community was observed in relatively small regions near the northern and eastern boundaries. The forested upland areas were dominated by eastern redcedar, sugarberry, and honey locust with an understory of common greenbrier (*Smilax bona-nox*), sedge (*Carex spp.*), and poison-ivy (*Toxicodendron radicans*).

CONCLUSIONS

Preferred Habitat for Federally Protected Species

Table 1 provides a summary of the state and federally listed species that could potentially occur within Grayson County, as well as a brief description of their habitat, whether this habitat is present within the survey area, and whether the proposed project would potentially affect the listed species.

Table 1. Federally- and State-listed Threatened and Endangered Species Occurring or Potentially Occurring in Grayson County, Texas

Species	State Status	Federal Status	Description of Habitat	Habitat Present[1]	Species Effect[2]
BIRDS					
Black Rail (*Laterallus jamaicensis*)	T	---	Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia.	**No**	**No**
Interior Least Tern (*Sternula antillarum athalassos*)	E	---	Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony.	**No**	**No**
Piping Plover (*Charadrius melodus*)	T	LT	Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e., north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.	**No**	**No**
Rufa Red Knot (*Calidris canutus rufa*)	T	LT	Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes	**No**	**No**
White-faced Ibis (*Plegadis chihi*)	T	---	Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.	**No**	**No**
Whooping Crane (*Grus americana*)	E	LE	Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.	**No**	**No**
Wood Stork (*Mycteria americana*)	T	---	Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.	**No**	**No**
FISH					
Blue sucker (*Cycleptus elongatus*)	T	--	Blue Sucker usually inhabit rapids, riffles, runs and pools with moderate to fast current, with bottoms of exposed bedrock sometimes in combination with hard clay, sand, gravel, and boulders; generally intolerant of highly turbid conditions. Adults winter in deep pools and move upstream in spring to spawn on riffles. Current distribution in Texas includes the Red River downstream of Lake Texoma, Sabine and Neches rivers, and Colorado River downstream of Austin, Texas. May occur in other river systems (Warren et al. 2000).	**No**	**No**
Chub shiner (*Notropis potteri*)	T	--	Brazos, Colorado, San Jacinto, and Trinity river basins. Flowing water with silt or sand substrate	**No**	**No**

Species	State Status	Federal Status	Description of Habitat	Habitat Present[1]	Species Effect[2]
Paddlefish (*Polyodon spathula*)	T	--	Species occurred in every major river drainage from the Trinity Basin eastward, but its numbers and range had been substantially reduced by the 1950's; recently reintroduced into Big Cypress drainage upstream of Caddo Lake. Prefers large, free-flowing rivers but will frequent impoundments with access to spawning sites.	No	No
Shovelnose sturgeon (*Scaphirhynchus platorynchus*)	T	SAT	Found only in the Red River below Denison Dam (Lake Texoma). Evidence of the presence of this species in the lower Pecos River, during prehistoric times, strongly suggests that it likely occurred in many Texas rivers. Inhabits flowing water over sandy bottoms or near rocky points or bars.	No	No
MAMMALS					
Black bear (*Ursus americanus*)	T	--	Generalist. Historically found throughout Texas. In Chisos, prefers higher elevations where pinyon-oaks predominate; also occasionally sighted in desert scrub of Trans-Pecos (Black Gap Wildlife Management Area) and Edwards Plateau in juniper-oak habitat. For ssp. luteolus, bottomland hardwoods, floodplain forests, upland hardwoods with mixed pine; marsh. Bottomland hardwoods and large tracts of inaccessible forested areas.	No	No
REPTILES					
Texas horned lizard (*Phrynosoma cornutum*)	T	---	Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.	No	No
Alligator Snapping Turtle (*Macrochelys temminckii*)	---	PT	Aquatic: Perennial water bodies; rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near running water; sometimes enters brackish coastal waters. Females emerge to lay eggs close to the water's edge.	No	No
INSECTS					
Monarch butterfly (*Danaus plexippus*)	---	PT	Adult monarch butterflies are large and conspicuous, with bright orange wings surrounded by a black border and covered with black veins. During the breeding season, monarchs lay their eggs on their obligate milkweed host plant (primarily Asclepias spp.), and larvae emerge after 2 to 5 days. Larvae develop through five larval instars (intervals between molts) over a period of 9 to 18 days, feeding on milkweed and sequestering toxic chemicals (cardenolides) as a defense against predators. The larva then pupates into a chrysalis before emerging 6 to 14 days later as an adult butterfly. There are multiple generations of monarchs produced during the breeding season, with most adult butterflies living approximately 2 to 5 weeks; overwintering adults enter into reproductive diapause (suspended reproduction) and live 6 to 9 months. Individual monarchs in temperate climates, such as eastern and western North America, undergo long-distance migration, and live for an extended period of time. In the fall, in both eastern and western North America, monarchs begin migrating to their respective overwintering sites.	Yes	No
MOLLUSKS					
Texas heelsplitter (*Potamilus amphichaenus*)	T	---	Occurs in small streams to large rivers in standing to slow-flowing water; most common in banks, backwaters and quiet pools; adapts to some reservoirs. Often found in soft substrates such as mud, silt or sand (Howells et al. 1996; Randklev et al. 2017a). [Mussels of Texas 2019]	No	No

LE – Federally Listed Endangered, LT – Federally Listed Threatened C – Candidate PT – Proposed Threatened SAT - Similarity of Appearance to a Threatened Taxon E – State Listed Endangered T – State Listed Threatened

[1]Habitat Present? – Do the vegetation communities located within the survey area match the requirements for that particular protected species?

[2]Species Effect? – Will the proposed project potentially affect a protected species?

Data Sources: USFWS IPaC (Published and accessed 29 January 2025), TPWD (accessed 29 January 2025) and field survey of the survey area

Regarding federally listed threatened and endangered species, Red Knot, Piping Plover, and Whooping Crane were listed for Grayson County.

- As this project will not be related to wind energy, the Red Knot and Piping Plover will not be affected.
- Whooping Cranes utilize estuaries, prairie marshes, moist grasslands, croplands, and will use large shallow wetland areas associated with lakes for roosting and feeding. Although the survey area contained open water, the stock ponds were too deep to promote the marsh-type mix of vegetation communities in association with open water sources that this species utilizes.

- The alligator snapping turtle prefers perennial water bodies including rivers, canals, lakes, and oxbows as well as swamps, bayous, and ponds near running water. It sometimes enters brackish coastal waters. Although multiple tributaries were identified, the ephemeral and intermittent nature of the tributaries would not provide suitable habitat for the alligator snapping turtle.
- The monarch butterfly migrates through the United States, including Texas, to and from overwintering grounds and summer habitats primarily located in Mexico and Canada, respectively. During migration, monarch butterflies feed on various flowering plants and breed solely on milkweeds (*Asclepias* spp.). While flowering plants were observed, their occurrence was sporadic and restricted to non- or infrequently maintained areas. As such, minimal feeding habitat was observed. Therefore, the only occurrence of monarch butterflies would be in relation to stopover during migration.

As such, the habitats present within the survey area were not suitable for any of the federally listed threatened or endangered species. Nor were the habitats suitable for nesting, feeding, or stopover migration habitat for these species.

Preferred Habitat for State Protected Species

There were 14 state-listed threated and endangered species for Grayson County, which includes three of the aforementioned federally listed species. Any occurrence of the Piping Plover, and Whitefaced Ibis (*Plegadis chihi*) would be in relation to stopover during migration; however, no suitable stopover or nesting habitat was observed within the survey area. Whooping Crane, Black Rail, Interior Least Tern (*Sternula antillarum athalassos*), and Wood Stork (*Mycteria americana*) would be unlikely to utilize the survey area, as their preferred habitat types were not present. Black Rails utilize freshwater marshes and grassy swamps with dense emergent vegetation, which were not present within the site. While this site contained a freshwater wetland, this community did not meet the parameters of the Wood Stork for roosting with no tall snags, red mangrove (*Rhizophora mangle*) dominated areas, or bald cypress (*Taxodium distichum*) dominated areas. Wood Storks utilize flooded fields and marsh habitats with shallow standing water for feeding areas, but none were observed. As such, foraging habitat potentially suitable for the Wood Stork was not present within the survey area.

Due to the high-traffic nature of the survey area and lack of any records of the black bear in the area it is unlikely that this species will utilize the site. The Texas horned lizard (*Phrynosoma cornutum*) prefers bare ground with scattered clumps of vegetation which did not occur within the survey area. The Texas heelsplitter (*Potamilus amphichaenus*) occurs in streams with flowing or standing water. Although multiple tributaries were identified, the ephemeral and intermittent nature of the tributaries would not provide suitable habitat for the Texas heelsplitter or the state listed fish species.

Vegetation Communities

None of the vegetation observed within the survey area would be considered unique or compose a unique vegetation type for the region. The vegetation communities described were composed of species that are not only common to grassland and forested areas, but to the Cross-Timbers and Blackland Prairie eco-regions of North Central Texas. It is IES's professional opinion that the proposed project will not have any effect on any unique vegetation, vegetation communities, or habitat types.

Potential to Affect Protected Species

As previously noted, habitat for any of the federally listed species and state listed species was not present within the survey area. As such, the facility and the operation of the facility shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species, or cause or contribute to the taking of any endangered or threatened species.

IES appreciates the opportunity to work with you and Texoma Area Solid Waste Authority, Inc. on this project and hope we may be of assistance to you in the future. If you have any comments, questions, or concerns, please do not hesitate to contact me at 972-562-7672 or by email at [redacted]

Sincerely,

Integrated Environmental Solutions, LLC.

Karisa Fenton

Ms. Karisa Fenton
Environmental Specialist

Attachments

File ref: 04.240.095

ATTACHMENT A

Figures

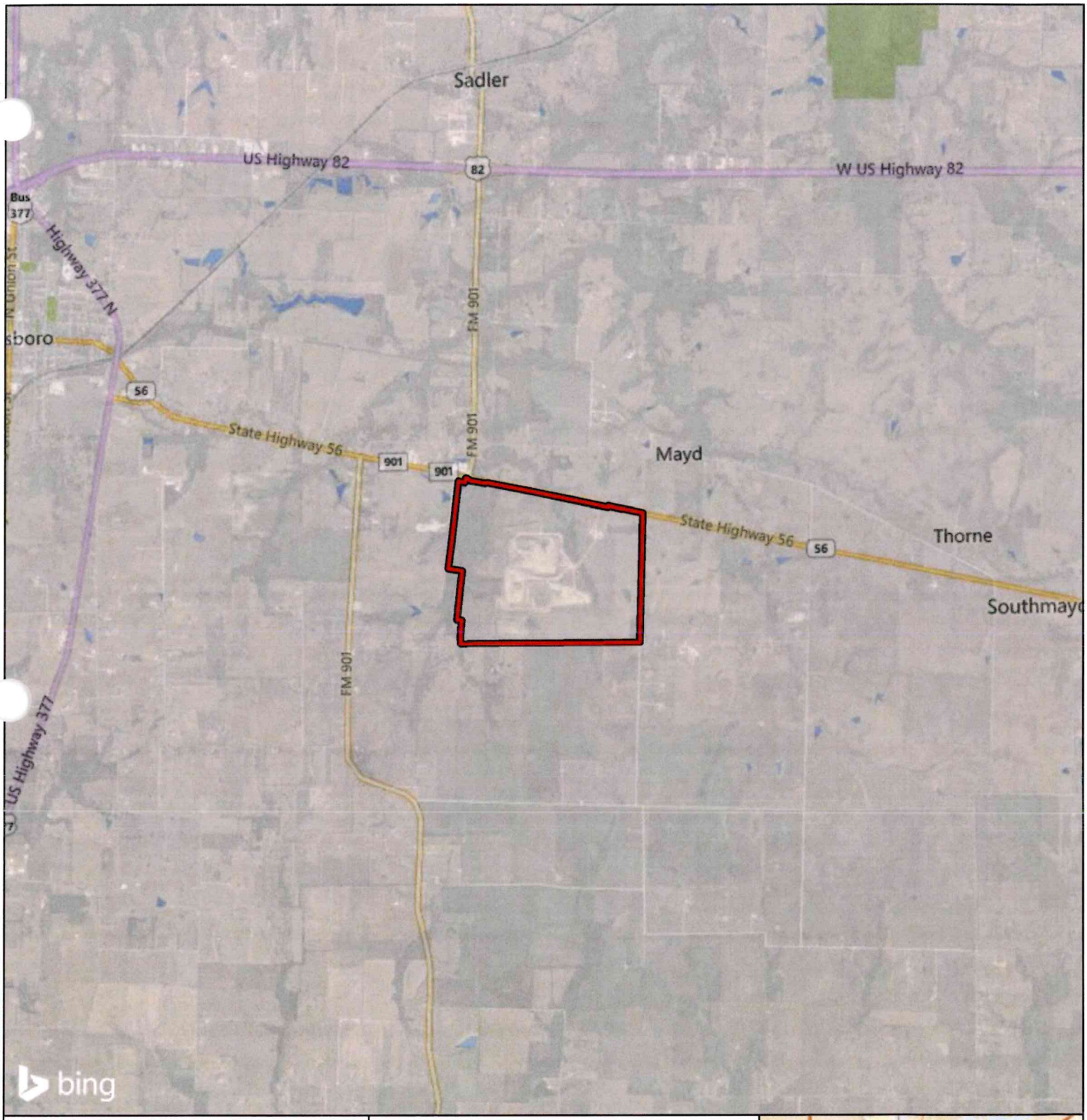


Figure 1.
General Location Map

TASWA
City of Whitesboro
Grayson County, Texas

1 in = 5,000 feet

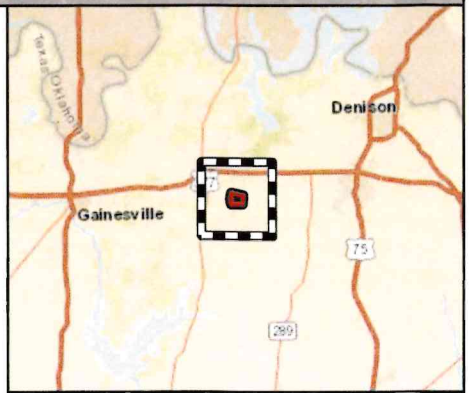
Feet
0 5,000

N
W E
S

File Ref. 04.240.095
Date: 5/16/2022

Survey Area

IIE.11



Area of Detail Scale: 1 inch equals 20 miles

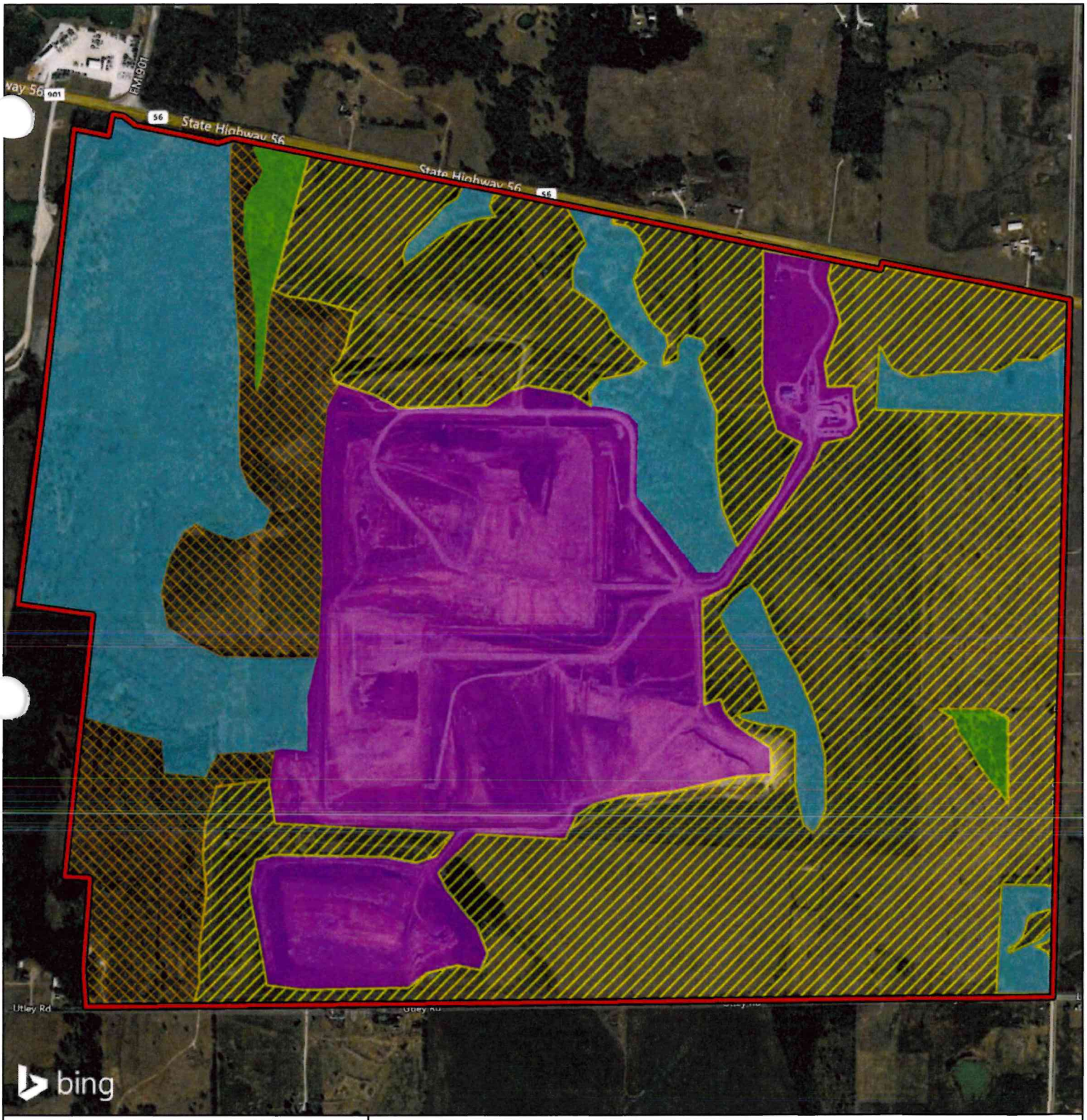


Figure 2.
Vegetation Communities Identified within the Survey Area

TASWA
City of Whitesboro
Grayson County, Texas

1 in = 925 feet

Feet
0 925

N
W E
S

File Ref. 04.240.095
Date: 5/16/2022

Survey Area

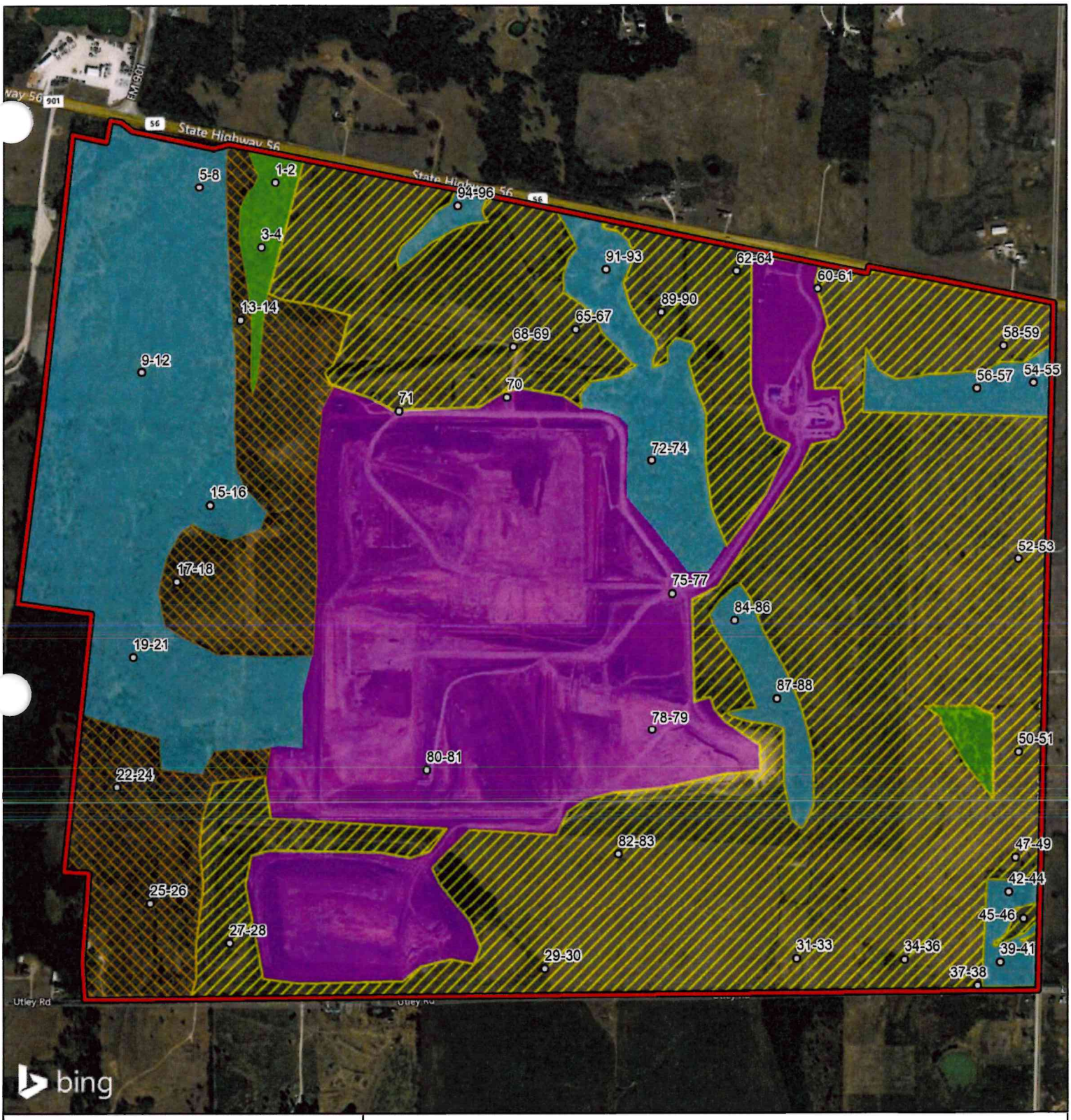
Vegetation Communities

- Forested Riparian Corridor
- Forested Upland
- Maintained Grassland
- Non-Maintained Grassland
- Disturbed Urban Matrix

IIE.12

ATTACHMENT B

Site Photographs



Photograph Location Map

TASWA
City of Whitesboro
Grayson County, Texas

1 in = 925 feet

Feet
0 925

N
W E
S

File Ref. 04.240.095
Date: 5/16/2022

Survey Area
Photograph Location

Vegetation Communities

- Forested Riparian Corridor
- Forested Upland
- Maintained Grassland
- Non-Maintained Grassland
- Disturbed Urban Matrix

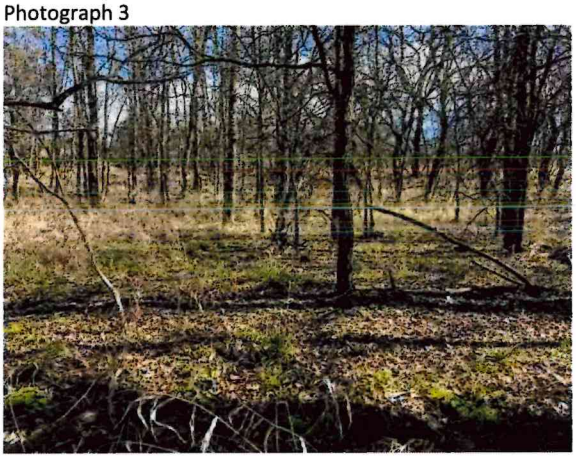
IIE.14

Photograph 1

Photograph 2

Photograph 3

Photograph 4



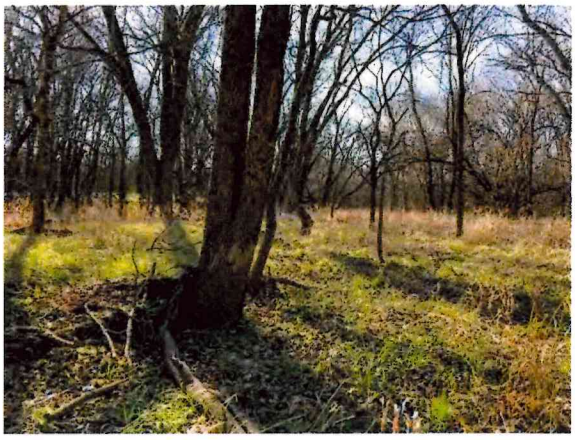
Photograph 5

Photograph 6

Photograph 7

Photograph 8

Photograph 9



Photograph 10

Photograph 11

Photograph 12

Photograph 13

Photograph 14

Photograph 15

Photograph 16

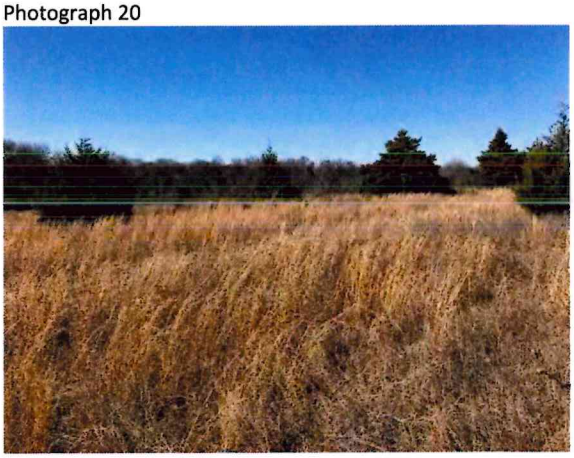
Photograph 17

Photograph 18

Photograph 19

Photograph 20

Photograph 21



Photograph 22

Photograph 23

Photograph 24

Photograph 25

Photograph 26

Photograph 27

Photograph 28

Photograph 29

Photograph 30

Photograph 31

Photograph 32

Photograph 33

Photograph 34

Photograph 35

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Photograph 83

Photograph 84

Photograph 85

Photograph 86

Photograph 87

Photograph 88

Photograph 89

Photograph 90

Photograph 91

Photograph 92

Photograph 93

Photograph 94

Photograph 95

Photograph 96

ATTACHMENT C

Protected Species Lists

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Arlington Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
Phone: (817) 277-1100 Fax: (817) 277-1129
Email Addres[redacted]

In Reply Refer To:
Project Code: 2022-0022863
Project Name: TASWA

01/29/2025 19:08:16 UTC

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed, and candidate species, as well as proposed and final designated critical habitat, which may occur within the boundary of your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.).

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under section 7(a)(1) of the Act, Federal agencies are directed to utilize their authorities to carry out programs for the conservation of threatened and endangered species. Under and 7(a)(2) and its implementing regulations (50 CFR 402 et seq.), Federal agencies are required to determine whether their actions may affect threatened and endangered species and/or designated critical habitat. A Federal action is an activity or program authorized, funded, or carried out, in whole or in part, by a Federal agency (50 CFR 402.02).

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For Federal actions other than major construction activities, the Service suggests that a biological evaluation (similar to a Biological Assessment) be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

After evaluating the potential effects of a proposed action on federally listed species, one of the following determinations should be made by the Federal agency:

1. *No effect* - the appropriate determination when a project, as proposed, is anticipated to have no effects to listed species or critical habitat. A "no effect" determination does not require section 7 consultation and no coordination or contact with the Service is necessary. However, the action agency should maintain a complete record of their evaluation, including the steps leading to the determination of affect, the qualified personnel conducting the evaluation, habitat conditions, site photographs, and any other related information.
2. *May affect, but is not likely to adversely affect* - the appropriate determination when a proposed action's anticipated effects to listed species or critical habitat are insignificant, discountable, or completely beneficial. Insignificant effects relate to the size of the impact and should never reach the scale where "take" of a listed species occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not be able to meaningfully measure, detect, or evaluate insignificant effects, or expect discountable effects to occur. This determination requires written concurrence from the Service. A biological evaluation or other supporting information justifying this determination should be submitted with a request for written concurrence.
3. *May affect, is likely to adversely affect* - the appropriate determination if any adverse effect to listed species or critical habitat may occur as a consequence of the proposed action, and

the effect is not discountable or insignificant. This determination requires formal section 7 consultation.

The Service has performed up-front analysis for certain project types and species in your project area. These analyses have been compiled into *determination keys*, which allows an action agency, or its designated non-federal representative, to initiate a streamlined process for determining a proposed project's potential effects on federally listed species. The determination keys can be accessed through IPaC.

The Service recommends that candidate species, proposed species, and proposed critical habitat be addressed should consultation be necessary. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found at: https://www.fws.gov/service/section-7-consultations

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 et seq.), and projects affecting these species may require development of an eagle conservation plan (https://www.fws.gov/library/collections/bald-and-golden-eagle-management). Additionally, wind energy projects should follow the wind energy guidelines (https://www.fws.gov/media/land-based-wind-energy-guidelines) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: https://www.fws.gov/media/recommended-best-practices-communication-tower-design-siting-construction-operation. The Federal Aviation Administration (FAA) released specifications for and made mandatory flashing L-810 lights on new towers 150-350 feet AGL, and the elimination of L-810 steady-burning side lights on towers above 350 feet AGL. While the FAA made these changes to reduce the number of migratory bird collisions (by as much as 70%), extinguishing steady-burning side lights also reduces maintenance costs to tower owners. For additional information concerning migratory birds and eagle conservation plans, please contact the Service's Migratory Bird Office at 505-248-7882.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in

the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds
- Wetlands

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Arlington Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, TX 77058-3051
(817) 277-1100

PROJECT SUMMARY

Project Code: 2022-0022863
Project Name: TASWA
Project Type: Landfill - Solid Waste
Project Description: 04.240.095
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@33.631491999999994,-96.83981105283601,14z

Counties: Grayson County, Texas

ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Note that 2 of these species should be considered only under certain conditions.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

BIRDS

NAME	STATUS
Piping Plover *Charadrius melodus* Population: [Atlantic Coast and Northern Great Plains populations] - Wherever found, except those areas where listed as endangered. There is **final** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/6039	Threatened
Rufa Red Knot *Calidris canutus rufa* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. This species only needs to be considered under the following conditions: ▪ Wind Energy Projects Species profile: https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane *Grus americana* Population: Wherever found, except where listed as an experimental population There is **final** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/758	Endangered

REPTILES

NAME	STATUS
Alligator Snapping Turtle *Macrochelys temminckii* No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/4658	Proposed Threatened

INSECTS

NAME	STATUS
Monarch Butterfly *Danaus plexippus* There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat. Species profile: https://ecos.fws.gov/ecp/species/9743	Proposed Threatened

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and Golden Eagles are protected under the Bald and Golden Eagle Protection Act [2] and the Migratory Bird Treaty Act (MBTA) [1]. Any person or organization who plans or conducts activities that may result in impacts to Bald or Golden Eagles, or their habitats, should follow appropriate regulations and consider implementing appropriate avoidance and minimization measures, as described in the various links on this page.

---

1. The Bald and Golden Eagle Protection Act of 1940.
2. The Migratory Birds Treaty Act of 1918.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

THERE ARE NO BALD AND GOLDEN EAGLES WITHIN THE VICINITY OF YOUR PROJECT AREA.

MIGRATORY BIRDS

The Migratory Bird Treaty Act (MBTA) [1] prohibits the take (including killing, capturing, selling, trading, and transport) of protected migratory bird species without prior authorization by the Department of Interior U.S. Fish and Wildlife Service (Service). The incidental take of migratory birds is the injury or death of birds that results from, but is not the purpose, of an activity. The Service interprets the MBTA to prohibit incidental take.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, see the "Probability of Presence Summary" below to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Little Blue Heron *Egretta caerulea* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9477	Breeds Mar 10 to Oct 15
Prairie Loggerhead Shrike *Lanius ludovicianus excubitorides* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/8833	Breeds Feb 1 to Jul 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read "Supplemental Information on Migratory Birds and Eagles", specifically the FAQ section titled "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

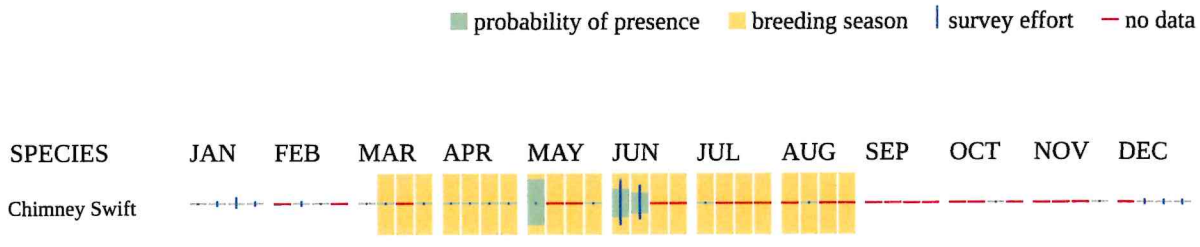
Probability of Presence (▪)

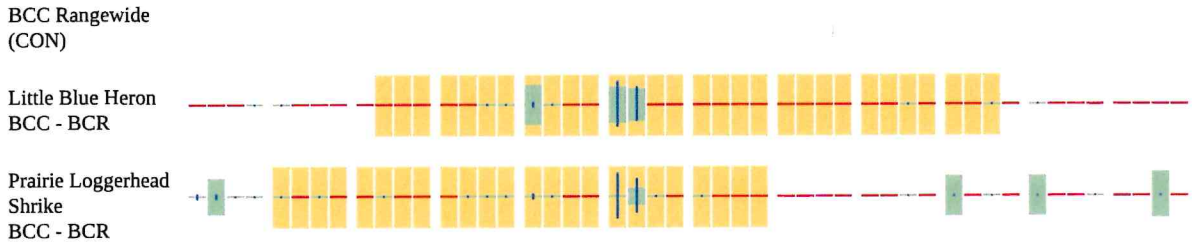
Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (▪)
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)
Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (–)
A week is marked as having no data if there were no survey events for that week.





Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide avoidance and minimization measures for birds
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

RIVERINE

- R4SBC
- R4SBA
- R5UBH

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1A

FRESHWATER POND

- PUBHh

IPAC USER CONTACT INFORMATION

Agency: Integrated Environmental Solutions
Name: Karisa Fenton
Address: 301 W Eldorado Pkwy, Suite 101
City: McKinney
State: TX
Zip: 75069
Email kfenton@intenvsol.com
Phone: 9725627672

Last Update: 1/15/2025

GRAYSON COUNTY

AMPHIBIANS

black rail *Laterallus jamaicensis*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Salt, brackish, and freshwater marshes, pond borders, wet meadows, and grassy swamps; nests in or along edge of marsh, sometimes on damp ground, but usually on mat of previous years dead grasses; nest usually hidden in marsh grass or at base of Salicornia

Federal Status: T	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2

interior least tern *Sternula antillarum athalassos*

Sand beaches, flats, bays, inlets, lagoons, islands. Subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Federal Status:	State Status: E	SGCN: N
Endemic: N	Global Rank: G4T3Q	State Rank: S1B

piping plover *Charadrius melodus*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Beaches, sandflats, and dunes along Gulf Coast beaches and adjacent offshore islands. Also spoil islands in the Intracoastal Waterway. Based on the November 30, 1992 Section 6 Job No. 9.1, Piping Plover and Snowy Plover Winter Habitat Status Survey, algal flats appear to be the highest quality habitat. Some of the most important aspects of algal flats are their relative inaccessibility and their continuous availability throughout all tidal conditions. Sand flats often appear to be preferred over algal flats when both are available, but large portions of sand flats along the Texas coast are available only during low-very low tides and are often completely unavailable during extreme high tides or strong north winds. Beaches appear to serve as a secondary habitat to the flats associated with the primary bays, lagoons, and inter-island passes. Beaches are rarely used on the southern Texas coast, where bayside habitat is always available, and are abandoned as bayside habitats become available on the central and northern coast. However, beaches are probably a vital habitat along the central and northern coast (i.e. north of Padre Island) during periods of extreme high tides that cover the flats. Optimal site characteristics appear to be large in area, sparsely vegetated, continuously available or in close proximity to secondary habitat, and with limited human disturbance.

Federal Status: T	State Status: T	SGCN: Y
Endemic: N	Global Rank: G3	State Rank: S2N

rufa red knot *Calidris canutus rufa*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Habitat: Primarily seacoasts on tidal flats and beaches, herbaceous wetland, and Tidal flat/shore. Bolivar Flats in Galveston County, sandy beaches Mustang Island, few on outer coastal and barrier beaches, tidal mudflats and salt marshes.

Federal Status: T	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4T2	State Rank: S2N

white-faced ibis *Plegadis chihi*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; currently confined to near-coastal rookeries in so-called hog-wallow prairies. Nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.

Federal Status:	State Status: T	SGCN: N

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Endemic: N | Global Rank: G5 | State Rank: S4B

whooping crane *Grus americana*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Small ponds, marshes, and flooded grain fields for both roosting and foraging. Potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties.

Federal Status: E | State Status: E | SGCN: Y
Endemic: N | Global Rank: G1 | State Rank: S1S2N

wood stork *Mycteria americana*

The county distribution for this species includes geographic areas that the species may use during migration. Time of year should be factored into evaluations to determine potential presence of this species in a specific county. Prefers to nest in large tracts of baldcypress (Taxodium distichum) or red mangrove (Rhizophora mangle); forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, sometimes in association with other wading birds (i.e. active heronries); breeds in Mexico and birds move into Gulf States in search of mud flats and other wetlands, even those associated with forested areas; formerly nested in Texas, but no breeding records since 1960.

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G4 | State Rank: SHB,S3N

FISH

blue sucker *Cycleptus elongatus*

Blue Sucker usually inhabit rapids, riffles, runs and pools with moderate to fast current, with bottoms of exposed bedrock sometimes in combination with hard clay, sand, gravel, and boulders; generally intolerant of highly turbid conditions. Adults winter in deep pools and move upstream in spring to spawn on riffles. Current distribution in Texas includes the Red River downstream of Lake Texoma, Sabine and Neches rivers, and Colorado River downstream of Austin, Texas. May occur in other river systems (Warren et al. 2000).

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G3G4 | State Rank: S3

chub shiner *Notropis potteri*

Brazos, Colorado, San Jacinto, and Trinity river basins. Flowing water with silt or sand substrate

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G4 | State Rank: S2

paddlefish *Polyodon spathula*

Species occurred in every major river drainage from the Trinity Basin eastward, but its numbers and range had been substantially reduced by the 1950's; recently reintroduced into Big Cypress drainage upstream of Caddo Lake. Prefers large, free-flowing rivers but will frequent impoundments with access to spawning sites.

Federal Status: | State Status: T | SGCN: Y
Endemic: N | Global Rank: G4 | State Rank: S3

shovelnose sturgeon *Scaphirhynchus platorynchus*

Found only in the Red River below Denison Dam (Lake Texoma). Evidence of the presence of this species in the lower Pecos River, during prehistoric times, strongly suggests that it likely occurred in many Texas rivers. Inhabits flowing water over sandy bottoms or near rocky points or bars.

Federal Status: SAT | State Status: T | SGCN: Y
Endemic: N | Global Rank: G4 | State Rank: S2

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MAMMALS

black bear *Ursus americanus*

Generalist. Historically found throughout Texas. In Chisos, prefers higher elevations where pinyon-oaks predominate; also occasionally sighted in desert scrub of Trans-Pecos (Black Gap Wildlife Management Area) and Edwards Plateau in juniper-oak habitat. For ssp. luteolus, bottomland hardwoods, floodplain forests, upland hardwoods with mixed pine; marsh. Bottomland hardwoods and large tracts of inaccessible forested areas.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G5	State Rank: S3

MOLLUSKS

Texas heelsplitter *Potamilus amphichaenus*

Occurs in small streams to large rivers in standing to slow-flowing water; most common in banks, backwaters and quiet pools; adapts to some reservoirs. Often found in soft substrates such as mud, silt or sand (Howells et al. 1996; Randklev et al. 2017a). [Mussels of Texas 2019]

Federal Status: PE	State Status: T	SGCN: Y
Endemic: N	Global Rank: G1G3	State Rank: S1

REPTILES

Texas horned lizard *Phrynosoma cornutum*

Terrestrial: Open habitats with sparse vegetation, including grass, prairie, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive. Occurs to 6000 feet, but largely limited below the pinyon-juniper zone on mountains in the Big Bend area.

Federal Status:	State Status: T	SGCN: Y
Endemic: N	Global Rank: G4G5	State Rank: S3

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July 12, 2022

Mr. David Clark, P.E.
Biggs & Mathews Environmental
1700 Robert Road, Suite 100
Mansfield, TX 76063

RE: TASWA Disposal and Recycling Facility, TCEQ Permit MSW 2290, Proposed Permit Amendment for Facility Expansion, Grayson County

Dear Mr. David Clark:

Texas Parks and Wildlife Department (TPWD) received a review request dated June 24, 2022, for the facility referenced above.

Under Texas Parks and Wildlife Code (PWC) section 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 section 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 PWC section 12.0011. Please refer to TPWD project number 48803 in return correspondence regarding this project.

Project Description

Biggs & Mathews Environmental, Inc. is preparing a permit amendment application on behalf of the Texoma Solid Waste Authority (TASWA) to expand the existing TASWA Disposal and Recycling Facility (Project) located in Grayson County. The amendment will include a vertical and horizontal expansion of the existing waste disposal boundary. A 920-acre property owned by TASWA includes the existing facility. With the amendment, a proposed disposal footprint of approximately 382 acres will be located within a proposed 569-acre permit boundary in the 920-acre property. Biggs & Mathews Environmental, Inc. retained Integrated Environmental Solutions, LLC to conduct a *Protected Species Habitat Assessment* (PSHA) of the 920-acre property to include in the permit application. The PSHA was provided for TPWD review; however, the location of the proposed permit boundary and disposal footprint were not included in the review materials.

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.

The PSHA recognizes the MBTA though claims that incidental take is not a violation of the MBTA. Please note that the USFWS published a final rule revoking the January 7, 2021, regulation that limited the scope of the MBTA and returns to implementing the MBTA as prohibiting incidental take. Information regarding the USFWS rules can be found at fws.gov/regulations/mbta/.

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 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.

The PSHA identifies riparian areas within the 902-acre survey area, though does not identify the location of streams or wetlands. TPWD review of U.S. Geological Survey topographical maps and USFWS National Wetland Inventory Maps indicates the Project survey area contains unnamed streams, freshwater ponds, and wetlands that may be jurisdictional waters of the U.S. and would be subject to USACE Section 404 CWA permitting if the Project would place dredge or fill into waters of the U.S.

Although isolated wetlands 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 and TPWD recommends protecting all waters from disturbance to the extent feasible.

> **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 March 22, 2022, 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 referring 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 TASWA to revegetate disposal 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 Kills and Spills Team (KAST) and will be liable for the value of lost resources under the authority of PWC sections 12.0011 (b) (1) and 12.301.

If the Project includes filling streams or stream relocation and channelization, then the Project may affect aquatic resources of the state.

Recommendation: If water is present and stream impacts will occur, the Project should be coordinated with the TPWD 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 Bregan Brown TPWD Region 2 KAST available at Kirian.Brown@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.

If the 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: If the Project involves work within a stream, 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 Grayson County obtained from TPWD online application identifying rare, threatened, and endangered species by county (RTEST), the Project did not consider other SGCN of Grayson County.

The RTEST list for Grayson County identifies the following SGCN with potential to occur with the county, excluding the federal and state listed SGCN addressed above or in the project's PSHA. 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 in RTEST:

Taxon	Scientific Name	Common Name	GRank[1]	SRank[2]
Amphibians	*Ambystoma tigrinum*	eastern tiger salamander	G5	S3
Amphibians	*Anaxyrus woodhousii*	Woodhouse's toad	G5	SU
Amphibians	*Pseudacris streckeri*	Strecker's chorus frog	G5	S3
Amphibians	*Lithobates areolatus areolatus*	southern crawfish frog	G4T4	S3
Birds	*Haliaeetus leucocephalus*	bald eagle	G5	S3B,S3N
Birds	*Leucophaeus pipixcan*	Franklin's gull	G5	S2N
Birds	*Athene cunicularia hypugaea*	western burrowing owl	G4T4	S2
Birds	*Anthus spragueii*	Sprague's pipit	G3G4	S3N
Birds	*Calcarius ornatus*	chestnut-collared longspur	G5	S3
Fish	*Anguilla rostrata*	american eel	G4	S4
Fish	*Hiodon alosoides*	goldeye	G5	S3
Fish	*Notropis bairdi*	Red River shiner	G4	S3
Fish	*Macrhybopsis storeriana*	silver chub	G5	S3
Fish	*Etheostoma radiosum*	orangebelly darter	G4	S3
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	*Ondatra zibethicus*	muskrat	G5	S5
Mammals	*Mustela frenata*	long-tailed weasel	G5	S5
Mammals	*Spilogale putorius*	eastern spotted skunk	G4	S1S3
Mammals	*Puma concolor*	mountain lion	G5	S2S3
Reptiles	*Deirochelys reticularia miaria*	western chicken turtle	G5T5	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	*Plestiodon septentrionalis*	prairie skink	G5	S2
Reptiles	*Crotalus horridus*	timber (canebrake) rattlesnake	G4	S4
Insects	*Bombus pensylvanicus*	American bumblebee	G3G4	SNR
Insects	*Bombus variabilis*	No accepted common name	G1G2	SNR
Plants	*Dalea hallii*	Hall's prairie clover	G3	S2
Plants	*Crataegus viridis var. glabriuscula*	Sutherland hawthorn	G5T3T4	S3
Plants	*Valerianella stenocarpa*	bigflower cornsalad	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.

The Project is located within the Texas Blackland Prairies Ecoregion, and priority habitats identified in the Texas Conservation Action Plan for conservation of SGCN of the within the Texas Blackland Prairies Ecoregion include barrens, native grassland communities, slope forests and woodlands, riparian and bottomland woodlands, freshwater wetlands, seeps, springs, and savannahs and woodlands. Of the species listed above, the southern crawfish frog and eastern spotted skunk are identified within the Texas Natural Diversity Database, occurring approximately 2 to 4 miles from the Project site. These and several of the SGCN listed above are associated with grassland habitats, and loss to grassland communities is a concern in the Texas Blackland Prairies ecoregion.

The PSHA identifies non-maintained grassland, maintained grassland, disturbed urban mix, forested riparian corridor, and forested upland vegetation communities within the 920-acre survey area. Of those habitats the forested riparian corridor and non-maintained grassland communities best represent priority habitats of the ecoregion for conservation including native grassland communities, riparian and bottomland woodlands, and savannahs and woodlands.

Beneficial Management Practices

TPWD recommends implementing the following additional BMP to avoid or minimize impacts to wildlife, particularly state listed species and other SGCN, potentially occurring at the project site:

1. TPWD recommends designing the project to minimize removal of native vegetation and retain native habitats. TPWD recommends that precautions be taken to avoid impact to SGCN flora and fauna, natural plant communities, and priority

habitat types of the ecoregion while working in Grayson County or if encountered during project construction, operation, maintenance, and reclamation activities. Areas exhibiting a native grass and forbs component should be protected from disturbance and from introduction of non-native vegetation. TPWD encourages clearly marking areas found to contain rare plants as work zone avoidance areas prior to disturbance activities.

2. TPWD recommends avoiding disturbance to streams, tributaries, and wetlands and providing robust setback distances to aquatic systems to serve as wooded stream buffers that provide aquatic resources with shade, protect streams from runoff and erosion, and serve as wildlife habitat and travel corridors.

3. Of the vegetation communities present within the 920-acre site, TPWD recommends the permit boundary and disposal footprint exclude streams, wetlands, riparian corridors, and the non-maintained grassland areas to the extent feasible. These areas likely provide greater species diversity and wildlife habitat than the maintained grassland and disturbed urban mix communities at the project site. There is an abundance of disturbed urban mix and maintained grassland to accommodate the approximately 382-acre disposal footprint and 569-acre permit boundary proposed for the permit amendment.

4. 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.

5. 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.

6. 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.

7. 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.

8. 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/48803

David Clark

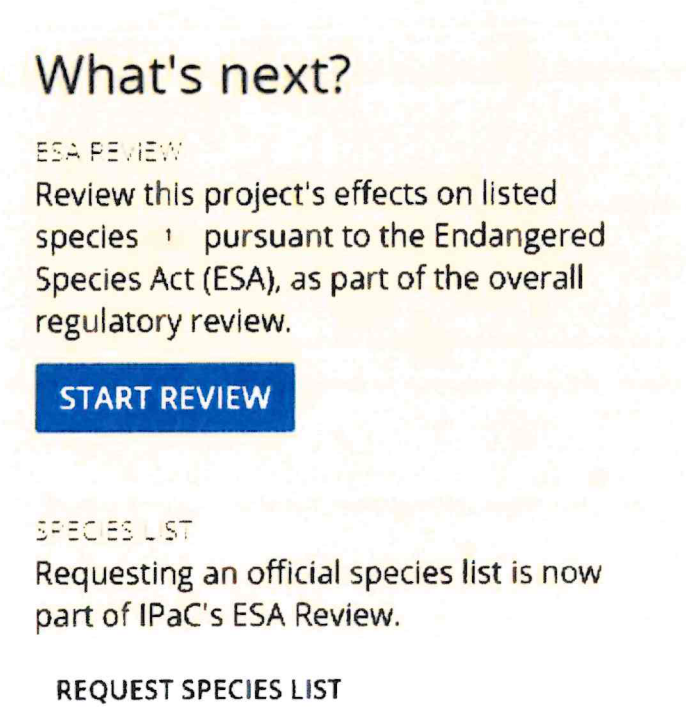
From: Khan, Jennifer M [redacted]
Sent: Tuesday, July 5, 2022 1:18 PM
To: David Clark
Subject: RE: [EXTERNAL] Threatened and Endangered Species - Wildlife Habitat Assessment

Hello Mr. Clark:

Thank you for sending this information on the proposed expansion of the TASWA Disposal and Recycling Facility in Grayson County, Texas. The biological assessment for the proposed project indicates you have determined the project would have no effect on federally listed species. For projects that are determined to have no effect on federally listed species, section 7 consultation under the Endangered Species Act is not required. We recommend the information in the assessment, as well as any other information relating to the determination, be provided to the federal action agency and maintained with the project file.

You may also find it useful to use our determination key within our Information for Planning and Consultation (IPaC) website. The determination key will lead you through a series of questions that can assist you in determining potential effects of a project on federally listed species. The Determination Key will also give you the option to download a letter documenting your coordination with this office. You can find the Determination Key feature by logging into the project home where you obtained the original species list from our IPaC system and then clicking "start review" as shown in the box below.

Please let me know if you have any questions. Thank you.



David Clark

From: Khan, Jennifer M [redacted]
Sent: Tuesday, July 5, 2022 1:18 PM
To: David Clark
Subject: RE: [EXTERNAL] Threatened and Endangered Species - Wildlife Habitat Assessment

Hello Mr. Clark:

Thank you for sending this information on the proposed expansion of the TASWA Disposal and Recycling Facility in Grayson County, Texas. The biological assessment for the proposed project indicates you have determined the project would have no effect on federally listed species. For projects that are determined to have no effect on federally listed species, section 7 consultation under the Endangered Species Act is not required. We recommend the information in the assessment, as well as any other information relating to the determination, be provided to the federal action agency and maintained with the project file.

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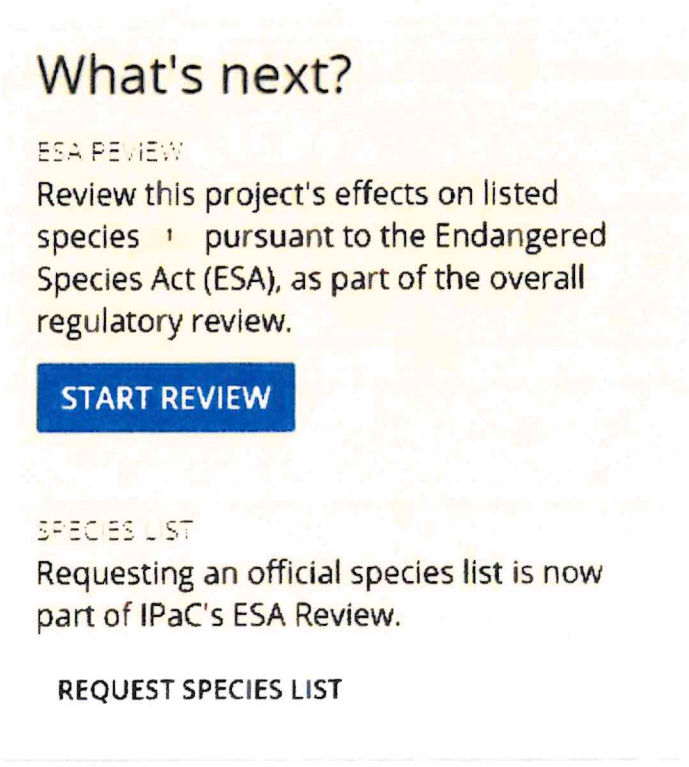
Please let me know if you have any questions. Thank you.



Jen M. Khan
Fish & Wildlife Biologist
U.S. Fish & Wildlife Service
2005 NE Green Oaks Blvd, Suite 140
Arlington, Texas 76006
(817) 277-1100 ext. 22105

From: Arlington ES, FW2[redacted]
Sent: Friday, June 24, 2022 3:27 PM
To: Khan, Jennifer M[redacted]
Subject: Fw: [EXTERNAL] Threatened and Endangered Species - Wildlife Habitat Assessment

Please review and advise. Thanks.

From: David Clark[redacted]
Sent: Friday, June 24, 2022 3:19 PM
To: Arlington ES, FW2[redacted]
Subject: [EXTERNAL] Threatened and Endangered Species - Wildlife Habitat Assessment

This email has been received from outside of DOI - Use caution before clicking on links, opening attachments, or responding.

On behalf of the Texoma Solid Waste Authority (TASWA), Biggs & Mathews Environmental, Inc. is preparing a permit amendment application to expand the existing TASWA Disposal and Recycling Facility (TCEQ Permit MSW 2290) located in Grayson County, Texas. The amendment application will request a vertical and horizontal expansion of the existing waste disposal boundary. The purpose of this correspondence is to document coordination with the Texas Parks and Wildlife Department consistent with the requirements of the municipal solid waste regulations, 30 Texas Administrative Code Chapter 330 (30 TAC §330.61(n)) for locations and specific data relating to endangered and threatened species in Texas.
A site-specific habitat assessment has been completed and the draft report is attached for your review and concurrence. A hard copy of the attached correspondence will also be sent to the Arlington office address.
If you need any additional information or have any questions, please do not hesitate to contact me.
Thanks for your assistance,
Clark

David Clark
Biggs and Mathews Env.
1700 Robert Road, Ste 100
Mansfield, TX 76063

APPENDIX IIF
TEXAS HISTORICAL COMMISSION DOCUMENTATION

TEXAS HISTORICAL COMMISSION

REQUEST FOR SHPO CONSULTATION:
Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas

Please see instructions for completing this form and additional information on Section 106 and Antiquities Code consultation on the Texas Historical Commission website at http://www.thc.state.tx.us/crm/crmsend.shtml.

☒ This is a new submission.

☐ This is additional information relating to THC tracking number(s): _____

Project Information

PROJECT NAME
Permit Amendment Application - TASWA Disposal and Recycling Facility

PROJECT ADDRESS	PROJECT CITY	PROJECT ZIP CODE(S)
25090 State Highway 56	**Whitesboro**	**76273**

PROJECT COUNTY OR COUNTIES
Grayson

PROJECT TYPE (Check all that apply)

☐ Road/Highway Construction or Improvement	☐ Repair, Rehabilitation, or Renovation of Structure(s)
☒ Site Excavation	☐ Addition to Existing Structure(s)
☐ Utilities and Infrastructure	☐ Demolition or Relocation of Existing Structure(s)
☒ New Construction	☐ None of these

BRIEF PROJECT DESCRIPTION: Please explain the project in one or two sentences. More details should be included as an attachment to this form.
Site is an existing Type I Municipal Solid Waste landfill (TCEQ Permit MSW 2290) that is being expanded. A cultural survey of the property was conducted by Geo-Marine, Inc. and a report dated July 2000 was submitted to the THC during the initial permitting process. The waste boundary limit is being expanded within the same property as originally permitted.

Project Contact Information

PROJECT CONTACT NAME	TITLE	ORGANIZATION
David Clark	**Engineer**	**Biggs and Mathews Env.**

ADDRESS	CITY	STATE	ZIP CODE
1700 Robert Road, Suite 100	**Mansfield**	**TX**	**76063**

PHONE	EMAIL
817-563-1144	[redacted]

Federal Involvement (Section 106 of the National Historic Preservation Act)

Does this project involve approval, funding, permit, or license from a federal agency?

☐ Yes (Please complete this section) ☒ No (Skip to next section)

FEDERAL AGENCY	FEDERAL PROGRAM, FUNDING, OR PERMIT TYPE
CONTACT PERSON	PHONE
ADDRESS	EMAIL

State Involvement (Antiquities Code of Texas)

Does this project occur on land or property owned by the State of Texas or a political subdivision of the state?

☐ Yes (Please complete this section) ☒ No (Skip to next section)

CURRENT OR FUTURE OWNER OF THE PUBLIC LAND	
CONTACT PERSON	PHONE
ADDRESS	EMAIL

Identification of Historic Properties: Archeology

Does this project involve ground-disturbing activity?

☑ Yes (Please complete this section) ☐ No (Skip to next section)

Describe the nature of the ground-disturbing activity, including but not limited to depth, width, and length.

Site is an existing landfill facility with excavation to a depth of approximately 90 feet over the waste footprint boundary of approximately 385 acres. Earth stockpiles may be placed on adjacent areas within the property boundary. Site plans showing the property, permit and waste boundaries are attached.

Describe the previous and current land use, conditions, and disturbances.

Site has been operated as a landfill since 2005. Prior to development of the property as a landfill, the property was mainly agricultural.

Identification of Historic Properties: Structures

Does the project area or area of potential effects include buildings, structures, or designed landscape features (such as parks or cemeteries) that are 45 years of age or older?

☐ Yes (Please complete this section) ☑ No (Skip to next section)

Is the project area or area of potential effects within or adjacent to a property or district that is listed in or eligible for listing in the National Register of Historic Places?

☐ Yes, name of property or district: ☑ No ☐ Unknown

In the space below or as an attachment, describe each building, structure, or landscape feature within the project area or area of potential effect that is 45 years of age or older.

ADDRESS	DATE OF CONSTRUCTION	SOURCE FOR CONSTRUCTION DATE
ADDRESS	DATE OF CONSTRUCTION	SOURCE FOR CONSTRUCTION DATE
ADDRESS	DATE OF CONSTRUCTION	SOURCE FOR CONSTRUCTION DATE

Attachments

Please see detailed instructions regarding attachments.

Include the following with each submission:

- ☐ Project Work Description
- ☑ Maps
- ☐ Identification of Historic Properties
- ☐ Photographs

For Section 106 reviews only, also include:

- ☐ Consulting Parties/Public Notification
- ☐ Area of Potential Effects
- ☐ Determination of Eligibility
- ☐ Determination of Effect

Submit completed form and attachments to the address below. Faxes and email are not acceptable.

Mark Wolfe
State Historic Preservation Officer
Texas Historical Commission
P.O. Box 12276, Austin, TX 78711-2276 (mail service)
108 W. 16th Street, Austin, TX 78701 (courier service)

For SHPO Use Only

eTRAC
electronic THC review and compliance

TEXAS HISTORICAL COMMISSION
REAL PLACES TELLING REAL STORIES

Home | Check Reviews | Submit | Abstracts | Shapefiles |

Hello dclark@biggsandmathews.com Log off

Review Request Confirmation

Your request for consultation has been successfully submitted to the Texas Historical Commission.

Project Name
TASWA Disposal and Recycling Facility

Track Number
202211707

Date Received
6/24/2022 4:50:09 PM

Due Date:
7/24/2022 4:50:09 PM (30 Days)

Thank you!

© 2022 - Texas Historical Commission

David Clark

From: [redacted]
Sent: Tuesday, July 12, 2022 8:32 AM
To: David Clark; [redacted]
Subject: Section 106 Submission

TEXAS HISTORICAL COMMISSION
real places telling real stories

Re: THC Courtesy Project Review
THC Tracking #202211707
Date: 07/12/2022
TASWA Disposal and Recycling Facility
25090 State Highway 56
Whitesboro,TX 76273

Description: Site is an existing TCEQ permitted landfill that is expanding the waste fill area.

Dear David Clark:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the Executive Director of the Texas Historical Commission (THC), as a courtesy review only and does not suffice for review under Section 106 of the National Historic Preservation Act or the Antiquities Code of Texas.

The review staff, led by Arlo McKee and Caitlin Brashear, has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-5853 to consult on further actions that may be necessary to protect historic properties.

Archeology Comments

- No historic properties affected. However, if cultural materials are encountered during construction or disturbance activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If the project changes, or if new historic properties are found, please contact the review

staff. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers [redacted]

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

Caitlin Bashear

for Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

APPENDIX IIG
TPDES PERMIT

Water Quality General Permits Search

Summary of Authorization TXR05AH82

Permit Number: TXR05AH82
Authorization Status: ACTIVE
Date Coverage Began: 09/07/2011
Date Coverage Ended:

Authorization Details

Site Name on Permit: TEXOMA AREA SOLID WASTE AUTHORITY LANDFILL
Authorization Type: INDUSTRIAL
Primary SIC Code: 4953
Activity Code : LF
Facility Operational Status : ACTIVE
Hazardous Metals Waiver : NO
Msw Landfill Closed : YES
Sector : L
Outfall Number : 001
SEGMENT NUMBER - 0203
RECEIVING WATER BODY - MUSTANG CREEK
OUTFALL LATITUDE - 33.639864
OUTFALL LONGITUDE - (-96.847537)
DISCHARGE TO MARINE OR FRESH - FRESH WATER

Outfall Number : 002
SEGMENT NUMBER - 0203
RECEIVING WATER BODY - MUSTANG CREEK
OUTFALL LATITUDE - 33.638108
OUTFALL LONGITUDE - (-96.838109)
DISCHARGE TO MARINE OR FRESH - FRESH WATER

Outfall Number : 003
SEGMENT NUMBER - 0203
RECEIVING WATER BODY - MUSTANG CREEK
OUTFALL LATITUDE - 33.635007
OUTFALL LONGITUDE - (-96.827454)
DISCHARGE TO MARINE OR FRESH - FRESH WATER

Outfall Number : 004
SEGMENT NUMBER - 0203
RECEIVING WATER BODY - MUSTANG CREEK
OUTFALL LATITUDE - 33.632947
OUTFALL LONGITUDE - (-96.827605)
DISCHARGE TO MARINE OR FRESH - FRESH WATER

Outfall Number : 005
SEGMENT NUMBER - 0203
RECEIVING WATER BODY - MUSTANG CREEK
OUTFALL LATITUDE - 33.628309
OUTFALL LONGITUDE - (-96.827855)
DISCHARGE TO MARINE OR FRESH - FRESH WATER

Outfall Number : 006
SEGMENT NUMBER - 0203
RECEIVING WATER BODY - MUSTANG CREEK
OUTFALL LATITUDE - 33.624902
OUTFALL LONGITUDE - (-96.828031)
DISCHARGE TO MARINE OR FRESH - FRESH WATER

Permittee Information

Operator: CN600339428 - TEXOMA AREA SOLID WASTE AUTHORITY
Address: 25090 STATE HIGHWAY 56 WHITESBORO TX 76273 4993
Annual Fee Billing Address: JOHN OSTEEN
25090 STATE HIGHWAY 56 WHITESBORO TX 76273 4993

Permitted Site Information

RN: RN100629922
RE Name: TEXOMA AREA SOLID WASTE AUTHORITY LANDFILL
Site Location: 25090 STATE HIGHWAY 56 WHITESBORO TX 76273 4993
County: GRAYSON
TCEQ Region: REGION 04 - DFW METROPLEX
Latitude: 33.717222
Longitude: -96.912777

Regulated Entity Site Information

RE Name: TEXOMA AREA SOLID WASTE AUTHORITY LANDFILL
Site Location: 25090 STATE HIGHWAY 56 WHITESBORO TX 76273 4993
County: GRAYSON
TCEQ Region: REGION 04 - DFW METROPLEX
Latitude: 33.717222
Longitude: -96.912777

Application History for this Authorization

Application Type	Status	Received Date	Final Action Date
NOTICE OF INTENT	APPROVED	09/07/2011	09/07/2011
NOI-RENEWAL	APPROVED	11/01/2016	11/01/2016
NOI-RENEWAL	APPROVED	11/10/2021	11/10/2021

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APPENDIX IIH
FEDERAL AVIATION ADMINISTRATION DOCUMENTATION

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2022-ASW-18834-OE

Issued Date: 10/04/2022

David Clark
Biggs and Mathews Environmental
1700 Robert Road
Suite 100
Mansfield, TX 76063

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Existing Municipal Solid Waste Landfill TASWA Disposal and Recycling Facility
Location:	Whitesboro, TX
Latitude:	33-37-57.24N NAD 83
Longitude:	96-49-43.20W
Heights:	731 feet site elevation (SE) 394 feet above ground level (AGL) 1125 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 M, Obstruction Marking and Lighting, red lights-Chapters 4,5(Red),&15.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

This determination expires on 04/04/2024 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (817) 222-5933, or andrew.hollie@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2022-ASW-18834-OE.

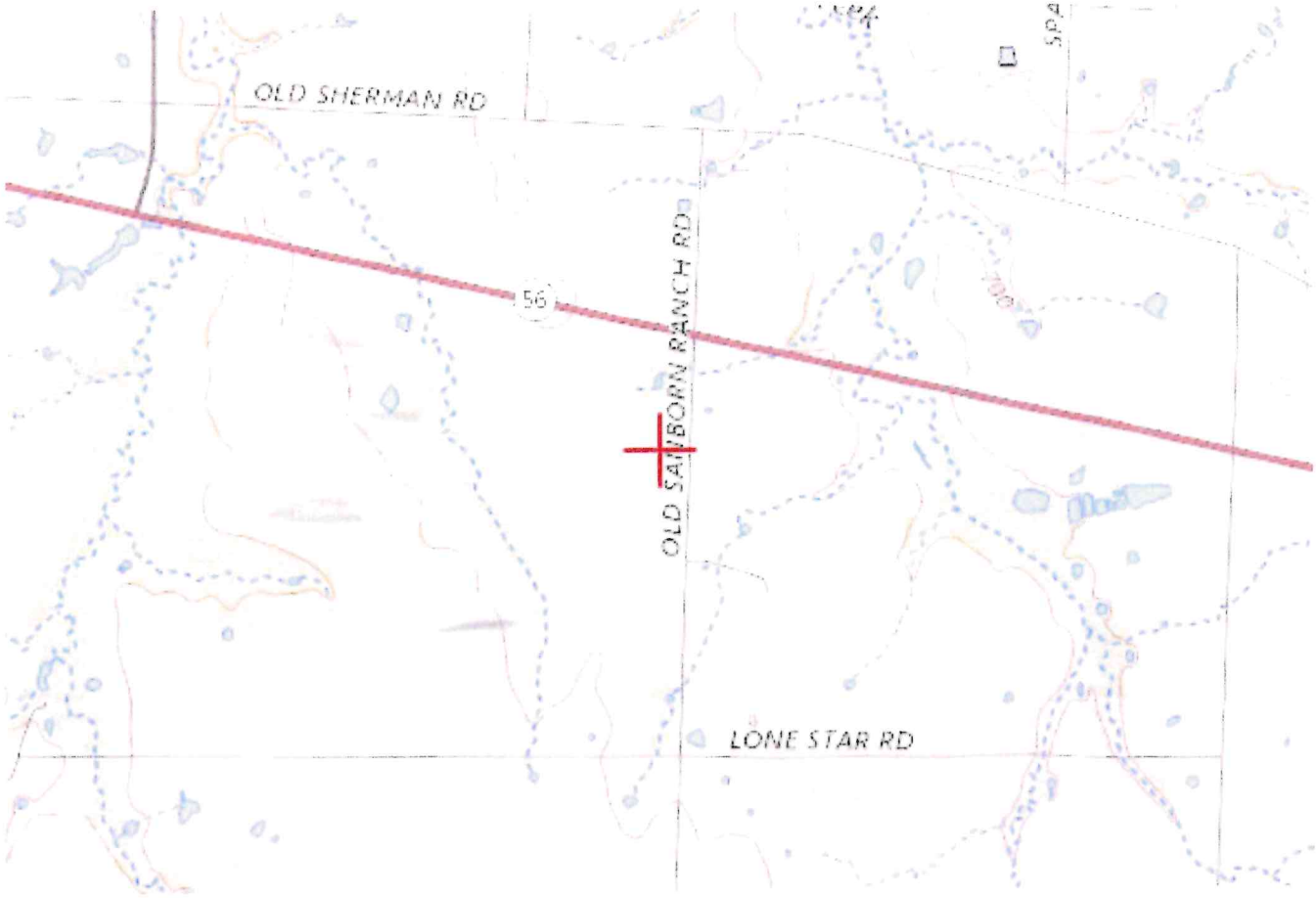
Signature Control No: 552255723-556445638 (DNE)
Andrew Hollie
Specialist

Attachment(s)
Case Description
Map(s)

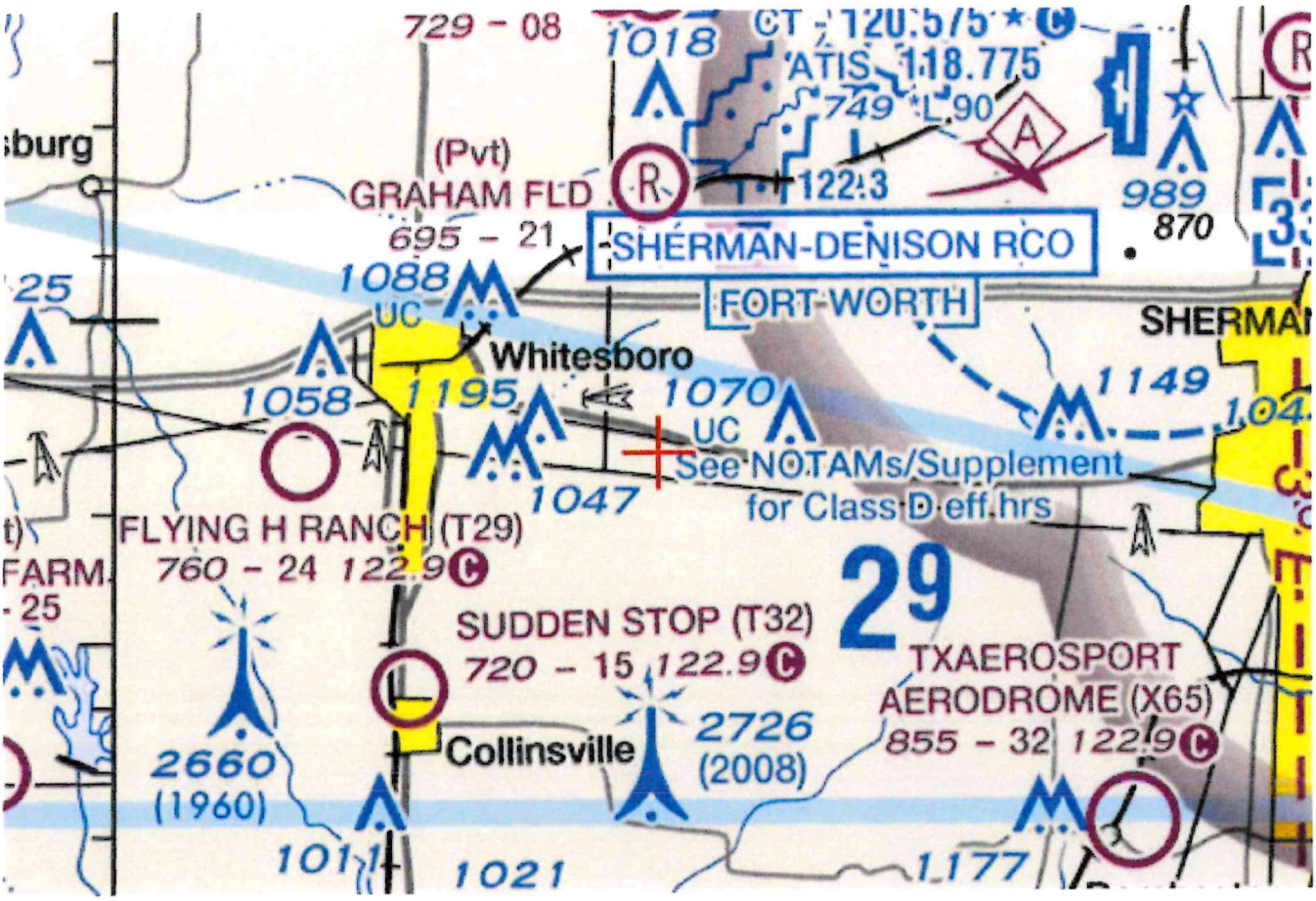
Case Description for ASN 2022-ASW-18834-OE

TASWA DRF is requesting a permit amendment from the TCEQ to increase the waste fill height from 835 ft msl to 1125 ft msl.

TOPO Map for ASN 2022-ASW-18834-OE



Sectional Map for ASN 2022-ASW-18834-OE



Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2022-ASW-18837-OE

Issued Date: 10/04/2022

David Clark
Biggs and Mathews Environmental
1700 Robert Road
Suite 100
Mansfield, TX 76063

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Existing Municipal Solid Waste Landfill TASWA Disposal and Recycling Facility
Location:	Whitesboro, TX
Latitude:	33-38-02.34N NAD 83
Longitude:	96-50-40.29W
Heights:	757 feet site elevation (SE)
	361 feet above ground level (AGL)
	1118 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 M, Obstruction Marking and Lighting, red lights-Chapters 4,5(Red),&15.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

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(b) extended, revised, or terminated by the issuing office.

(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

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This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (817) 222-5933, or [redacted]
On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2022-ASW-18837-OE.

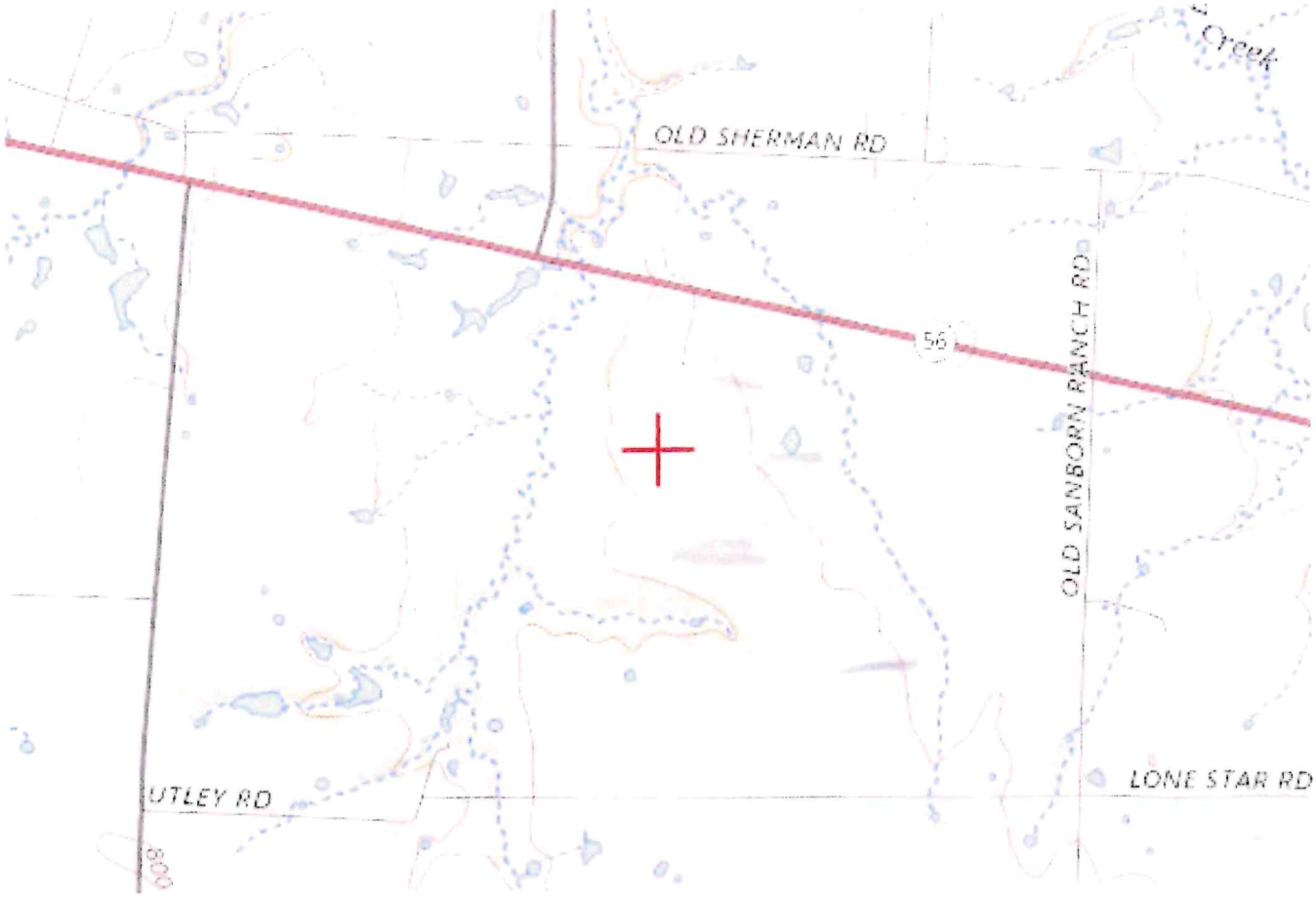
Signature Control No: 552255726-556445639 (DNE)
Andrew Hollie
Specialist

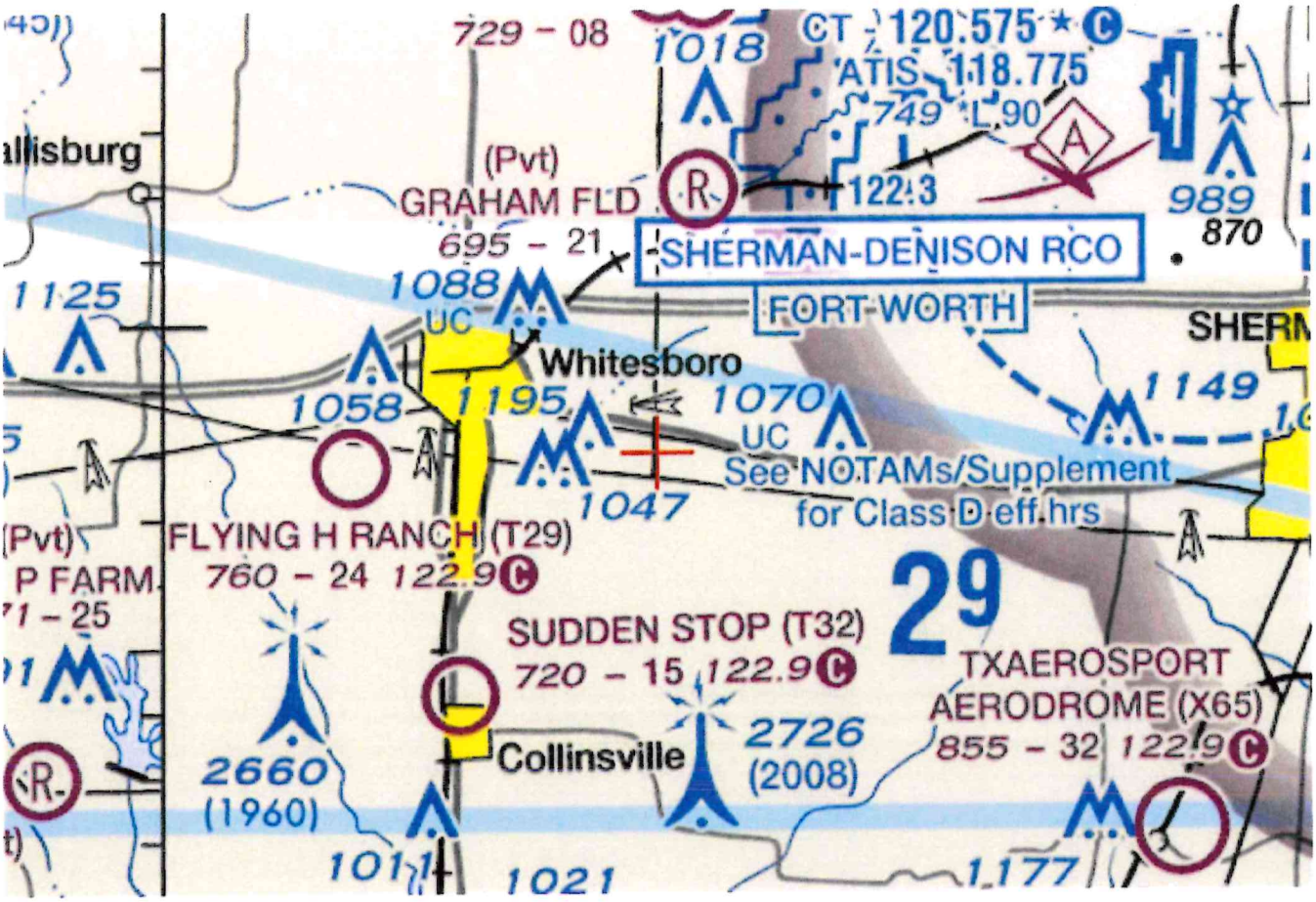
Attachment(s)
Case Description
Map(s)

Case Description for ASN 2022-ASW-18837-OE

TASWA DRF is requesting a permit amendment from the TCEQ to increase the waste fill height from 835 ft msl to 1125 ft msl.

TOPO Map for ASN 2022-ASW-18837-OE

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SUDDEN STOP (T32)
720 – 15 122.9
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AERODROME (X65)
855 – 32 122.9
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Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2022-ASW-18835-OE

Issued Date: 10/04/2022

David Clark
Biggs and Mathews Environmental
1700 Robert Road
Suite 100
Mansfield, TX 76063

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Existing Municipal Solid Waste Landfill TASWA Disposal and Recycling Facility
Location:	Whitesboro, TX
Latitude:	33-37-32.64N NAD 83
Longitude:	96-49-44.39W
Heights:	740 feet site elevation (SE)
	384 feet above ground level (AGL)
	1124 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 M, Obstruction Marking and Lighting, red lights-Chapters 4,5(Red),&15.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the project is abandoned or:

_____ At least 10 days prior to start of construction (7460-2, Part 1)
__X__ Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

This determination expires on 04/04/2024 unless:

(a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
(b) extended, revised, or terminated by the issuing office.

(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (817) 222-5933, or [redacted]
On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2022-ASW-18835-OE.

Signature Control No: 552255724-556445640 (DNE)
Andrew Hollie
Specialist

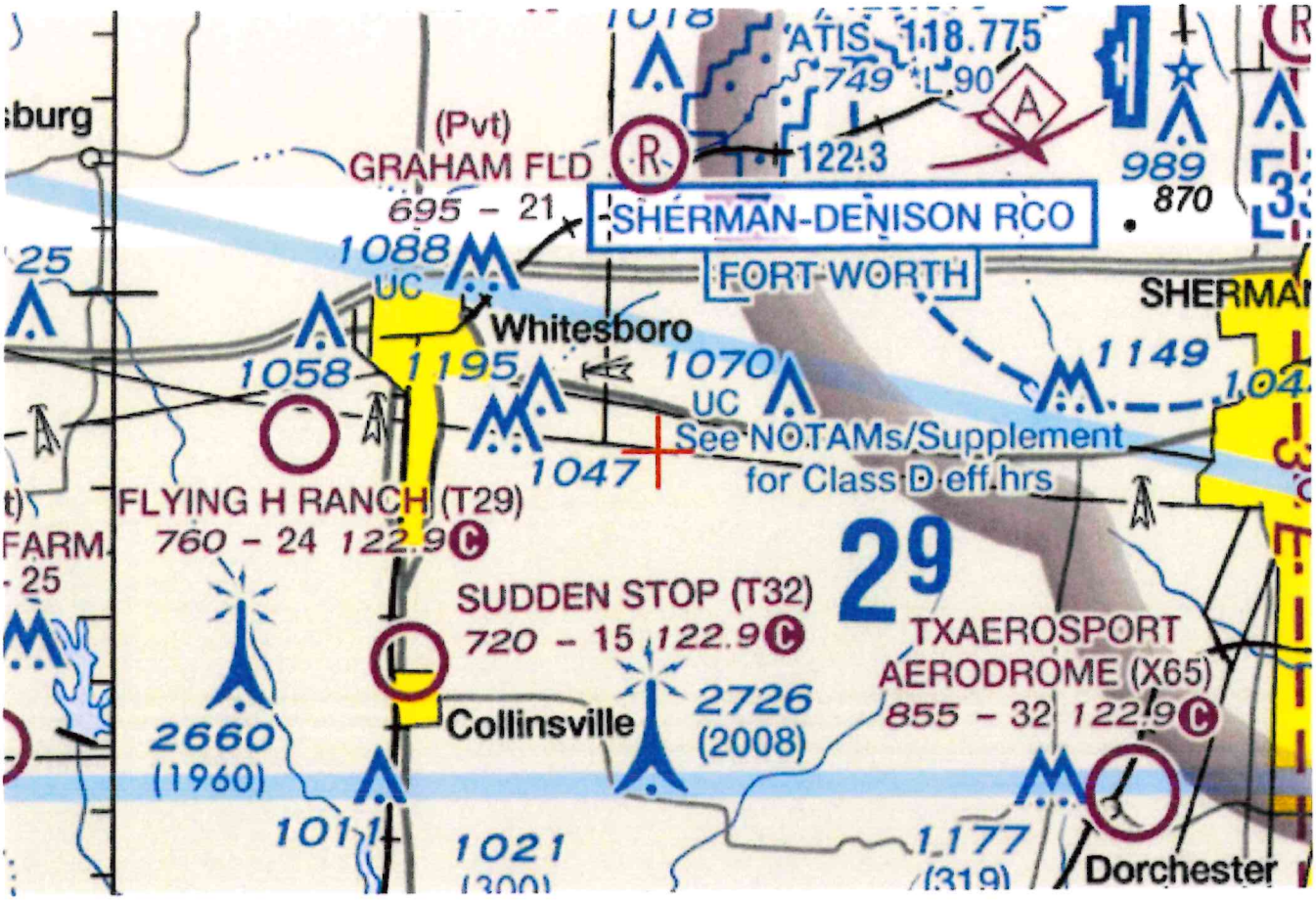
Attachment(s)
Case Description
Map(s)

Case Description for ASN 2022-ASW-18835-OE

TASWA DRF is requesting a permit amendment from the TCEQ to increase the waste fill height from 835 ft msl to 1125 ft msl.

TOPO Map for ASN 2022-ASW-18835-OE

Sectional Map for ASN 2022-ASW-18835-OE



Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2022-ASW-18836-OE

Issued Date: 10/04/2022

David Clark
Biggs and Mathews Environmental
1700 Robert Road
Suite 100
Mansfield, TX 76063

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Existing Municipal Solid Waste Landfill TASWA Disposal and Recycling Facility
Location:	Whitesboro, TX
Latitude:	33-37-25.50N NAD 83
Longitude:	96-50-41.63W
Heights:	778 feet site elevation (SE)
	347 feet above ground level (AGL)
	1125 feet above mean sea level (AMSL)

This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a hazard to air navigation provided the following condition(s), if any, is(are) met:

As a condition to this Determination, the structure is to be marked/lighted in accordance with FAA Advisory circular 70/7460-1 M, Obstruction Marking and Lighting, red lights-Chapters 4,5(Red),&15.

Any failure or malfunction that lasts more than thirty (30) minutes and affects a top light or flashing obstruction light, regardless of its position, should be reported immediately to (877) 487-6867 so a Notice to Airmen (NOTAM) can be issued. As soon as the normal operation is restored, notify the same number.

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(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

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If we can be of further assistance, please contact our office at (817) 222-5933, or [redacted]
On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2022-ASW-18836-OE.

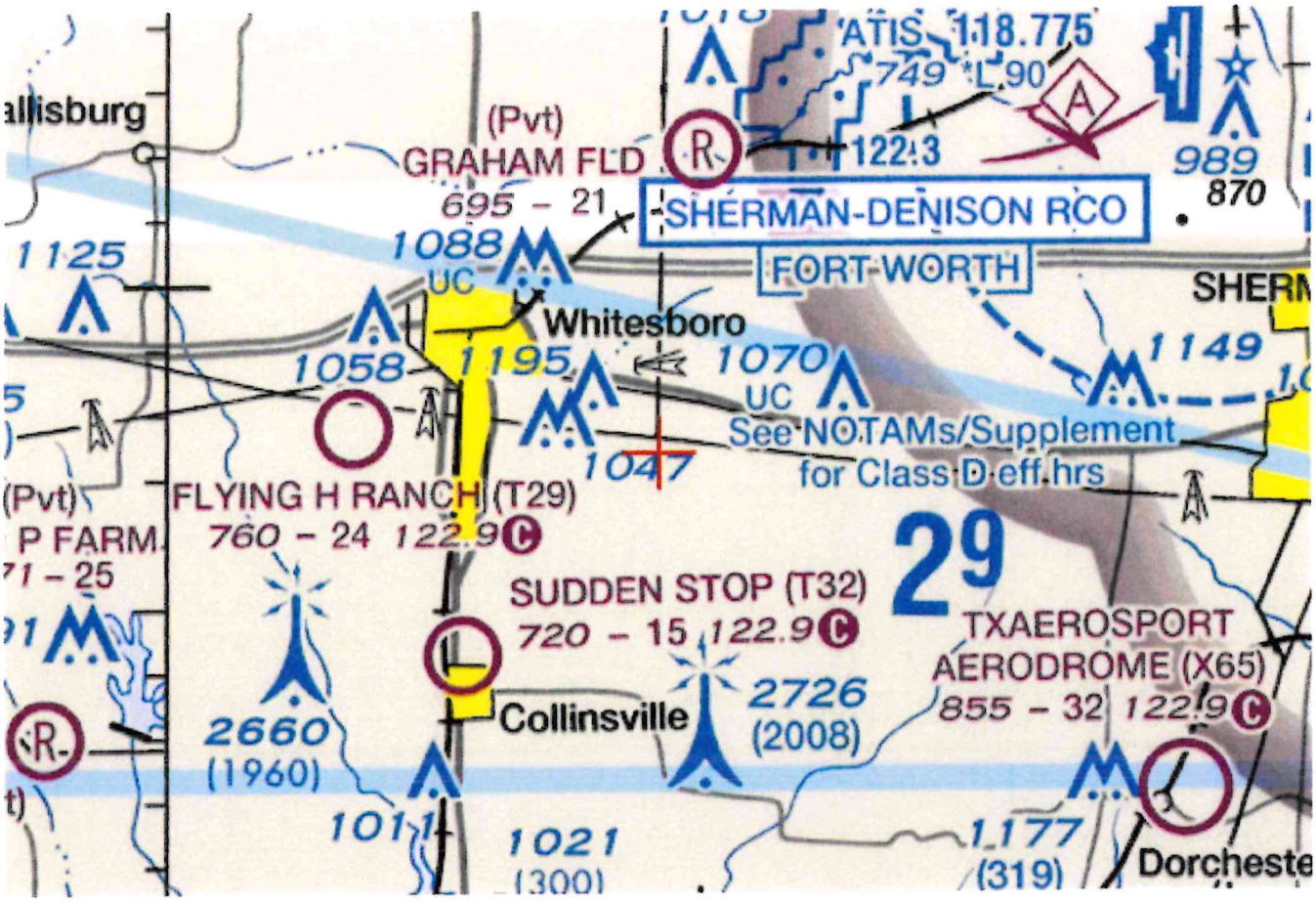
Signature Control No: 552255725-556445641 (DNE)
Andrew Hollie
Specialist

Attachment(s)
Case Description
Map(s)

Case Description for ASN 2022-ASW-18836-OE

TASWA DRF is requesting a permit amendment from the TCEQ to increase the waste fill height from 835 ft msl to 1125 ft msl.

TOPO Map for ASN 2022-ASW-18836-OE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APPENDIX IIJ
WASTE ACCEPTANCE PLAN FORM TYPE I AND TYPE I AE LANDFILL FACILITIES

iv. ☐ Yes ☑ No Waste from commercial air pollution control devices [§330.171(b), §330.3(148)(G), §330.331(e)]

v. ☐ Yes ☑ No Tanks, drums, or containers that were used for shipping or storing any material that has been listed as a hazardous constituent in 40 CFR Part 261, Appendix VII but has not been listed as a commercial chemical product in 40 CFR §261.33(e) or (f) [§330.171(b), §330.3(148)(G)]

vi. ☐ Yes ☑ No Drugs, other than those contained in normal household waste [§330.171(b), §330.3(148)(J)]

vii. ☐ Yes ☑ No Contaminated foods, other than those contained in normal household waste [§330.171(b), §330.3(148)(J)]

viii. ☐ Yes ☑ No Contaminated beverages, other than those contained in normal household waste [§330.171(b), §330.3(148)(J)]

ix. ☑ Yes ☐ No Empty containers that have been used for pesticide, herbicide, fungicide, or rodenticide, that have been triple-rinsed before receipt at the landfill, are rendered unusable before receipt or on arrival, and are covered by the end of the same working day they are received [§330.171(c)(5)(A)]

x. ☑ Yes ☐ No Empty containers for which triple-rinsing is not feasible or practical (e.g. paper bags, cardboard containers) that are managed as a municipal hazardous waste from a conditionally exempt small quantity generator or in accordance with requirements for disposal of industrial wastes [§330.171(c)(5)(B), §330.171(c)(6), §330.173]

xi. ☐ Yes ☑ No Regulated asbestos-containing material (RACM) [40 CFR 261, §330.171(c)(3), §330.3(126)]

xii. ☑ Yes ☐ No Non-regulated asbestos-containing material (non-RACM) [40 CFR 261, §330.171(c)(4), §330.3(93)]

xiii. ☐ Yes ☑ No Incinerator ash [§330.3(148)(M), §330.171(b)]

xiv. ☐ Yes ☑ No Soil contaminated by petroleum products, crude oils, or chemicals in concentrations of greater than 1,500 mg/kg total petroleum hydrocarbons; or contaminated by constituents of concern that exceed the concentrations listed in §335.521(a)(1) [§330.3(148)(N), §330.171(b)(4)] (may be accepted at Type I landfills with Class 1 cells. [§330.331(e)] (Excluded from Type I AE. [§330.173(a)])

xv. ☑ Yes ☐ No Household-generated used oil filters that have been crushed to less than 20% of original volume or processed by a method other than crushing to remove all free-flowing used oil. The processing method may include (1) having the filter separated into component parts and free-flowing used oil removed from the filter element by compression; (2) having a replaceable filter medium that has been compressed to remove free-flowing used oil; **or** (3) having a housing that has been punctured and the filter drained for at least 24 hours. [§330.171(d)].

xvi. ☐ Yes ☑ No Waste from oil, gas, and geothermal activities subject to regulation by the Railroad Commission of Texas) [§330.171(b), §330.3(148)(P)]

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

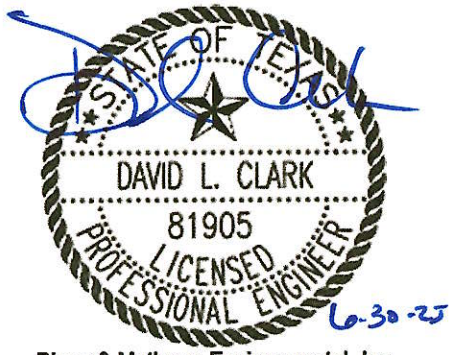
PERMIT AMENDMENT APPLICATION

VOLUME 2 OF 4

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised March 2025
Revised June 2025



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-256

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

VOLUME 2 OF 4

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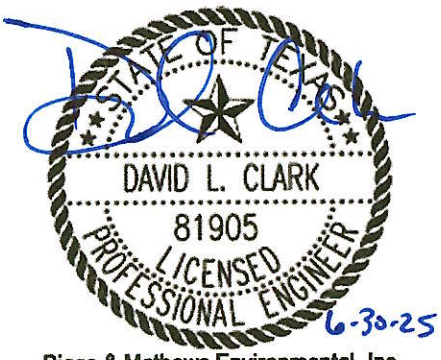
PART III FACILITY INVESTIGATION AND DESIGN

Attachment A – Site Development Plan Narrative
Attachment B – General Facility Design
Attachment C – Facility Surface Water Drainage Report
Attachment D – Waste Management Unit Desigh



Biggs & Mathews Environmental, Inc.
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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

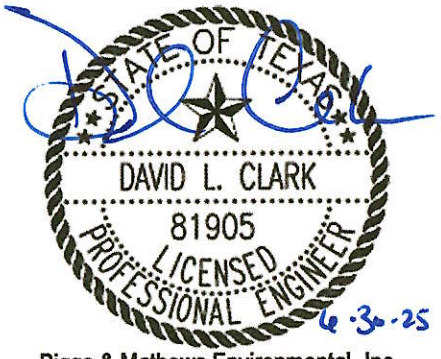
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised March 2025
Revised June 2025



Biggs & Mathews Environmental, Inc.
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TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

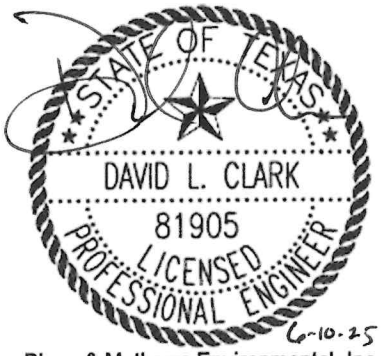
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT B
GENERAL FACILITY DESIGN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

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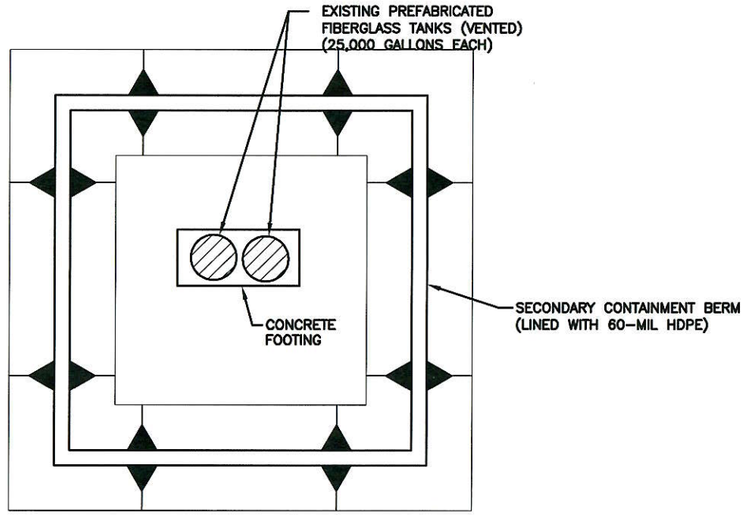
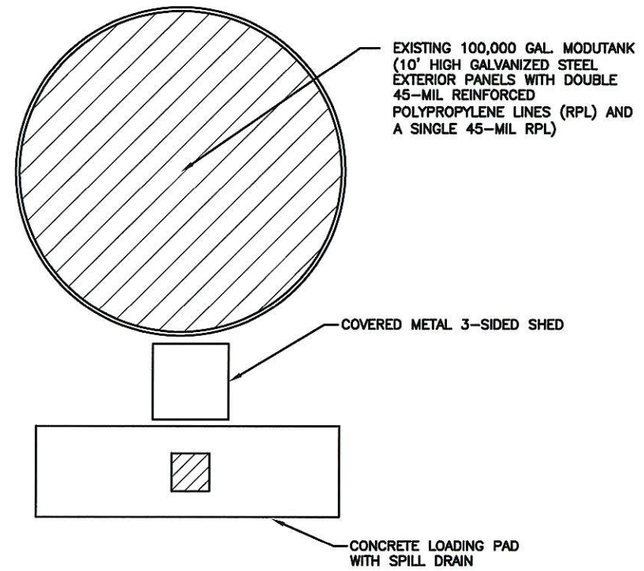
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

APPENDIX B1





LEACHATE STORAGE FACILITY PLAN 1/B.3

STATE OF TEXAS
DAVID L. CLARK
81905
LICENSED
PROFESSIONAL ENGINEER
6-10-25

ISSUED FOR PERMITTING PURPOSES ONLY

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TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

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B.3

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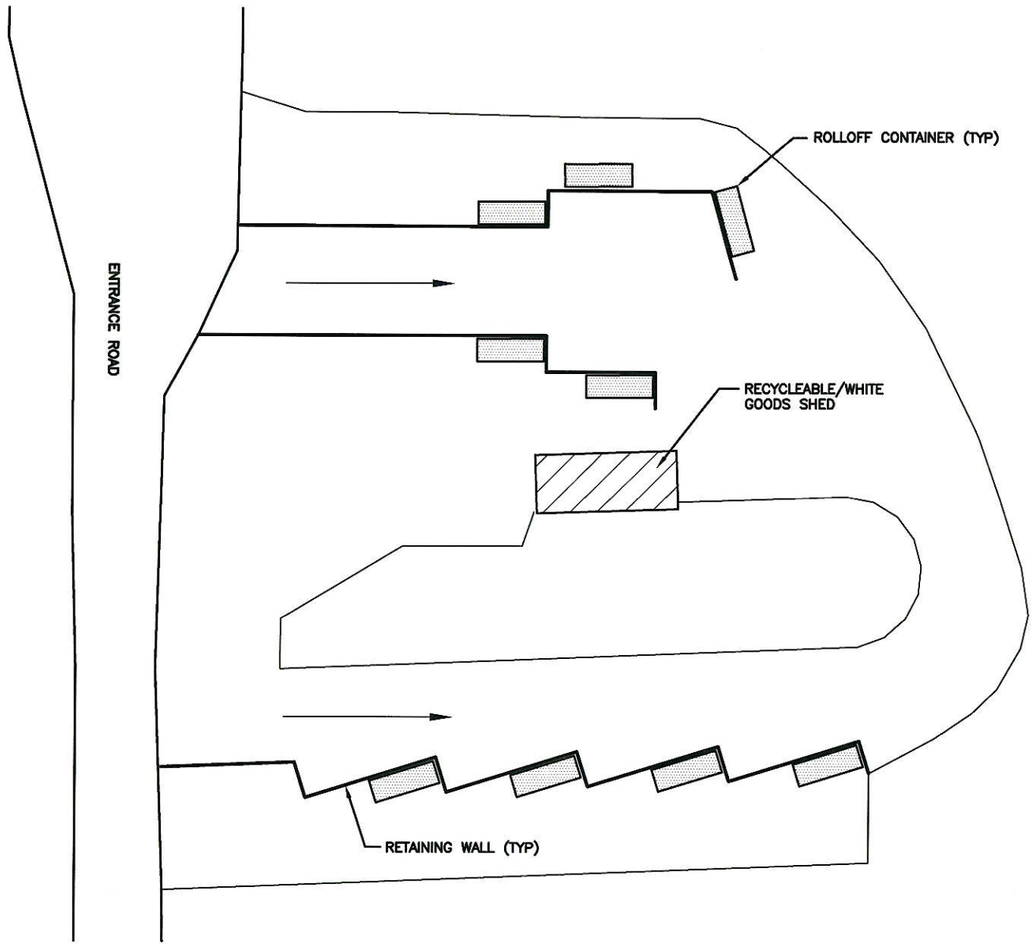

CITIZEN'S CONVENIENCE CENTER 1/B.4

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SCALE IN FEET

STATE OF TEXAS
DAVID L. CLARK
81905
LICENSED
PROFESSIONAL ENGINEER
6-10-25

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS			
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REV	DATE	DESCRIPTION	DWN BY

CITIZEN'S CONVENIENCE CENTER SCHEMATIC

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

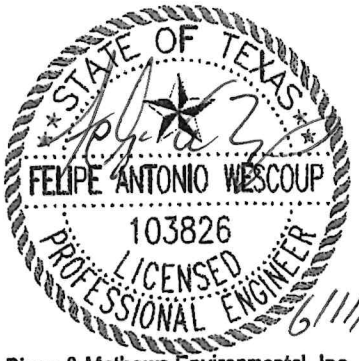
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT C
FACILITY SURFACE WATER DRAINAGE REPORT

Prepared for

Texoma Area Solid Waste Authority, Inc.

February 2025
Revised June 2025



6/11/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

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FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

6/11/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

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Attachment C1 Drainage Analysis and Design
Attachment C2 Flood Control Analysis
Attachment C3 Drainage System Plans and Details

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

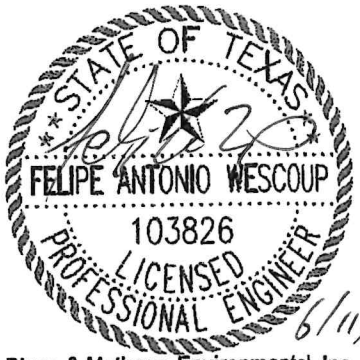
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT C1
DRAINAGE ANALYSIS AND DESIGN

Prepared for

Texoma Area Solid Waste Authority

February 2025
Revised June 2025



6/11/2025

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Firm Registration No. F-256

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TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

6/11/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

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1 INTRODUCTION 1

2 METHODOLOGY 3

3 CURRENT PERMITTED CONDITIONS 6

4 POSTDEVELOPMENT CONDITIONS 8

5 PROPOSED DRAINAGE SYSTEM DESIGN 10

6 EROSION AND SEDIMENTATION CONTROL 12

7 CURRENT PERMITTED/POSTDEVELOPMENT COMPARISON 15

8 CONCLUSIONS 16

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APPENDIX C1B
Current Permitted Hydrologic Calculations

APPENDIX C1C
Postdevelopment Hydrologic Calculations

APPENDIX C1D
Perimeter Drainage System Design

APPENDIX C1E
Final Cover Drainage Structure Design

APPENDIX C1F
Intermediate Cover Erosion and Sedimentation Control Plan

APPENDIX C1G
Intermediate Cover Erosion Control Structure Design

4 POSTDEVELOPMENT CONDITIONS

Drawing C1-A-2 of Appendix C1A delineates the postdevelopment drainage areas that contribute runoff to the proposed permit boundary. Peak discharges at the comparison points along the proposed permit boundary, as shown on Drawing C1-A-2, were determined for the postdevelopment condition. Refer to Appendix C1C for postdevelopment hydrology calculations.

As in the current permitted condition:

Stormwater runoff does not enter the TASWA DRF permit boundary. The major portion of the stormwater runoff from the TASWA DRF enters unnamed tributaries of Mustang Creek at one location along the northern permit boundary. There is a second runoff location along the norther permit boundary just west of the primary runoff location. A minor portion of the stormwater runoff exits at four locations along the eastern permit boundary. The remaining portion of the stormwater runoff exits at four locations along the the western permit boundary.

There is an increase in runoff volume from the current permitted to post-development conditions at comparison points CP2, CP6, CP7, and CP8. This is primarily attributed to the increase in Curve Number (CN) values for the post-developed condition. In the current permitted condition, undeveloped areas have a CN value of 84. In the post-development condition, a CN value of 85 to 87 is used for all final cover areas in accordance with TCEQ guidance. The TCEQ has determined this CN value to be appropriate for landfill final cover systems as noted in RG-417. This increase in CN values results in reduced infiltration and greater surface runoff.

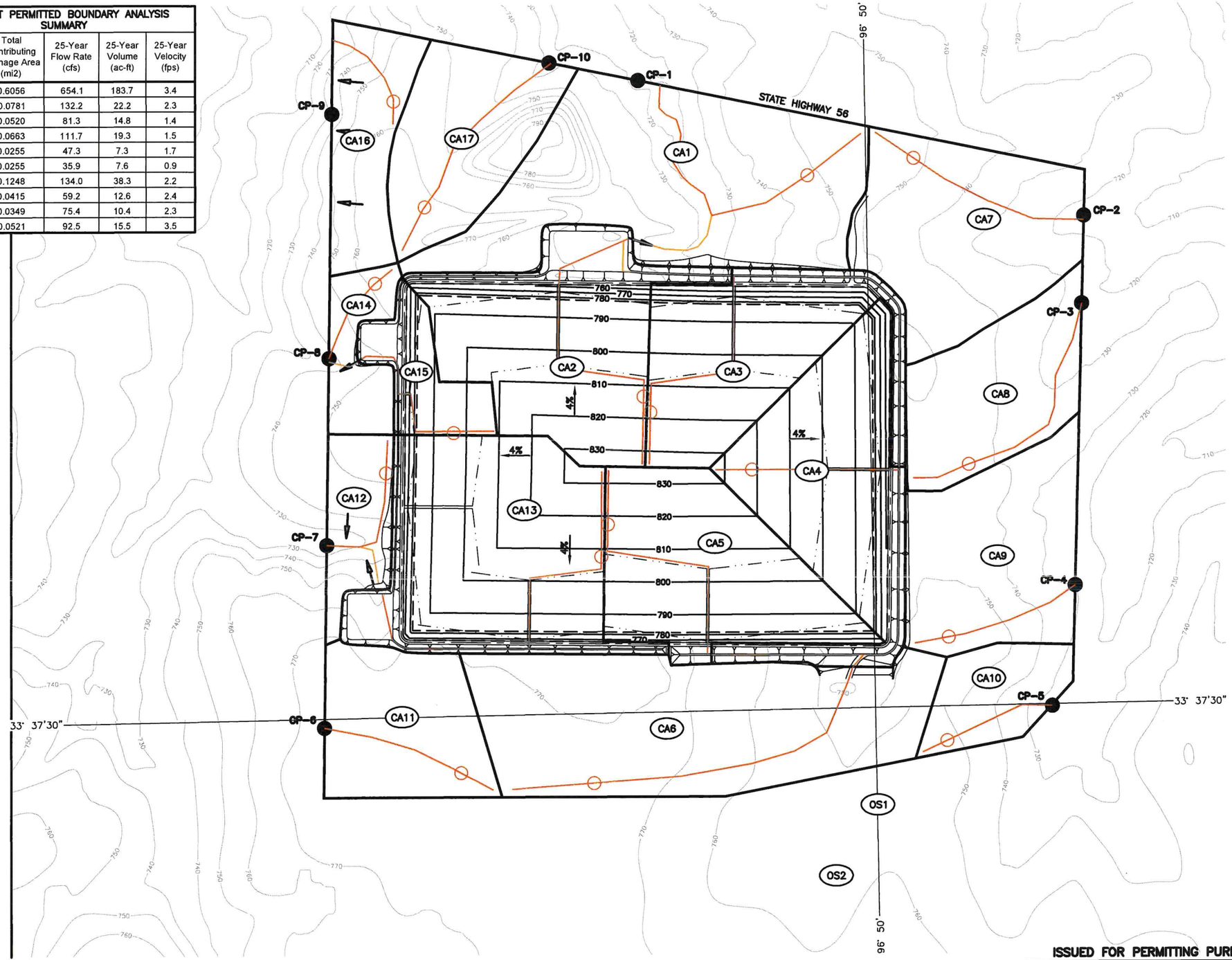
The runoff volume from CP2 drains to a TxDOT bar ditch, and then to a large tributary of Mustang Creek; the runoff volume from CP6, CP7, and CP8 drains into a large tributary of Mustang Creek. There are no water impoundments between the permit boundary and the tributaries that would be affected by the increased volumes, and because there is no increase in flow rate, no conveyances are adversely impacted. Despite this increase in runoff volume, the proposed drainage system design, including the strategically sized detention ponds with controlled release rates, ensures that the discharge from the site does not adversely alter existing drainage patterns at the permit boundary or in receiving streams. The detention ponds are designed to capture the increased volume and release it at a controlled rate that mimics pre-development flow conditions, thereby maintaining the natural drainage patterns downstream of the facility.

The locations where stormwater enters and exits the permit boundary are further discussed below in Table 2.

ATTACHMENT C1
APPENDIX C1A

CURRENT PERMITTED/POSTDEVELOPMENT COMPARISON

CURRENT PERMITTED BOUNDARY ANALYSIS SUMMARY				
Comparison Point	Total Contributing Drainage Area (mi2)	25-Year Flow Rate (cfs)	25-Year Volume (ac-ft)	25-Year Velocity (fps)
CP1	0.6056	654.1	183.7	3.4
CP2	0.0781	132.2	22.2	2.3
CP3	0.0520	81.3	14.8	1.4
CP4	0.0663	111.7	19.3	1.5
CP5	0.0255	47.3	7.3	1.7
CP6	0.0255	35.9	7.6	0.9
CP7	0.1248	134.0	38.3	2.2
CP8	0.0415	59.2	12.6	2.4
CP9	0.0349	75.4	10.4	2.3
CP10	0.0521	92.5	15.5	3.5



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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290 LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 800 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- CA01 DRAINAGE AREA DESIGNATION
- COMPARISON POINT–POINT DISCHARGE
- COMPARISON POINT–SHEET FLOW (NON–POINT DISCHARGE)

NOTE(S):

1. USGS CONTOURS DOWNLOADED FROM USGS WEBSITE ON MARCH 25, 2024.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.
4. DRAINAGE AREAS CONTRIBUTING TO EACH COMPARISON POINT ARE LISTED ON TABLE 1 – CURRENT PERMITTED BOUNDARY ANALYSIS SUMMARY IN SECTION 3 OF ATTACHMENT C1.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED
PROFESSIONAL ENGINEER

6/11/2025

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

CURRENT PERMITTED BOUNDARY ANALYSIS SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DISPOSAL AND RECYCLING FACILITY PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817–563–1144
TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

C1A.1

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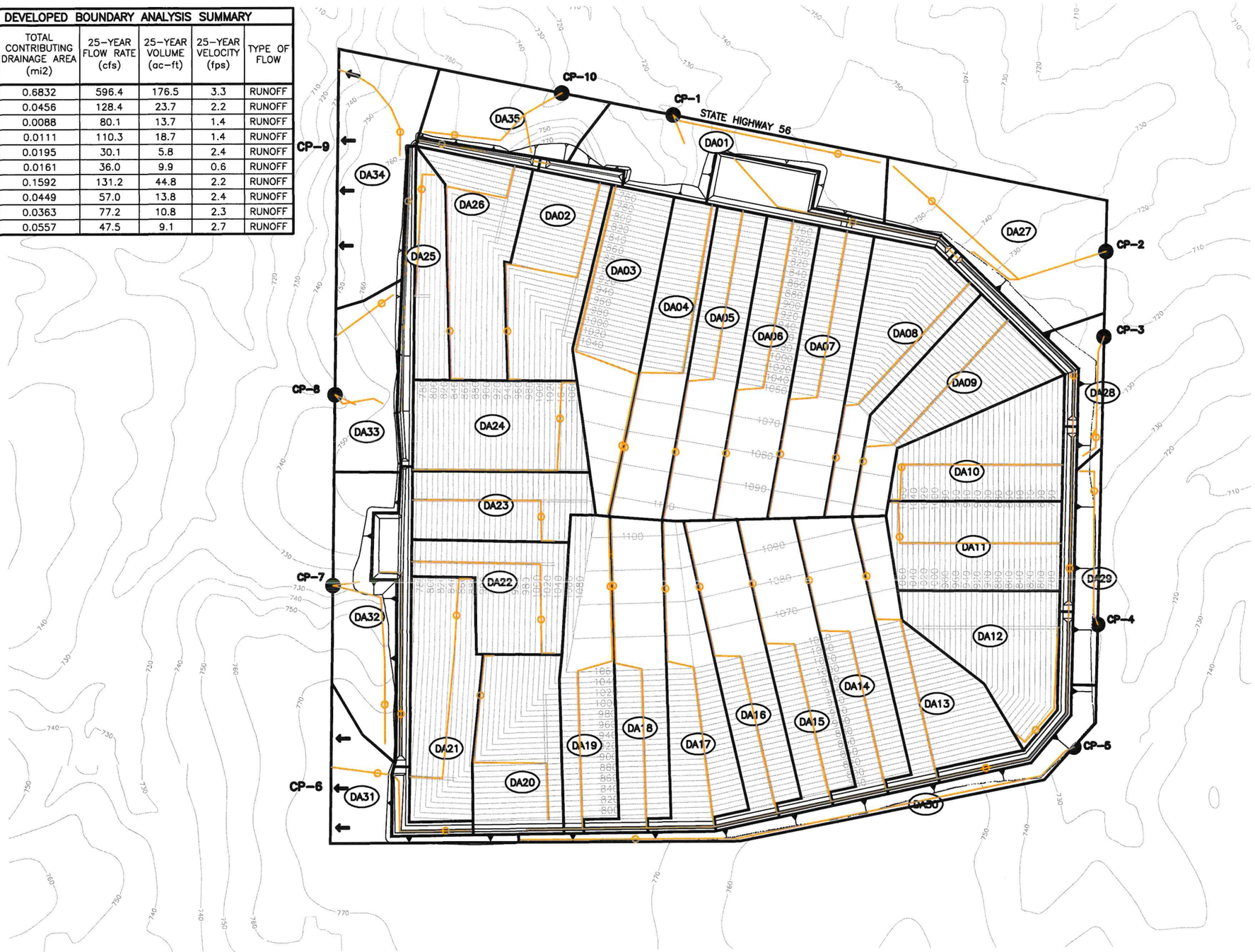
POST DEVELOPED BOUNDARY ANALYSIS SUMMARY					
BOUNDARY COMPARISON POINT	TOTAL CONTRIBUTING DRAINAGE AREA (mi2)	25-YEAR FLOW RATE (cfs)	25-YEAR VOLUME (ac-ft)	25-YEAR VELOCITY (fps)	TYPE OF FLOW
CP1	0.6832	596.4	176.5	3.3	RUNOFF
CP2	0.0456	128.4	23.7	2.2	RUNOFF
CP3	0.0088	80.1	13.7	1.4	RUNOFF
CP4	0.0111	110.3	18.7	1.4	RUNOFF
CP5	0.0195	30.1	5.8	2.4	RUNOFF
CP6	0.0161	36.0	9.9	0.6	RUNOFF
CP7	0.1592	131.2	44.8	2.2	RUNOFF
CP8	0.0449	57.0	13.8	2.4	RUNOFF
CP9	0.0363	77.2	10.8	2.3	RUNOFF
CP10	0.0557	47.5	9.1	2.7	RUNOFF



0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LIMIT OF WASTE
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- CA02 DRAINAGE AREA DESIGNATION
- COMPARISON POINT-POINT DISCHARGE
- COMPARISON POINT-SHEET FLOW (NON-POINT DISCHARGE)

NOTE(S):

1. USGS CONTOURS DOWNLOADED FROM USGS WEBSITE ON MARCH 25, 2024.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
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REVISIONS			
1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

POST DEVELOPED BOUNDARY ANALYSIS SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BME

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

C1A.2

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CURRENT PERMITTED/POSTDEVELOPED BOUNDARY ANALYSIS SUMMARY TABLE

CURRENT PERMITTED/POSTDEVELOPED BOUNDARY ANALYSIS SUMMARY TABLE

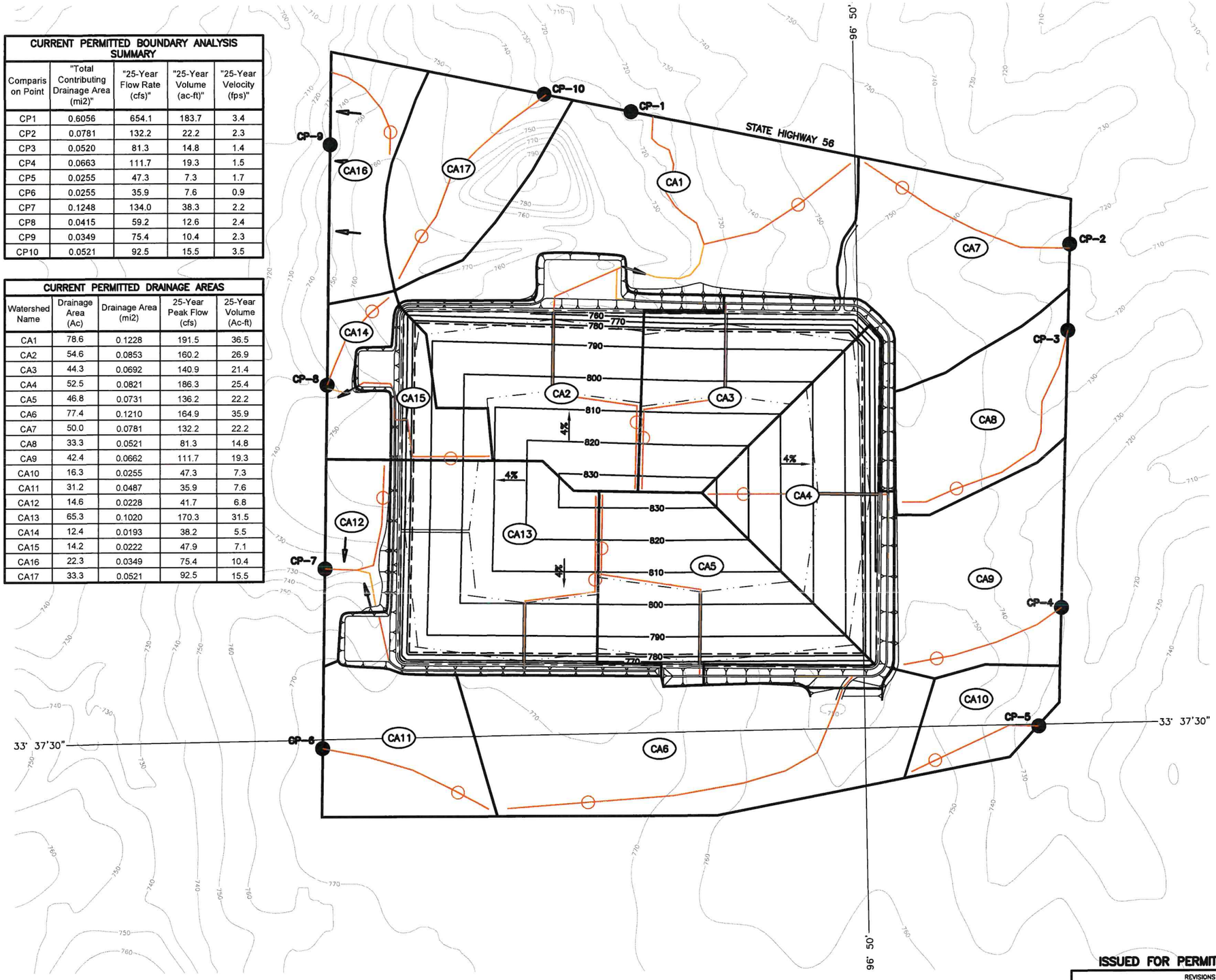
Discharge Point	Total Contributing Drainage Area (mi^2)				25-Year Flow Rate (cfs)				25-Year Volume (Ac-ft)				25-Year Velocity (fps)			
	Current Permitted	Post-Developed	Difference	Percent Difference	Current Permitted	Post-Developed	Difference	Percent Difference	Current Permitted	Post-Developed	Difference	Percent Difference	Current Permitted	Post-Developed	Difference	Percent Difference
CP1	0.6056	0.6832	0.0776	13%	654.1	596.4	-57.7	-9%	183.7	176.5	-7.2	-4%	3.4	3.3	-0.1	-3%
CP2	0.0781	0.0456	-0.0325	-42%	132.2	128.4	-3.8	-3%	22.2	23.7	1.5	7%	2.3	2.3	0.0	-1%
CP3	0.0520	0.0088	-0.0432	-83%	81.3	80.1	-1.2	-1%	14.8	13.7	-1.1	-7%	1.4	1.4	0.0	-1%
CP4	0.0663	0.0111	-0.0552	-83%	111.7	110.3	-1.4	-1%	19.3	18.7	-0.6	-3%	1.5	1.4	0.0	-1%
CP5	0.0255	0.0195	-0.0060	-24%	47.3	30.1	-17.2	-36%	7.3	5.8	-1.5	-21%	1.7	1.4	-0.3	-16%
CP6	0.0255	0.0161	-0.0094	-37%	35.9	36.0	0.1	0%	7.6	9.9	2.3	30%	0.9	0.6	-0.3	-37%
CP7	0.1248	0.1592	0.0344	28%	134.0	131.2	-2.8	-2%	38.3	44.8	6.5	17%	2.2	2.2	0.0	0%
CP8	0.0415	0.0449	0.0034	8%	59.2	57.0	-2.2	-4%	12.6	13.8	1.2	10%	2.4	2.4	0.0	-1%
CP9	0.0349	0.0363	0.0014	4%	75.4	77.2	1.8	2%	10.4	10.8	0.4	4%	2.3	2.3	0.0	1%
CP10	0.0521	0.0557	0.0036	7%	92.5	47.5	-45.0	-49%	15.5	9.1	-6.4	-41%	3.5	2.7	-0.8	-23%

ATTACHMENT C1
APPENDIX C1B

CURRENT PERMITTED HYDROLOGIC CALCULATIONS

CURRENT PERMITTED BOUNDARY ANALYSIS SUMMARY				
Comparison Point	"Total Contributing Drainage Area (mi2)"	"25-Year Flow Rate (cfs)"	"25-Year Volume (ac-ft)"	"25-Year Velocity (fps)"
CP1	0.6056	654.1	183.7	3.4
CP2	0.0781	132.2	22.2	2.3
CP3	0.0520	81.3	14.8	1.4
CP4	0.0663	111.7	19.3	1.5
CP5	0.0255	47.3	7.3	1.7
CP6	0.0255	35.9	7.6	0.9
CP7	0.1248	134.0	38.3	2.2
CP8	0.0415	59.2	12.6	2.4
CP9	0.0349	75.4	10.4	2.3
CP10	0.0521	92.5	15.5	3.5

CURRENT PERMITTED DRAINAGE AREAS				
Watershed Name	Drainage Area (Ac)	Drainage Area (mi2)	25-Year Peak Flow (cfs)	25-Year Volume (Ac-ft)
CA1	78.6	0.1228	191.5	36.5
CA2	54.6	0.0853	160.2	26.9
CA3	44.3	0.0692	140.9	21.4
CA4	52.5	0.0821	186.3	25.4
CA5	46.8	0.0731	136.2	22.2
CA6	77.4	0.1210	164.9	35.9
CA7	50.0	0.0781	132.2	22.2
CA8	33.3	0.0521	81.3	14.8
CA9	42.4	0.0662	111.7	19.3
CA10	16.3	0.0255	47.3	7.3
CA11	31.2	0.0487	35.9	7.6
CA12	14.6	0.0228	41.7	6.8
CA13	65.3	0.1020	170.3	31.5
CA14	12.4	0.0193	38.2	5.5
CA15	14.2	0.0222	47.9	7.1
CA16	22.3	0.0349	75.4	10.4
CA17	33.3	0.0521	92.5	15.5



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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 800 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- CA01 DRAINAGE AREA DESIGNATION
- COMPARISON POINT–POINT DISCHARGE
- COMPARISON POINT–SHEET FLOW (NON–POINT DISCHARGE)

NOTE(S):

1. EXISTING GROUND CONTOURS DOWNLOADED FROM USGS TNM DOWNLOAD PROGRAM. IMAGERY DATE AUGUST 19, 2022.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

STATE OF TEXAS
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103826
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6/11/2025

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
REV	DATE	DESCRIPTION	DWN BY

CURRENT PERMITTED DRAINAGE AREA SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817–563–1144
TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

C1B.1

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unit hydrograph data, and reach characteristics. This information is included on pages C1B.9 and C1B.10.

The first table, titled Current Permitted Watershed Characteristics, page C1B.9, provides the summary of drainage areas, soil types, Curve Numbers (CN) values, initial loss, reach slope calculations, and determination of Manning's n value. The Soil Conservation Service (SCS) CN were derived from watershed characteristic tables from the SCS Technical Report 55 (TR-55), which included evaluation of soil and surface cover/condition characteristics. The second table, titled Unit Hydrograph Data – Snyder's Hydrograph Coefficients, page C1B.10, provides the determination of the Snyder's Unit Hydrograph parameters.

RAINFALL DATA

The hypothetical precipitation for the storm event for the facility was taken from the National Oceanic and Atmospheric Administration (NOAA) Point Precipitation Frequency Estimates (Atlas 14, Volume 11, Version 2). A return period of 25 years and a duration of 24 hours was used for the design storm. The rainfall data for the facility located in Grayson County, Texas is depicted in the table on page C1B.12.

CURRENT PERMITTED DRAINAGE STRUCTURE DESIGN PARAMETERS

Pages C1B.14 through C1B.16 include drainage structure data for the existing ponds and culverts incorporated into the hydrologic model.

HYDROLOGIC ANALYSIS

For the hydrologic evaluation, HEC-HMS was used for the precipitation-runoff simulation for the current permitted condition. The following describes the various modeling components. The HEC-HMS hydrologic analysis results begin on page C1B.18.

Watershed Subareas and Schematization

The drainage areas that contribute flow to the TASWA DRF 2290A permit boundary were delineated into subareas to derive peak flows to determine current permitted runon and runoff flows. Hydrographs are developed for each subarea and appropriately combined and routed through existing surface drainage features. The subareas are shown on Drawing C1-B-1, and pages C1B.18, 21 and 23 for the HEC-HMS schematic of the current permitted condition.

ATTACHMENT C1
APPENDIX C1C

POSTDEVELOPMENT HYDROLOGIC CALCULATIONS

POSTDEVELOPMENT NARRATIVE

30 TAC §330.305(a)

The post development hydrologic analysis represents the hydrologic calculations as defined by the landfill completion plan for the TASWA Solid Waste Disposal and Recycling Facility (TASWA DRF) MSW Permit No. 2290A in accordance with §330.305(a)-(d).

POSTDEVELOPMENT DRAINAGE AREA DRAWINGS

The Postdevelopment Drainage Area Summary (Drawing C1C.5) delineates the drainage areas that contribute stormwater runon or runoff to the proposed permit boundary. Drainage areas within the permit boundary are designated by the prefix "DA".

POSTDEVELOPMENT WATERSHED CHARACTERISTICS

Watershed characteristics have been developed for the postdevelopment hydrologic evaluation. The watershed characteristics address drainage area runoff characteristics, unit hydrograph data, reach characteristics, existing culverts, and the proposed final condition drainage system including the detention ponds. This information is included on pages C1C.7 and C1C.8.

The first table, titled Postdeveloped Watershed Characteristics, pages C1C.7 and C1C.8, provides the summary of drainage areas, soil types, Curve Numbers (CN) values, initial loss, reach slope calculations, and determination of Manning's n value. The Soil Conservation Service (SCS) CN were derived from watershed characteristic tables from the SCS Technical Report 55 (TR-55), which included evaluation of anticipated postdevelopment soil and surface cover/condition characteristics. The second table, titled Unit Hydrograph Data - Snyder's Hydrograph Coefficients, page C1C.9, provides the determination of the Snyder's Unit Hydrograph parameters. The runoff characteristics for the off-site drainage areas did not change from the current permitted condition.

POSTDEVELOPMENT DRAINAGE STRUCTURE DESIGN PARAMETERS

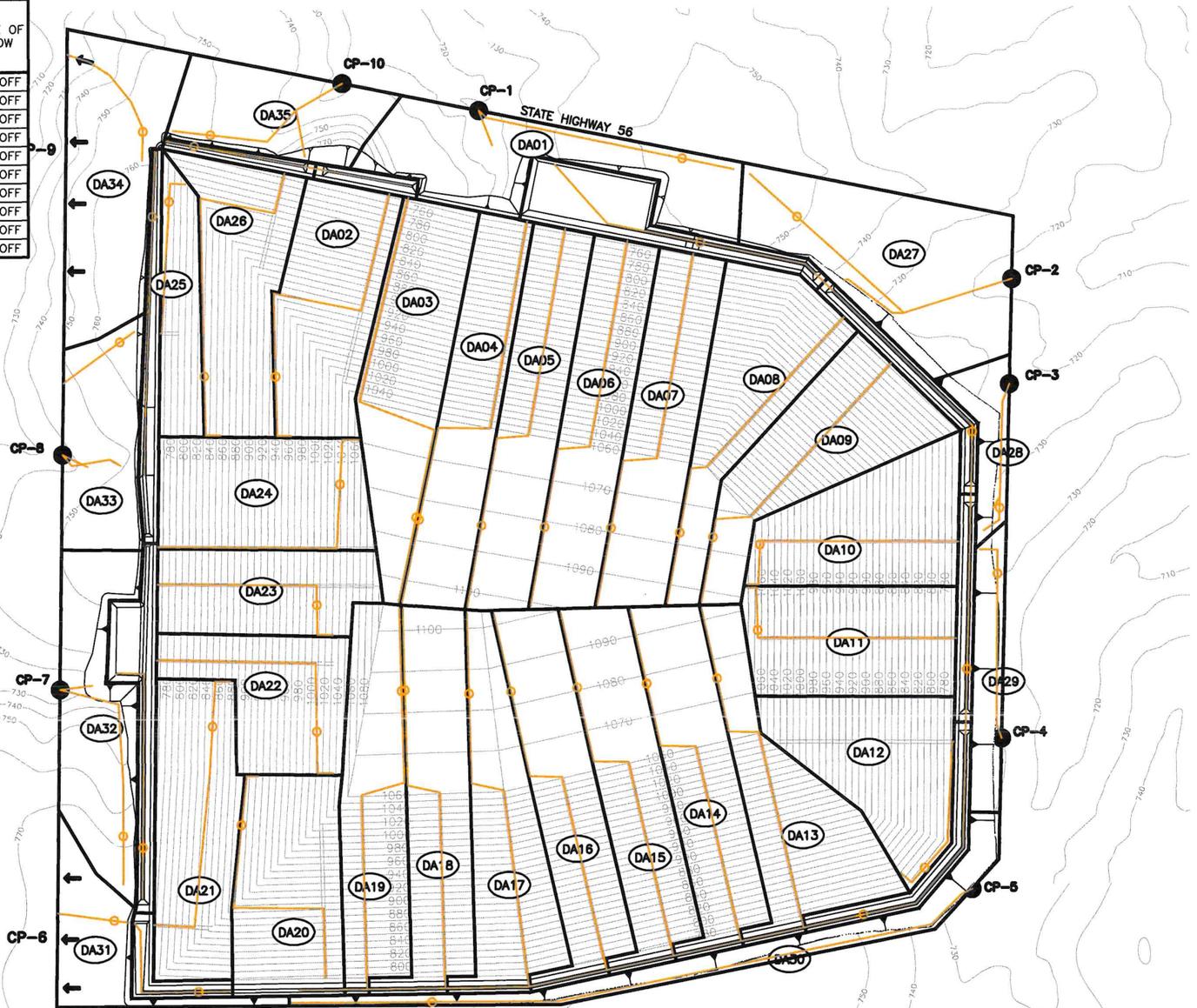
Pages C1C.10 through C1C.18 include drainage structure data for the existing and proposed ponds and culverts incorporated into the hydrologic model. The postdevelopment hydrologic model is defined by the landfill completion plan for the TASWA DRF MSW Permit No. 2290A.

HYDROLOGIC ANALYSIS

For the hydrologic evaluation, HEC-HMS was used for the precipitation runoff simulation for the postdevelopment condition. The following describes the various modeling components. The HEC-HMS hydrologic analysis results begin on page C1C.19.

POST DEVELOPED BOUNDARY ANALYSIS SUMMARY					
BOUNDARY COMPARISON POINT	TOTAL CONTRIBUTING DRAINAGE AREA (mi2)	25-YEAR FLOW RATE (cfs)	25-YEAR VOLUME (ac-ft)	25-YEAR VELOCITY (fps)	TYPE OF FLOW
CP1	0.6832	596.4	176.5	3.3	RUNOFF
CP2	0.0456	128.4	23.7	2.2	RUNOFF
CP3	0.0088	80.1	13.7	1.4	RUNOFF
CP4	0.0111	110.3	18.7	1.4	RUNOFF
CP5	0.0195	30.1	5.8	2.4	RUNOFF
CP6	0.0161	36.0	9.9	0.6	RUNOFF
CP7	0.1592	131.2	44.8	2.2	RUNOFF
CP8	0.0449	57.0	13.8	2.4	RUNOFF
CP9	0.0363	77.2	10.8	2.3	RUNOFF
CP10	0.0557	47.5	9.1	2.7	RUNOFF

POST DEVELOPED DRAINAGE AREAS			
WATERSHED NAME	AREA (ac)	25-YEAR FLOW RATE (cfs)	25-YEAR VOLUME (ac-ft)
DA1	22.0	65.9	10.9
POND 1	9.9	27.0	5.6
DA2	20.3	75.2	10.0
DA3	22.9	86.1	11.1
DA4	20.1	75.5	9.7
DA5	20.5	77.0	2.4
DA6	20.8	79.8	10.1
DA7	20.8	79.8	10.1
DA8	20.7	82.0	10.2
DA9	20.8	85.9	10.3
DA10	19.5	86.5	9.6
DA11	19.6	86.8	0
DA12	19.3	54.1	9.5
DA13	20.9	83.0	10.3
DA14	20.7	79.3	10.0
DA15	21.0	80.6	10.1
DA16	21.1	79.4	10.2
DA17	20.4	76.7	9.9
DA18	21.2	79.6	10.2
DA19	20.0	74.4	9.7
DA20	19.8	72.1	9.7
DA21	20.9	79.9	10.3
DA22	16.1	70.0	7.9
DA23	15.4	68.5	7.6
DA24	20.0	92.3	9.9
DA25	9.1	26.0	4.5
DA26	19.5	67.7	0
DA27	29.2	81.0	13.5
DA28	5.6	16.5	2.6
DA29	7.1	13.7	3.3
DA30	12.5	30.1	5.8
DA31	10.3	24.2	4.8
DA32	19.2	58.8	8.9
POND 2	7.5	22.1	35.9
DA33	14.5	48.5	6.7
POND 3	5.1	12.1	7.0
DA34	23.2	77.2	10.8
DA35	14.4	42.0	6.7



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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LIMIT OF WASTE
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- FLOW PATH
- CA01 DRAINAGE AREA DESIGNATION
- COMPARISON POINT-POINT DISCHARGE
- COMPARISON POINT-SHEET FLOW (NON-POINT DISCHARGE)

NOTE(S):

1. EXISTING GROUND CONTOURS DOWNLOADED FROM USGS WEBSITE ON MARCH 25, 2024.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
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ISSUED FOR PERMITTING PURPOSES

REVISIONS			
1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

POST DEVELOPED DRAINAGE AREA SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
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C1C.1

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POSTDEVELOPED WATERSHED CHARACTERISTICS

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
UNIT HYDROGRAPH DATA
Postdeveloped Watershed Characteristics

			CN Determination						Main Reach Slope Calculation (for Espey Method)					Mannings "n" Determination			
Watershed Name	Watershed Area (ac)	Watershed Area (sq mi)	Non-Final Cover Area (ac) CN = 84	Final Cover Topslope Area (ac) CN = 85	Final Cover Sideslope Area (ac) CN = 87	Channel Area (ac) CN=87	Pond Area (ac) CN = 98	CN	Longest Reach (ft)	20% of Reach Length (ft)	Elevation @ 20% Reach Length from Upstream	Downstream Elevation	Slope (ft/ft)	Sheet Flow % of n = 0.070	Shallow Concentrated or Swale Flow	Channelized Flow % of n = 0.035	Composite n
DA01	22.0	0.0344	0.0	0.0	22.0	0.0	0.0	87	1600	320	752.0	720.0	0.0250	20	40	40	0.048
DA02	20.3	0.0317	0.0	0.0	20.3	0.0	0.0	87	2220	444	936.2	745.8	0.1072	5	25	70	0.041
DA03	22.9	0.0358	0.0	8.3	14.6	0.0	0.0	86	2600	520	1085.0	742.0	0.1649	10	25	65	0.042
DA04	20.1	0.0314	0.0	9.9	10.2	0.0	0.0	86	2560	512	1085.0	740.8	0.1681	10	25	65	0.042
DA05	20.5	0.0320	0.0	9.5	11.0	0.0	0.0	86	2510	502	1084.0	742.6	0.1700	10	25	65	0.042
DA06	20.8	0.0325	0.0	9.5	11.3	0.0	0.0	86	2430	486	1081.0	744.6	0.1730	10	25	65	0.042
DA07	20.8	0.0325	0.0	8.8	12.0	0.0	0.0	86	2350	470	1079.0	746.6	0.1768	15	25	60	0.044
DA08	20.7	0.0323	0.0	4.0	16.7	0.0	0.0	87	2160	432	1077.0	752.0	0.1881	15	30	55	0.045
DA09	20.8	0.0325	0.0	3.6	17.2	0.0	0.0	87	1980	396	1077.0	754.0	0.2039	15	20	65	0.043
DA10	19.5	0.0305	0.0	0.0	19.5	0.0	0.0	87	1540	308	1060.0	760.0	0.2435	5	15	80	0.039
DA11	19.6	0.0306	0.0	0.0	19.6	0.0	0.0	87	1570	314	1063.0	762.6	0.2392	5	20	75	0.040
DA12	19.3	0.0302	0.0	0.0	19.3	0.0	0.0	87	1030	206	773.6	765.4	0.0100	10	60	30	0.048
DA13	20.9	0.0327	0.0	4.2	15.8	0.9	0.0	87	2170	434	1075.0	764.7	0.1787	15	30	55	0.045
DA14	20.7	0.0323	0.0	8.6	11.1	1.0	0.0	86	2270	454	1078.0	766.4	0.1716	15	25	60	0.044
DA15	21.0	0.0328	0.0	9.2	10.8	1.0	0.0	86	2350	470	1080.0	768.2	0.1659	15	25	60	0.044
DA16	21.1	0.0330	0.0	9.7	10.3	1.1	0.0	86	2410	482	1083.0	770.0	0.1623	10	25	65	0.042
DA17	20.4	0.0319	0.0	6.7	12.4	1.3	0.0	86	2440	488	1084.0	772.1	0.1598	10	25	65	0.042
DA18	21.2	0.0331	0.0	10.2	9.9	1.1	0.0	86	2460	492	1086.0	774.3	0.1584	10	25	65	0.042
DA19	20.0	0.0313	0.0	6.1	13.5	0.4	0.0	86	2510	502	1065.0	776.4	0.1437	10	25	65	0.042
DA20	19.8	0.0309	0.0	0.0	18.1	1.7	0.0	87	1840	368	900.0	786.0	0.0774	5	35	60	0.042
DA21	20.9	0.0327	0.0	0.0	20.9	0.0	0.0	87	1840	368	881.7	776.7	0.0713	5	35	60	0.042
DA22	16.1	0.0252	0.0	0.0	16.1	0.0	0.0	87	1730	346	1007.5	763.4	0.1764	5	35	60	0.042
DA23	15.4	0.0241	0.0	0.0	15.4	0.0	0.0	87	1360	272	1003.1	762.0	0.2216	5	20	75	0.040
DA24	20.0	0.0313	0.0	0.0	20.0	0.0	0.0	87	1850	370	1043.8	762.0	0.1904	5	30	65	0.041

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
UNIT HYDROGRAPH DATA
Postdeveloped Watershed Characteristics

			CN Determination						Main Reach Slope Calculation (for Espey Method)					Mannings "n" Determination			
Watershed Name	Watershed Area (ac)	Watershed Area (sq mi)	Non-Final Cover Area (ac) CN = 84	Final Cover Topslope Area (ac) CN = 85	Final Cover Sideslope Area (ac) CN = 87	Channel Area (ac) CN=87	Pond Area (ac) CN = 98	CN	Longest Reach (ft)	20% of Reach Length (ft)	Elevation @ 20% Reach Length from Upstream	Downstream Elevation	Slope (ft/ft)	Sheet Flow % of n = 0.070	Shallow Concentrated or Swale Flow	Channelized Flow % of n = 0.035	Composite n
DA25	9.1	0.0142	0.0	0.0	9.1	0.0	0.0	87	1010	202	769.5	761.7	0.0097	10	60	30	0.048
DA26	19.5	0.0305	0.0	0.0	19.5	0.0	0.0	87	2240	448	827.8	752.2	0.0422	5	25	70	0.041
DA27	29.2	0.0456	29.2	0.0	0.0	0.0	0.0	84	1950	390	751.0	717.0	0.0218	15	30	55	0.045
DA28	5.6	0.0088	5.6	0.0	0.0	0.0	0.0	84	950	190	732.0	725.0	0.0092	10	0	90	0.039
DA29	7.1	0.0111	7.1	0.0	0.0	0.0	0.0	84	1260	252	730.0	729.0	0.0010	10	0	90	0.039
DA30	12.5	0.0195	12.5	0.0	0.0	0.0	0.0	84	4270	854	772.0	728.0	0.0129	5	15	80	0.039
DA31	10.3	0.0161	10.3	0.0	0.0	0.0	0.0	84	440	88	773.0	772.0	0.0028	70	30	0	0.064
DA32	19.2	0.0300	19.2	0.0	0.0	0.0	0.0	84	1460	292	767.0	728.0	0.0334	20	40	40	0.048
DA33	14.5	0.0227	14.5	0.0	0.0	0.0	0.0	84	530	106	762.0	747.0	0.0354	55	45	0	0.061
DA34	23.2	0.0363	23.2	0.0	0.0	0.0	0.0	84	870	174	756.0	720.0	0.0517	35	65	0	0.057
DA35	14.4	0.0225	14.4	0.0	0.0	0.0	0.0	84	1160	232	750.0	728.0	0.0237	25	70	5	0.054
I-02A	1.7	0.0027	0.0	0.0	0.0	1.7	0.0	87	840	168	753.5	744.0	0.0141	35	65	0	0.057
I-08A	4.0	0.0063	0.0	0.0	0.0	4.0	0.0	87	1520	304	749.2	743.2	0.0049	20	70	10	0.053
I-10A	3.3	0.0052	0.0	0.0	0.0	3.3	0.0	87	1230	246	755.4	751.2	0.0043	25	70	5	0.054
I-12A	4.5	0.0070	0.0	0.0	0.0	4.5	0.0	87	1820	364	763.2	757.1	0.0042	15	70	15	0.051
I-21A	2.7	0.0042	0.0	0.0	0.0	1.7	1.0	91	970	194	777.4	772.0	0.0070	30	70	0	0.056
P1P	9.9	0.0155	0.0	0.0	0.0	2.9	7.0	94	2092	418	742.4	728.0	0.0086	0	70	30	0.046
P2P	7.5	0.0117	0.0	0.0	0.0	4.5	3.0	91	1540	308	761.3	749.0	0.0100	0	70	30	0.046
P3P	5.1	0.0080	0.0	0.0	0.0	4.2	0.9	89	1960	392	755.1	750.0	0.0033	0	70	30	0.046
I-03	1.5	0.0023	0.0	0.0	0.0	0.0	1.5	98	630	126	750.0	743.0	0.0139	0	70	30	0.046

UNIT HYDROGRAPH DATA

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

Postdeveloped Conditions

Watershed Name	Longest Reach (ft)	Slope (ft/ft)	Impervious Cover %	Manning's "n"	Eff. Coeff.	Tr (min)	Tlag (min)	Area (sq mi)	qp (cfs/sq mi)	Tlag (hr)	Cp
					(A)	(B)	(C)		(D)		(E)
DA01	1600	0.0250	2.0	0.048	0.90	31.7	29.2	0.0344	895.1	0.49	0.68
DA02	2220	0.1072	2.0	0.041	0.88	22.8	20.3	0.0317	1277.4	0.34	0.68
DA03	2600	0.1649	2.0	0.042	0.88	21.2	18.7	0.0358	1372.0	0.31	0.67
DA04	2560	0.1681	2.0	0.042	0.88	21.1	18.6	0.0314	1391.5	0.31	0.67
DA05	2510	0.1700	2.0	0.042	0.88	20.9	18.4	0.0320	1401.5	0.31	0.67
DA06	2430	0.1730	2.0	0.042	0.88	20.7	18.2	0.0325	1418.6	0.30	0.67
DA07	2350	0.1768	2.0	0.044	0.88	20.4	17.9	0.0325	1438.6	0.30	0.67
DA08	2160	0.1881	2.0	0.045	0.88	19.7	17.2	0.0323	1493.5	0.29	0.67
DA09	1980	0.2039	2.0	0.043	0.88	18.9	16.4	0.0325	1558.9	0.27	0.67
DA10	1540	0.2435	2.0	0.039	0.85	16.4	13.9	0.0305	1819.7	0.23	0.66
DA11	1570	0.2392	2.0	0.040	0.85	16.6	14.1	0.0306	1802.0	0.23	0.66
DA12	1030	0.0100	2.0	0.048	0.90	36.1	33.6	0.0302	783.8	0.56	0.69
DA13	2170	0.1787	2.0	0.045	0.88	20.0	17.5	0.0327	1471.1	0.29	0.67
DA14	2270	0.1716	2.0	0.044	0.88	20.4	17.9	0.0323	1439.6	0.30	0.67
DA15	2350	0.1659	2.0	0.044	0.88	20.7	18.2	0.0328	1413.7	0.30	0.67
DA16	2410	0.1623	2.0	0.042	0.88	21.0	18.5	0.0330	1396.6	0.31	0.67
DA17	2440	0.1598	2.0	0.042	0.88	21.1	18.6	0.0319	1388.4	0.31	0.67
DA18	2460	0.1584	2.0	0.042	0.88	21.2	18.7	0.0331	1380.2	0.31	0.67
DA19	2510	0.1437	2.0	0.042	0.88	21.8	19.3	0.0313	1341.3	0.32	0.67
DA20	1840	0.0774	2.0	0.042	0.88	23.7	21.2	0.0309	1227.6	0.35	0.68
DA21	1840	0.0713	2.0	0.042	0.88	24.2	21.7	0.0327	1198.3	0.36	0.68
DA22	1730	0.1764	2.0	0.042	0.88	19.0	16.5	0.0252	1566.2	0.28	0.67
DA23	1360	0.2216	2.0	0.040	0.85	16.3	13.8	0.0241	1846.8	0.23	0.67
DA24	1850	0.1904	2.0	0.041	0.88	19.0	16.5	0.0313	1558.8	0.27	0.67
DA25	1010	0.0097	2.0	0.048	0.90	36.2	33.7	0.0142	805.1	0.56	0.71
DA26	2240	0.0422	2.0	0.041	0.88	28.9	26.4	0.0305	994.8	0.44	0.68
DA27	1950	0.0218	2.0	0.045	0.88	33.0	30.5	0.0456	848.8	0.51	0.67
DA28	950	0.0092	2.0	0.039	0.85	33.3	30.8	0.0088	897.1	0.51	0.72
DA29	1260	0.0010	2.0	0.039	0.85	62.0	59.5	0.0111	456.7	0.99	0.71
DA30	4270	0.0129	2.0	0.039	0.85	43.3	40.8	0.0195	656.5	0.68	0.70
DA31	440	0.0028	2.0	0.064	0.96	45.2	42.7	0.0161	631.2	0.71	0.70
DA32	1460	0.0334	2.0	0.048	0.90	28.9	26.4	0.0300	994.6	0.44	0.68
DA33	530	0.0354	2.0	0.061	0.96	25.1	22.6	0.0227	1167.6	0.38	0.69
DA34	870	0.0517	2.0	0.057	0.94	24.7	22.2	0.0363	1167.3	0.37	0.67
DA35	1160	0.0237	2.0	0.054	0.93	31.4	28.9	0.0225	921.0	0.48	0.69
I-02A	840	0.0141	2.0	0.057	0.94	33.9	31.4	0.0027	923.9	0.52	0.76
I-08A	1520	0.0049	2.0	0.053	0.93	49.4	46.9	0.0063	596.0	0.78	0.73
I-10A	1230	0.0043	2.0	0.054	0.93	48.8	46.3	0.0052	608.7	0.77	0.73
I-12A	1820	0.0042	2.0	0.051	0.93	53.7	51.2	0.0070	543.2	0.85	0.72
I-21A	970	0.0070	2.0	0.056	0.94	41.8	39.3	0.0042	724.2	0.66	0.74
P1P	2092	0.0086	2.0	0.046	0.90	44.0	41.5	0.0155	650.3	0.69	0.70
P2P	1540	0.0100	2.0	0.046	0.90	39.5	37.0	0.0117	737.9	0.62	0.71
P3P	1960	0.0033	2.0	0.046	0.90	55.3	52.8	0.0080	523.2	0.88	0.72
I-03	630	0.0139	2.0	0.046	0.90	29.6	27.1	0.0023	1072.6	0.45	0.76

(A) Conveyance efficiency from Dodson & Associates, Inc. Hands-On HEC-1, February 1999, pgs 6-19.

(B) $Tr=3.1(L^{0.23})(S^{-0.25})(I^{-0.18})(Effcoef^{-1.57})$

(C) $Tlag=Tr-(5/2)$

(D) $qp=31600(A^{-0.04})(Tr^{-1.07})$

(E) $Cp=49.375(A^{-0.04})(Tr^{-1.07})(Tlag)$

Tr = Surface runoff to unit hydrograph peak (min)

L = Distance along main channel from study point to watershed boundary

S = Main channel slope (ft/ft)

I = Impervious cover within the watershed

Tlag = Watershed lag time (min)

qp = Hydrograph peak discharge (cfs/sq. mi.)

Cp = Snyder's peaking coefficient

POSTDEVELOPMENT DRAINAGE STRUCTURE DESIGN PARAMETERS

Pond Data for HEC-HMS
Pond 1 Post

Reservoir

Description:	
Downstream:	R1
Method:	Outflow Structures
Storage Method:	Elevation-Storage
Stor-Dis Function:	Pond 1 Post
Initial Condition:	Inflow = Outflow
Main Tailwater:	Assume None
Auxiliary:	None
Time Step Method:	Automatic Adaptation
Outlets:	1
Spillways:	1
Dam Tops:	1
Pumps:	0
Dam Break:	No
Dam Seepage:	No
Release:	No
Evaporation:	No

Outlet

Method:	Culvert Outlet	
Direction:	Main	
Number Barrels:	2	
Solution Method:	Automatic	
Shape:	Box	
Chart:	8: Flared Wingwalls	
Scale:	1:Wingwalls flared 30 to 75 degrees	
Length:	150	ft
Rise:	3	ft
Span:	6	ft
Inlet Elevation:	728	ft
Entrance Coefficient:	0.5	
Outlet Elevation:	727	
Exit Coefficient:	1	
Mannings n:	0.013	

Spillway

Method:	Broad-Crested Spillway
Direction:	Main
Elevation:	737.5 ft
Length:	100 ft
Coefficient:	2.6
Gates:	0

Dam Tops

Method:	Level Overflow
Direction:	Main
Elevation:	738
Length:	1190
Coefficient:	2.6

Paired Data
Elevation-Storage
Pond 1 Post

Elevation	Storage Cumulative		Incremental
(ft)	(ac-ft)	(cy)	(cy)
728.7	0.004	5.8	5.8
729.0	0.205	330.8	325.0
730.0	1.083	1,746.8	1,416.0
731.0	3.134	5,055.5	3,308.7
732.0	6.632	10,699.7	5,644.2
733.0	11.249	18,147.8	7,448.1
734.0	16.512	26,639.2	8,491.4
735.0	22.128	35,700.5	9,061.3
736.0	28.009	45,188.2	9,487.7
737.0	34.182	55,147.3	9,959.1
738.0	40.660	65,598.0	10,450.7
739.0	47.421	76,505.3	10,907.3
740.0	54.467	87,874.1	11,368.8
741.0	61.791	99,688.7	11,814.6

Pond Data for HEC-HMS
I-02

Reservoir

Description:	
Downstream:	R35
Method:	Outflow Structures
Storage Method:	Elevation-Storage
Stor-Dis Function:	I-02
Initial Condition:	Inflow = Outflow
Main Tailwater:	Assume None
Auxiliary:	None
Time Step Method:	Automatic Adaptation
Outlets:	2
Spillways:	0
Dam Tops:	0
Pumps:	0
Dam Break:	No
Dam Seepage:	No
Release:	No
Evaporation:	No

Paired Data
Elevation-Storage
I-02

Elevation	Storage Cumulative		Incremental
(ft)	(ac-ft)	(cy)	(cy)
744.0	0.000	0.0	0.0
745.0	0.010	16.9	16.9
746.0	0.052	83.9	67.0
747.0	0.139	223.8	139.9
748.0	0.285	459.2	235.4
749.0	0.504	813.0	353.8
750.0	0.811	1,307.8	494.8
751.0	1.216	1,962.3	654.5

Outlet 1

Method:	Culvert Outlet	
Direction:	Main	
Number Barrels:	1	
Solution Method:	Automatic	
Shape:	Circular	
Chart:	1: Concrete Pipe Culvert	
Scale:	1: Square edge entrance with headwall	
Length:	150	ft
Diameter:	1	ft
Inlet Elevation:	744	ft
Entrance Coefficient:	0.5	
Outlet Elevation:	743.5	
Exit Coefficient:	1	
Mannings n:	0.013	

Outlet 2

Method:	Culvert Outlet	
Direction:	Auxiliary	
Number Barrels:	1	
Solution Method:	Automatic	
Shape:	Circular	
Chart:	1: Concrete Pipe Culv	
Scale:	1: Square edge entrar	
Length:	150	ft
Diameter:	2.25	ft
Inlet Elevation:	744	ft
Entrance Coefficient:	0.5	
Outlet Elevation:	743.5	
Exit Coefficient:	1	
Mannings n:	0.013	

Pond Data for HEC-HMS
I-03

Reservoir

Description:	
Downstream:	CP01
Method:	Outflow Structures
Storage Method:	Elevation-Storage
Stor-Dis Function:	I-03
Initial Condition:	Inflow = Outflow
Main Tailwater:	Assume None
Auxiliary:	None
Time Step Method:	Automatic Adaptation
Outlets:	1
Spillways:	1
Dam Tops:	1
Pumps:	0
Dam Break:	No
Dam Seepage:	No
Release:	No
Evaporation:	No

Outlet

Method:	Culvert Outlet	
Direction:	Main	
Number Barrels:	1	
Solution Method:	Automatic	
Shape:	Circular	
Chart:	1: Concrete Pipe Culvert	
Scale:	1: Square edge entrance with headwall	
Length:	150	ft
Diameter:	3	ft
Inlet Elevation:	734.5	ft
Entrance Coefficient:	0.5	
Outlet Elevation:	733.5	
Exit Coefficient:	1	
Mannings n:	0.013	

Spillway

Method:	Broad-Crested Spillway
Direction:	Main
Elevation:	742.87 ft
Length:	100 ft
Coefficient:	2.6
Gates:	0

Dam Tops

Method:	Level Overflow
Direction:	Main
Elevation:	743.37
Length:	630
Coefficient:	2.6

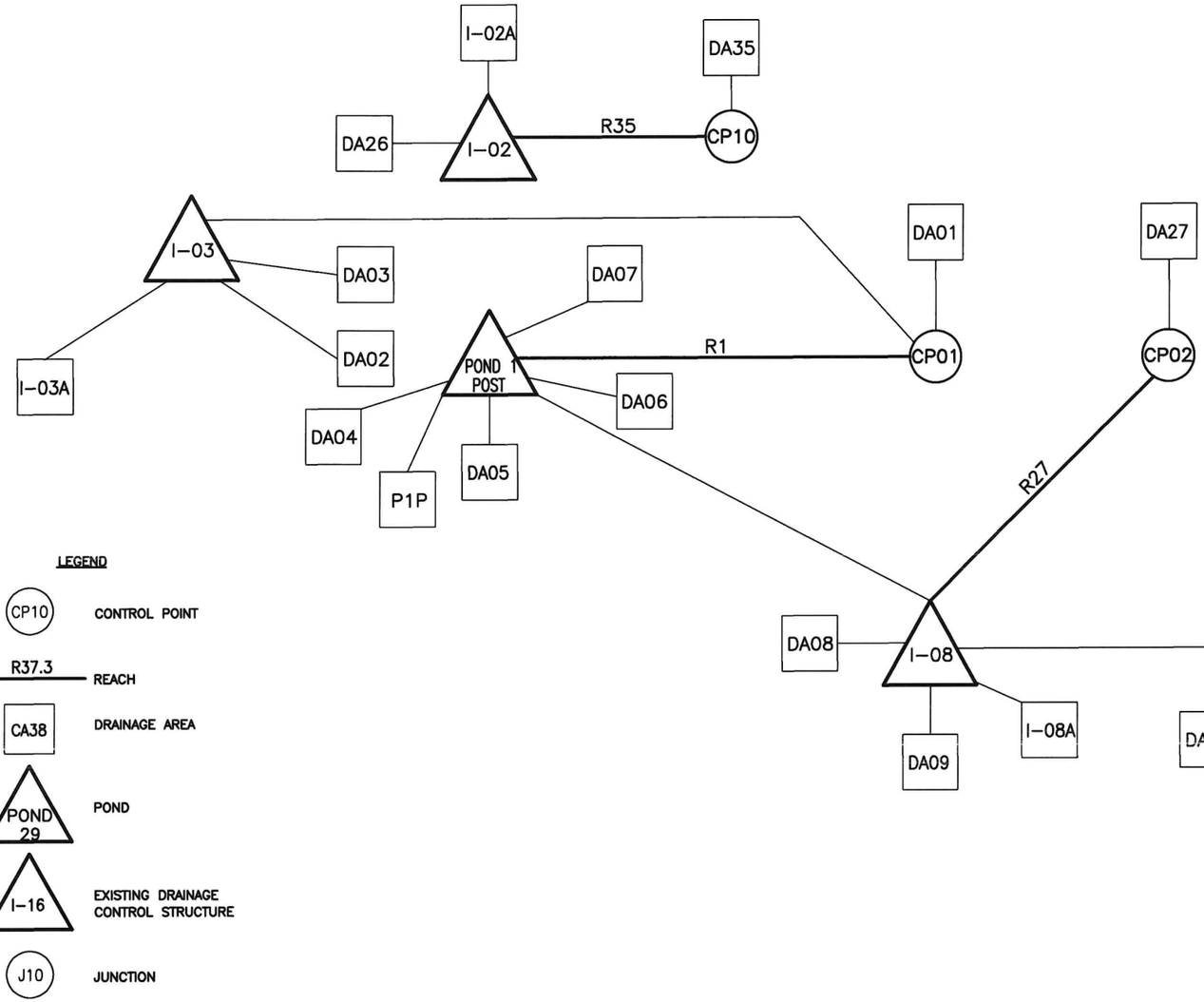
Paired Data

Elevation-Storage

I-03

Elevation	Storage Cumulative		Incremental
(ft)	(ac-ft)	(cy)	(cy)
734.5	0.002	3.3	3.3
735.0	0.026	41.7	38.4
736.0	0.088	142.4	100.7
737.0	0.204	328.9	186.5
738.0	0.387	624.8	295.9
739.0	0.653	1,053.4	428.6
740.0	1.015	1,638.2	584.8
741.0	1.489	2,402.2	764.0
742.0	2.075	3,347.9	945.7
743.0	2.771	4,470.5	1,122.6
744.0	3.564	5,750.1	1,279.6
745.0	4.437	7,159.1	1,409.0

POSTDEVELOPED HYDROLOGIC ANALYSIS
25-YEAR, 24-HOUR STORM EVENT



LEGEND

- CP10 — CONTROL POINT
- R37.3 — REACH
- CA38 — DRAINAGE AREA
- POND 29 — POND
- I-16 — EXISTING DRAINAGE CONTROL STRUCTURE
- J10 — JUNCTION

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED
PROFESSIONAL ENGINEER

6/11/2025

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

NORTH AND EAST SCHEMATIC BOUNDARY ANALYSIS SUMMARY

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

C1C.2

O:\TASWA\P\Drawings\ATT C\C1-C-5_PostDrngGraph.dwg Layout: GraphDWG User: bboles

	Project:	2024 TASWA	Simulation Run:	North Post alternative
	Start of Run:	01Jan2024, 00:00	Basin Model:	North Post
	End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
	Compute Time:	11Jun2025, 10:44:33	Control Specifications	Control 1

Hydrologic Element	Drainage Area (MI^2)	Peak Discharge (CFS)	Time of Peak	Volume (ACRE-FT)
CP01	0.6807	596.4	1 January 2024, 12:40	176.5
CP02	0.0456	128.4	1 January 2024, 12:35	23.7
CP03	0.0088	80.1	1 January 2024, 12:35	13.7
CP04	0.0111	110.3	1 January 2024, 12:35	18.7
CP05	0.0195	30.1	1 January 2024, 12:45	5.8
CP10	0.0557	47.5	1 January 2024, 12:30	9.1
DA01	0.0344	65.9	1 January 2024, 12:30	10.9
DA02	0.0317	75.2	1 January 2024, 12:25	10
DA03	0.0358	86.1	1 January 2024, 12:20	11.1
DA04	0.0314	75.5	1 January 2024, 12:20	9.7
DA05	0.032	77	1 January 2024, 12:20	9.9
DA06	0.0325	79.8	1 January 2024, 12:20	10.1
DA07	0.0325	79.8	1 January 2024, 12:20	10.1
DA08	0.0323	82	1 January 2024, 12:20	10.2
DA09	0.0325	85.9	1 January 2024, 12:20	10.3
DA10	0.0305	86.5	1 January 2024, 12:15	9.6
DA11	0.0306	86.8	1 January 2024, 12:15	9.7
DA12	0.0302	54.1	1 January 2024, 12:35	9.5
DA13	0.0327	83	1 January 2024, 12:20	10.3
DA14	0.0323	79.3	1 January 2024, 12:20	10
DA15	0.0328	80.6	1 January 2024, 12:20	10.1
DA16	0.033	79.4	1 January 2024, 12:20	10.2
DA17	0.0319	76.7	1 January 2024, 12:20	9.9
DA18	0.0331	79.6	1 January 2024, 12:20	10.2
DA19	0.0313	74.4	1 January 2024, 12:20	9.7
DA20	0.0309	72.1	1 January 2024, 12:25	9.7
DA26	0.0305	62.7	1 January 2024, 12:30	9.6
DA27	0.0456	81	1 January 2024, 12:35	13.5
DA28	0.0088	16.5	1 January 2024, 12:35	2.6
DA29	0.0111	13.7	1 January 2024, 13:00	3.3
DA30	0.0195	30.1	1 January 2024, 12:45	5.8
DA35	0.0225	42	1 January 2024, 12:30	6.7
East	0.085	347.7	1 January 2024, 12:35	61.9
I-02	0.0332	6.3	1 January 2024, 12:50	2.4
I-02A	0.0027	5.9	1 January 2024, 12:30	0.9
I-03	0.0698	131.7	1 January 2024, 12:35	22
I-03A	0.0023	5.6	1 January 2024, 12:30	0.9

I-08	0.4326	557.1	1 January 2024, 12:35	98.4
I-08A	0.0063	10.5	1 January 2024, 12:40	2
I-10	0.3615	490.7	1 January 2024, 12:35	86.2
I-10A	0.0052	8.9	1 January 2024, 12:40	1.6
I-12	0.2952	461.2	1 January 2024, 12:35	76.4
I-12A	0.007	11.1	1 January 2024, 12:45	2.2
J1	0.2253	510.1	1 January 2024, 12:25	69.9
J2	0.193	439	1 January 2024, 12:25	59.9
J3	0.1602	365.9	1 January 2024, 12:25	49.8
J4	0.1272	292.2	1 January 2024, 12:25	39.5
J5	0.0953	220	1 January 2024, 12:25	29.7
J6	0.0622	144.3	1 January 2024, 12:25	19.4
J7	0.0309	72.1	1 January 2024, 12:25	9.7
North	0.7364	640.7	1 January 2024, 12:40	185.6
North & East	0.8214	987.3	1 January 2024, 12:35	247.5
Pond 1 Post	0.5765	464.5	1 January 2024, 13:05	143.7
P1P	0.0155	27	1 January 2024, 12:45	5.6
R1	0.5765	464.2	1 January 2024, 13:05	143.7
R13	0.2253	505.3	1 January 2024, 12:25	69.9
R14	0.193	434.7	1 January 2024, 12:25	59.9
R15	0.1602	362.4	1 January 2024, 12:25	49.8
R16	0.1272	289.3	1 January 2024, 12:25	39.6
R17	0.0953	218.1	1 January 2024, 12:25	29.7
R18	0.0622	143.1	1 January 2024, 12:25	19.4
R19	0.0309	71.2	1 January 2024, 12:25	9.7
R27	0	47.9	1 January 2024, 12:40	10.1
R28	0	64	1 January 2024, 12:40	11.1
R35	0.0332	6.3	1 January 2024, 12:55	2.4

Project: 2024 TASWA Simulation Run: North Post- alternative

Reservoir: Pond 1 Post

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	830.7 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:30
Peak Discharge:	464.5 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 13:05
Inflow Volume:	143.7 (ACRE-FT)	Peak Storage:	30.2 (ACRE-FT)
Discharge Volume:	143.7 (ACRE-FT)	Peak Elevation:	736.3 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-02

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	68.6 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:30
Peak Discharge:	6.3 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:50
Inflow Volume:	10.5 (ACRE-FT)	Peak Storage:	1.1 (ACRE-FT)
Discharge Volume:	2.4 (ACRE-FT)	Peak Elevation:	750.7 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-03

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	164.6 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:20
Peak Discharge:	131.7 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:35
Inflow Volume:	22.0 (ACRE-FT)	Peak Storage:	2.9 (ACRE-FT)
Discharge Volume:	22.0 (ACRE-FT)	Peak Elevation:	743.2 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-08

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	620.4 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:30
Peak Discharge:	557.1 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:35
Inflow Volume:	108.7 (ACRE-FT)	Peak Storage:	2.9 (ACRE-FT)
Discharge Volume:	98.4 (ACRE-FT)	Peak Elevation:	749.1 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-10

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	568.5 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:30
Peak Discharge:	490.7 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:35
Inflow Volume:	97.4 (ACRE-FT)	Peak Storage:	2.8 (ACRE-FT)
Discharge Volume:	86.2 (ACRE-FT)	Peak Elevation:	756.6 (FT)

Project: 2024 TASWA Simulation Run: North Post- alternative
Reservoir: I-12

Start of Run:	01Jan2024, 00:00	Basin Model:	North Post - Alternative
End of Run:	03Jan2024, 00:00	Meteorologic Model:	25-Year
Compute Time:	11Jun2025, 10:44:33	Control Specifications:	Control 1

Volume Units: ACRE-FT

Computed Results

Peak Inflow:	639.0 (CFS)	Date/Time of Peak Inflow:	01Jan2024, 12:25
Peak Discharge:	461.2 (CFS)	Date/Time of Peak Discharge:	01Jan2024, 12:35
Inflow Volume:	92.0 (ACRE-FT)	Peak Storage:	4.7 (ACRE-FT)
Discharge Volume:	76.4 (ACRE-FT)	Peak Elevation:	763.7 (FT)

POSTDEVELOPED VELOCITY SUMMARY

Postdeveloped 25-Year Velocity Calculations at Permit Boundary Comparison Points

Required: Determine the 25-year flow depths and velocities at the permit boundary.

Method: Calculate the flow depths and velocities using Manning's Equation.

Solution:

		Velocity Calculations						
Comparison Point	Q (cfs)	Width[1] (ft)	Bottom Slope[2] (%)	Side Slopes[3] (h:v)	Manning's n	Depth (ft)	Velocity (fps)	Shear Stress (psf)
CP01	596.4	200	0.6	15.0	0.030	**0.85**	**3.31**	**0.32**
CP02	128.4	250	1.6	25.0	0.030	**0.22**	**2.26**	**0.22**
CP03	80.1	450	1.2	0.0	0.030	**0.13**	**1.38**	**0.10**
CP04	110.3	1000	2.6	0.0	0.030	**0.08**	**1.44**	**0.12**
CP05	30.1	500	5.0	0.0	0.030	**0.04**	**1.38**	**0.14**
CP06	36.0	1100	3.0	0.0	0.030	**0.04**	**0.92**	**0.07**
CP07	131.2	200	1.0	8.0	0.030	**0.30**	**2.19**	**0.19**
CP08	57.0	200	4.0	25.0	0.030	**0.12**	**2.37**	**0.30**
CP09	77.2	500	8.0	0.0	0.030	**0.07**	**2.31**	**0.33**
CP10	47.5	100	3.0	10.0	0.030	**0.18**	**2.66**	**0.33**

Notes:

1. Comparison points where surface water runoff enters or exits the permit boundary in established natural or constructed channels; width refers to the bottom width of the channel.
   Comparison points where surface water runoff enters or exits the permit boundary as sheet flow or not well established channels; width refers to the sheet flow width.
2. For channels, bottom slope is the slope of the channel bottom where surface water enters or exits the permit boundary.
   For sheet flow, bottom slope is the slope of the ground where surface water enters or exits the permit boundary.
3. For channels, side slope is the average side slope of the channel where surface water enters or exits the permit boundary.
   For sheet flow, there are no side slopes and are represented by "0" in this table.

POSTDEVELOPED FLOW AND BOUNDARY ANALYSIS SUMMARY

Postdeveloped Flow Summary

Watershed Name	Drainage Area (Ac)	Drainage Area (mi^2)	25-Year Peak Flow (cfs)	25-Year Volume (Ac-ft)
DA01	22.0	0.0344	65.9	10.9
DA02	20.3	0.0317	75.2	10.0
DA03	22.9	0.0358	86.1	11.1
DA04	20.1	0.0314	75.5	9.7
DA05	20.5	0.0320	77.0	9.9
DA06	20.8	0.0325	79.8	10.1
DA07	20.8	0.0325	79.8	10.1
DA08	20.7	0.0323	82.0	10.2
DA09	20.8	0.0325	85.9	10.3
DA10	19.5	0.0305	86.5	9.6
DA11	19.6	0.0306	86.8	9.7
DA12	19.3	0.0302	54.1	9.5
DA13	20.9	0.0327	83.0	10.3
DA14	20.7	0.0323	79.3	10.0
DA15	21.0	0.0328	80.6	10.1
DA16	21.1	0.0330	79.4	10.2
DA17	20.4	0.0319	76.7	9.9
DA18	21.2	0.0331	79.6	10.2
DA19	20.0	0.0313	74.4	9.7
DA20	19.8	0.0309	72.1	9.7
DA21	20.9	0.0327	79.9	10.3
DA22	16.1	0.0252	70.0	7.9
DA23	15.4	0.0241	68.5	7.6
DA24	20.0	0.0313	92.3	9.9
DA25	9.1	0.0142	26.0	4.5
DA26	19.5	0.0305	62.7	9.6
DA27	29.2	0.0456	81.0	13.5
DA28	5.6	0.0088	16.5	2.6
DA29	7.1	0.0111	13.7	3.3
DA30	12.5	0.0195	30.1	5.8
DA31	10.3	0.0161	24.2	4.8
DA32	19.2	0.0300	58.8	8.9
DA33	14.5	0.0227	48.5	6.7
DA34	23.2	0.0363	77.2	10.8
DA35	14.4	0.0225	42.0	6.7
I-02A	1.7	0.0027	5.9	0.9
I-08A	4.0	0.0063	10.5	2.0
I-10A	3.3	0.0052	8.9	1.6
I-12A	4.5	0.0070	11.1	2.2
I-21A	2.7	0.0042	8.0	1.3
P1P	9.9	0.0155	27.0	5.6
P2P	7.5	0.0117	22.1	3.9
P3P	5.1	0.0080	12.1	2.6
I-03A	1.5	0.0023	5.6	0.9

Postdeveloped Boundary Analysis Summary

Comparison Point	Total Contributing Drainage Area (mi^2)	25-Year Flow Rate (cfs)	25-Year Volume (ac-ft)	25-Year Velocity (fps)
CP1	0.6832	596.4	176.5	3.31
CP2	0.0456	128.4	23.7	2.26
CP3	0.0088	80.1	13.7	1.38
CP4	0.0111	110.3	18.7	1.44
CP5	0.0195	30.1	5.8	1.38
CP6	0.0161	36.0	9.9	0.58
CP7	0.1592	131.2	44.8	2.21
CP8	0.0449	57.0	13.8	2.37
CP9	0.0363	77.2	10.8	2.31
CP10	0.0557	47.5	9.1	2.66

ATTACHMENT C1
APPENDIX C1D

PERIMETER DRAINAGE SYSTEM DESIGN

Perimeter Channel Summary

Station (feet)	Station (feet)	Flow Depth (feet)	Depth Description	Interior Berm/Road		Exterior Berm	
				Minimum Channel Depth (feet)	Minimum Freeboard	Minimum Channel Depth (feet)	Minimum Freeboard (feet)
East Ditch							
2+29	2+98	2.99	Normal	8.0	5.01	6.0	3.01
2+98	13+12	2.78	Normal	8.0	5.22	6.0	3.22
13+12	16+25	3.29	Normal	8.0	4.71	6.0	2.71
16+25	20+26	3.08	Normal	8.0	4.92	6.0	2.92
20+26	26+46	2.83	Normal	8.0	5.17	6.0	3.17
26+46	29+86	2.91	Normal	8.0	5.09	6.0	3.09
29+86	33+51	3.35	Normal	8.0	4.65	6.0	2.65
33+51	39+40	3.11	Normal	8.0	4.89	6.0	2.89
39+40	43+72	2.82	Normal	8.0	5.18	6.0	3.18
43+72	45+70	3.38	Normal	8.0	4.62	6.0	2.62
45+70	52+11	3.31	Normal	8.0	4.69	6.0	2.69
52+11	56+52	3.23	Normal	8.0	4.77	6.0	2.77
56+52	63+54	3.23	Normal	8.0	4.77	6.0	2.77
63+54	67+48	2.96	Normal	8.0	5.04	6.0	3.04
67+48	71+68	2.74	Normal	8.0	5.26	6.0	3.26
71+68	75+80	2.48	Normal	8.0	5.52	6.0	3.52
75+80	80+65	2.20	Normal	8.0	5.8	6.0	3.8
80+65	85+74	1.89	Normal	8.0	6.11	6.0	4.11
85+74	90+50	1.49	Normal	8.0	6.51	6.0	4.51
90+50	98+66	1.00	Normal	8.0	7	6.0	5
West Ditch 1							
0+00	7+85	0.75	Normal	8.0	7.25	6.0	5.25
7+85	13+39	0.52	Normal	8.0	7.48	6.0	5.48
13+39	14+92	0.82	Normal	8.0	7.18	6.0	5.18
14+92	19+06	0.21	Normal	8.0	7.79	6.0	5.79
14+92	19+06	0.33	Normal	8.0	7.67	6.0	5.67
19+06	24+75	0.21	Normal	8.0	7.79	6.0	5.79
West Ditch 2							
0+00	1+24	1.72	Normal	8.0	6.28	6.0	4.28
1+24	3+55	1.32	Normal	8.0	6.68	6.0	4.68
West Ditch 3							
0+00	3+55	0.24	Normal	8.0	7.26	6.0	3.26
West Ditch 4							
0+00	15+52	0.56	Normal	8	7.44	6.0	5.44
North Ditch							
0+00	5+76	0.17	Normal	8.0	7.83	6.0	5.83
5+76	8+36	0.70	Normal	8.0	7.3	6.0	5.3
8+36	15+77	0.17	Normal	8.0	7.83	6.0	5.83

Notes:

1. Minimum freeboard based on the pool depth of the drainage control structure as shown on drawings in Attachment C3.

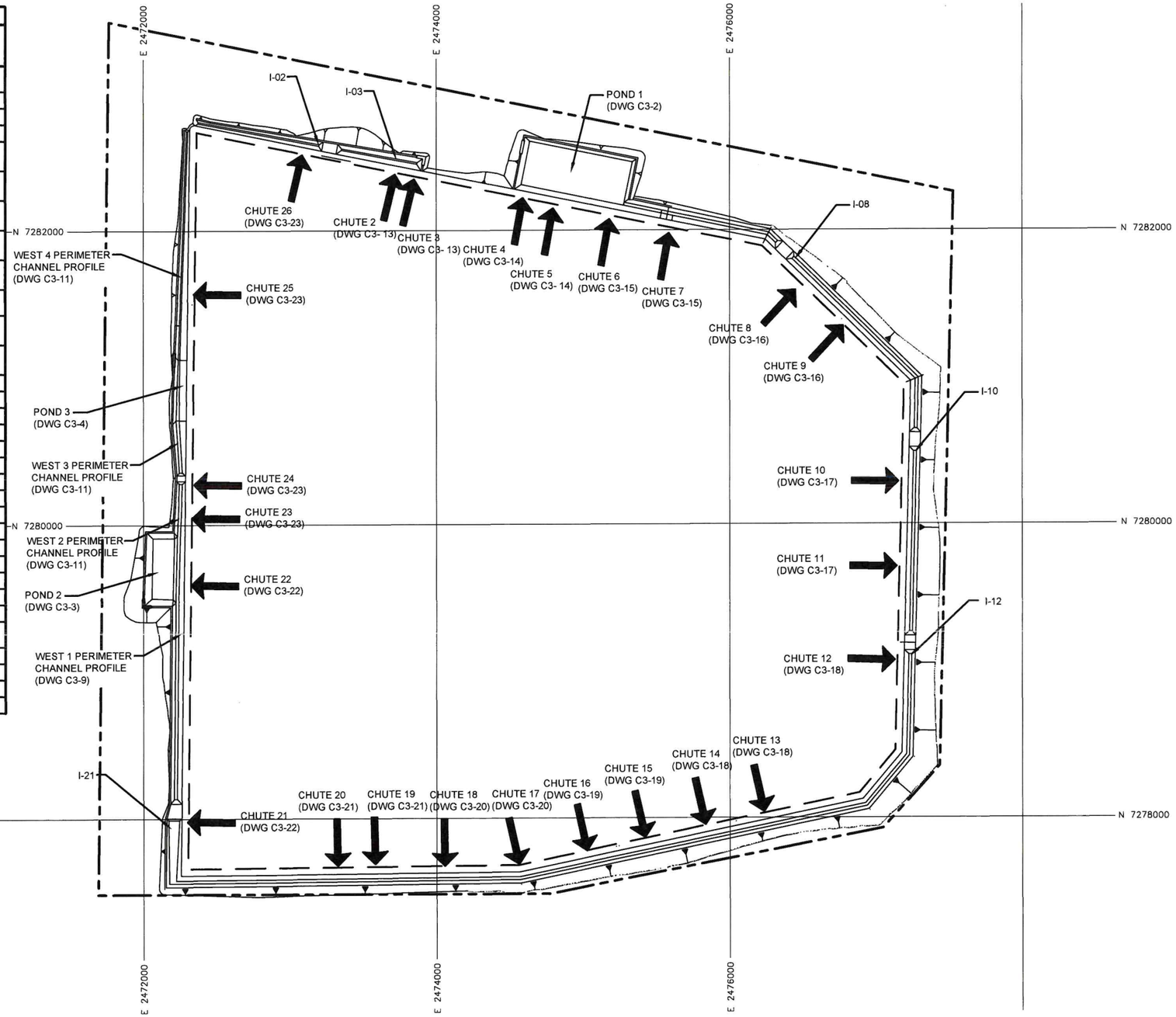
DETENTION POND ANALYSIS

The detention pond was designed to provide the necessary storage and outlet control to mitigate impacts to the receiving channels downstream of the TASWA DRF. The hydraulic design parameter for the detention pond are provided on pages C1C.11 through C1C.13. Detention pond design information is included in Attachment C3. The following table provides storage volume and surface elevation for the 25-year storm event.

Detention Pond	25-Year Water Surface Elevation (feet-msl)	Exterior Berm		Interior Berm/Road	
		Perimeter Pond Berm Elevation (feet-msl)	Freeboard (feet)	Access Road Elevation (feet-msl)	Freeboard (feet)
Pond 1 Post	736.3	738	1.7	740.0	3.7
Pond 2 Post	756.7	762.0	5.3	763.5	6.8
Pond 3 Post	754.1	756.0	1.9	762.0	7.9

PERIMETER DRAINAGE PLAN

DRAWING INDEX	
DRAWING	DESCRIPTION
C3–1	DRAINAGE STRUCTURE PLAN – DRAINAGE SYSTEM CALLOUTS
C3–2	POND 1
C3–3	POND 2
C3–4	POND 3
C3–5	EAST PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 24+00
C3–6	EAST PERIMETER CHANNEL PROFILE STA. 24+00 THROUGH 53+00
C3–7	EAST PERIMETER CHANNEL PROFILE STA. 53+00 THROUGH 82+00
C3–8	EAST PERIMETER CHANNEL PROFILE STA. 82+00 THROUGH 98+66.78
C3–9	WEST 1 PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 24+75.69
C3–10	WEST 2 AND WEST 3 PERIMETER CHANNEL PROFILE
C3–11	WEST 4 PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 15+52.06
C3–12	NORTH PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 15+77.33
C3–13	CHUTE 2 PROFILE
C3–14	CHUTE 3 AND 4 PROFILES
C3–15	CHUTE 5 AND 6 PROFILES
C3–16	CHUTE 7 AND 8 PROFILES
C3–17	CHUTE 9 AND 10 PROFILES
C3–18	CHUTE 11 AND 12 PROFILES
C3–19	CHUTE 13 AND 14 PROFILES
C3–20	CHUTE 15 AND 16 PROFILES
C3–21	CHUTE 17 AND 18 PROFILES
C3–22	CHUTE 19 AND 20 PROFILES
C3–23	CHUTE 21 AND 22 PROFILES
C3–24	CHUTE 23 AND 24 PROFILES
C3–25	CHUTE 25 AND 26 PROFILES
C3–26	DRAINAGE DETAILS
C3–27	DRAINAGE DETAILS
C3–28	PERIMETER ROAD LOW WATER CROSSING
C3–29	CP–1, CP–9, AND CP–10
C3–30	CP–2 AND CP–3
C3–31	CP–4 AND CP–5
C3–32	CP–6, CP–7, AND CP–8



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SCALE IN FEET

LEGEND

2290A PERMIT BOUNDARY

2290A LANDFILL FOOTPRINT

NOTE(S):

1. REFER TO DRAINAGE SYSTEM CALLOUTS FOR PONDS, CHANNELS, CHUTES, AND CULVERT DETAILS.

STATE OF TEXAS
FELIPE ANTONIO WESCOUP
103826
LICENSED
PROFESSIONAL ENGINEER

6/11/2025

ISSUED FOR PERMITTING PURPOSES

REVISIONS			
REV	DATE	DESCRIPTION	DWN BY
1	06/25	NOD 1 RESPONSE	BBB

PERIMETER DRAINAGE PLAN

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DISPOSAL AND RECYCLING FACILITY
PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817–563–1144

TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

C1D.1

O:\TASWA\P\Drawings\ATT C\C3-1_DrngStructures.dwg Layout: C1-D-1 User: bboles

Depth and Velocity Calculations for the Perimeter Channels for the 25-Year Peak Runoff

Required: Determine the velocity and depth for the perimeter channels and compare to the permissible non-erodible flow velocity.

Method: Manning's Equation for flow velocity.

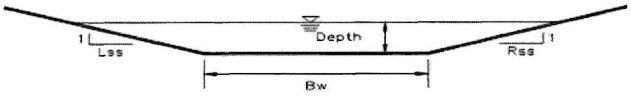
References:

1. Texas Department of Transportation, *Hydraulic Design Manual,* March 2004.

Solution:

Manning's Equation V = (k/n)(R^2/3)(S^1/2)

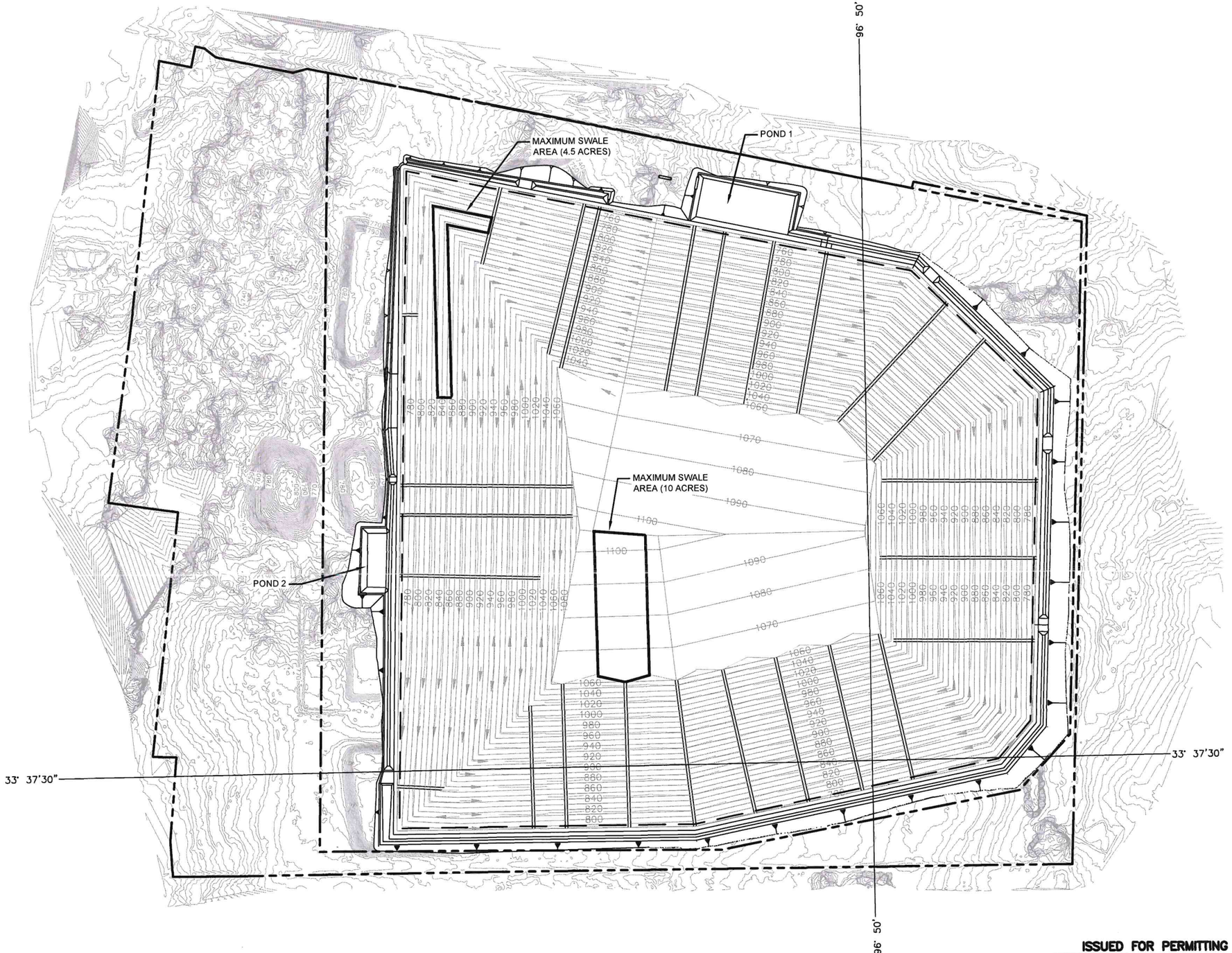
V = Velocity (fps)
k = Conversion Factor = 1.486
n = Manning's Roughness Coefficient = 0.03 Grass lined channel
R = Hydraulic Radius = A/Pw
A = Cross-Sectional Area (ft^2)
Pw = Wetted Perimeter (ft)
S = Channel Slope (ft/ft)
Bw = Bottom Width (ft)



Channel	Channel Station		Q (cfs)	S (ft/ft)	BW (ft)	Rss (H:V)	Lss (H:V)	D (ft)	R (ft)	A (sf)	PW (ft)	V (fps)	Shear Stress (psf)
East Ditch													
E2	2+29	2+98	636.9	0.0066	20	4.0	4.0	2.99	2.14	95.38	44.62	6.68	1.23
E3	2+98	13+12	557.1	0.0066	20	4.0	4.0	2.78	2.02	86.69	42.96	6.43	1.15
E4	13+12	16+25	669.1	0.0050	20	4.0	4.0	3.29	2.32	109.15	47.14	6.13	1.03
E5	16+25	20+26	587.1	0.0050	20	4.0	4.0	3.08	2.19	99.38	45.37	5.91	0.96
E6	20+26	26+46	501.2	0.0050	20	4.0	4.0	2.83	2.05	88.76	43.36	5.65	0.88
E7	26+46	29+86	490.7	0.0043	20	4.0	4.0	2.91	2.10	92.26	44.03	5.32	0.78
E8	29+86	33+51	643.4	0.0043	20	4.0	4.0	3.35	2.35	112.03	47.65	5.74	0.90
E9	33+51	39+40	556.9	0.0043	20	4.0	4.0	3.11	2.21	101.00	45.67	5.51	0.84
E10	39+40	43+72	461.2	0.0043	20	4.0	4.0	2.82	2.04	88.27	43.27	5.22	0.76
E11	43+72	45+70	653.2	0.0043	20	4.0	4.0	3.38	2.37	113.25	47.86	5.77	0.91
E12	45+70	52+11	599.1	0.0039	20	4.0	4.0	3.31	2.33	110.23	47.33	5.43	0.81
E13	52+11	56+52	599.1	0.0043	20	4.0	4.0	3.23	2.28	106.43	46.65	5.63	0.87
E14	56+52	63+54	599.1	0.0043	20	4.0	4.0	3.23	2.28	106.43	46.65	5.63	0.87
R13	63+54	67+48	505.3	0.0043	20	4.0	4.0	2.96	2.12	94.21	44.40	5.36	0.79
R14	67+48	71+68	434.7	0.0043	20	4.0	4.0	2.74	1.99	84.63	42.55	5.14	0.73
R15	71+68	75+80	362.4	0.0043	20	4.0	4.0	2.48	1.84	74.38	40.49	4.87	0.67
R16	75+80	80+65	289.3	0.0043	20	4.0	4.0	2.20	1.66	63.46	38.16	4.56	0.59
R17	80+65	85+74	218.1	0.0043	20	4.0	4.0	1.89	1.46	52.09	35.58	4.19	0.51
R18	85+74	90+50	143.1	0.0044	20	4.0	4.0	1.49	1.20	38.63	32.27	3.70	0.41
R19	90+50	98+66	71.2	0.0044	20	4.0	4.0	1.00	0.85	24.10	28.28	2.95	0.28
West Ditch 1													
W1-1	0+00	7+85	40.5	0.0040	20	4.0	4.0	0.75	0.66	17.14	26.15	2.36	0.19
W1-2	7+85	13+39	40.0	0.0134	20	4.0	4.0	0.52	0.47	11.49	24.29	3.48	0.44
W1-3	13+39	14+92	87.9	0.0134	20	4.0	4.0	0.82	0.72	19.16	26.78	4.59	0.69
W1-4	14+92	19+06	8.0	0.0125	20	4.0	4.0	0.21	0.20	4.27	21.69	1.87	0.16
W1-5	14+92	19+06	8.0	0.0024	20	4.0	4.0	0.33	0.31	7.14	22.76	1.12	0.05
W1-6	19+06	24+75	8.0	0.0125	20	4.0	4.0	0.21	0.20	4.27	21.69	1.87	0.16
West Ditch 2													
W2-1	0+00	1+24	182.9	0.0043	20	4.0	4.0	1.72	1.35	46.10	34.15	3.97	0.46
W2-2	1+24	3+55	114.4	0.004	20	4.0	4.0	1.32	1.08	33.42	30.90	3.42	0.35
West Ditch 3													
W3	0+00	3+55	12.1	0.018	20	4.0	4.0	0.24	0.22	4.93	21.94	2.46	0.26
West Ditch4													
W4	0+00	15+52	26.0	0.005	20	4.0	4.0	0.56	0.50	12.37	24.59	2.10	0.16
North Ditch													
N1	0+00	5+76	6.2	0.014	20	4.0	4.0	0.17	0.16	3.52	21.40	1.76	0.15
N1-2	5+76	8+36	68.6	0.014	20	4.0	4.0	0.70	0.62	16.06	25.80	4.27	0.61
N1-3	8+36	15+77	5.9	0.014	20	4.0	4.0	0.17	0.16	3.42	21.36	1.73	0.14

ATTACHMENT C1
APPENDIX C1E

FINAL COVER DRAINAGE STRUCTURE DESIGN



0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- SWALE AREA BOUNDARY
- SWALE

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL, FROM DRONE SURVEY FLOWN JUNE 1, 2022.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

STATE OF TEXAS
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103826
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PROFESSIONAL ENGINEER
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MAXIMUM SWALE AREA

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DISPOSAL AND RECYCLING FACILITY PERMIT AMENDMENT

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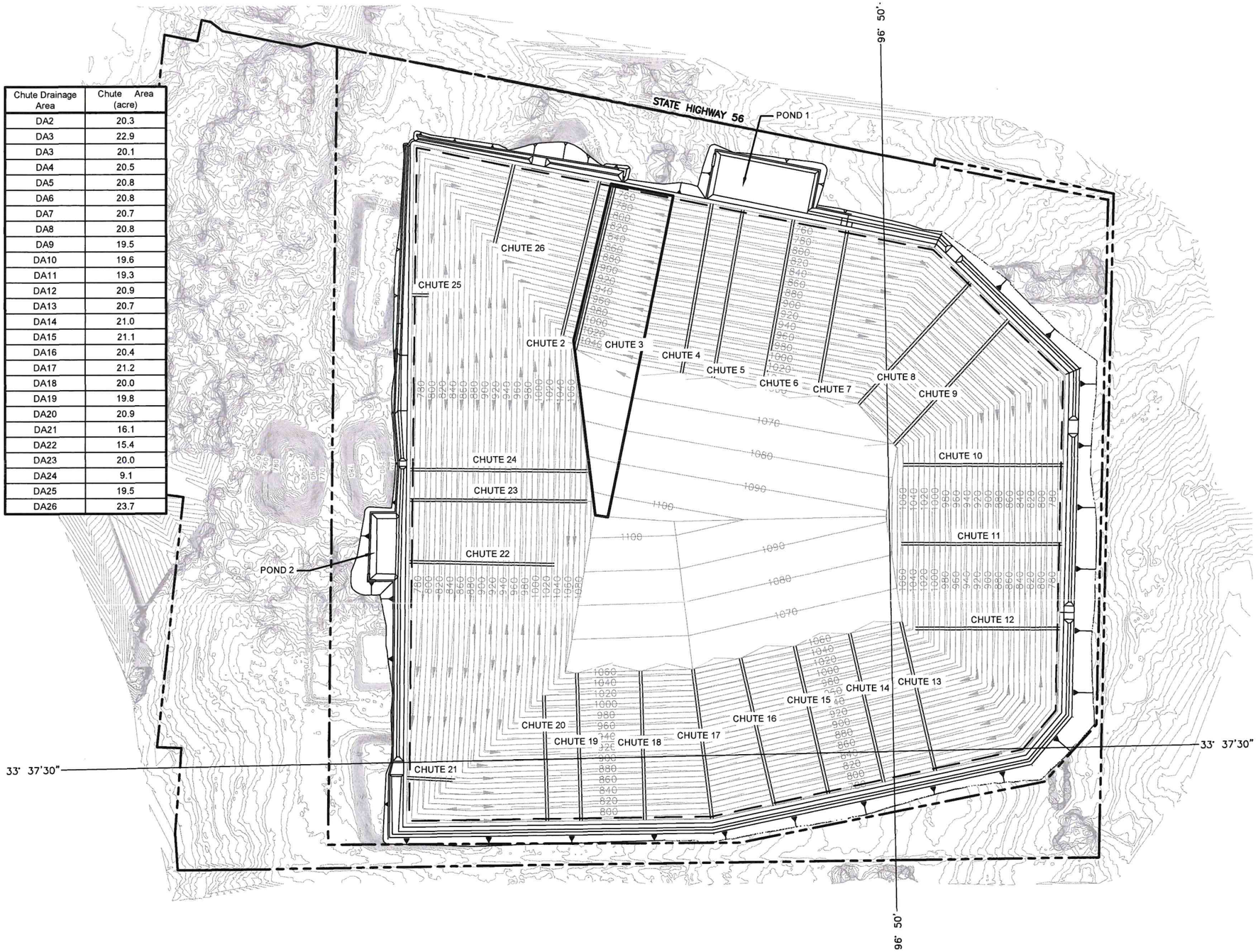
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

C1E.1

O:\TASWA\P\Drawings\ATT C\C1-E-1.dwg Layout: C1-E-1 User: bbold

Chute Drainage Area	Chute Area (acre)
DA2	20.3
DA3	22.9
DA3	20.1
DA4	20.5
DA5	20.8
DA6	20.8
DA7	20.7
DA8	20.8
DA9	19.5
DA10	19.6
DA11	19.3
DA12	20.9
DA13	20.7
DA14	21.0
DA15	21.1
DA16	20.4
DA17	21.2
DA18	20.0
DA19	19.8
DA20	20.9
DA21	16.1
DA22	15.4
DA23	20.0
DA24	9.1
DA25	19.5
DA26	23.7



0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- SWALE AREA BOUNDARY
- SWALE

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL, FROM DRONE SURVEY FLOWN JUNE 1, 2022.
2. CONTOURS WITHIN EXISTING LANDFILL FOOTPRINT DEPICT CURRENT PERMITTED FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

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1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

CHUTE AREA

TEXOMA AREA SOLID WASTE AUTHORITY
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C1E.2

O:\TASWA\P\Drawings\ATT C\C1-E-2.dwg Layout: C1-E-2 User: bbold

EROSION LAYER EVALUATION

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 TASWA DRF. 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. The minimum thickness of the erosion layer is based on the depth of frost penetration, or 6 inches, whichever is greater. For Grayson County, the approximate depth of frost penetration is less than 6 inches.

2. Soil loss is calculated using the Universal Soil Loss Equation (USLE) by following SCS procedures. Based on 85% vegetative cover, the calculated soil loss from final cover will not exceed 3 tons per acre per year. Soil loss thickness is calculated by multiplying the soil loss by the postclosure year period (30 years), multiplying by a safety factor of 2, and then converting the soil loss to a thickness. The USLE, with a safety factor of 2, calculates the soil loss of the 4 percent top slopes to be 6.03 inches and the side slopes to be 6.70 inches. These thicknesses are then compared to the actual soil thickness of the erosion layer, which is 24 inches. These calculations begin on page C1E.8.

	4% slope	25% slope
Maximum Sheet Flow	1100 ft	120
Soil Loss	0.16 tons/acre/year	2.66 tons/acre/year

3. Sheet flow velocities for a 25-year storm event are calculated to be less than permissible nonerodible velocities. The supporting calculations are presented on page C1E.15.

4. Vegetation for the site will be native and introduced grasses with root depths of 6 inches to 8 inches.

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 may 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.

6. Slope stability information is included in Attachment D5.

Erosion Loss Evaluation

Required: Determine the required soil thickness and compare to the actual soil thickness.

Method: Expected soil loss is calculated using the Universal Soil Loss Equation. Minimum erosion layer thickness is determined by adding the minimum thickness allowed by TCEQ to the expected thickness of soil loss.

References:

1. TNRCC, *Use of the Universal Soil Loss Equation in Final Cover/Configuration Design Procedural Handbook,* October 1993.

Solution:

Annual Soil Loss in tons/acre/year (A) = RKLSCP

Design Parameters	Top Slope (4%)	Perimeter Slope (25%)	
Rainfall Factor (R) =	275	275	Grayson County
Soil Erodibility Factor (K) =	0.25	0.25	(Loam)
Longest Run =	1100	120	ft
Slope =	4.0	25	%
Topographic Factor (LS) =	0.79	6.45	
Crop Management Factor (C) =	0.006	0.006	(tall grass with 85% cover)
Erosion Control Practice Factor (P) =	0.50	1.00	(Contouring)
Soil Loss (A) =	0.16	2.66	tons/acre/yr.

Erosion Layer Thickness Evaluation:

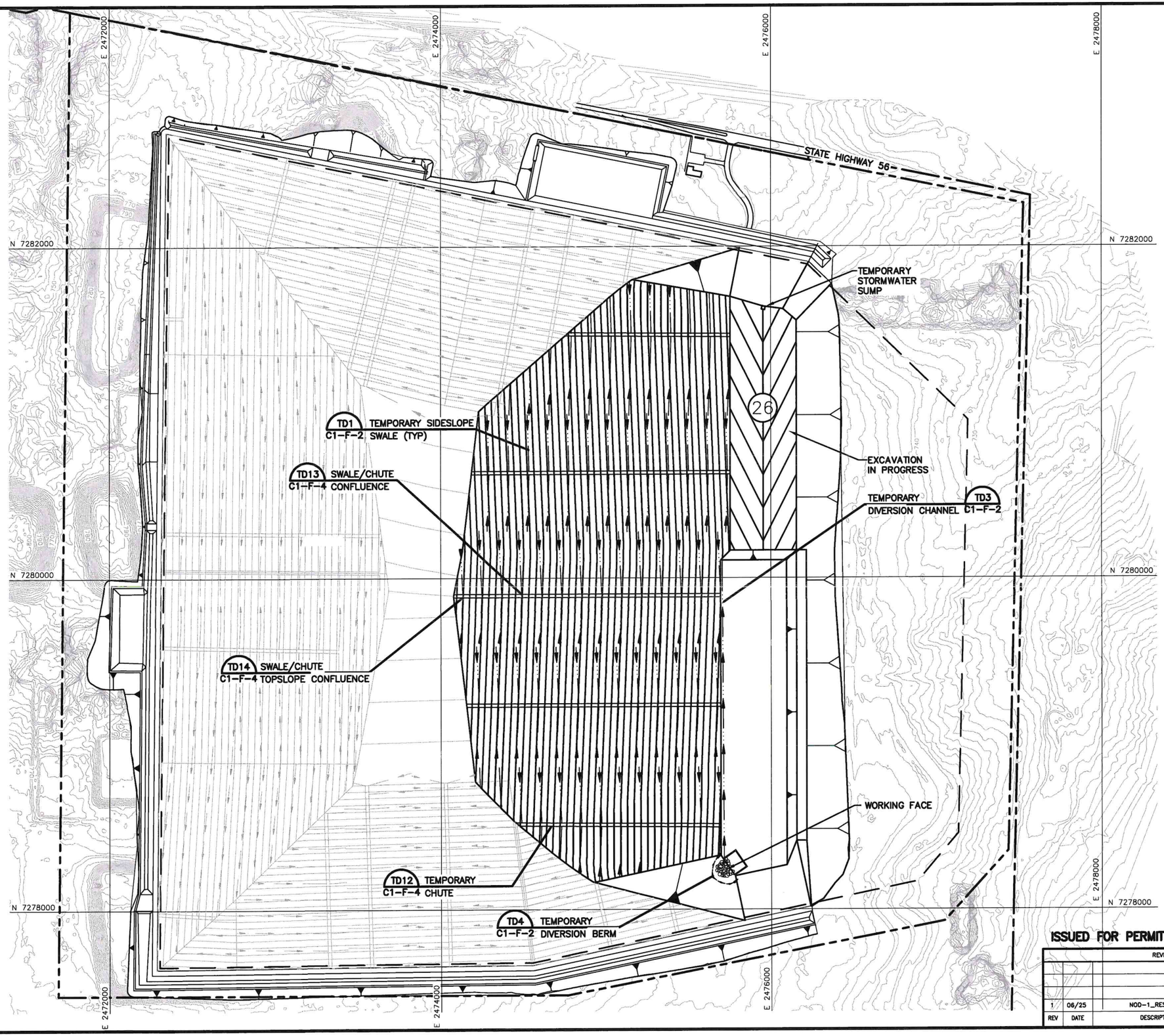
Required Thickness (T) = AYF/w

	Top Slope (4%)	Perimeter Slope (25%)	
Soil Loss (A) =	0.16	2.66	tons/acre/yr.
Postclosure Period =	30	30	years
Factor of Safety (F) =	2	2	
Specific Weight of Soil (w) =	125	125	pcf
Required Soil Thickness (T)	**0.04**	**0.70**	**inches**
Actual Soil Thickness	12.00	12.00	inches

Summary: As noted in the permit drawings, 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 0.70 inches.

ATTACHMENT C1
APPENDIX C1F

INTERMEDIATE COVER
EROSION AND SEDIMENTATION CONTROL PLAN



0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7279000 — STATE PLANE COORDINATES
- 750 — EXISTING 10' GROUND CONTOUR
- 700 — EXCAVATION CONTOUR

NOTES:

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS AND MATHEWS ENVIRONMENTAL FROM DRONE SURVEY FLOWN ON JUNE 1, 2022.

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INTERMEDIATE COVER EROSION CONTROL FEATURES

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DRF PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
C1F.1

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT C3
DRAINAGE SYSTEM PLANS AND DETAILS

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

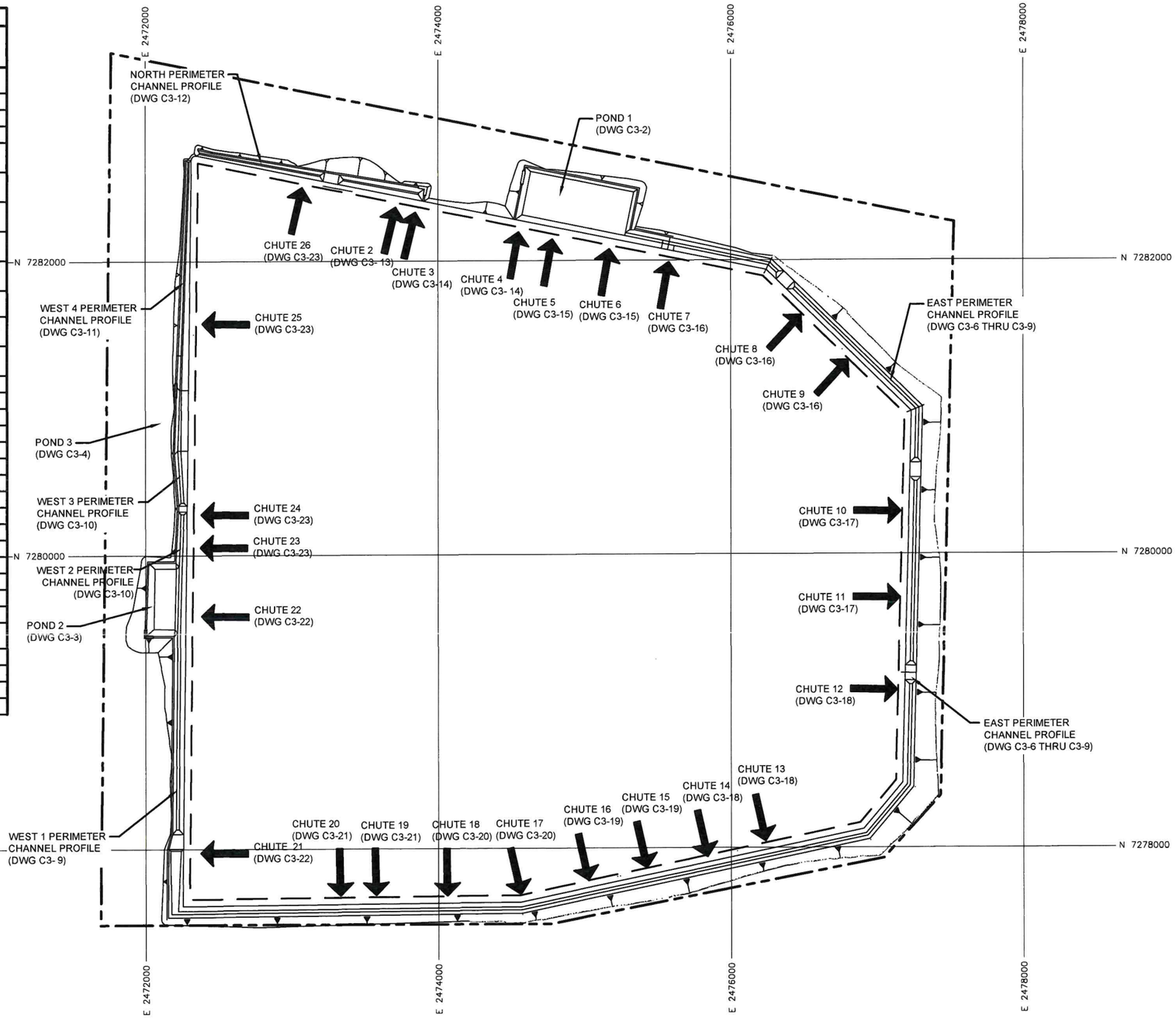
Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

DRAWING INDEX	
DRAWING	DESCRIPTION
C3-1	DRAINAGE STRUCTURE PLAN – DRAINAGE SYSTEM CALLOUTS
C3-2	POND 1
C3-3	POND 2
C3-4	POND 3
C3-5	EAST PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 24+00
C3-6	EAST PERIMETER CHANNEL PROFILE STA. 24+00 THROUGH 53+00
C3-7	EAST PERIMETER CHANNEL PROFILE STA. 53+00 THROUGH 82+00
C3-8	EAST PERIMETER CHANNEL PROFILE STA. 82+00 THROUGH 98+66.78
C3-9	WEST 1 PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 24+75.69
C3-10	WEST 2 AND WEST 3 PERIMETER CHANNEL PROFILE
C3-11	WEST 4 PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 15+52.06
C3-12	NORTH PERIMETER CHANNEL PROFILE STA. 0+00 THROUGH 15+77.33
C3-13	CHUTE 2 PROFILE
C3-14	CHUTE 3 AND 4 PROFILES
C3-15	CHUTE 5 AND 6 PROFILES
C3-16	CHUTE 7 AND 8 PROFILES
C3-17	CHUTE 9 AND 10 PROFILES
C3-18	CHUTE 11 AND 12 PROFILES
C3-19	CHUTE 13 AND 14 PROFILES
C3-20	CHUTE 15 AND 16 PROFILES
C3-21	CHUTE 17 AND 18 PROFILES
C3-22	CHUTE 19 AND 20 PROFILES
C3-23	CHUTE 21 AND 22 PROFILES
C3-24	CHUTE 23 AND 24 PROFILES
C3-25	CHUTE 25 AND 26 PROFILES
C3-26	DRAINAGE DETAILS
C3-27	DRAINAGE DETAILS
C3-28	PERIMETER ROAD LOW WATER CROSSING
C3-29	CP-1, CP-9, AND CP-10
C3-30	CP-2 AND CP-3
C3-31	CP-4 AND CP-5
C3-32	CP-6, CP-7, AND CP-8



0 400 800
SCALE IN FEET

LEGEND

2290A PERMIT BOUNDARY

2290A LANDFILL FOOTPRINT

NOTE(S):

1. REFER TO DRAINAGE SYSTEM CALLOUTS FOR PONDS, CHANNELS, CHUTES, AND CULVERT DETAILS.

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1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

DRAINAGE STRUCTURE PLAN (DRAINAGE SYTEM CALLOUTS)

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DISPOSAL AND RECYCLING FACILITY PERMIT AMENDMENT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

C3.1

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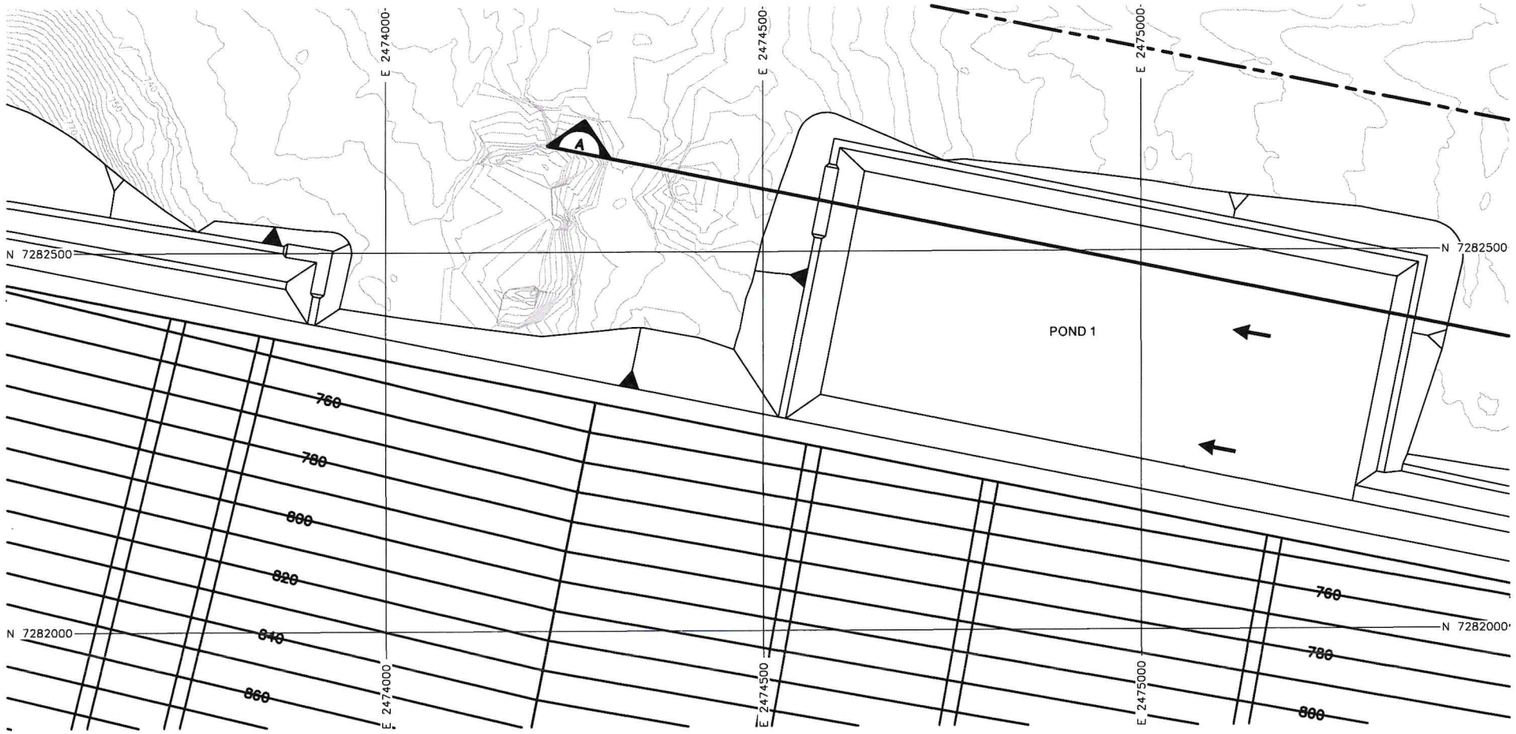


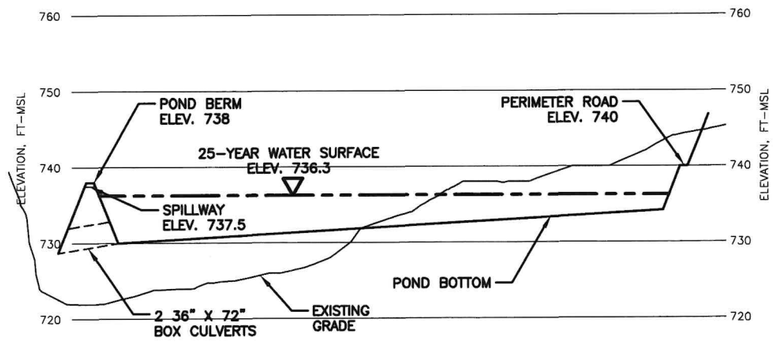
0 100 200
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 500 — 10' FINAL COVER CONTOUR
- DRAINAGE FLOW DIRECTION

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL, FROM DRONE SURVEY FLOWN JUNE 1, 2022.
2. REFER TO DRAINAGE SYSTEM CALLOUTS FOR PONDS, CHANNELS, CHUTES, AND CULVERT DETAILS.



POND 1 – SECTION A (A)

0 100 200
HORIZONTAL SCALE IN FEET

0 10 20
VERTICAL SCALE IN FEET

POND 1 ELEVATION–STORAGE RELATIONSHIP	
ELEVATION (FT)	VOLUME AT ELEVATION (AC–FT)
728.7	0.00
729	0.21
730	1.08
731	3.13
732	6.63
733	11.25
734	16.51
735	22.13
736	28.01
737	34.18
738	40.66
739	47.42
740	54.47

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REV	DATE	DESCRIPTION	DWN BY

POND 1

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DISPOSAL AND RECYCLING FACILITY PERMIT AMENDMENT

BME

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C3.2

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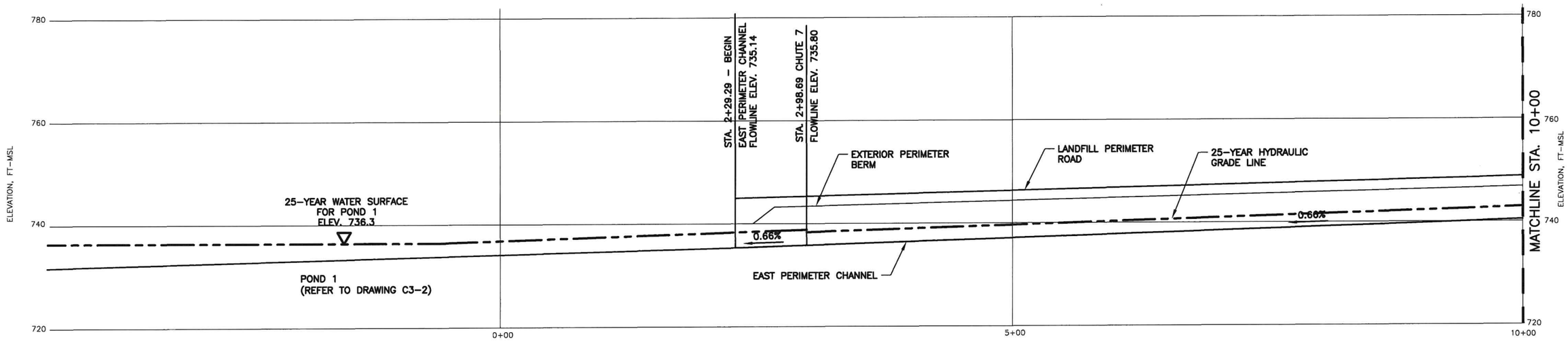
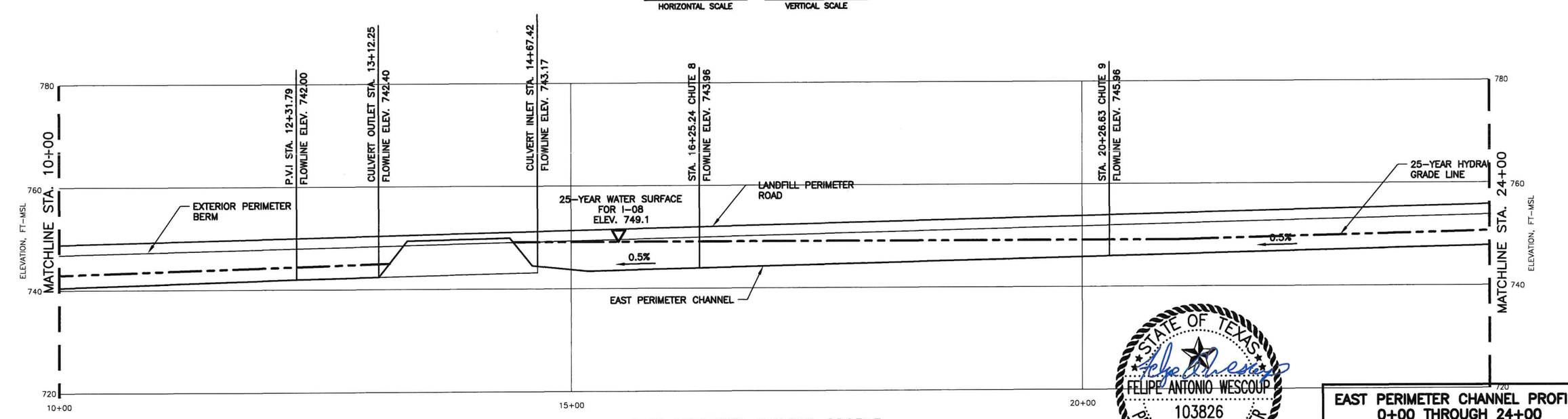


EAST PERIMETER CHANNEL PROFILE

STA. 0+00 TO 10+00

0 50 100 HORIZONTAL SCALE

0 10 20 VERTICAL SCALE



EAST PERIMETER CHANNEL PROFILE

STA. 10+00 TO 24+00

0 50 100 HORIZONTAL SCALE

0 10 20 VERTICAL SCALE

25-YEAR HYDRAULIC ANALYSIS

STATION		BOTTOM SLOPE (%)	BOTTOM WIDTH (ft)	CHANNEL DEPTH (ft)	FLOW DEPTH (ft)	FREE-BOARD (ft)	FLOW RATE (cfs)	FLOW VELOCITY (fps)	EROSION PROTECTION
2+29	2+98	0.0066	20	6	2.99	3.01	636.9	6.68	TURF MAT
2+98	13+12	0.0066	20	6	2.78	3.22	557.1	6.43	TURF MAT
13+12	16+25	0.0050	20	6	3.29	2.71	669.1	6.13	TURF MAT
16+25	20+26	0.0050	20	6	3.08	2.92	587.1	5.91	TURF MAT
20+26	24+00	0.0050	20	6	2.83	3.17	501.2	5.65	TURF MAT

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EAST PERIMETER CHANNEL PROFILE 0+00 THROUGH 24+00

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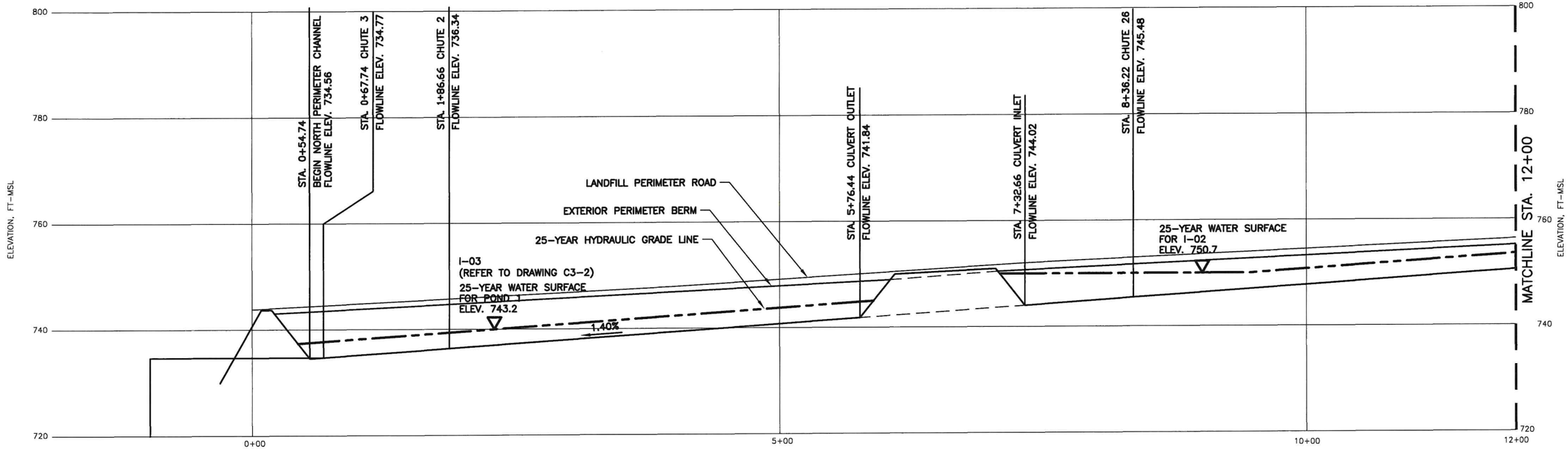
TBPG FIRM NO. 50222

C3.5

O:\TASWA\P\Drawings\ATT C\C3-5thru8_EastChan.dwg Layout: C3-5 User: bboles

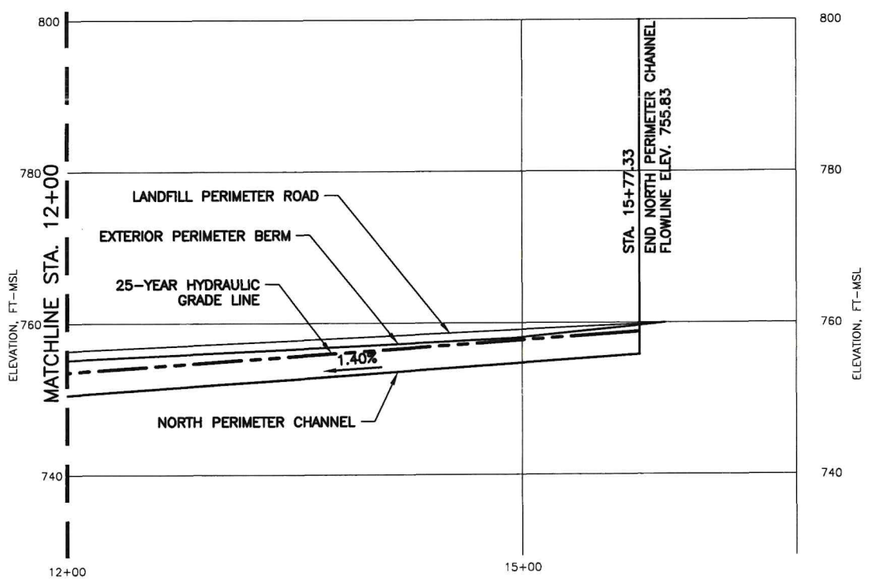


NORTH PERIMETER CHANNEL PROFILE

STA. 0+00 TO 12+00

0 50 100 HORIZONTAL SCALE

0 10 20 VERTICAL SCALE



NORTH PERIMETER CHANNEL PROFILE

STA. 12+00 TO 15+77.33

0 50 100 HORIZONTAL SCALE

0 10 20 VERTICAL SCALE

STATION		BOTTOM SLOPE (%)	BOTTOM WIDTH (ft)	CHANNEL DEPTH (ft)	FLOW DEPTH (ft)	FREE-BOARD (ft)	FLOW RATE (cfs)	FLOW VELOCITY (fps)	EROSION PROTECTION
0+00	5+76	0.014	20	6	0.17	5.83	6.20	1.76	VEGETATION
5+76	8+36	0.014	20	6	0.70	5.3	68.60	4.27	VEGETATION
8+36	15+77	0.014	20	6	0.17	5.83	5.90	1.73	VEGETATION

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REV	DATE	DESCRIPTION	DWN BY

NORTH PERIMETER CHANNEL PROFILE
0+00 THROUGH 15+77.33

TEXOMA AREA SOLID WASTE AUTHORITY
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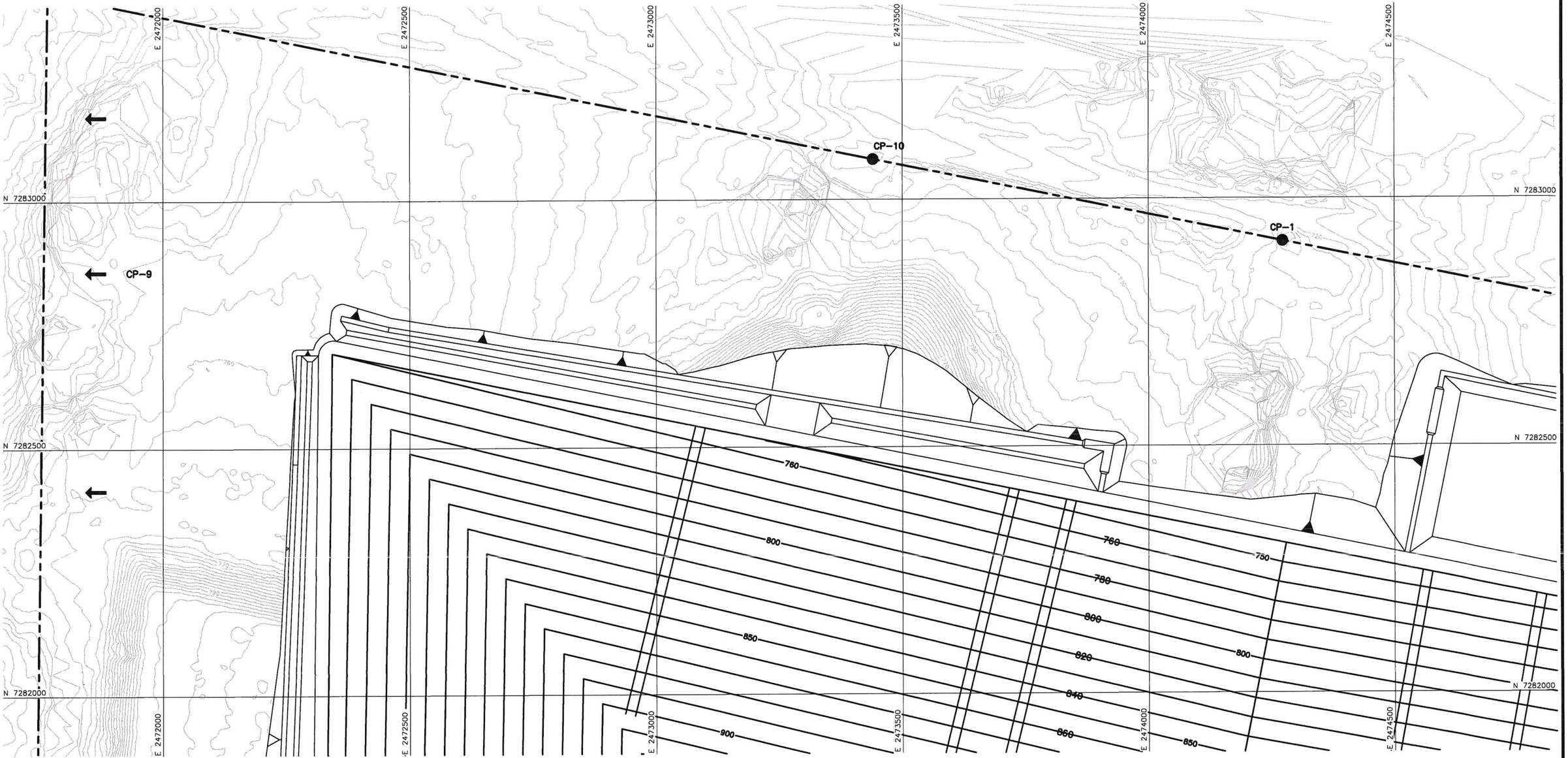
TBPG FIRM NO. 50222

C3.12

O:\TASWA\P\Drawings\ATT C\C3-12_NorthChan.dwg Layout: North Perimeter Channel User: bboles



0 100 200
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- 900 LANDFILL 10' CONTOUR
- DRAINAGE AREA BOUNDARY
- DA01 DRAINAGE AREA DESIGNATION
- COMPARISON POINT–POINT DISCHARGE
- FLOW DIRECTION

NOTE(S):

1. 7.5 MINUTE TOPOGRAPHIC BASE MAPS SADLER, TEX AND ETHEL, TEX DOWNLOADED FROM USGS WEBSITE ON FEBRUARY 10, 2022.
2. CONTOURS WITHIN LANDFILL FOOTPRINT DEPICT FINAL CONTOURS.
3. DRAINAGE AREA BOUNDARY NOT SHOWN WHERE COINCIDENTAL WITH PERMIT BOUNDARY.

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CP–1, CP–9 AND CP–10

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DISPOSAL AND RECYCLING FACILITY PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
MANSFIELD • WICHITA FALLS
817–563–1144
TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

C3.29

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

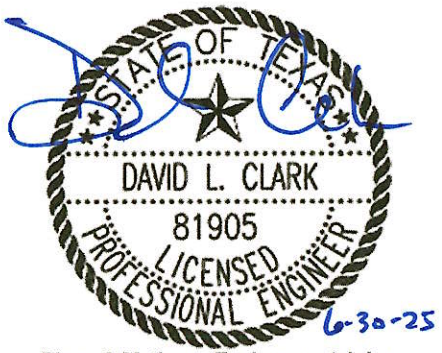
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT D
WASTE MANAGEMENT UNIT DESIGN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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Firm Registration No. F-256

Prepared by

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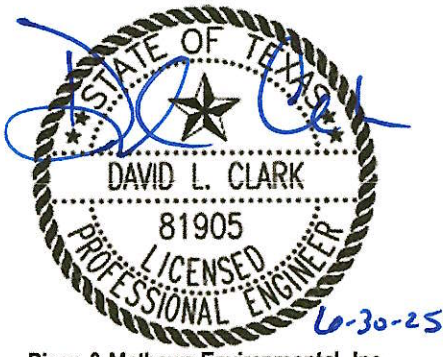

Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256
30 TAC §330.63(d)

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2 MATERIAL STAGING AREAS 2

3 LANDFILL UNITS 4

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Attachment D2 – Cross Sections

Attachment D3 – Construction Design Details

Attachment D4 – Site Life

Attachment D5 – Geotechnical Design

Attachment D6 – Contaminated Water Management Plan

Attachment D7 – Liner Quality Control Plan

Attachment D8 – Final Cover Quality Control Plan

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

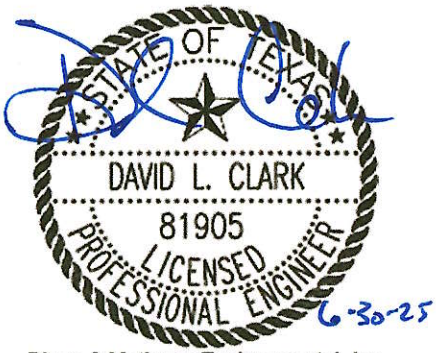
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D1
SITE LAYOUT PLANS

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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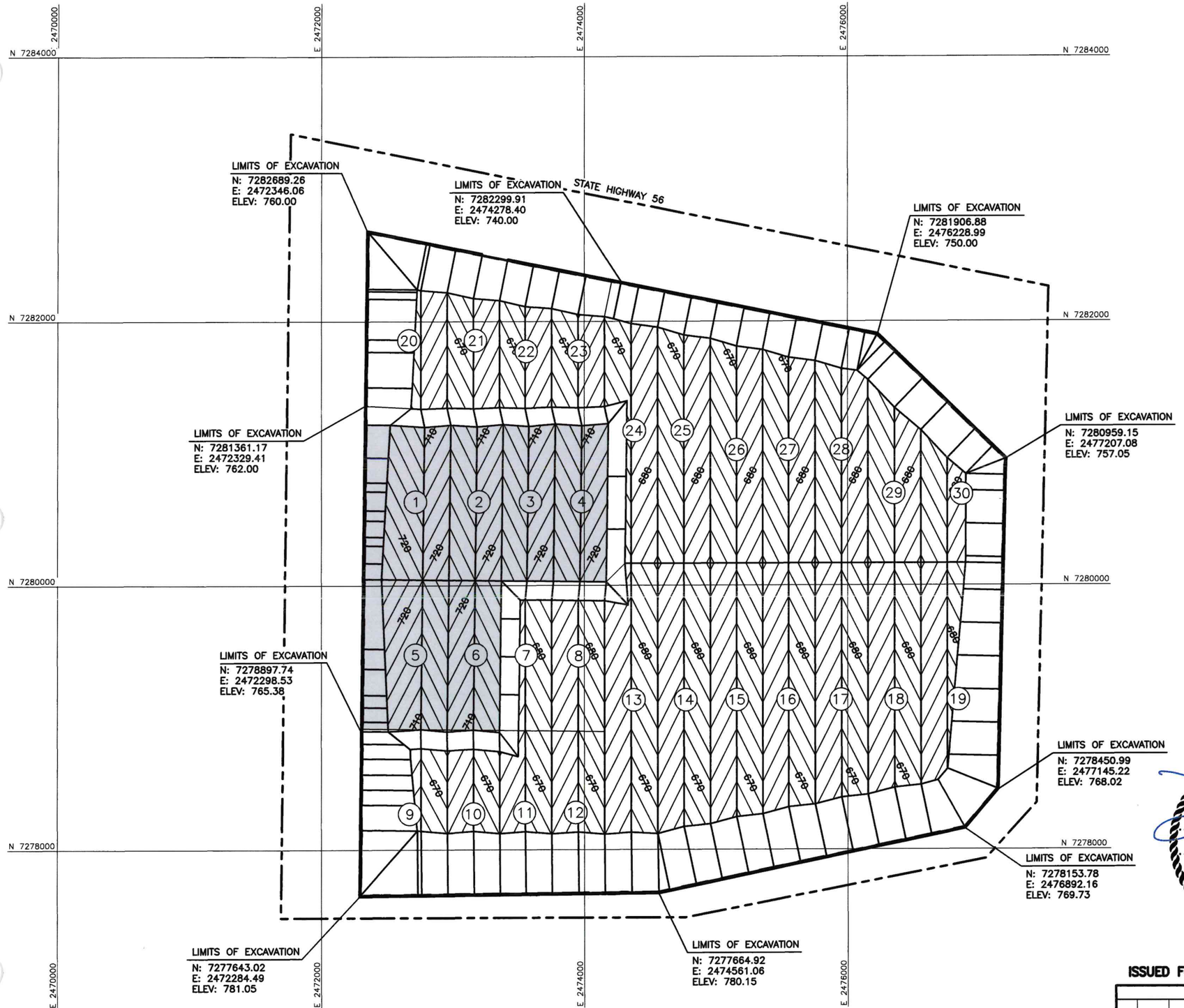

0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7279000 STATE PLANE COORDINATES
- LINED AREA
- 670 EXCAVATION CONTOUR
- (10) SECTOR NUMBER (DEVELOPMENT SEQUENCE)

NOTES:

1. ELEVATION OF DEEPEST EXCAVATION IS 663.9 FT-MSL.
2. SECTORS 1-6 HAVE BEEN LINED AND RECEIVED WASTE FILL.

STATE OF TEXAS
DAVID L. CLARK
81905
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EXCAVATION PLAN

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

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MANSFIELD, TEXAS 76063
817-563-1144
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D1.3

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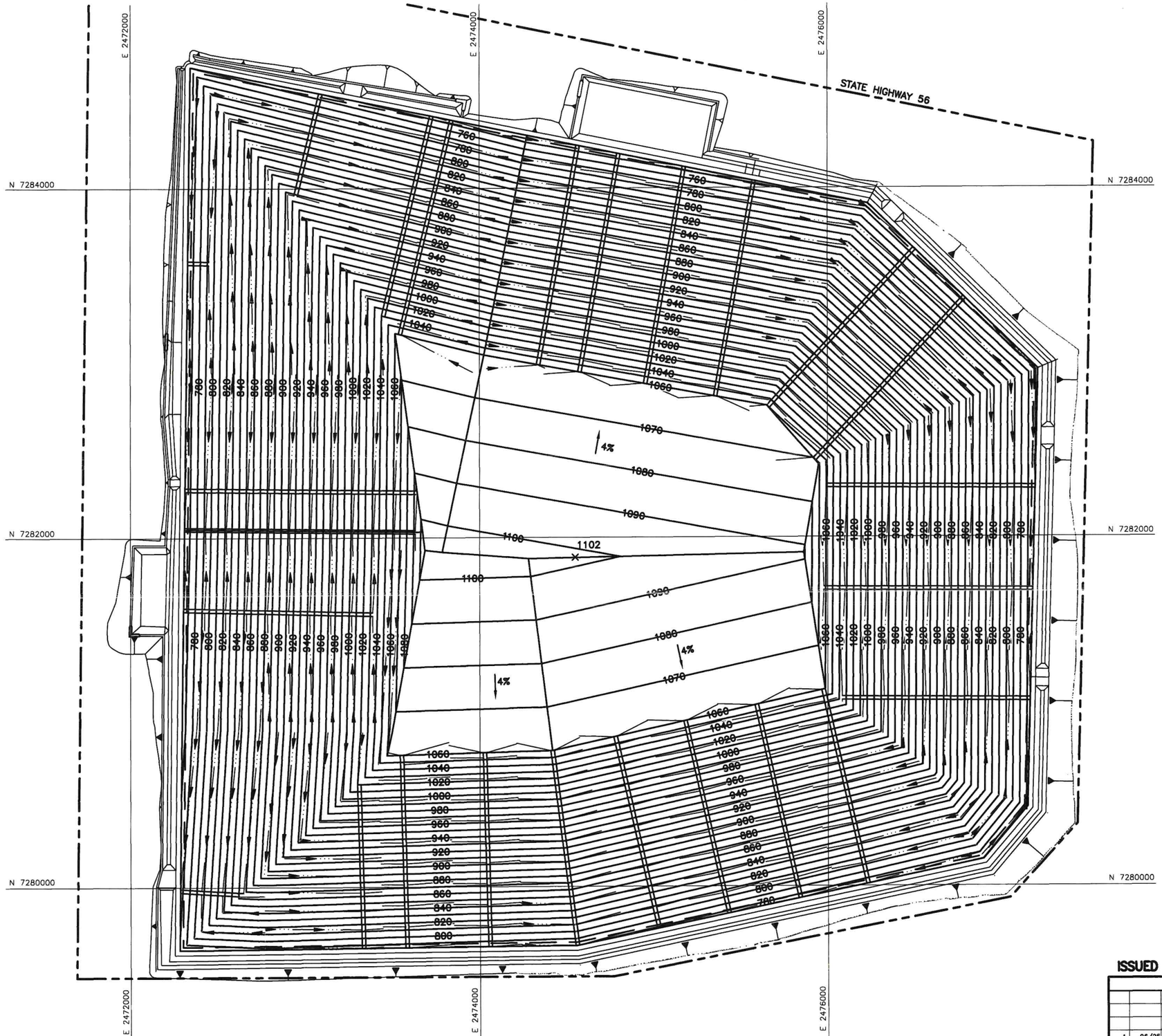

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7279000 — STATE PLANE COORDINATES
- 1000 — FINAL COVER CONTOUR
- SWALE
- LETDOWN CHUTE

NOTES:

1. PROPOSED CONTOURS DEPICT TOP OF FINAL COVER GRADES.
2. MAXIMUM FINAL COVER ELEVATION = 1106.7 FT-MSL.
3. MAXIMUM TOP OF WASTE ELEVATION = 1102.2 FT-MSL.

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LANDFILL COMPLETION PLAN

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

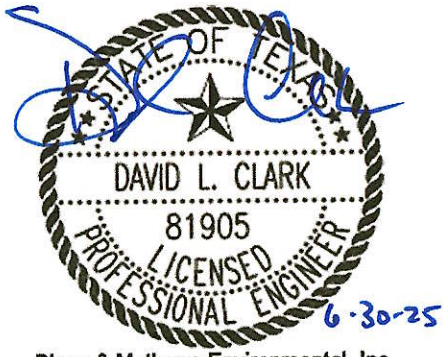
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D2
CROSS SECTIONS

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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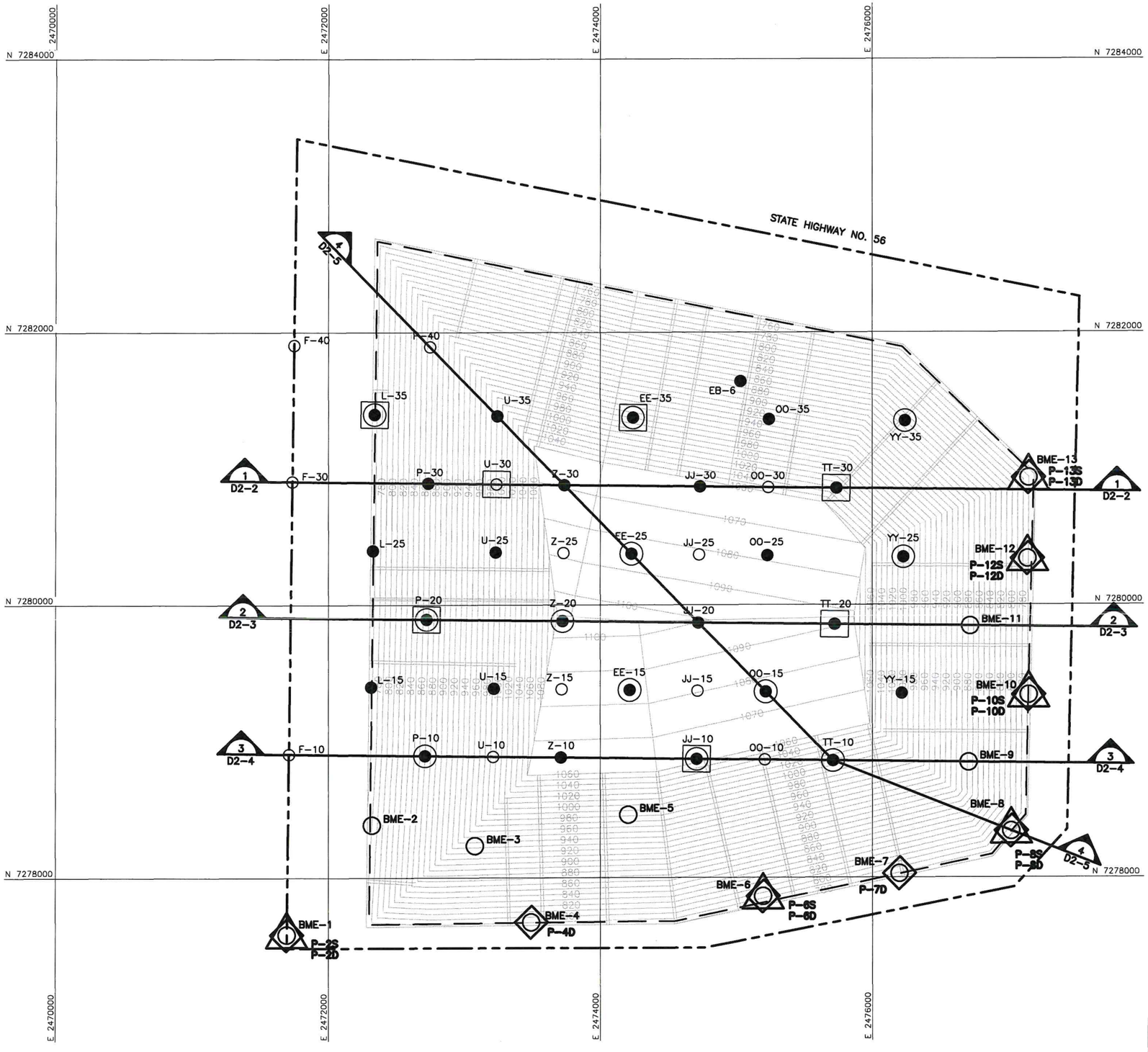

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- 750 FINAL COVER CONTOUR
- N 7279000 STATE PLANE COORDINATES
- JJ-30 HISTORICAL BORINGS > 30' BELOW EDE
- Z-25 HISTORICAL BORINGS > 5' BELOW EDE
- WOODBINE PIEZOMETERS
- SHALE PIEZOMETERS
- EXISTING MONITORING WELL
- BME-3 NEW BORING > 30' BELOW EDE
- P-10D NEW LAYER V PIEZOMETER
- P-10S NEW LAYER II/III PIEZOMETER

NOTES:

1. CONTOURS DEPICT TOP OF FINAL COVER GRADES.

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CROSS SECTION LOCATION MAP

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

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TBPG FIRM NO. 50222

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D2.1

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

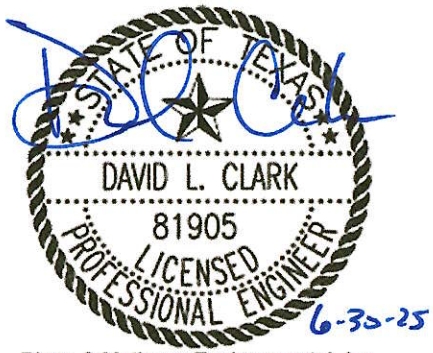
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D3
CONSTRUCTION DESIGN DETAILS

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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Firm Registration No. F-256

Prepared by

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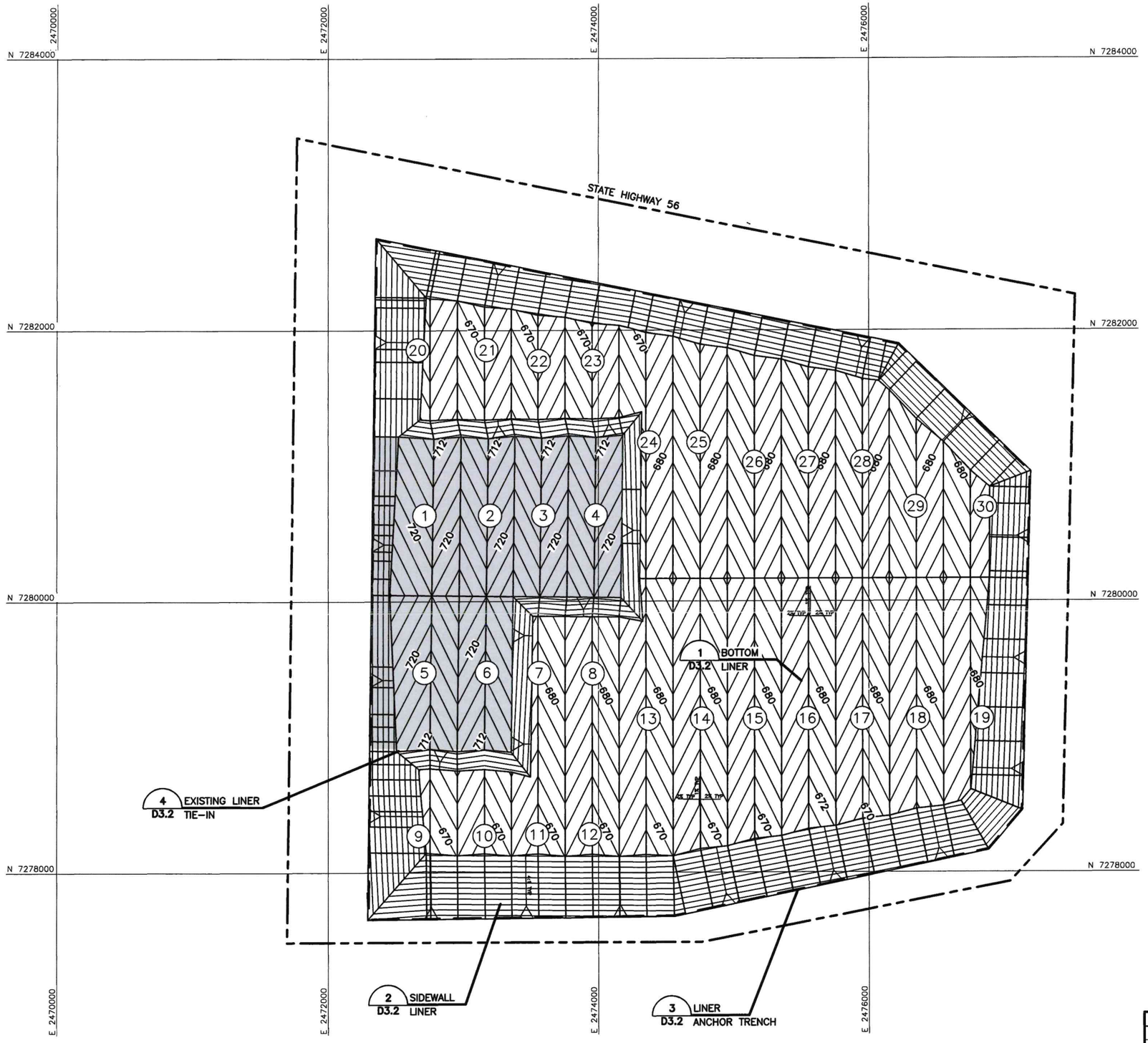

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7279000 STATE PLANE COORDINATES
- LINED AREA
- 670 LINER CONTOUR
- (17) SECTOR NUMBER (DEVELOPMENT SEQUENCE)

NOTES:

1. SECTORS 1–6 HAVE BEEN LINED AND RECEIVED WASTE FILL.

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LINER PLAN

TEXOMA AREA SOLID WASTE AUTHORITY
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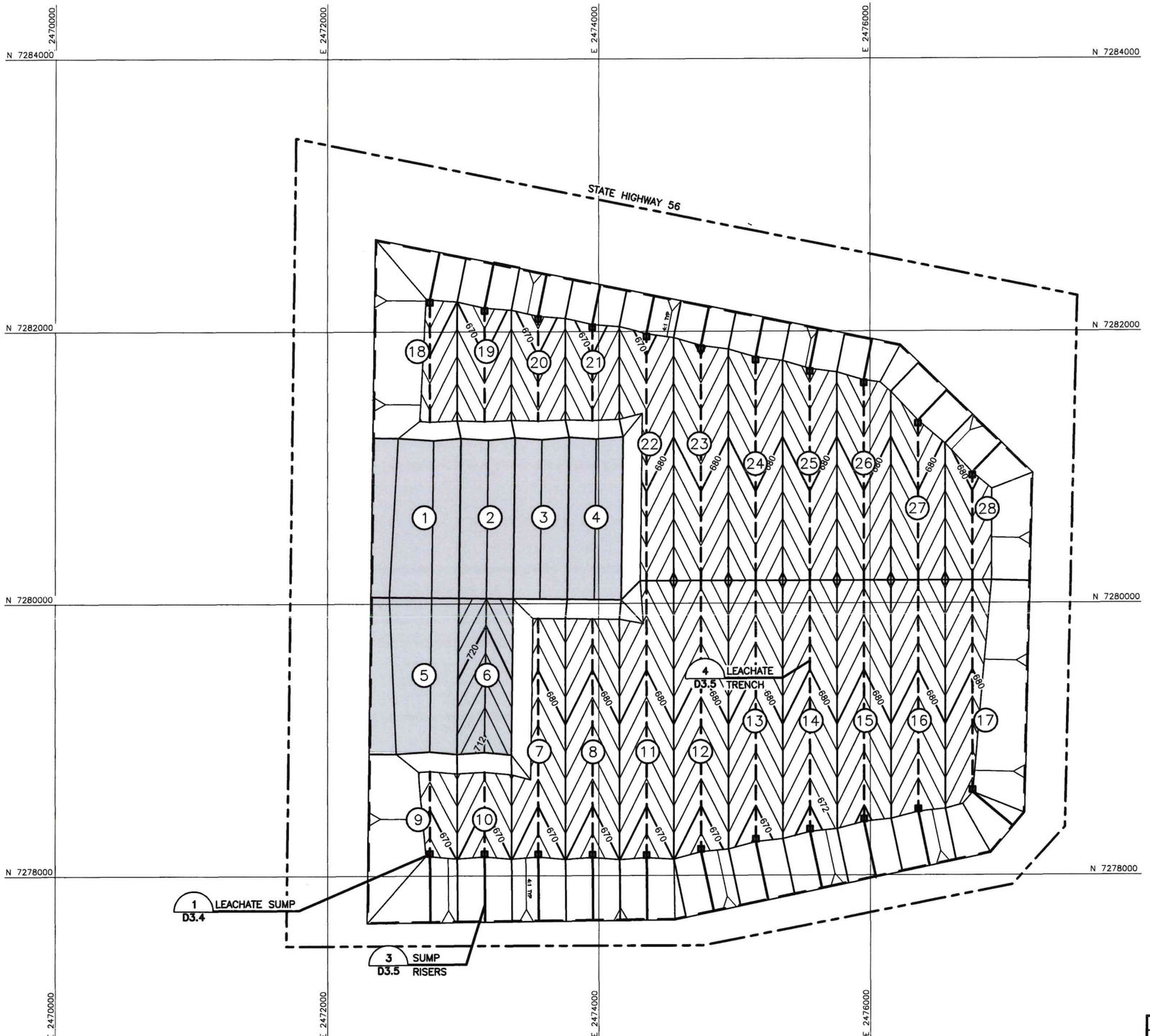

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7279000 STATE PLANE COORDINATES
- LINED AREA
- 670 LINER CONTOUR
- (17) SECTOR NUMBER (DEVELOPMENT SEQUENCE)

NOTES:

1. SECTORS 1–6 HAVE BEEN LINED AND RECEIVED WASTE FILL.

STATE OF TEXAS
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LEACHATE COLLECTION SYSTEM PLAN

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PERMIT AMENDMENT

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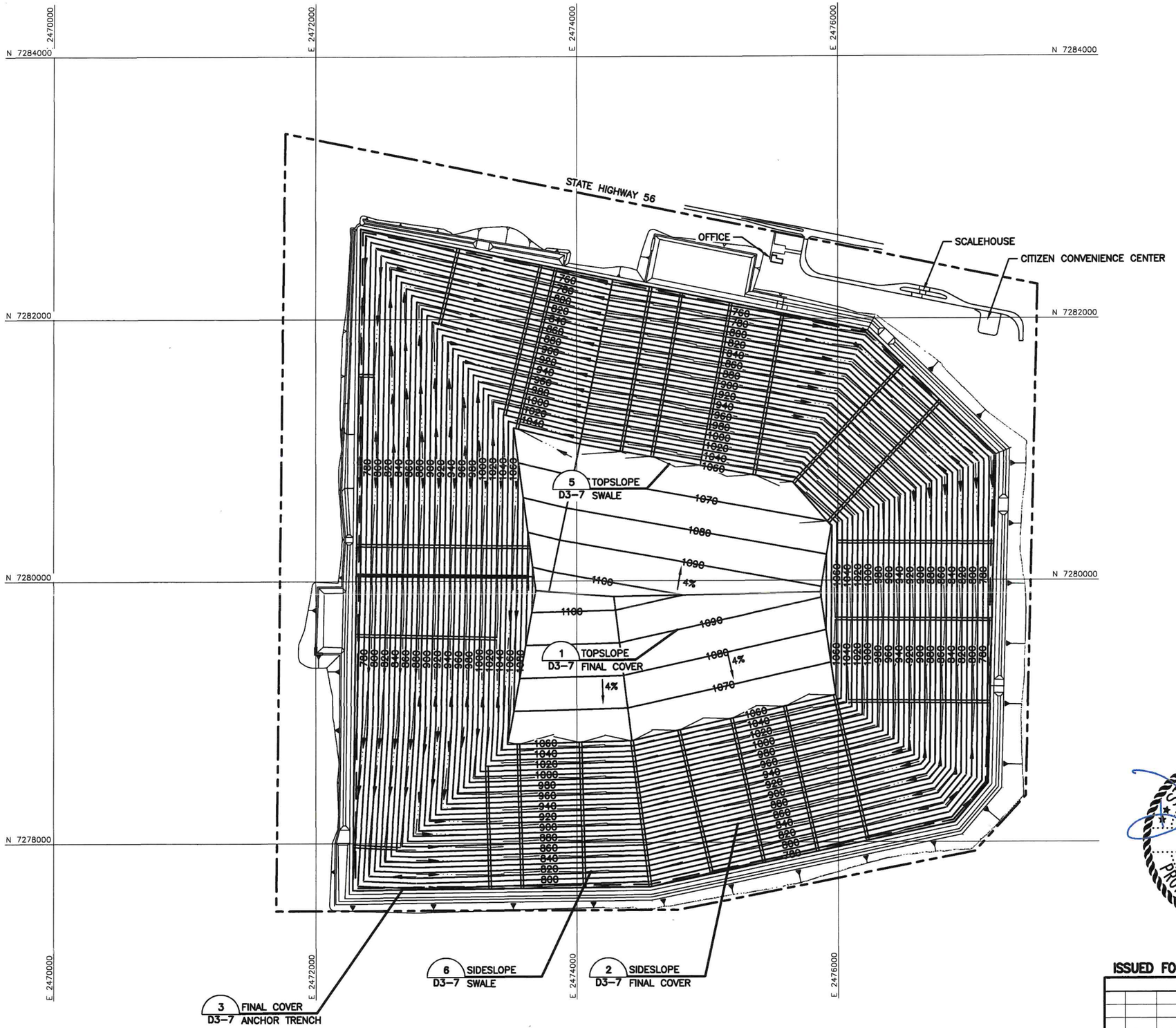

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7279000 STATE PLANE COORDINATES
- 1000 FINAL COVER CONTOUR
- SWALE
- LETDOWN CHUTE

NOTES:

1. PROPOSED CONTOURS DEPICT TOP OF FINAL COVER GRADES.

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6-11-25

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LANDFILL COMPLETION PLAN

TEXOMA AREA SOLID WASTE AUTHORITY
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PERMIT AMENDMENT

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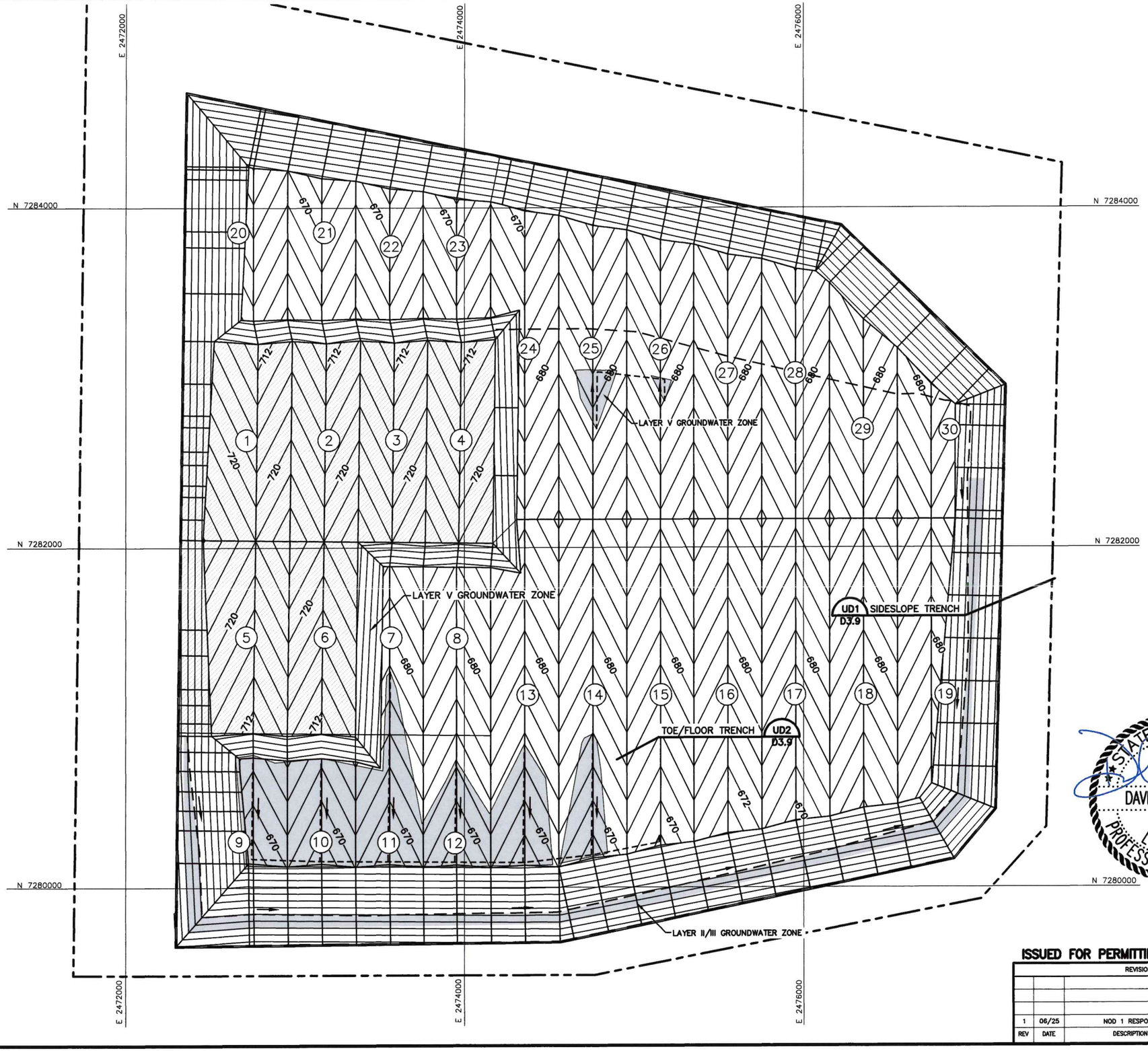

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7279000 STATE PLANE COORDINATES
- DEWATERING TRENCH
- GROUNDWATER ZONE
- EXISTING LINED AREA

NOTES:

1. LAYER II/III GROUNDWATER WILL BE INTERCEPTED ON THE SIDESLOPE AND TYPICALLY DAYLIGHTED TO THE ADJACENT OPEN EXCAVATION. A SUMP/PIUMP WILL BE PROVIDED WHEN DAYLIGHTING SIDESLOPE DEWATERING TRENCH IS NOT FEASIBLE.
2. GRADING OF SIDESLOPE DEWATERING TRENCH WILL BE DETERMINED DURING SECTOR DEVELOPMENT BASED ON FIELD CONDITIONS DURING EXCAVATION.
3. LAYER V GROUNDWATER WILL BE COLLECTED IN DEWATERING TRENCHES BENEATH THE LEACHATE COLLECTION TRENCH AND ALONG THE TOE OF THE SLOPE WHERE LAYER V GROUNDWATER IS ENCOUNTERED IN THE BOTTOM OF THE EXCAVATION.
4. LAYER V DEWATERING TRENCHES WILL BE DAYLIGHTED TO ADJACENT OPEN EXCAVATION OR COLLECTED IN CLOSED SUMPS AND PUMPED INTO THE STORMWATER DISCHARGE SYSTEM.

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6-11-25

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UNDERDRAIN PLAN

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

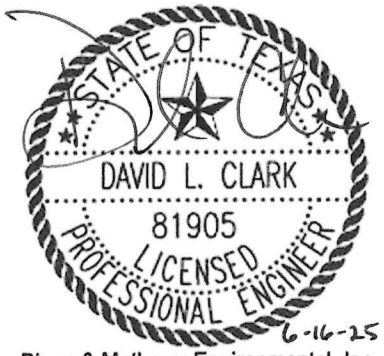
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT D4
SITE LIFE

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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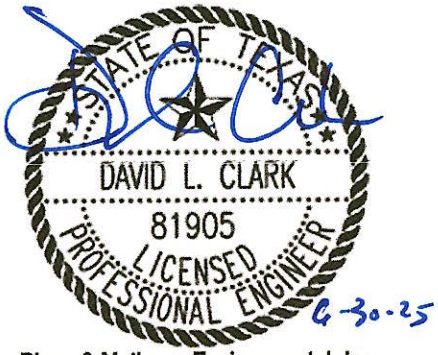


Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

CONTENTS

30 TAC §330.63(d)(4)(D)

1 SITE LIFE 1

TABLES AND CALCULATION SHEETS

Capacity and Site Life D4.2

CAPACITY AND SITE LIFE

Required:

1. Estimate the remaining site life for the TASWA Facility.

Assumptions:

1. The waste acceptance rate will increase at an annual rate of 2%.
2. Beginning Waste Accepted = 270,000 tons
3. Airspace Utilization Factor = 0.4
4. The facility accepts waste 312 days per year (6 days a week).

Solution:

		Total Capacity =	183,500,000 cy
AUF:	0.4	Approximate Capacity Used =	7,000,000 cy
Year 1 Waste:	270,000 tons	Total remaining waste volume =	176,500,000 cy
Days Operating	312	Total remaining waste tonnage =	70,600,000 tons

Year	Annual Waste (tons)	Daily Waste (tons/day)	Accumulated Waste (tons)	Remaining Capacity (tons)	Annual Waste (cy)	Accumulated Waste (cy)	Remaining Capacity (cy)
1	270,000	865	270,000	70,330,000	675,000	675,000	175,825,000
2	275,400	883	545,400	70,054,600	688,500	1,363,500	175,136,500
3	280,908	900	826,308	69,773,692	702,270	2,065,770	174,434,230
4	286,526	918	1,112,834	69,487,166	716,315	2,782,085	173,717,915
5	292,257	937	1,405,091	69,194,909	730,642	3,512,727	172,987,273
10	322,675	1,034	2,956,425	67,643,575	806,687	7,391,062	169,108,938
20	393,339	1,261	6,560,290	64,039,710	983,348	16,400,725	160,099,275
30	479,478	1,537	10,953,381	59,646,619	1,198,695	27,383,453	149,116,547
40	584,481	1,873	16,308,535	54,291,465	1,461,203	40,771,339	135,728,661
50	712,479	2,284	22,836,438	47,763,562	1,781,198	57,091,096	119,408,904
60	868,508	2,784	30,793,916	39,806,084	2,171,270	76,984,789	99,515,211
70	1,058,707	3,393	40,494,036	30,105,964	2,646,766	101,235,090	75,264,910
80	1,290,557	4,136	52,318,429	18,281,571	3,226,394	130,796,072	45,703,928
90	1,573,182	5,042	66,732,297	3,867,703	3,932,956	166,830,743	9,669,257
91	1,604,646	5,143	68,336,943	2,263,057	4,011,615	170,842,358	5,657,642
92	1,636,739	5,246	69,973,682	626,318	4,091,847	174,934,205	1,565,795
93	1,669,474	5,351	71,643,156	-1,043,156	4,173,684	179,107,889	-2,607,889

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

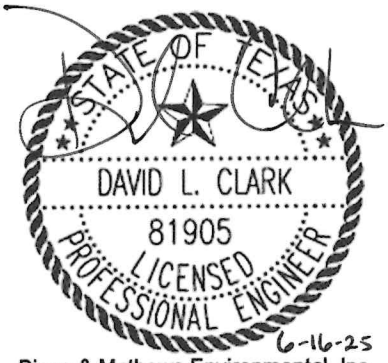
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT D6
LEACHATE AND CONTAMINATED WATER MANAGEMENT PLAN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025



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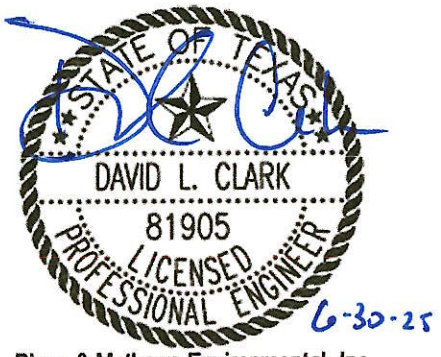

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Firm Registration No. F-256

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30 TAC §§330.65(c), 330.177, 330.207, 330.227, 330.331(a)(2), 330.333, 330.337(d)

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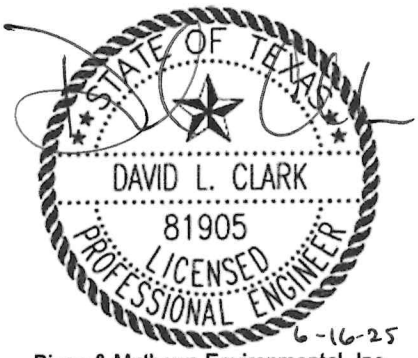
CONTAINMENT/DIVERSION BERM DESIGN



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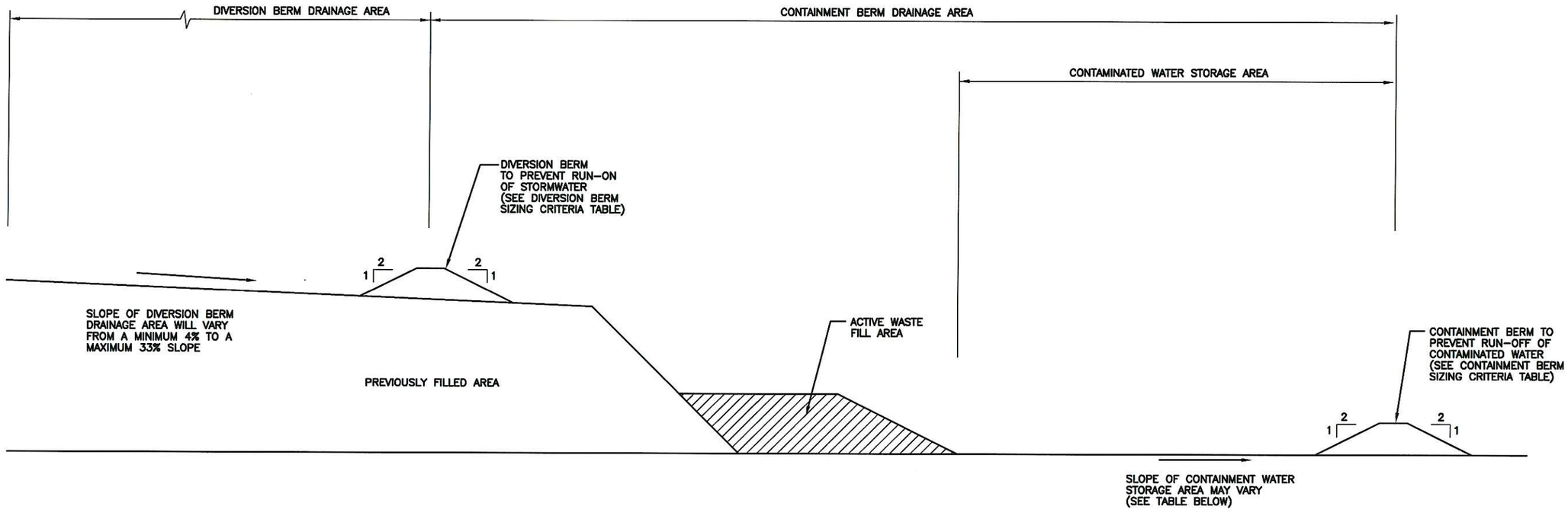


DIVERSION BERM SIZING CRITERIA

DIVERSION BERM DRAINAGE AREA (ACRES)	4%			33%		
	FLOW RATE (CFS)	FLOW DEPTH (FT)	REQUIRED MINIMUM DIVERSION BERM HEIGHT (FT)	FLOW RATE (CFS)	FLOW DEPTH (FT)	REQUIRED MINIMUM DIVERSION BERM HEIGHT (FT)
0.5	4.7	0.5	1.5	4.0	0.9	1.9
1.0	7.6	0.6	1.6	6.8	1.1	2.1
1.5	11.5	0.7	1.7	10.6	1.3	2.3

NOTE: DIVERSION BERMS WILL BE SIZED TO DIVERT STORMWATER FROM THE 25 YEAR, 24 HOUR STORM EVENT WITH A FREEBOARD OF 1 FT.

CONTAINMENT BERM SIZING CRITERIA

CONTAINMENT BERM DRAINAGE AREA (ACRES)	CONTAINMENT WATER STORAGE AREA (ACRES)	FLOOR SLOPE OF CONTAMINATED WATER STORAGE AREA	REQUIRED MINIMUM HEIGHT OF CONTAINMENT BERM (FT)
0.5	0.35	1 %	2.5
	0.25	2 %	3.2
	0.20	4 %	4.5
1.0	0.50	1 %	3.2
	0.35	2 %	4.0
	0.25	4 %	5.4
1.5	0.60	1 %	3.6
	0.40	2 %	4.5
	0.30	4 %	6.2

NOTE: CONTAINMENT BERMS WILL BE SIZED TO CONTAIN STORMWATER FROM THE 25 YEAR, 24 HOUR STORM EVENT. THE CRITERIA ARE BASED ON A MINIMUM DOWNSLOPE CONTAINMENT BERM LENGTH OF 100 FEET WITH A FREEBOARD OF 1.0 FT.

STATE OF TEXAS
DAVID L. CLARK
81905
PROFESSIONAL ENGINEER
6-10-25

ISSUED FOR PERMITTING PURPOSES ONLY

REVISIONS			
1	06/25	NOD 1 RESPONSE	BBB
REV	DATE	DESCRIPTION	DWN BY

CONTAIMINATED WATER RUNON/RUNOFF DETAILS

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
D6-C1

O:\TASWA\P\Drawings\ATT D\D6-C1.dwg Layout: Layout1 User: bboles

Containment Berm Design

Required: Size containment berms to contain contaminated water around the working face.

References:
1) Texas Department of Transportation, Hydraulic Design Manual, Revised May 2014.
Note: The *Hydraulic Design Manual*, Revised September 2019, uses a different equation to
2) NOAA Atlas 14, Precipitation-Frequency Atlas of the United States, Volume 11 Version 2.0: Texas, 2018.

Solution: Determine the storage volume required for the 25-year, 24-hour rainfall event using the NRCS

$$P_e = \frac{(P - I_a)^2}{(P - Ia) + S} \qquad \text{(Ref. 1)}$$

where:

P =	7.45	in	total depth of rainfall, Ref. 2
S =	z (100/CN - 1)		potential maximum depth of water retained in the watershed (in)
z =	10	unitless	z = 10 for English units
CN =	87	unitless	See page C1-C-7, Attachment C

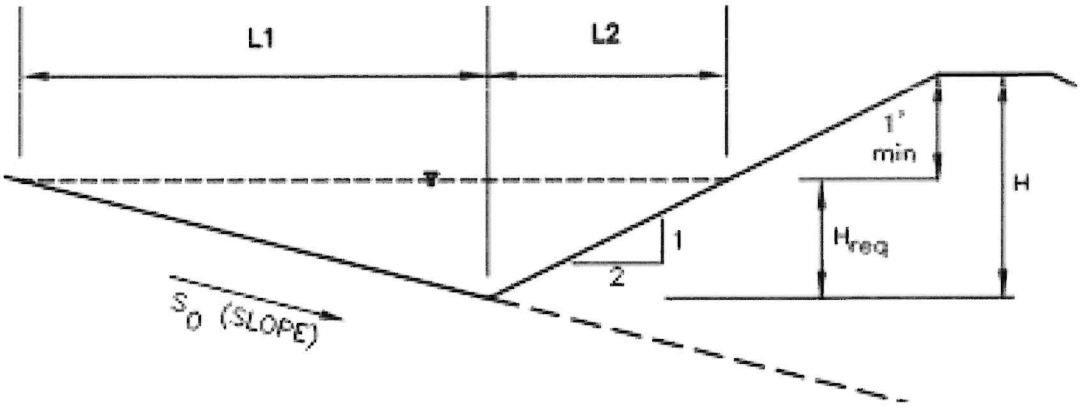
S = 1.494 in

I_a = 0.2 S = initial abstraction before ponding (in)

I_a = 0.299 in

P_e = 5.915 in accumulated excess rainfall (in)

Size the storage area from the following figure:



$A_s = (L_1 + L_2)H / 2$ Storage Area = $W(L_1 + L_2)$

where: A_s = cross section area (sf) W = storage width (ft)

$L_1 = H / S_o$

$L_2 = 2H$

Drainage area	Required Volume	H_{req}	H Provided	S_o	L_1	L_2	W	As
ac	cf	ft	ft	ft/ft	ft	ft	ft	sf
0.5	10,736	2.03	3.03	0.02	152	4.06	100	236.0
1	21,472	2.87	3.87	0.02	194	5.75	100	386.3
1.5	32,208	3.52	4.52	0.02	226	7.04	100	526.6

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2290A

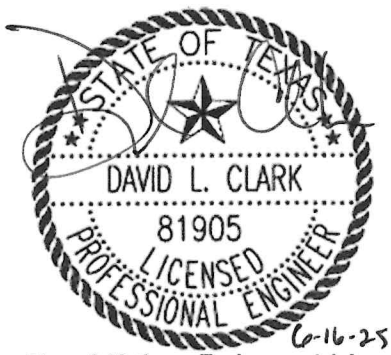
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT D7
LINER QUALITY CONTROL PLAN

Prepared for

Texoma Area Solid Waste Authority

February 2025
Revised June 2025



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Prepared by

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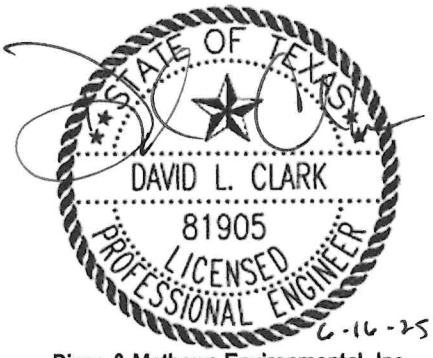
FIRM REGISTRATION NO. 50222



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APPENDIX D7E
GRI-GM13

1 INTRODUCTION

30 TAC §330.339

1.1 Purpose

This Liner Quality Control Plan (LQCP) has been prepared in accordance with 30 TAC §330.339 to establish procedures for the design, construction, testing, and documentation of the liner and leachate collection system. Quality control (QC) of construction and quality assurance (QA) of sampling should follow the latest technical guidelines of the executive director unless guideline is obsolete and/or more recent QA/QC standards are available.

1.2 Definitions

Specific terms and acronyms that are used in this LQCP are defined below.

ASTM – American Society for Testing and Material

BER – Ballast Evaluation Report

Construction Quality Assurance (CQA) – CQA is a planned system of activities that provides the owner and permitting agency assurance that the facility was constructed as specified in the design. CQA includes the observations, evaluations, and testing necessary to assess and document the quality of the constructed facility. CQA includes measures taken by the CQA organization to assess whether the work is in compliance with the plans, specifications, and permit requirements for a project.

GLER – Geomembrane Liner Evaluation Report

Geotechnical Professional (GP) – The GP is the authorized representative of the operator who is responsible for all CQA activities for the project. The GP must be registered as a Professional Engineer in Texas. Experience and education should include geotechnical engineering, engineering geology, soil mechanics, geotechnical laboratory testing, construction quality assurance and quality control testing, and hydrogeology. The GP must also have competency and experience in certifying similar projects.

The GP may also be known in applicable regulations and guidelines as the CQA engineer, resident project representative, geotechnical quality control/quality assurance professional (GQCP), or professional of record (POR).

CQA Monitors – CQA monitors are representatives of the GP who work under direct supervision of the GP. The CQA monitor is responsible for quality assurance monitoring

and performing on-site tests and observations. The CQA monitor must be NICET-certified at Level 2 for soils and geosynthetics, an engineering technician with a minimum of four years directly related experience, or a graduate engineer or geologist with one year of directly related experience.

Quality Assurance – Quality assurance is a planned program that is designed to assure that the work meets the requirements of the plans, specifications, and permit for a project. Quality assurance includes procedures, quality control activities, and documentation that are performed by the GP and CQA monitor.

Quality Control – Quality control includes the activities that implement the quality assurance program. The GP, CQA monitor, and contractor will perform quality control.

Seasonal High Water Table – The seasonal high water table is the highest measured water level within the construction area.

SLER – Soil Liner Evaluation Report

1.3 Sequence of Construction Activities

Construction of lined areas at the TASWA DRF will generally proceed in the following sequence of activities:

- The area will be excavated to the proposed subgrade elevations.
- A temporary dewatering system, if required, will be installed as described in Section 3.3.
- The subgrade elevations will be verified.
- The compacted soil liner will be constructed, tested, and verified in accordance with Section 4.
- The geomembrane liner will be constructed, tested, and verified in accordance with Section 5.
- The leachate collection system will be constructed and verified in accordance with Section 6. All soil testing and evaluation of constructed soil liners will be complete prior to installing the leachate collection system.
- The protective cover will be constructed and verified in accordance with Section 7.
- The Soils and Liner Evaluation Report will be submitted to the TCEQ.
- The Geomembrane Liner Evaluation Report will be submitted to the TCEQ.

Daily and Intermediate Cover

Daily and intermediate cover materials consist of soil that has not been previously mixed with solid waste.

Topsoil

Topsoil consists of soil that is capable of sustaining vegetation and is free of debris, rubbish, and solid waste.

Unsuitable Materials

Unsuitable materials consist of any material that is determined by the GP to not be suitable for use as classified above.

3.3 Construction Below Groundwater

3.3.1 Highest Measured Water Elevations

The highest measured water elevations in the upper (Layer II) zone and lower (Layer V) zone will be used as the design groundwater elevations. The most recent groundwater elevations must be reviewed before the construction of each cell and, if necessary, the highest measured water elevations will be adjusted upward.

3.3.2 Temporary Dewatering

Groundwater is potentially contained in Layer II sand and sandstone and the Layer V sandstone/shaly sand shale with sand. If present, groundwater found in the upper part of Layer III is apparently in direct communication with groundwater in Layer II and acts as one hydrogeologic unit. Layer IV acts as a lower confining unit for groundwater in Layer II and III and as an upper confining unit to groundwater in Layer V.

If groundwater is encountered during excavation, lined areas will be dewatered during and after construction by a temporary dewatering system. The temporary dewatering system will consist of a network of underdrains consisting of HDPE panel-shaped pipe wrapped in geotextile encased in sand-filled trenches or perforated pipe encased in an aggregate trench wrapped in geotextile. The underdrains will discharge into open sumps beyond the lined areas or into closed sumps beneath the lined areas. The groundwater will be pumped from the sumps into the perimeter drainage system. Automated submersible pumps will be installed in closed sumps. The temporary dewatering system will be operated until sufficient ballast has been placed to offset the hydrostatic forces, the ballast has been documented in the BER and approval of the BER is received from TCEQ or 14 days have lapsed from receipt of the BER by the TCEQ.

The design procedures and typical details of the temporary dewatering system are provided in Appendix D7B – Temporary Dewatering System. Design and installation of

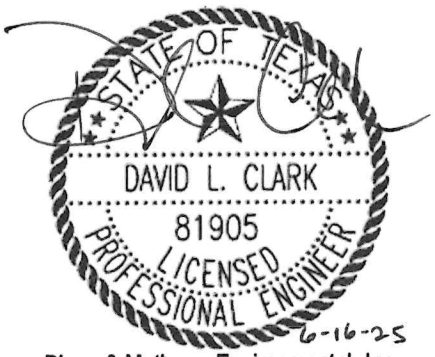
the temporary dewatering system will be documented in the SLER in accordance with Section 9.2.

3.4 Excavation

A description of the materials that will be encountered in the excavations is provided in Attachment D5.

The slope stability analyses are provided in Attachment D5. The slope stability analyses are only valid for the conditions that were analyzed. Any changes to the excavation plan, dewatering system, ballast system, liner system, final cover system, or landfill completion plan will necessitate that the slope stability analyses be revised to reflect the actual conditions.

APPENDIX D7C
BALLAST CALCULATIONS



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Example Ballast Calculation
Layer II Groundwater

Required: Example calculation to evaluate the long-term hydrostatic uplift pressures on the liner system and determine the ballast requirements.

Assumptions:
1) The design water elevations are shown on Drawing D7A-1.
2) All cells must be re-evaluated based on updated groundwater data prior to construction.
3) Assume normal and vertical forces to be the same in the bottom, and design for normal forces.
4) Uplift is evaluated at the clay liner geomembrane interface.
5) Groundwater is present in Layer II and upper Layer III but is not connected to Layer V as demonstrated in Attachment E.

References: Equations used are basic vector, soil and fluid mechanics equations found in all vector, soil and fluid mechanics textbooks.

Solution: Calculations are shown for the sideslope of Sector 25 where Layer II has the highest groundwater potential.

The forces acting upon the liner system are:

P_N = normal pressure	R_N = normal resistance
P_V = vertical pressure	R_V = vertical resistance
P_H = horizontal pressure	R_H = horizontal resistance

Section B — 1) Determine the uplift pressure upon the FML at the bottom of Layer II.

γ_w = unit weight of water =	62.4	pcf
Groundwater elevation =	729.5	ft-msl
Liner elevation =	705	ft-msl
H = design water level above liner =	24.5	ft
β = sidewall slope =	14.0	deg

Equation B1	***Bottom***	$P_N = H\gamma_w$ =	1528.8 psf	(No groundwater pressure acts at toe/bottom calculation provided only for future reference)
Equation B2(a)	***Slope***	$P_N = H\gamma_w$ =	1528.8 psf	
Equation B2(b)		$P_V = P_N \cos\beta$ =	1483.1 psf	
Equation B2(c)		$P_H = P_N \sin\beta$ =	370.9 psf	

Section C — 2) Determine the resistance pressure of protective cover at the bottom and on the slope.

Protective cover:

γ = density (92% std proctor or field data) =	115.0	pcf
T_N = normal thickness =	2.0	ft
T_V = vertical thickness =	2.06	ft
ϕ = angle of internal friction =	14.0	deg

Equation C1	***Bottom***	$R_N = \gamma_{pc} T_N$ =	230.0 psf	(No groundwater pressure acts at toe/bottom calculation provided only for future reference)
Equation C2(a)	***Slope***	$R_V = R_N / \cos\beta$	237.0 psf	
Equation C2(b)		$R_H = k_o R_V$ =	118.5 psf	(k_0 assumed as 0.5)
Equation C2(c)		$R_N = R_H \sin\beta + R_V \cos\beta$ =	258.7 psf	

Section D — 3) Determine the factors of safety against uplift and evaluate the need for additional ballast.

Equation D1	***Bottom***	$FS_N = R_N / P_N$ =	0.2	(No groundwater pressure acts at toe/bottom - calculation provided only for future reference)
Equation D2(a)	***Slope***	$FS_N = R_N / P_N$ =	0.2	
Equation D2(b)		$FS_V = R_V / P_V$ =	0.2	
Equation D2(c)		$FS_H = R_H / P_H$ =	0.3	

Example Ballast Calculation
Layer II Groundwater

The factor of safety for protective cover providing ballast against hydrostatic uplift is less than 1.2. Evaluate the height of waste ballast required to provide a factor of safety of at least 1.5.

γ_{sw} = unit weight of solid waste = 44.0 pcf

Section E
Equation E1 **Bottom** $FS = (R_N + B_N) / P_N$ (No groundwater pressure acts at toe/bottom - calculation provided only for future reference)

Equation E2(a) **Slope** $FS = (R_v + B_v) / P_v$

For FS = 1.5 $H = (FS * P_v - R_v) / \gamma_{sw}$
H = 45.2 ft

Equation E2(b) $FS = (R_H + B_H) / P_H$

For FS = 1.5 $H = (FS*P_H - R_H) / (\gamma_{sw}*k_0)$
H = 19.9 ft

Using waste height calculated for vertical forces, check FS with normal forces:

For H_{sw} = 45.2 ft

Equation E2(c) $FS = ((R_v + B_v)cosB + (R_h + B_h)sinB) / P_n$

FS = 1.8 Factor of safety is greater than 1.5 so vertical forces control

This example calculation was performed at the location in Sector 25 that has the largest hydrostatic force at the site based on the highest measured groundwater map included in Appendix D7-A .

The GP will evaluate the highest measured water levels to determine where the largest hydrostatic force is located and perform these calculations to determine how much ballast is required when preparing the Ballast Evaluation Report for submittal to the TCEQ prior to decommissioning any dewatering system.

Example Ballast Calculation
Layer V Groundwater

Required: Example calculation to evaluate the long-term hydrostatic uplift pressures on the liner system and determine the ballast requirements.

Assumptions:
1) The design water elevations are shown on Drawing D7A-2.
2) All cells must be re-evaluated based on updated groundwater data prior to construction.
3) Assume normal and vertical forces to be the same in the bottom, and design for normal forces.
4) Uplift is evaluated at the clay liner geomembrane interface.
5) Groundwater is present in Layer V and not in Layer VI as demonstrated in Attachment E.

References: Equations used are basic vector, soil and fluid mechanics equations found in all vector, soil and fluid mechanics textbooks.

Solution: Calculations are shown for the lower end of Sector 9 where Layer V has the highest groundwater potential relative to the design liner elevation.

PLOT

P_N = normal pressure	R_N = normal resistance
P_V = vertical pressure	R_V = vertical resistance
P_H = horizontal pressure	R_H = horizontal resistance

Section B — 1) Determine the uplift pressure upon the FML at the critical location on the bottom liner.

γ_w = unit weight of water =	62.4	pcf
Groundwater elevation =	669	ft-msl
Liner elevation =	662	ft-msl
H = design water level above liner =	7	ft
β = sidewall slope =	14.0	deg

Equation B1	***Bottom***	$P_N = H\gamma_w$ =	436.8	psf
Equation B2(a)	***Slope***	$P_N = H\gamma_w$ =	436.8	psf
Equation B2(b)		$P_V = P_N \cos\beta$ =	423.8	psf
Equation B2(c)		$P_H = P_N \sin\beta$ =	106.0	psf

Section C — 2) Determine the resistance pressure of protective cover at the bottom and on the slope.

Protective cover:

γ = density (92% std proctor or field data) =	115.0	pcf
T_N = normal thickness =	2.0	ft
T_V = vertical thickness =	2.06	ft
ϕ = angle of internal friction =	14.0	deg

Equation C1	***Bottom***	$R_N = \gamma_{pc} T_N$ =	230.0	psf
Equation C2(a)	***Slope***	$R_V = R_N / \cos\beta$	237.0	psf
Equation C2(b)		$R_H = k_o R_V$ =	118.5	psf (k_0 assumed as 0.5)
Equation C2(c)		$R_N = R_H \sin\beta + R_V \cos\beta$ =	258.7	psf

Section D — 3) Determine the factors of safety against uplift and evaluate the need for additional ballast.

Equation D1	***Bottom***	$FS_N = R_N / P_N$ =	0.5	(No groundwater pressure acts at toe/bottom - calculation provided only for future reference)
Equation D2(a)	***Slope***	$FS_N = R_N / P_N$ =	0.6	
Equation D2(b)		$FS_V = R_V / P_V$ =	0.6	
Equation D2(c)		$FS_H = R_H / P_H$ =	1.1	

Example Ballast Calculation
Layer V Groundwater

The factor of safety for protective cover providing ballast against hydrostatic uplift is less than 1.2. Evaluate the height of waste ballast required to provide a factor of safety of at least 1.5.

γ_{sw} = unit weight of solid waste = 44.0 pcf

Section E
Equation E1 **Bottom** $FS = (R_N + B_N) / P_N$

Equation E2(a) **Slope** $FS = (R_v + B_v) / P_v$

For FS = 1.5 $H = (FS * P_v - R_v) / \gamma_{sw}$
$H =$ 9.1 ft

Equation E2(b) $FS = (R_H + B_H) / P_H$

For FS = 1.5 $H = (FS*P_H - R_H) / (\gamma_{sw}*k_0)$
$H =$ 1.8 ft

Using waste height calculated for vertical forces, check FS with normal forces:

For $H_{sw} =$ 9.1 ft

Equation E2(c) $FS = ((R_v + B_v)cosB + (R_h + B_h)sinB) / P_n$

$FS =$ 1.9 Factor of safety is greater than 1.5 so vertical forces control

This example calculation was performed at the location in Sector 9 that has the largest hydrostatic force at the site based on the highest measured groundwater map included in Appendix D7-A .

The GP will evaluate the highest measured water levels to determine where the largest hydrostatic force is located and perform these calculations to determine how much ballast is required when preparing the Ballast Evaluation Report for submittal to the TCEQ prior to decommissioning any dewatering system.

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

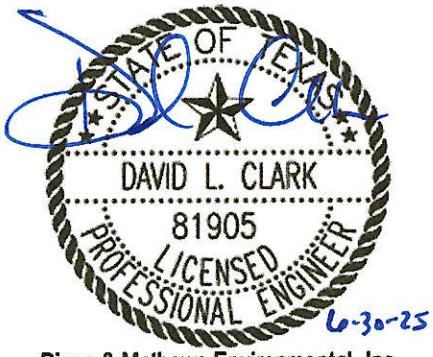
PERMIT AMENDMENT APPLICATION

VOLUME 3 OF 4

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised March 2025
Revised June 2025



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Firm Registration No. F-256

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FIRM REGISTRATION NO. 50222

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

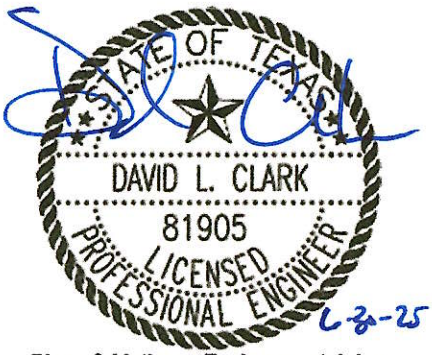
PERMIT AMENDMENT APPLICATION

VOLUME 3 OF 4

CONTENTS

PART III FACILITY INVESTIGATION AND DESIGN

Attachment E – Geology Report
Attachment F – Groundwater Monitoring Plan



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Firm Registration No. F-256

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

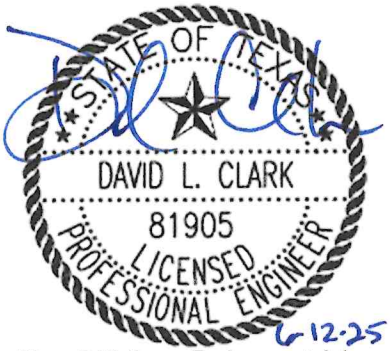
PERMIT AMENDMENT APPLICATION

PART III – SITE DEVELOPMENT PLAN
ATTACHMENT E
GEOLOGY REPORT

Prepared for:

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised June 2025



6-12-25

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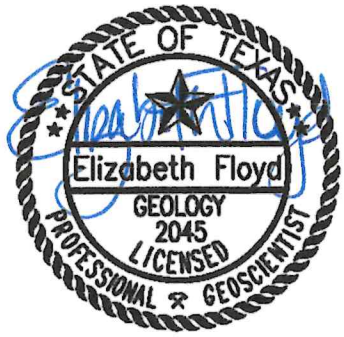
Firm Registration No. F-256
For Sections 2.3, 5.1-5.3



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Firm Registration No. 50222
6/12/2025

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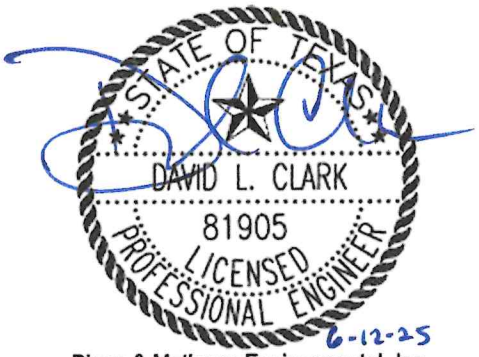

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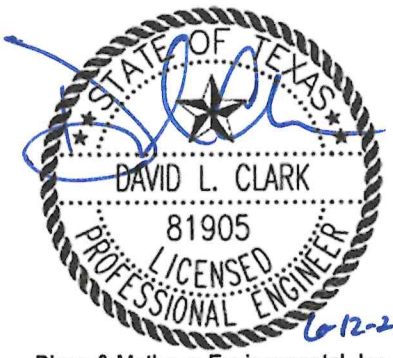

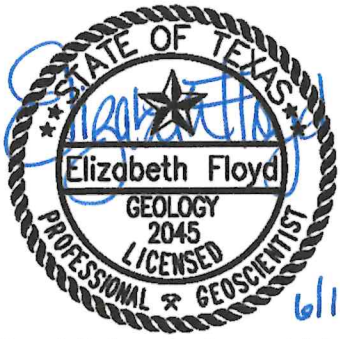

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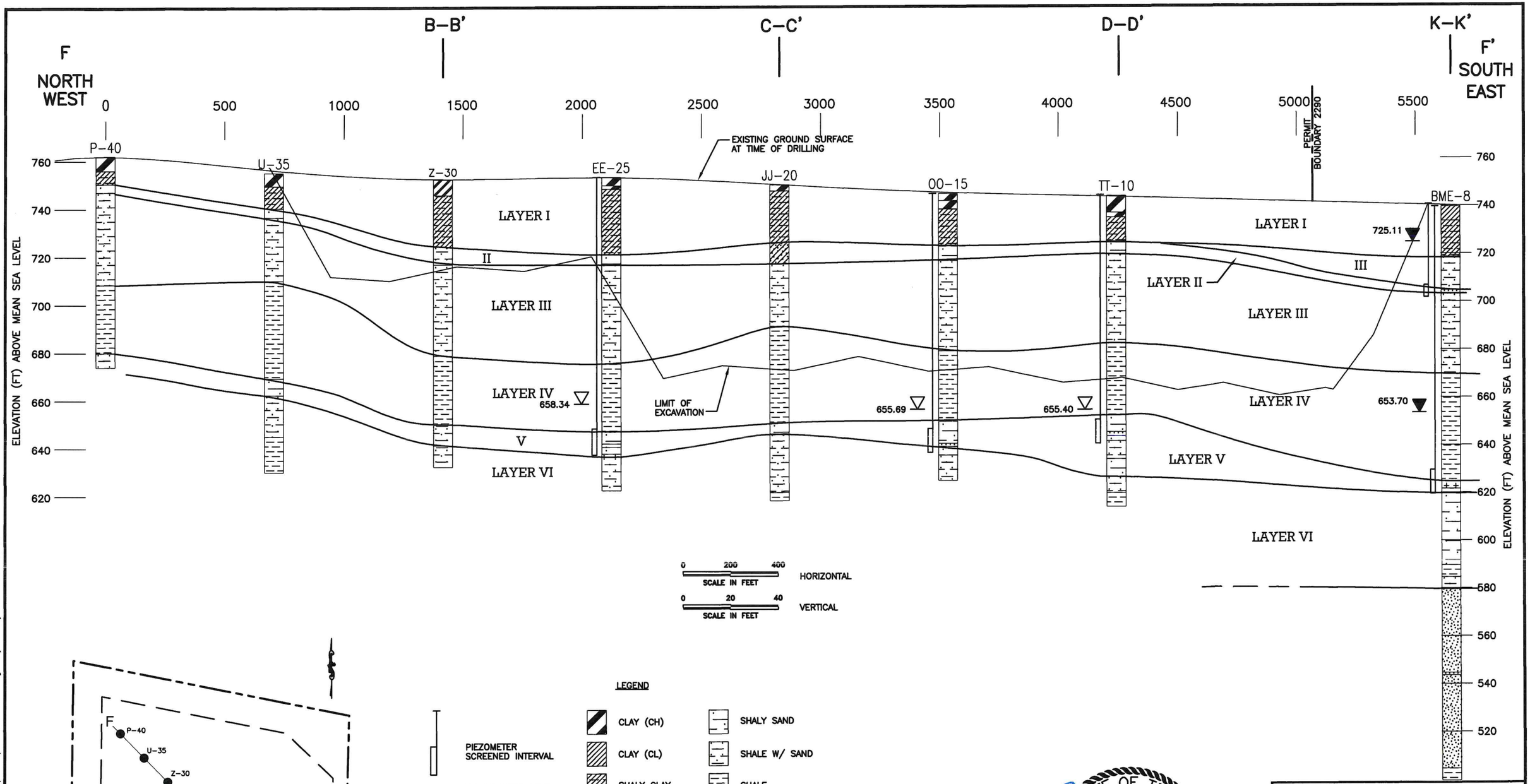
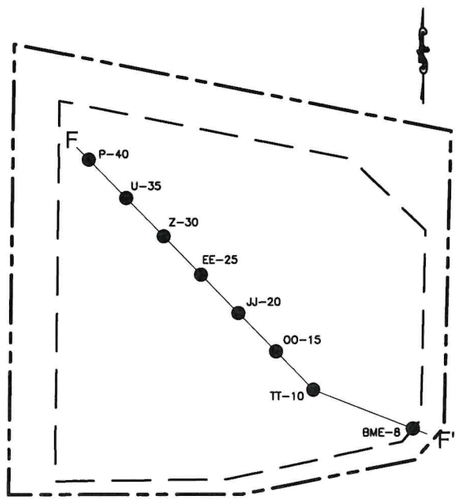
Monitoring Well and Piezometer Details

Well No.	Date Installed	Total Depth (ft)	Surface Elevation (ft/msl)	Top of Casing Elevation (ft/msl)	Filter Pack Elevation (ft/msl)	Screen Elevation (ft/msl)	Layer Screened
Monitoring Wells							
MW-1	8/12/04	32.0	765.00	767.85	746.50 - 733.50	743.50 - 733.50	Layer II & III
MW-2	8/31/04	22.5	760.21	760.87	746.21 - 738.21	743.21 - 738.21	Layer II & III
MW-3	8/26/04	26.5	749.36	749.97	731.36 - 723.36	728.36 - 723.36	Layer II & III
MW-4	8/12/04	18.5	739.61	742.34	729.61 - 721.61	726.61 - 721.61	Layer II & III
MW-5	8/17/04	12.5	728.60	731.01	723.54 - 717.54	722.54 - 717.54	Layer II & III
MW-6	8/17/04	32.5	744.65	747.44	725.65 - 712.64	722.65 - 712.65	Layer II & III
MW-7	8/17/04	32.9	746.84	749.14	723.00 - 715.00	720.00 - 715.00	Layer II & III
MW-12	8/25/04	20.5	758.36	760.32	752.71 - 739.71	749.71 - 739.71	Layer II & III
MW-13	8/26/04	89.5	729.54	732.02	653.54 - 640.54	650.54 - 640.54	Layer V
MW-14	8/24/04	107.5	744.65	747.30	650.65 - 637.65	647.65 - 637.65	Layer V
MW-15	8/29/04	114.5	747.37	749.63	646.37 - 633.37	643.37 - 633.37	Layer V
MW-16	8/14/04	106.0	742.12	744.96	649.62 - 636.62	646.62 - 636.62	Layer V
MW-17	8/12/04	133.5	749.76	752.16	629.76 - 616.76	626.76 - 616.76	Layer V
MW-18	8/13/04	130.5	747.85	750.38	630.85 - 617.85	627.85 - 617.85	Layer V
MW-19	8/12/22	122.0	749.30	752.18	642.30 - 629.30	639.30 - 629.30	Layer V
MW-26	8/26/22	90.5	759.76	762.20	682.76 - 669.76	679.76 - 669.76	Layer V
Piezometers							
L35(S)	4/4/00	25.0	765.6	768.62	748.8 - 740.6	746.7 - 741.7	Layer II
L35(D)	4/13/00	96.0	765.3	768.24	678.6 - 669.3	675.3 - 670.3	Layer V
P10	4/19/00	109.0	766.3	765.70	666.5 - 657.3	663.3 - 658.3	Layer V
P20(S)	4/4/00	46.0	761.9	764.73	729.9 - 715.9	726.9 - 716.9	Layer III
P20(D)	4/11/00	99.0	761.8	764.78	680.2 - 662.8	675.8 - 665.8	Layer V
U30	4/4/00	45.0	757.9	760.94	726.9 - 712.9	723.1 - 713.1	Layer III
Z20	4/12/00	113.5	763.7	766.47	658.7 - 650.2	655.7 - 650.7	Layer V
EE15	4/17/00	122.0	762.8	765.73	665.3 - 640.8	656.6 - 641.6	Layer V
EE25	4/14/00	117.0	453.0	756.01	655.3 - 636.0	648.0 - 637.0	Layer V
EE35(S)	4/5/00	21.0	737.3	740.19	725.3 - 713.3	722.3 - 713.7	Layer II & III
EE35(D)	4/10/00	101.0	737.2	740.10	650.2 - 636.2	647.2 - 637.2	Layer V
JJ10(S)	4/3/00	41.5	764.4	767.18	737.7 - 723.9	734.4 - 724.4	Layer II
JJ10(D)	4/18/00	119.0	764.6	767.60	659.7 - 645.9	656.6 - 645.6	Layer V
OO15	4/20/00	112.0	748.6	751.40	651.3 - 636.6	647.6 - 637.6	Layer V





KEY MAP

LEGEND

- PIEZOMETER SCREENED INTERVAL
- GROUNDWATER LEVEL ON JUNE 29, 2000
- GROUNDWATER LEVEL ON MARCH 19, 2024
- CLAY (CH)
- CLAY (CL)
- SHALY CLAY
- SANDY CLAY
- SHALY SAND
- SHALE W/ SAND
- SHALE
- SANDSTONE

NOTES:

1. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
2. CROSS–SECTION LOCATION MAP IS FIGURE E3–1.
3. ALL BOREHOLES WERE DRILLED USING METHODS THAT USED WATER IN THE DRILLING PROCESS. STABLE WATER LEVELS SHOWN ARE FROM THE INSTALLED WATER LEVEL PIEZOMETER OR ESTABLISHED MONITORING WELL.

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CROSS SECTION F – F'

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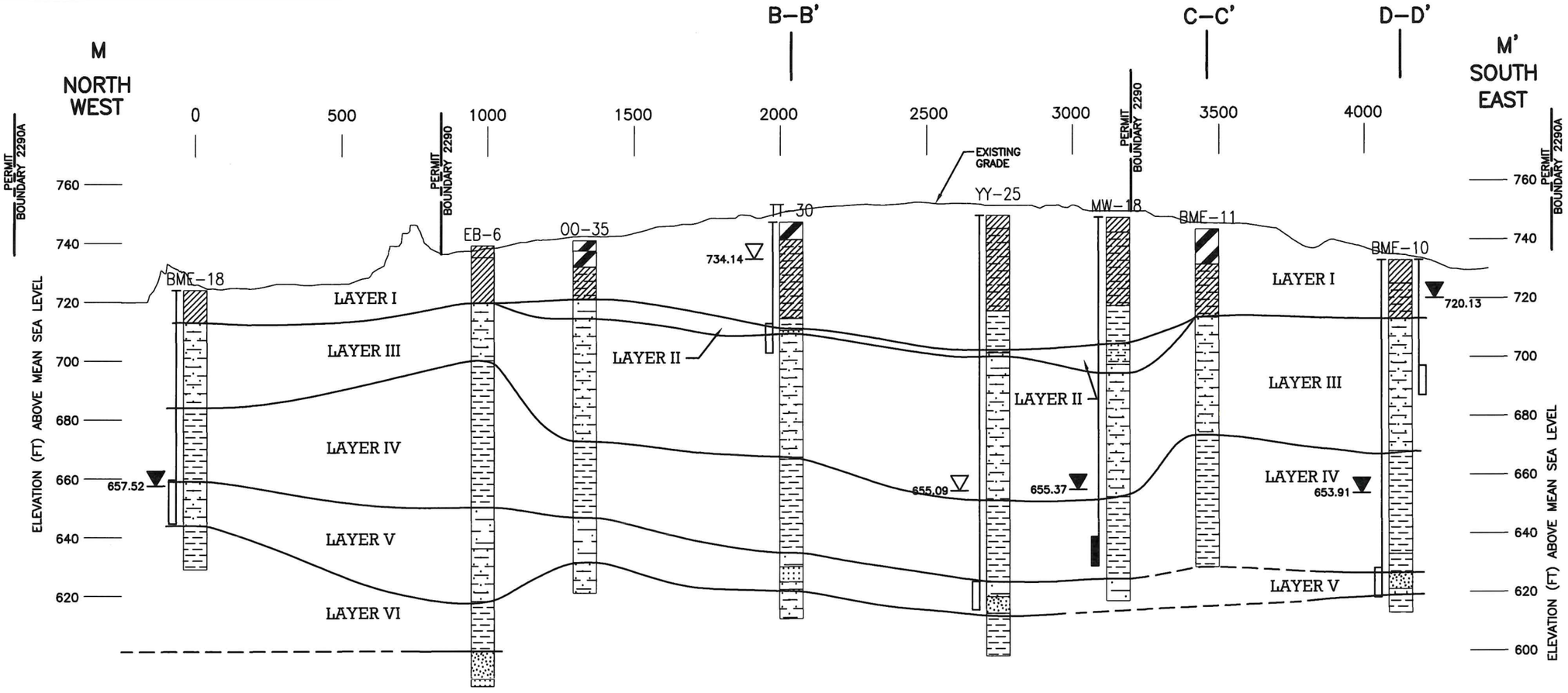

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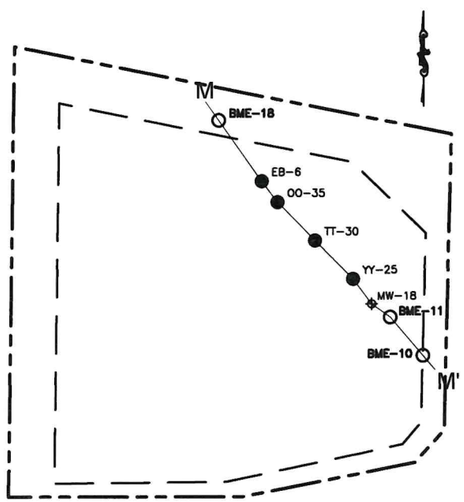

KEY MAP

LEGEND

- PIEZOMETER SCREENED INTERVAL
- MONITORING WELL SCREENED INTERVAL
- GROUNDWATER LEVEL ON JUNE 29, 2000
- GROUNDWATER LEVEL ON MARCH 19, 2024
- CLAY (CH)
- CLAY (CL)
- SHALY CLAY
- SANDY CLAY
- SHALY SAND
- SHALE W/ SAND
- SHALE
- SANDSTONE
- SANDSTONE W/ SHALE
- SAND
- SILTSTONE

NOTES:

1. CROSS SECTION CORRELATIONS ARE INTERPOLATED BETWEEN BORINGS. ACTUAL CONDITIONS MAY VARY FROM THOSE ILLUSTRATED.
2. CROSS–SECTION LOCATION MAP IS FIGURE E3–1.
3. BOREHOLES DRILLED WITH MUD ROTARY. STABLE WATER LEVELS SHOWN ARE FROM THE INSTALLED WATER LEVEL PIEZOMETER OR ESTABLISHED MONITORING WELL.

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CROSS SECTION M – M'

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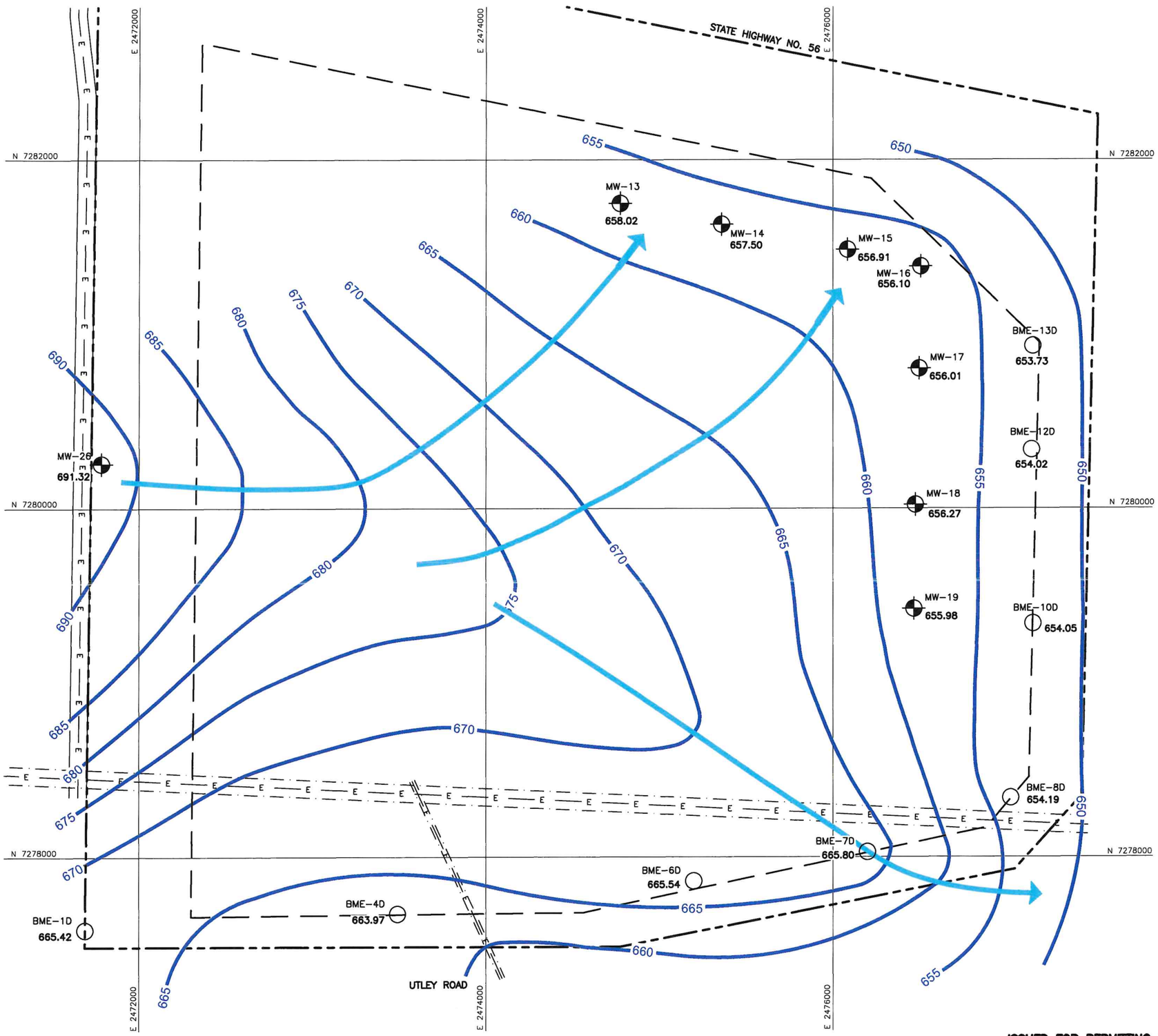

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LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

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MARCH 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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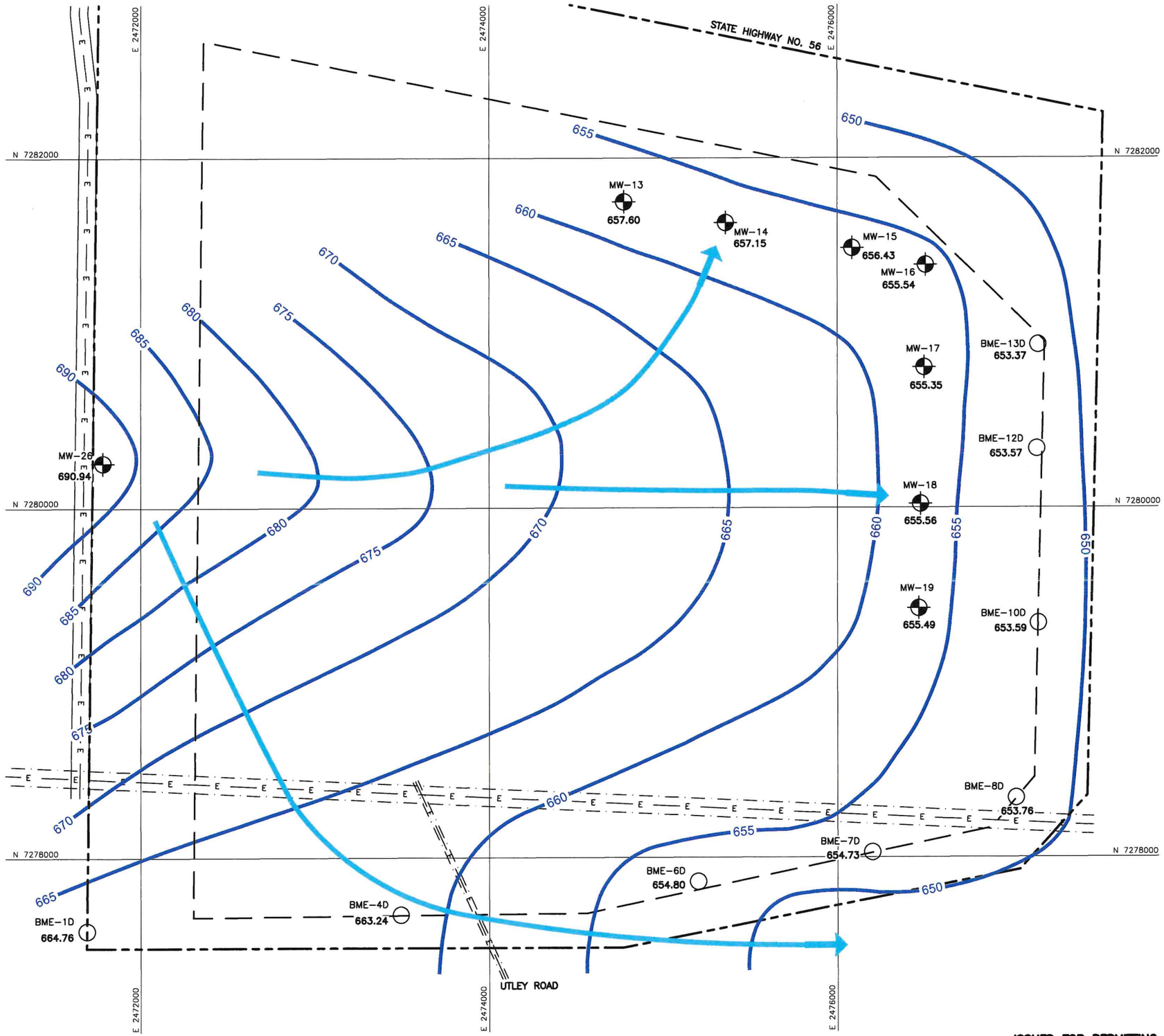

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LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
- MW-1 MONITOR WELL LOCATION AND ID NUMBER
- BME-15 PIEZOMETER LOCATION AND ID NUMBER
- 654.05 WATER LEVEL ELEVATION
- 735 CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

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APRIL 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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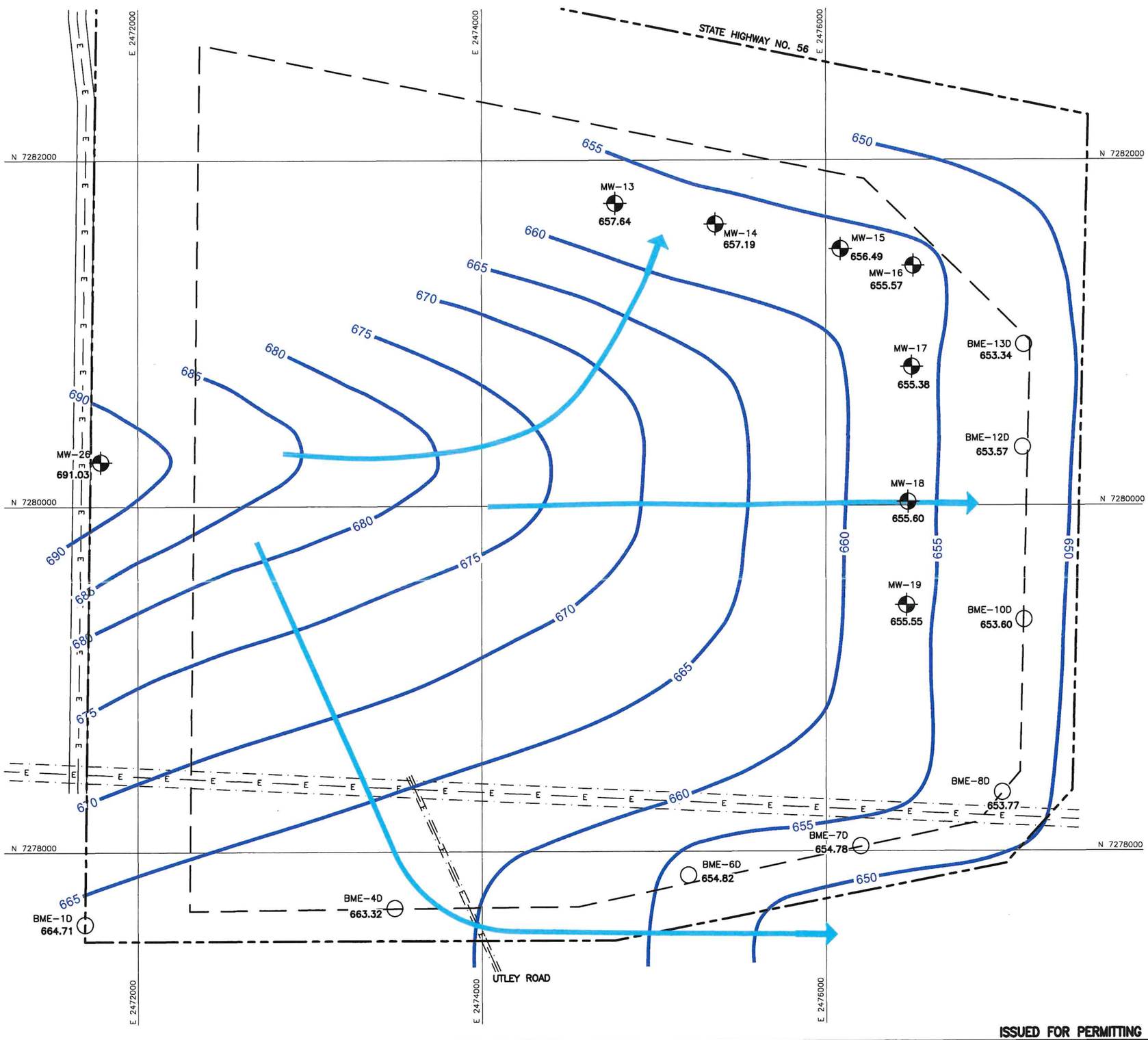

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SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

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MAY 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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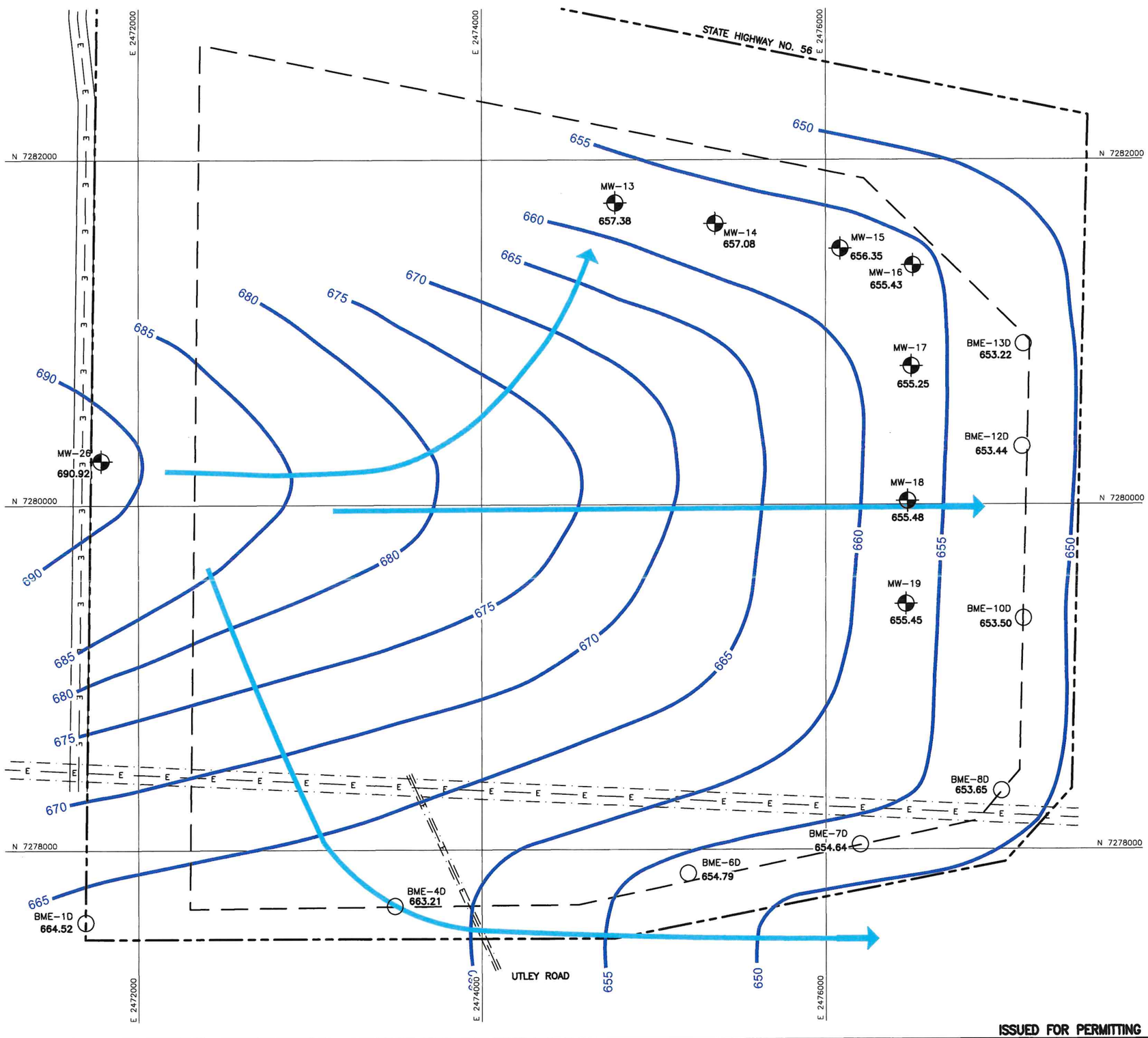

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LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
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JUNE 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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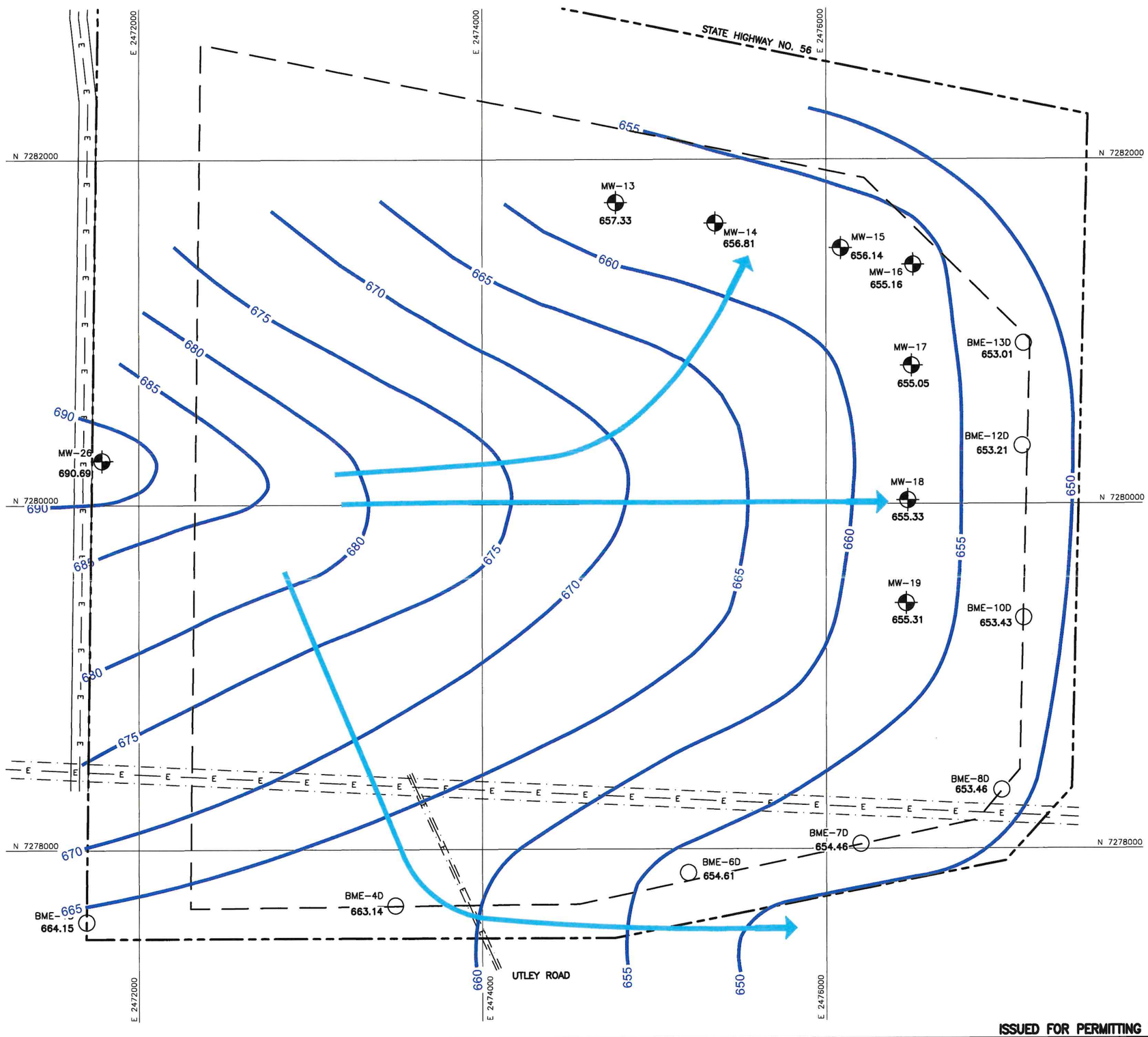

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LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
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JULY 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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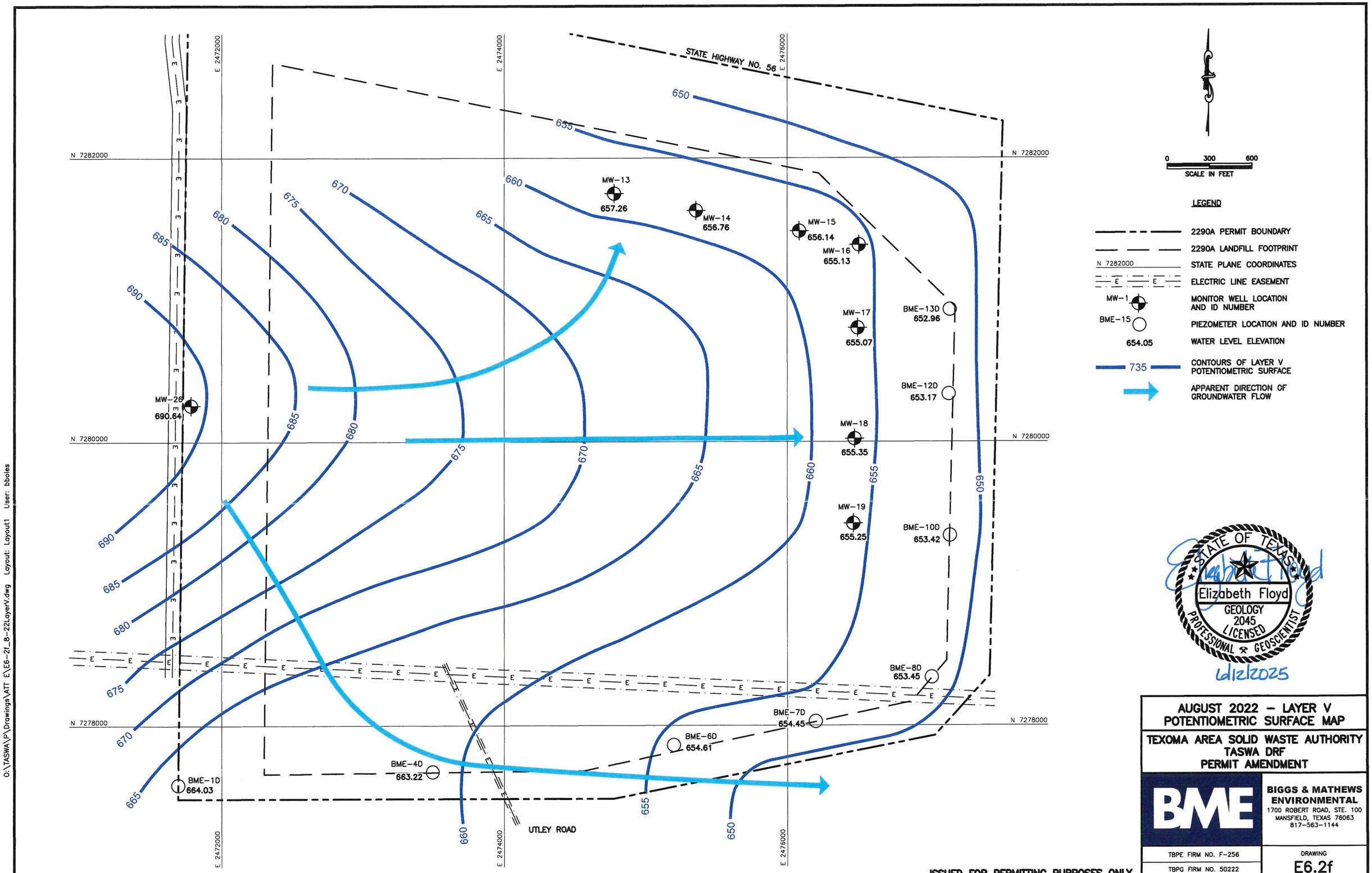

AUGUST 2022 – LAYER V
POTENTIOMETRIC SURFACE MAP

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BME

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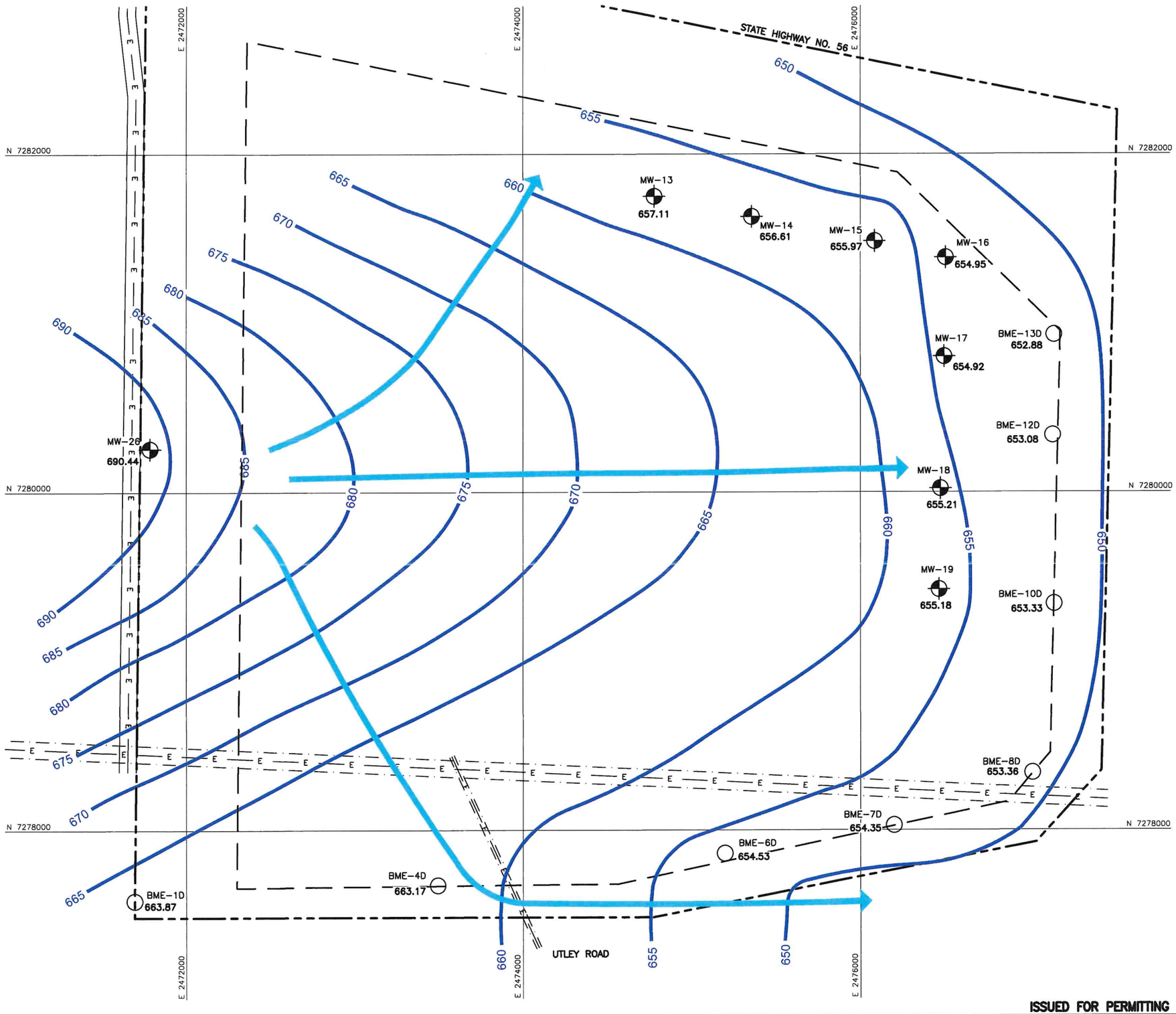

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SEPTEMBER 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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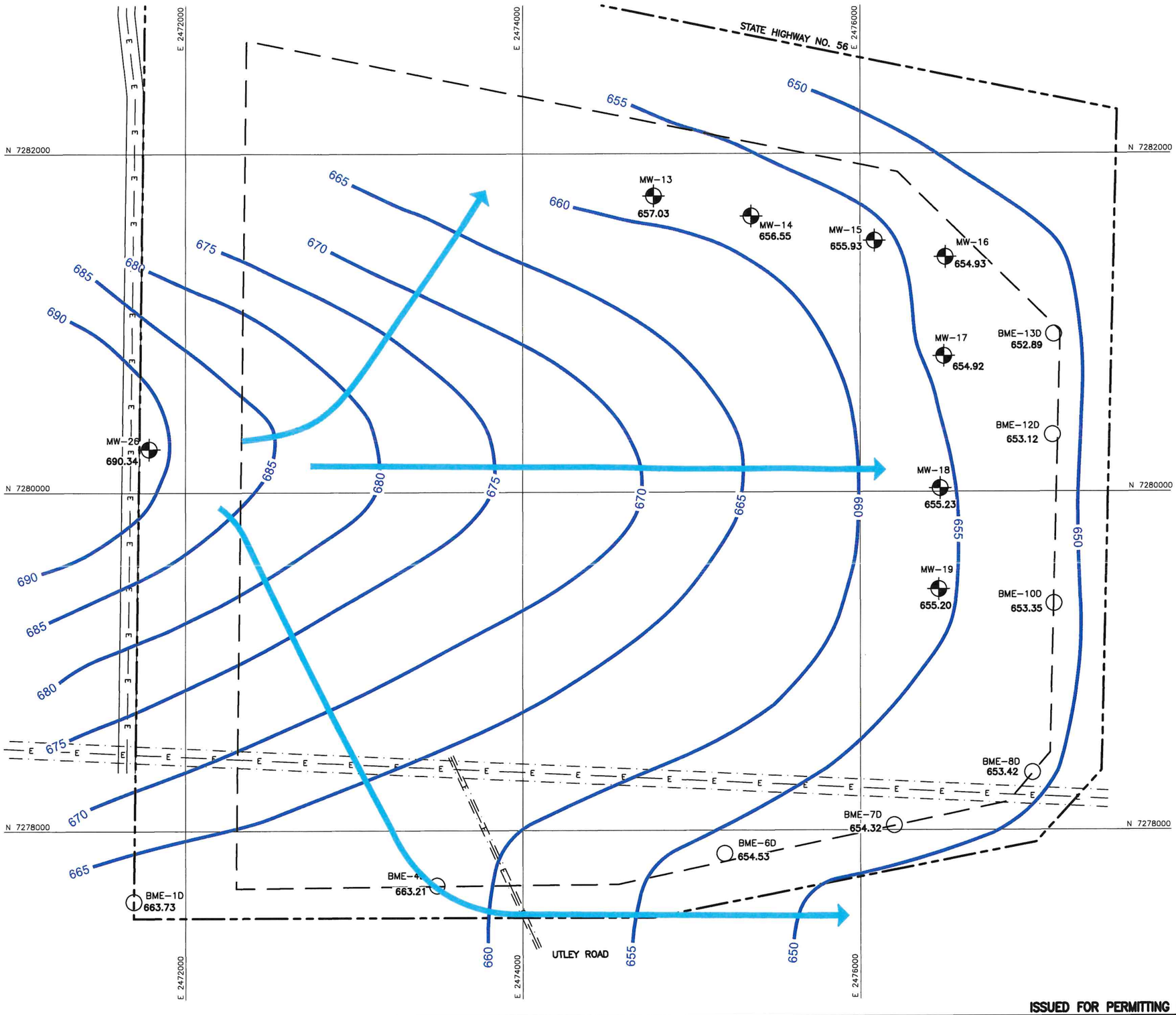
E6.2g



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DRAWING
E6.2h

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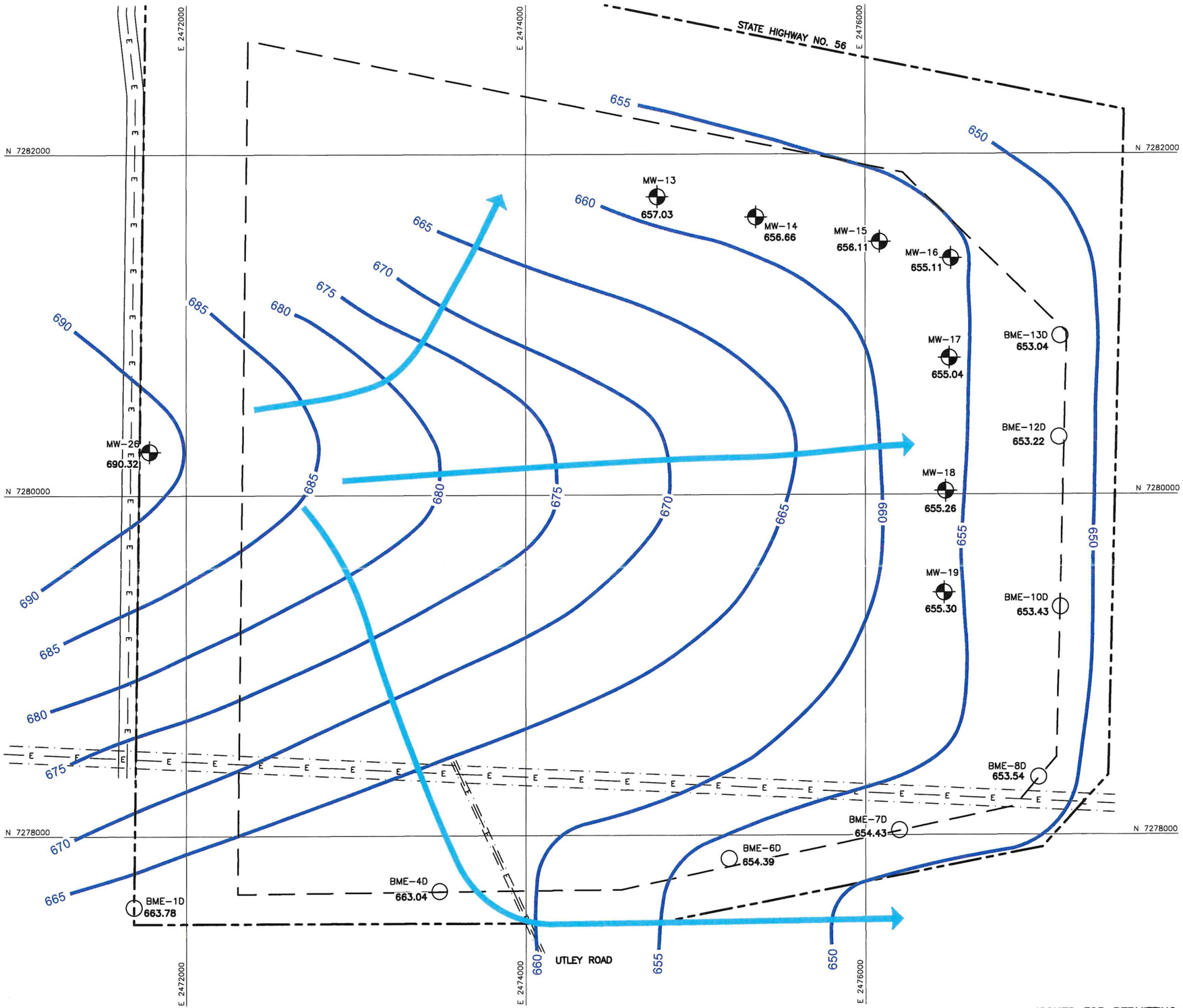

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

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NOVEMBER 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY
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PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2i

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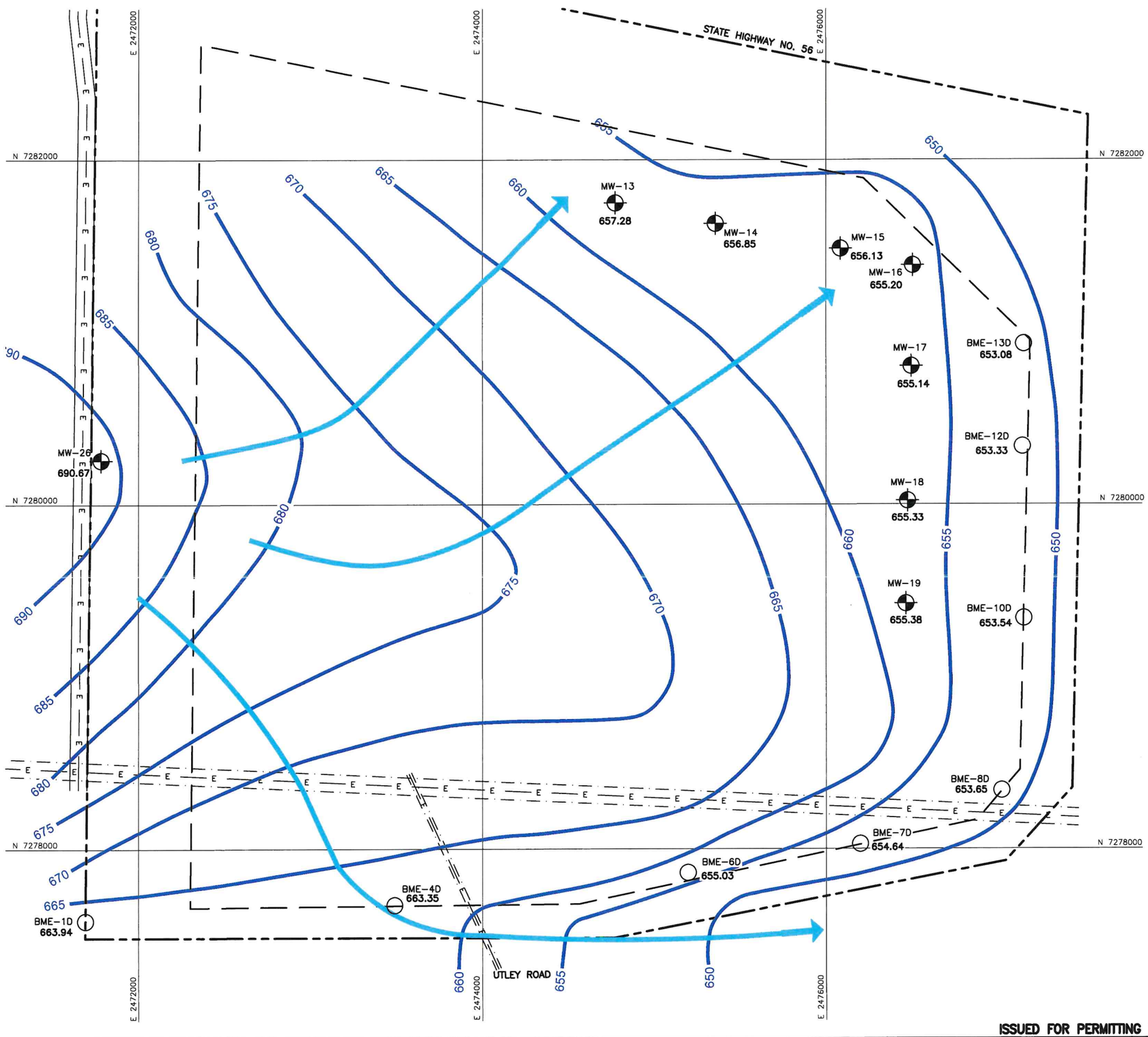

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
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DECEMBER 2022 – LAYER V POTENTIOMETRIC SURFACE MAP

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817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2j

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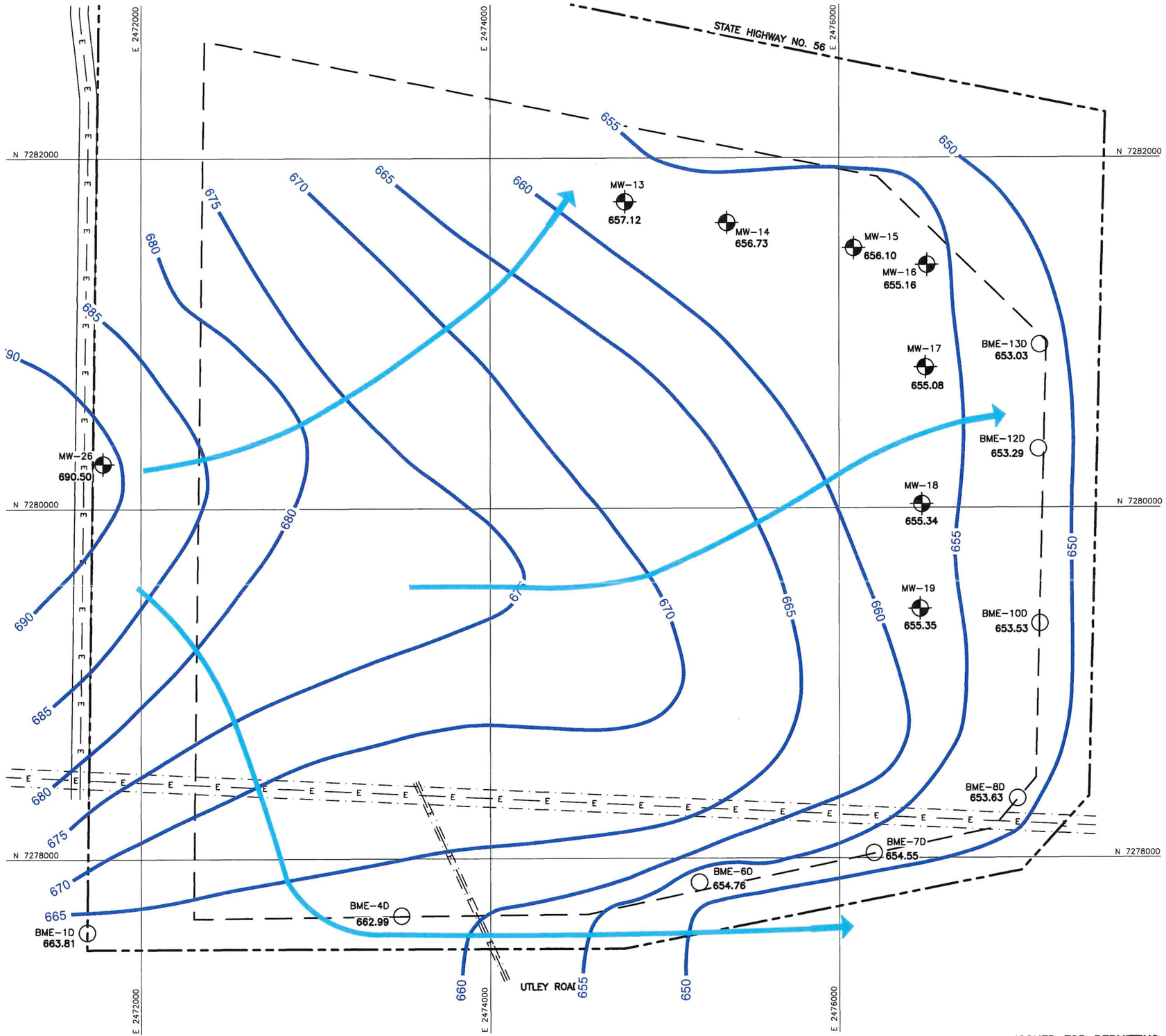

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

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JANUARY 2023 – LAYER V POTENTIOMETRIC SURFACE MAP

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817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
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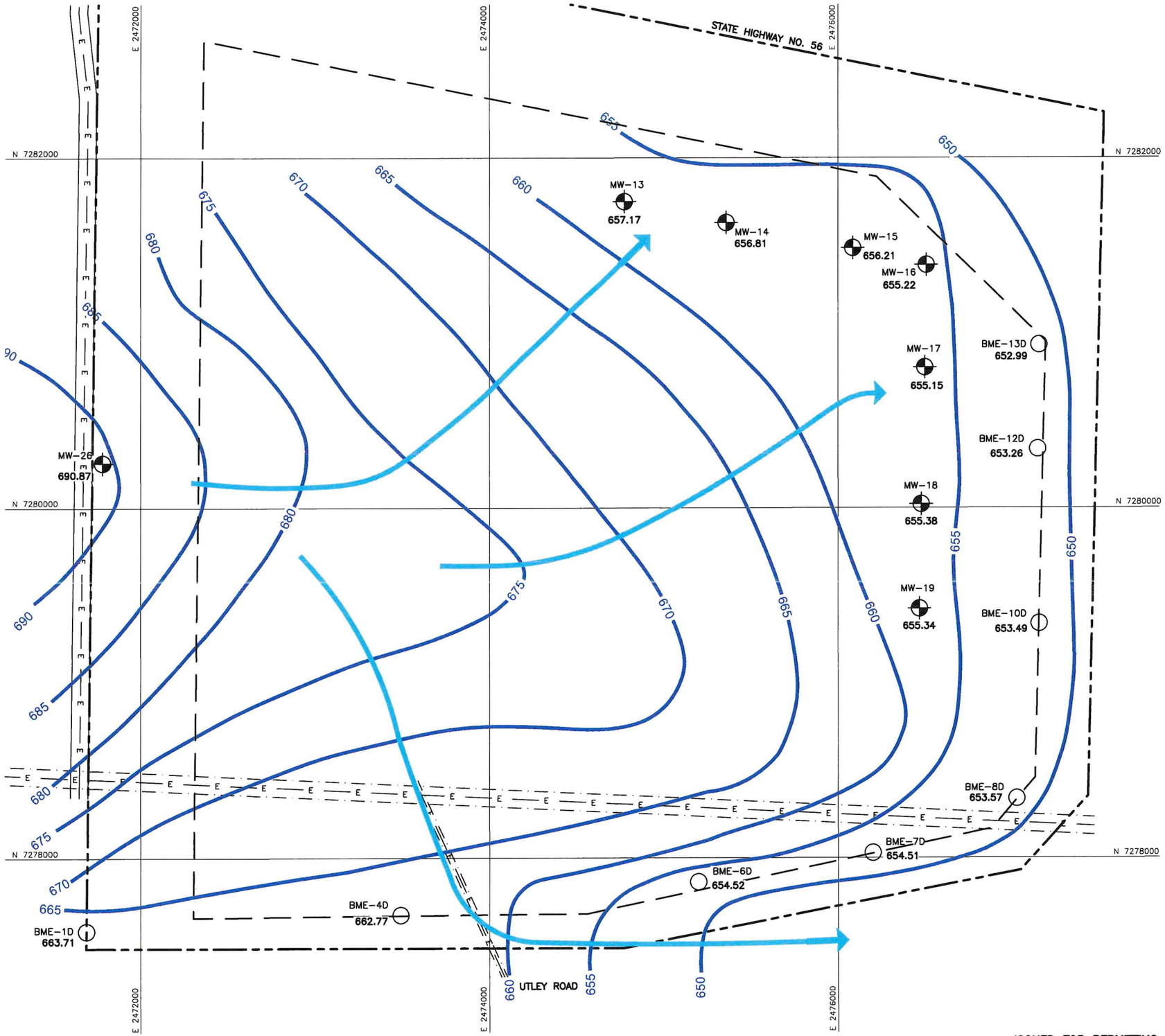
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UTLEY ROAD
E 2472000
E 2474000
E 2476000
N 7282000
N 7280000
N 7278000
MW-13
657.17
MW-14
656.81
MW-15
656.21
MW-16
655.22
MW-17
655.15
MW-18
655.38
MW-19
655.34
MW-26
690.87
BME-1D
663.71
BME-4D
662.77
BME-6D
654.52
BME-7D
654.51
BME-8D
653.57
BME-10D
653.49
BME-12D
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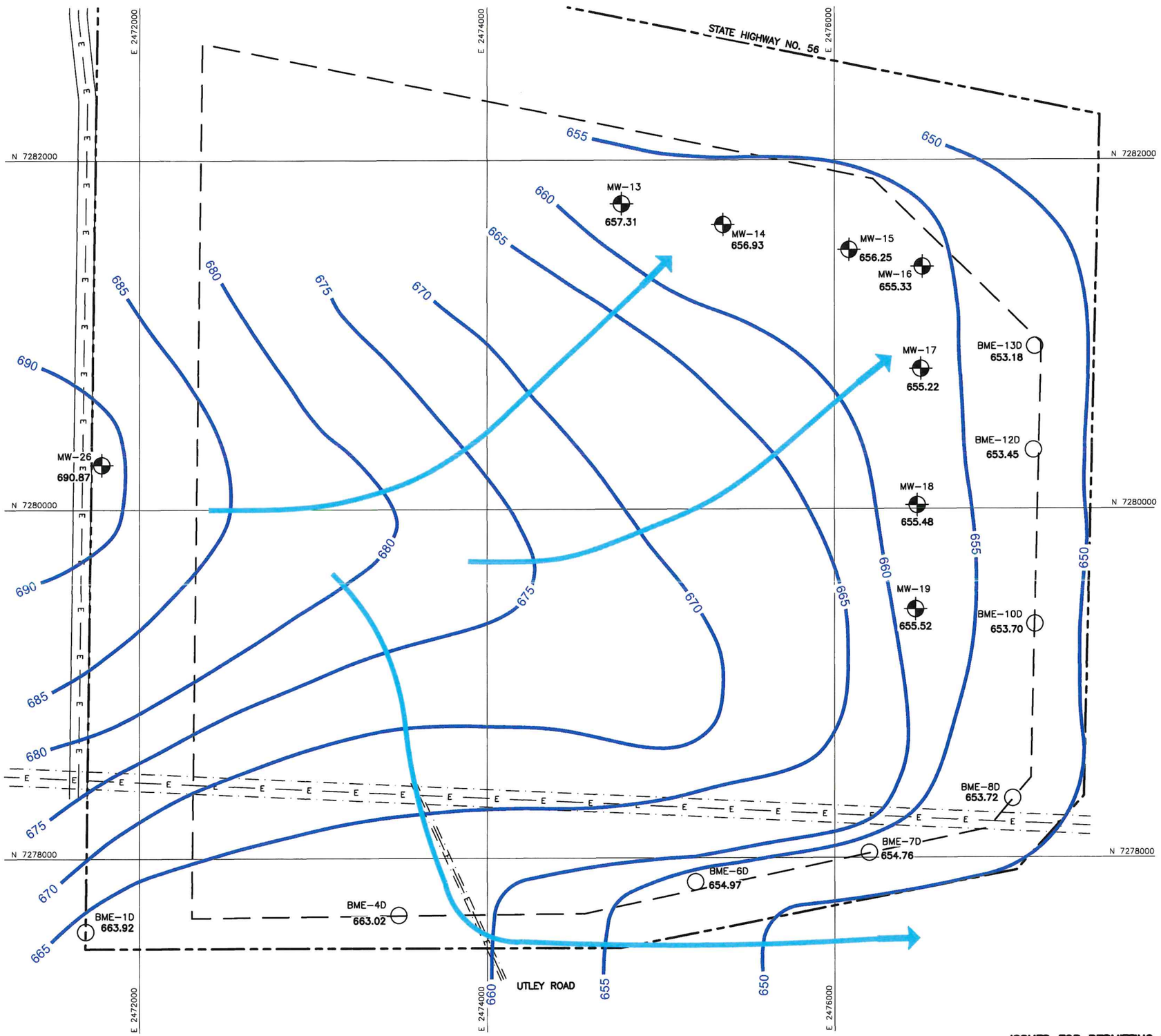
E E E



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MARCH 2023 – LAYER V POTENTIOMETRIC SURFACE MAP

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TBPG FIRM NO. 50222

DRAWING
E6.2m

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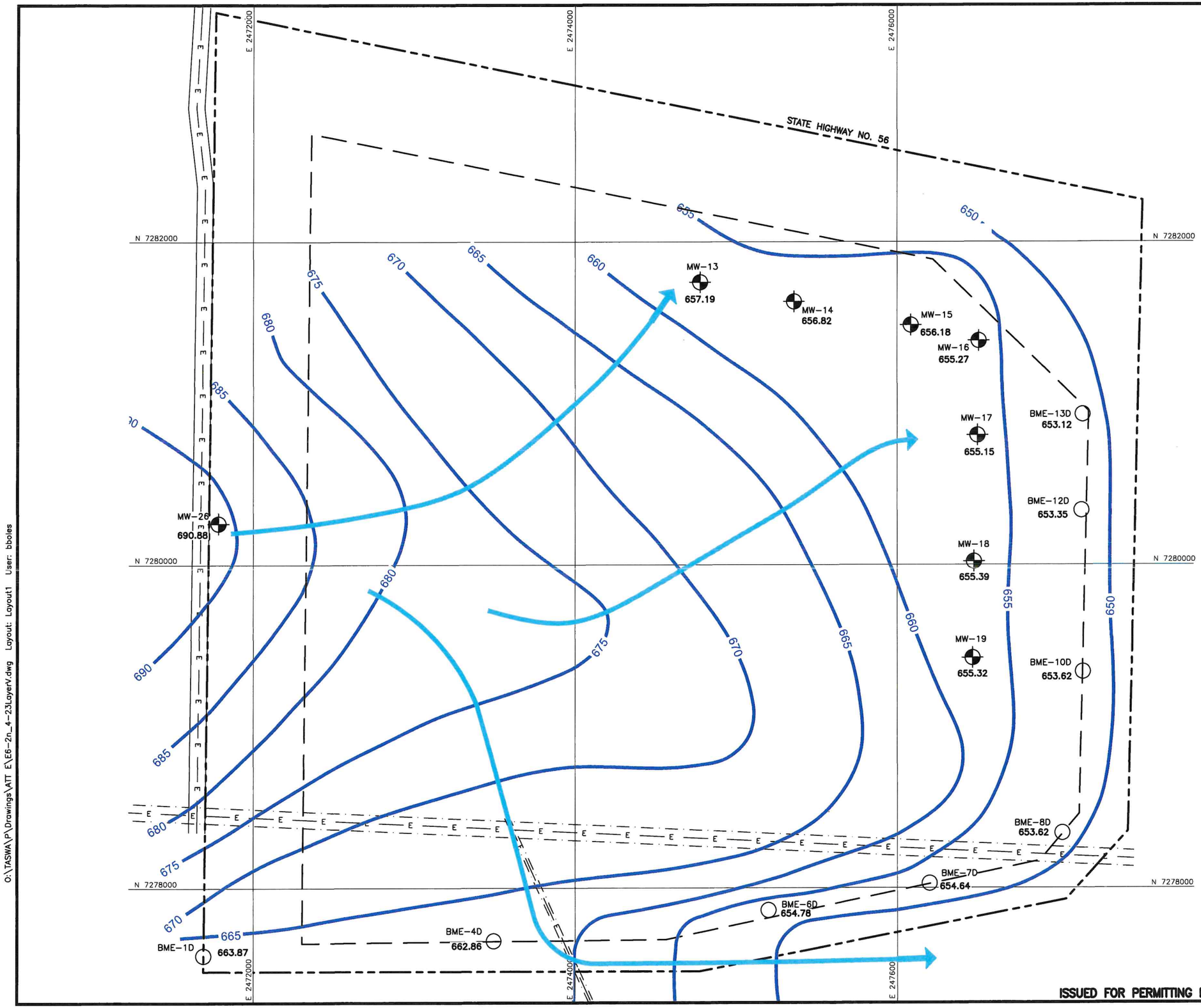

0 400 800
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
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APRIL 2024–LAYER V POTENTIOMETRIC SURFACE MAP

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TBPG FIRM NO. 50222

DRAWING
E6.2n

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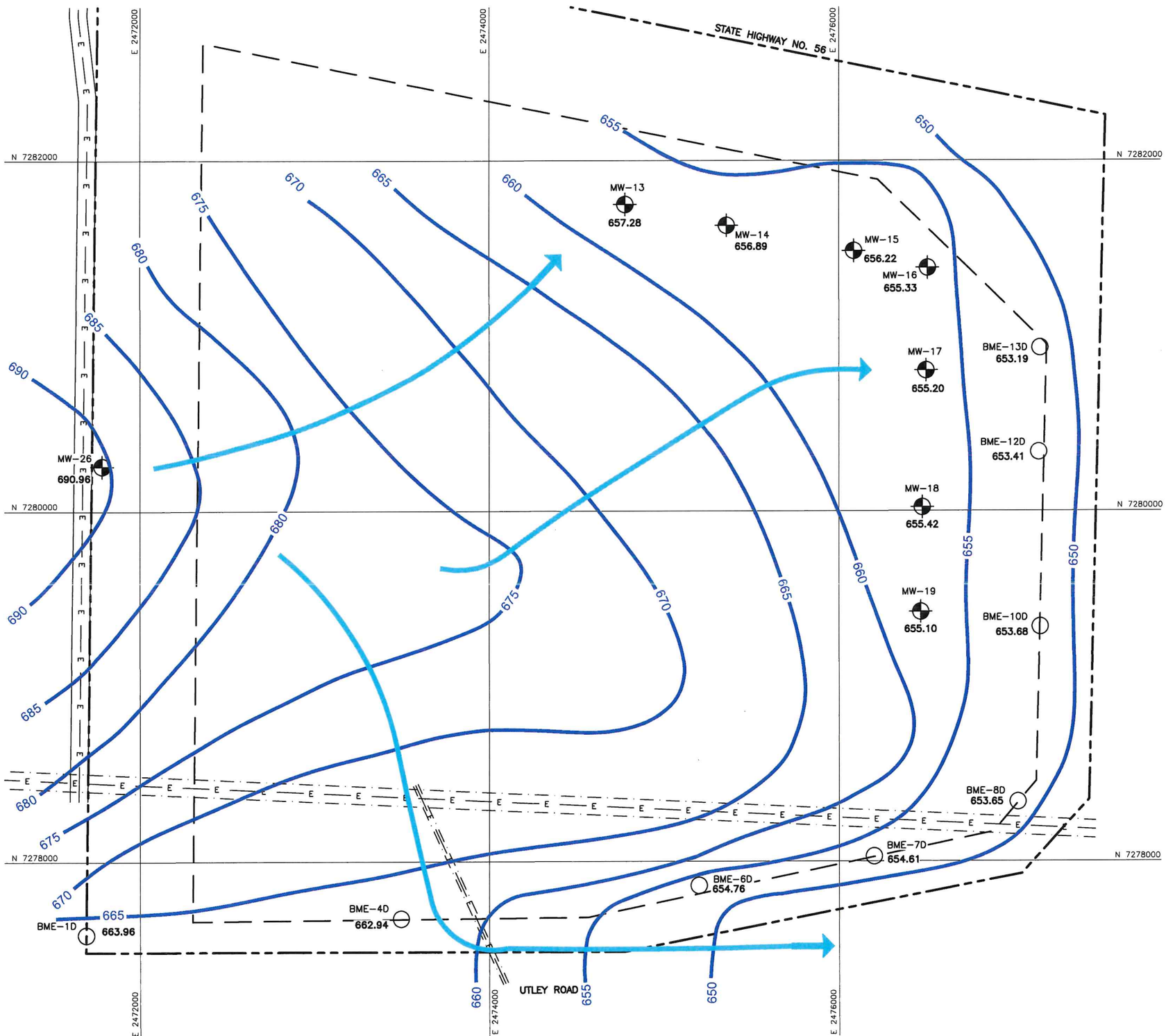

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
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MAY 2023 – LAYER V POTENTIOMETRIC SURFACE MAP

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TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2o

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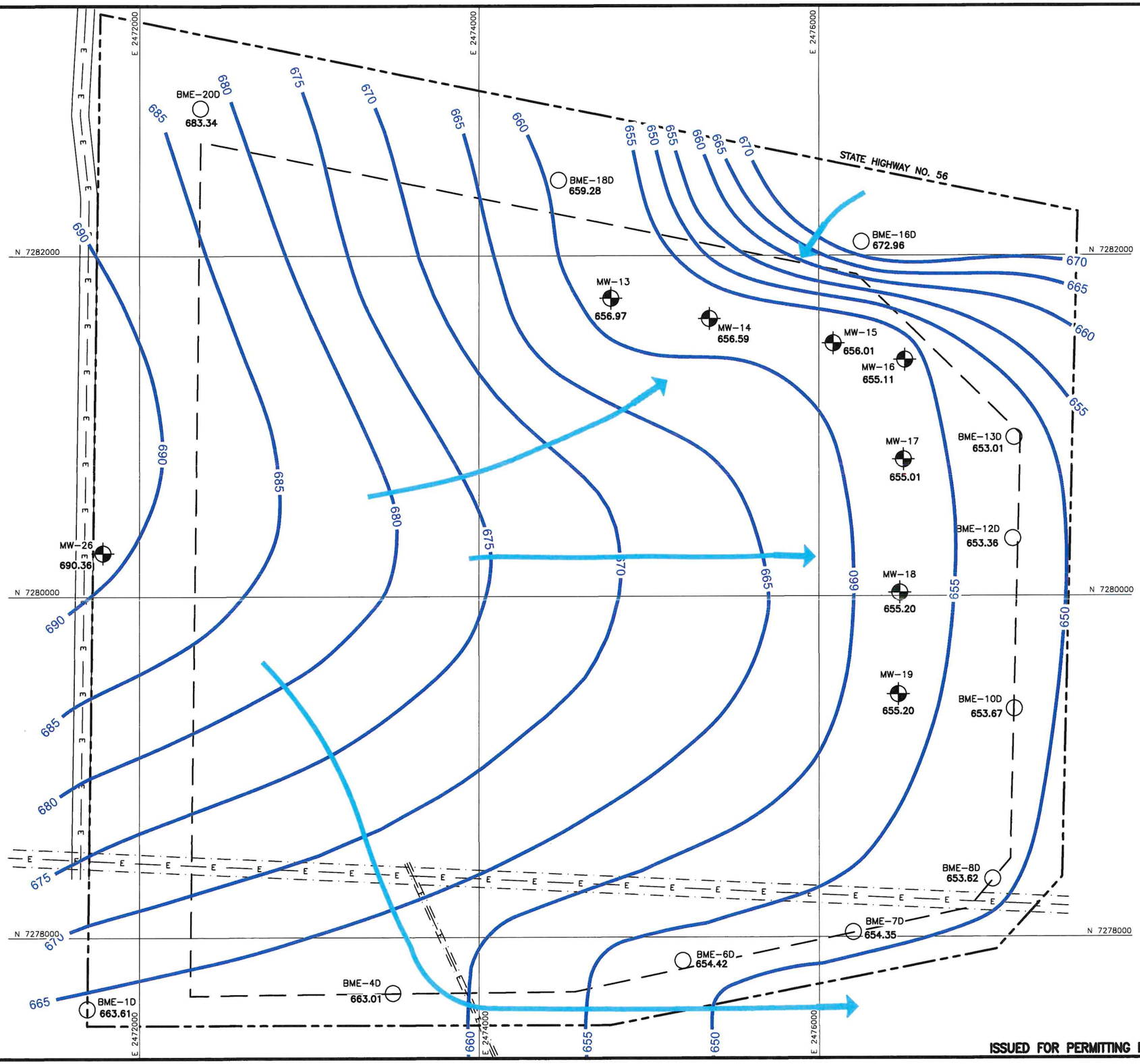

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
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DECEMBER 2023 – LAYER V POTENTIOMETRIC SURFACE MAP

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TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2p

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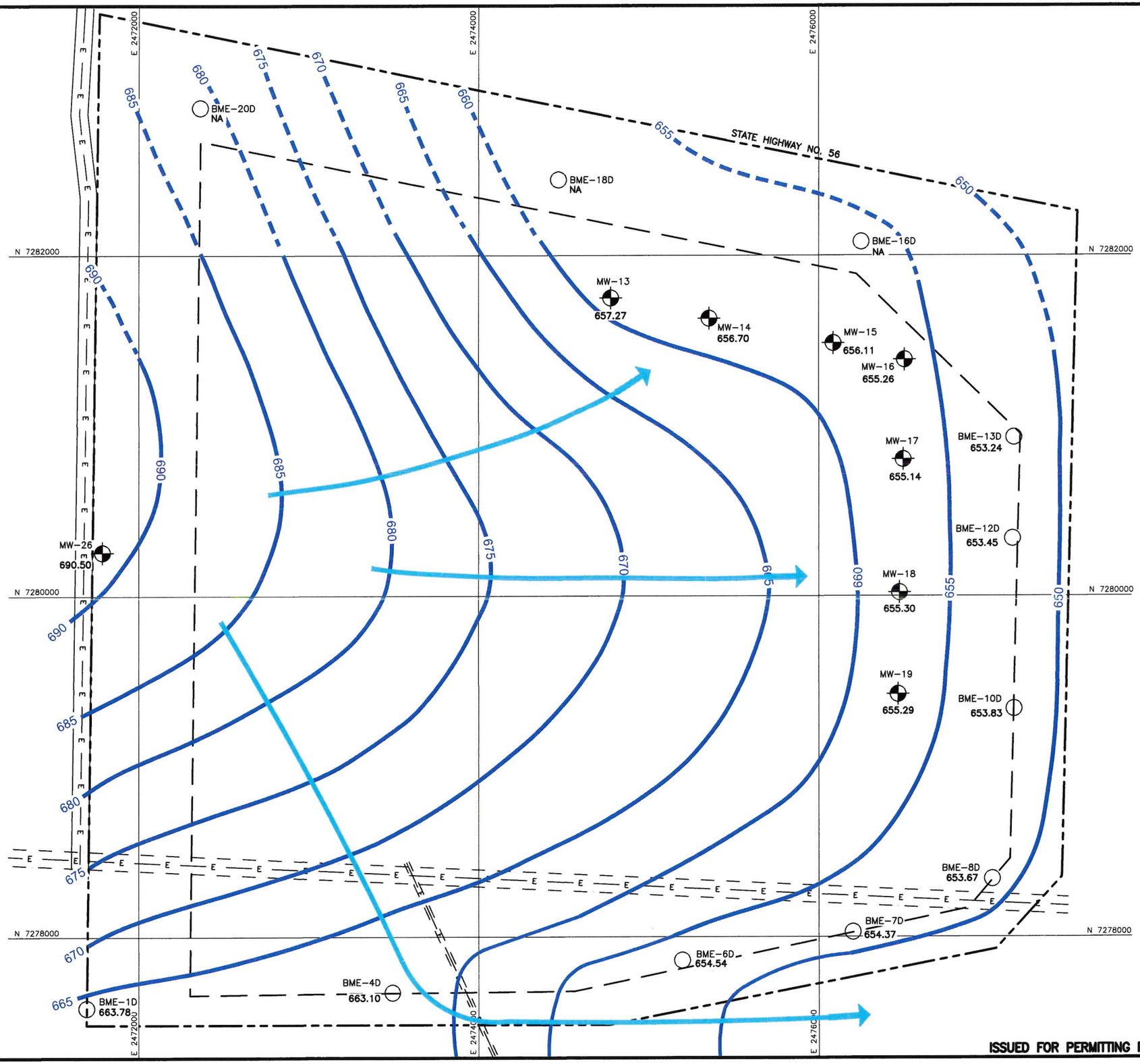

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
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JANUARY 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY
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TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2q

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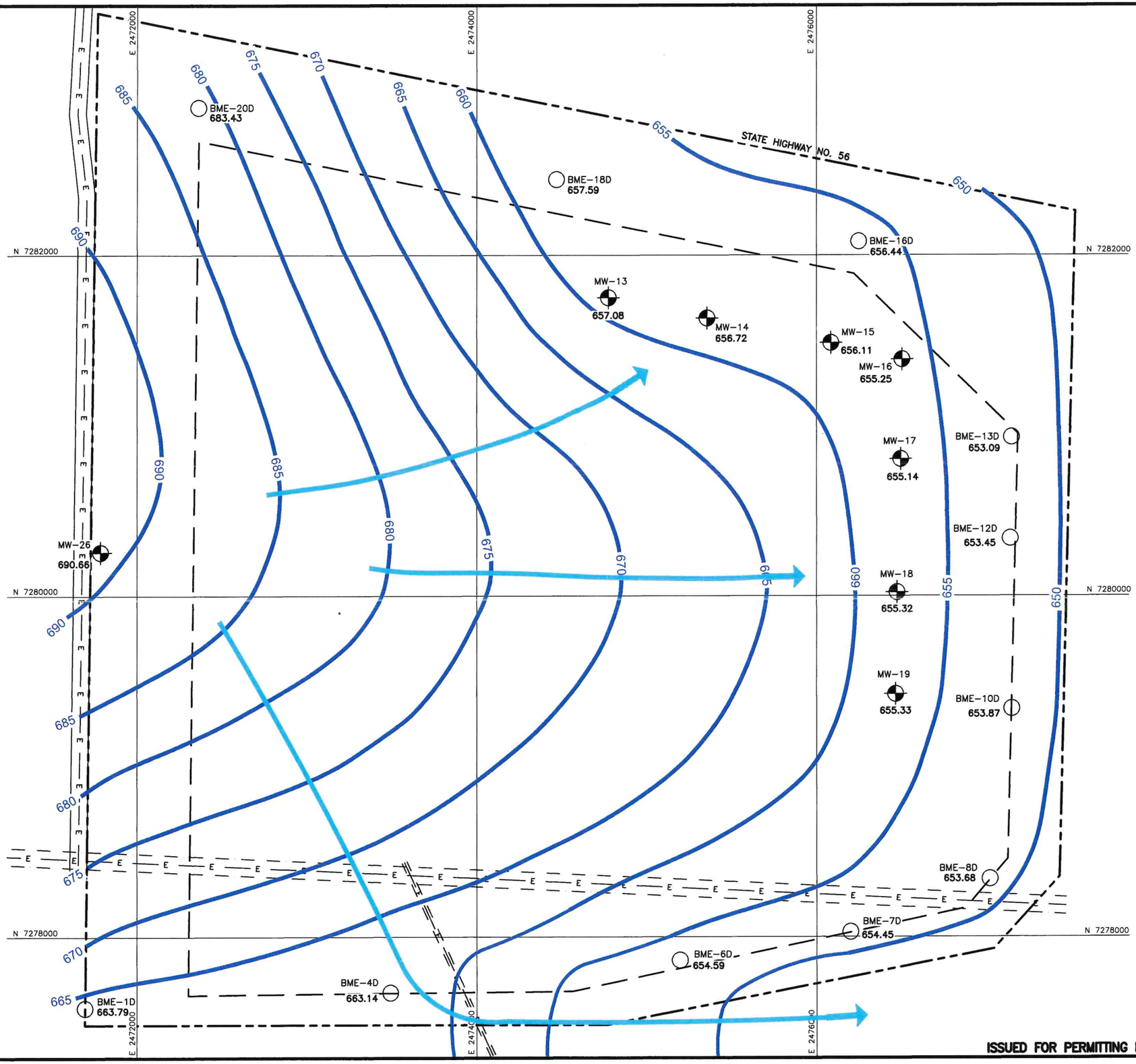

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E — E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

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FEBRUARY 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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PERMIT AMENDMENT

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MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2r

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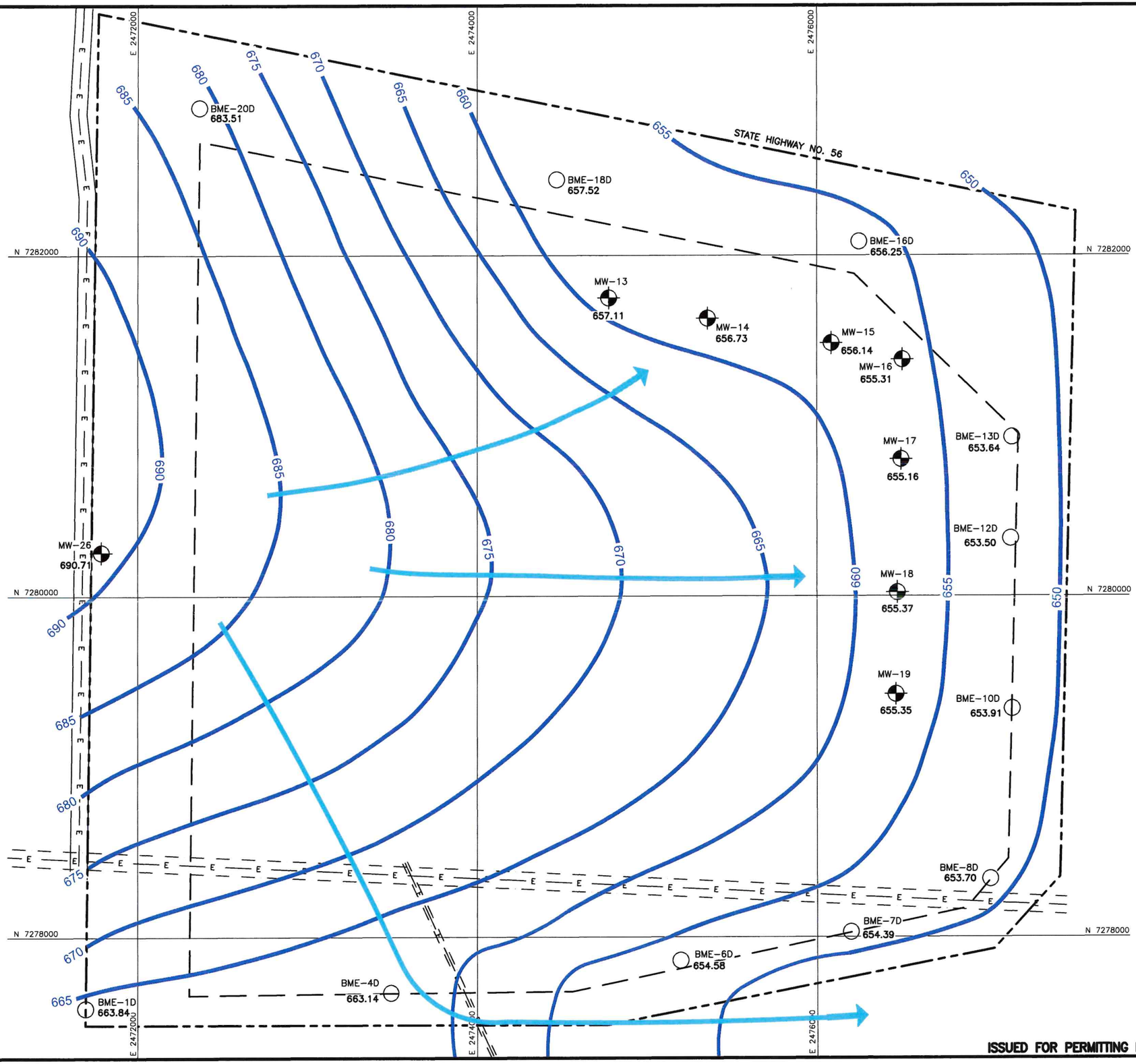

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
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MARCH 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY
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PERMIT AMENDMENT

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817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2s

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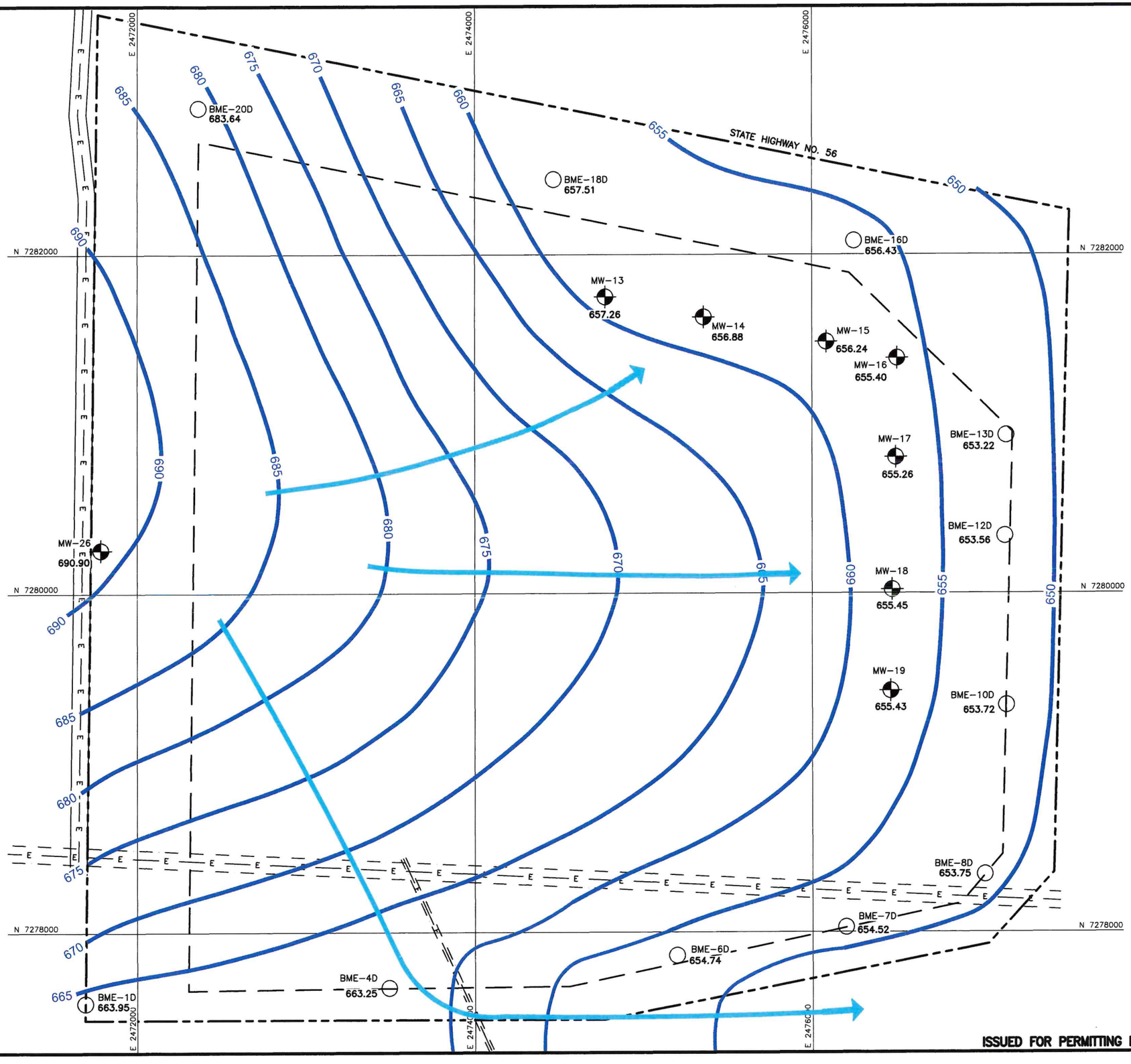
E 2472000
E 2474000
E 2476000
N 7282000
N 7280000
N 7278000
STATE HIGHWAY NO. 56
BME-20D
683.64
BME-18D
657.51
BME-16D
656.43
MW-13
657.26
MW-14
656.88
MW-15
656.24
MW-16
655.40
MW-17
655.26
BME-13D
653.22
BME-12D
653.56
MW-18
655.45
MW-19
655.43
BME-10D
653.72
BME-8D
653.75
BME-7D
654.52
BME-6D
654.74
BME-4D
663.25
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663.95
MW-26
690.90
690
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680
675
670
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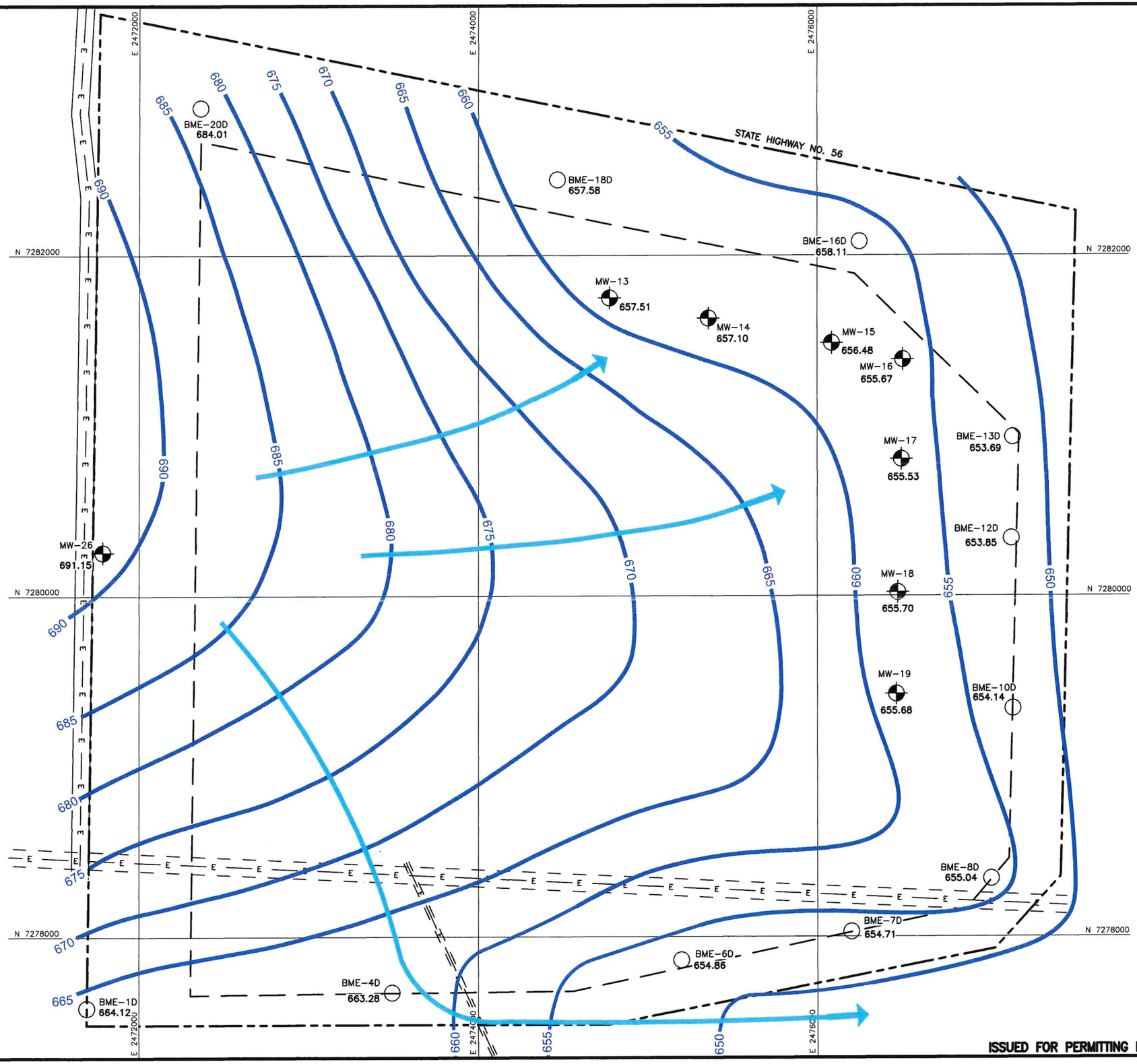
660
655
650
E E E



0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
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- APPARENT DIRECTION OF GROUNDWATER FLOW

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JUNE 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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TBPG FIRM NO. 50222

DRAWING
E6.2u

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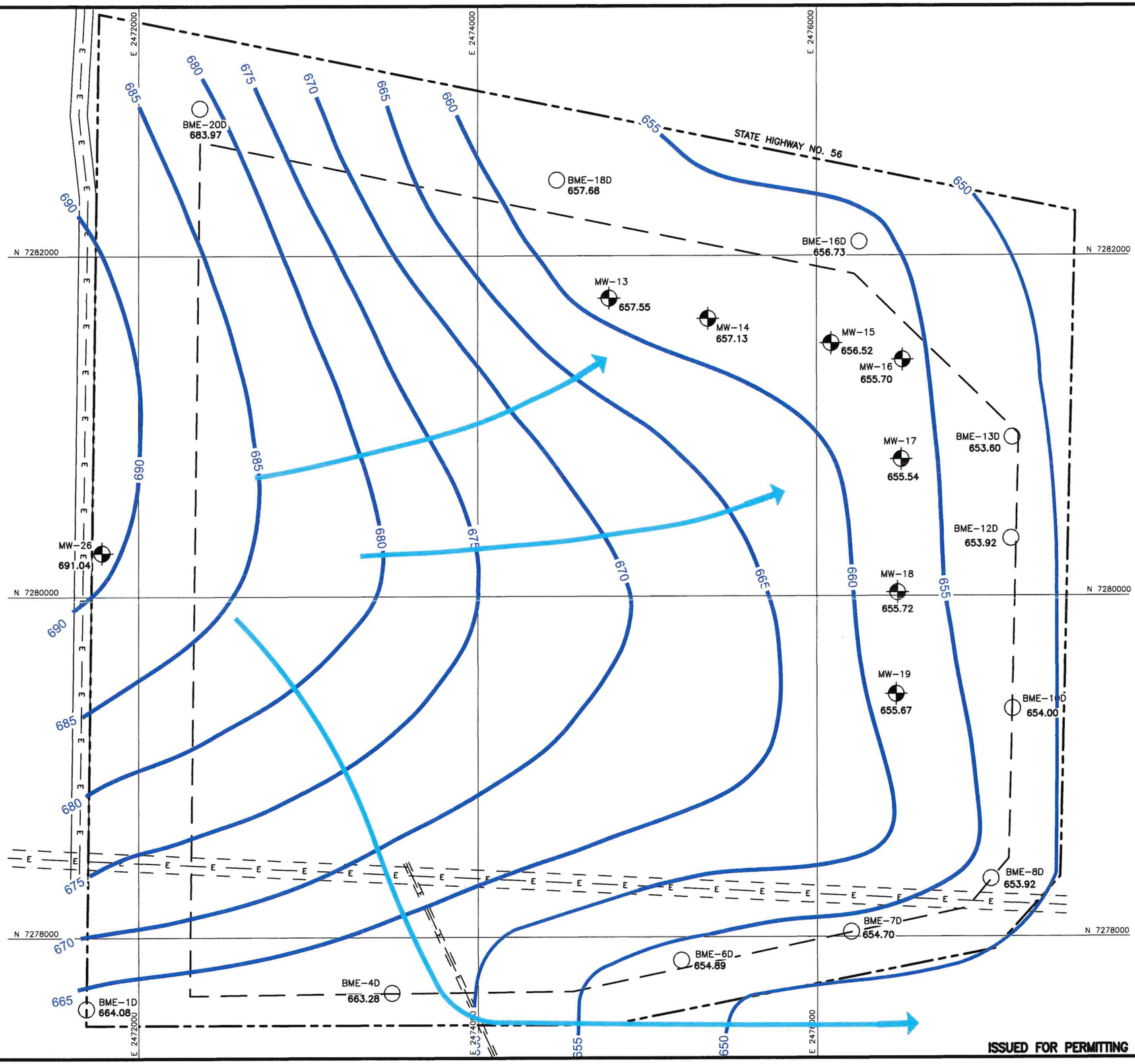

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
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JULY 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DRF PERMIT AMENDMENT

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TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2v

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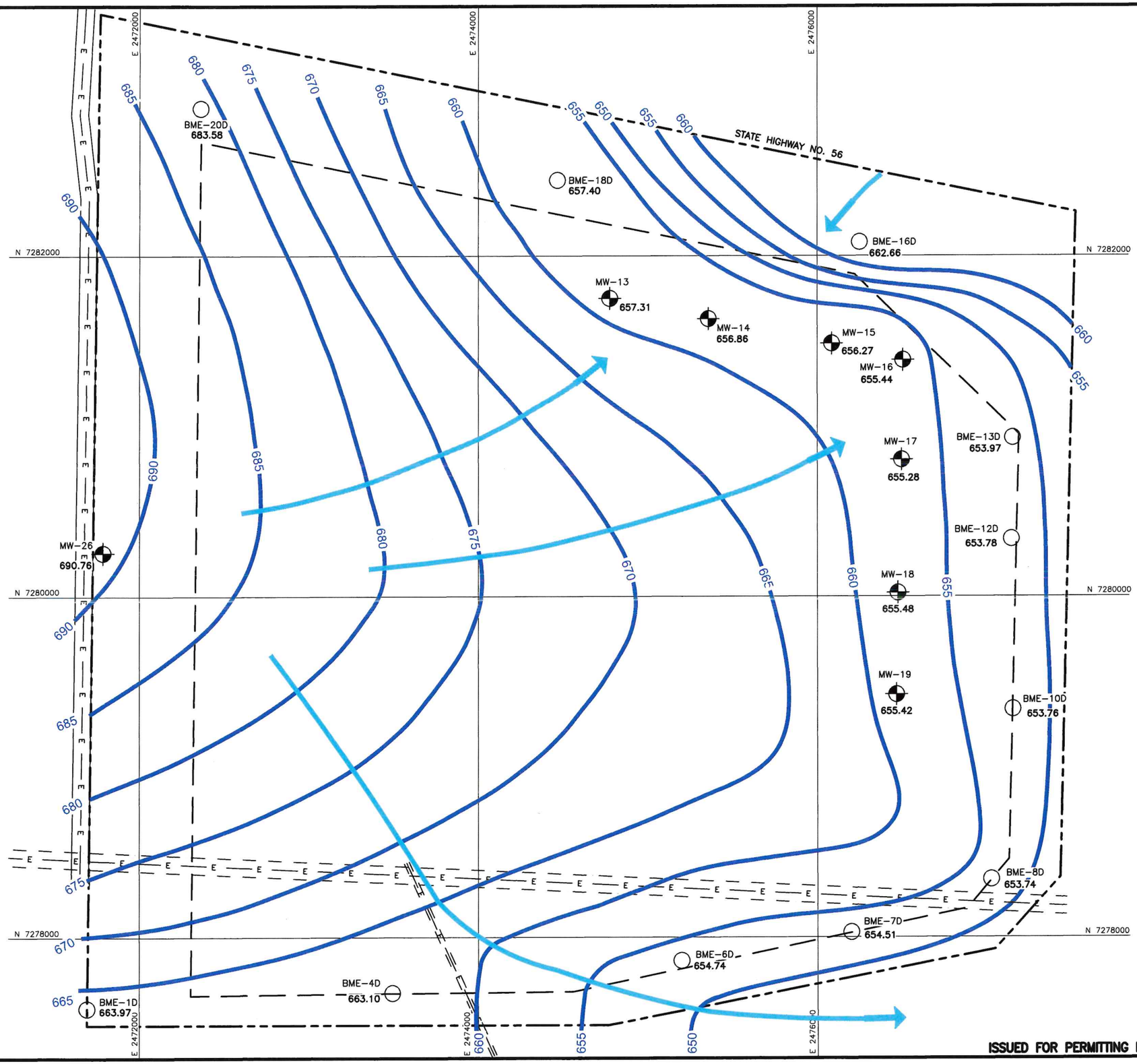

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
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AUGUST 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2w

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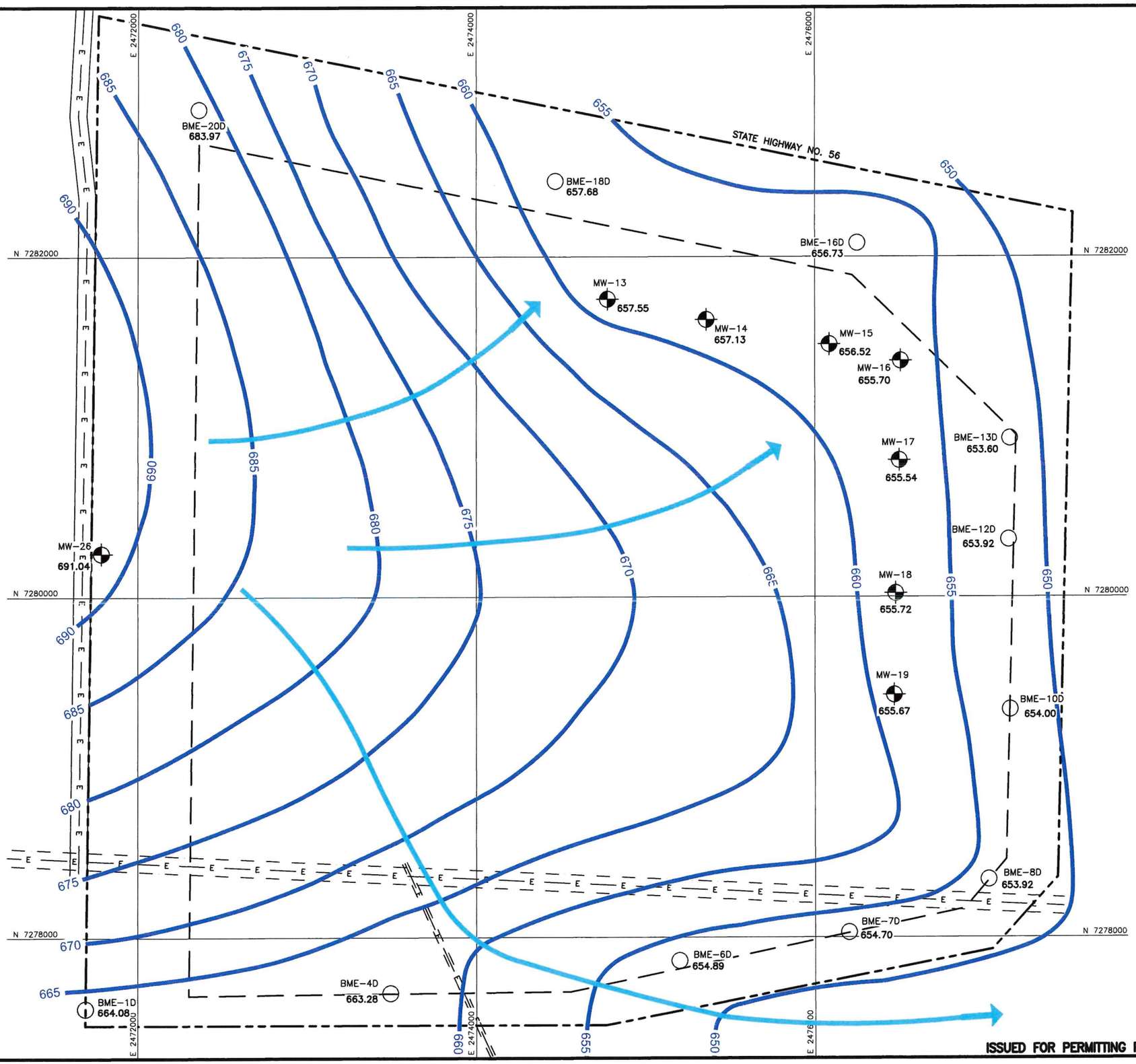

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SEPTEMBER 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

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TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2x

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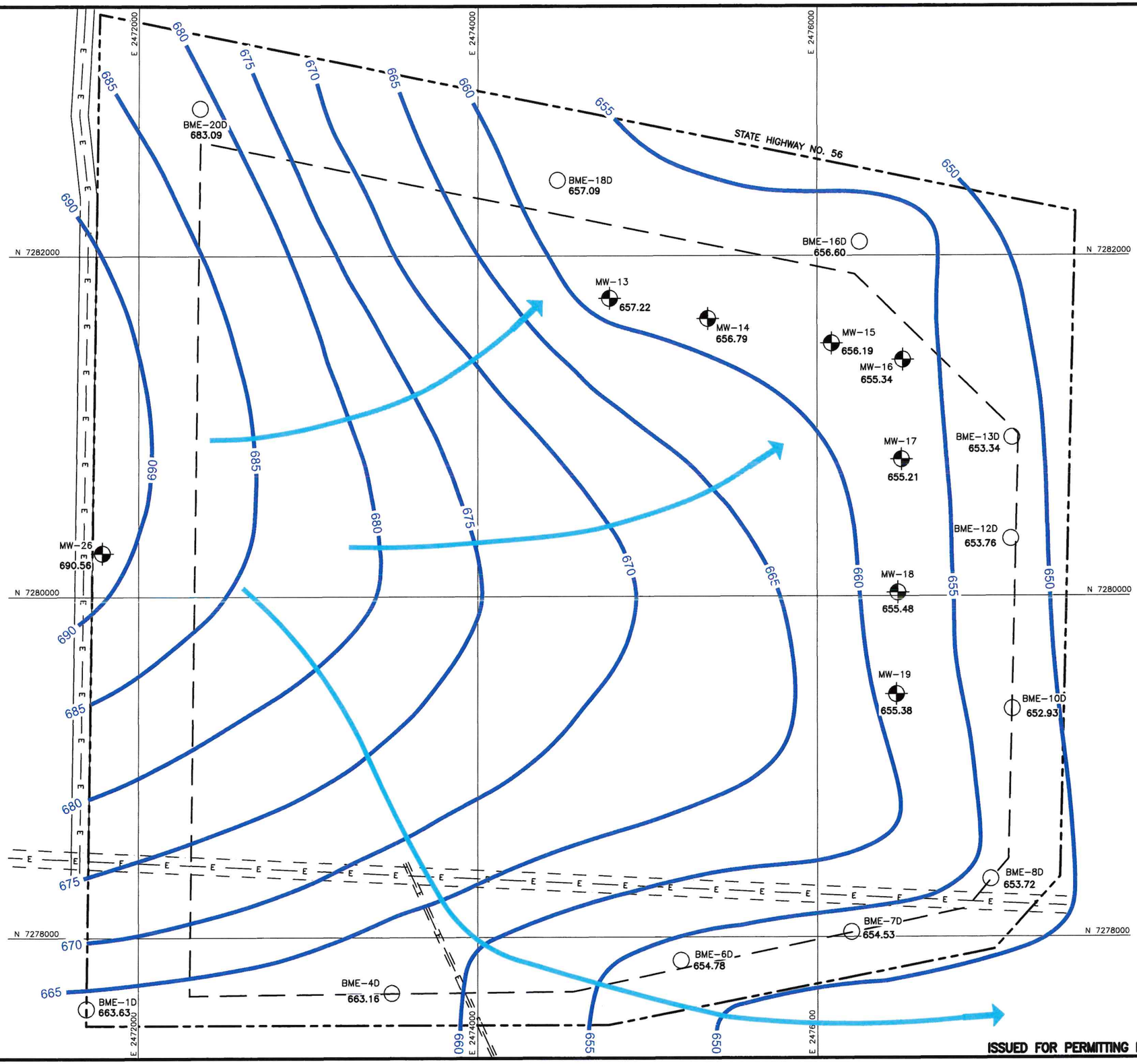

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LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
- MW-1 — MONITOR WELL LOCATION AND ID NUMBER
- BME-15 — PIEZOMETER LOCATION AND ID NUMBER
- 654.05 — WATER LEVEL ELEVATION
- 735 — CONTOURS OF LAYER V POTENTIOMETRIC SURFACE
- APPARENT DIRECTION OF GROUNDWATER FLOW

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
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PROFESSIONAL GEOSCIENTIST

6/12/2025

OCTOBER 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY TASWA DRF PERMIT AMENDMENT

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MANSFIELD, TEXAS 76063
817-563-1144

TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2y

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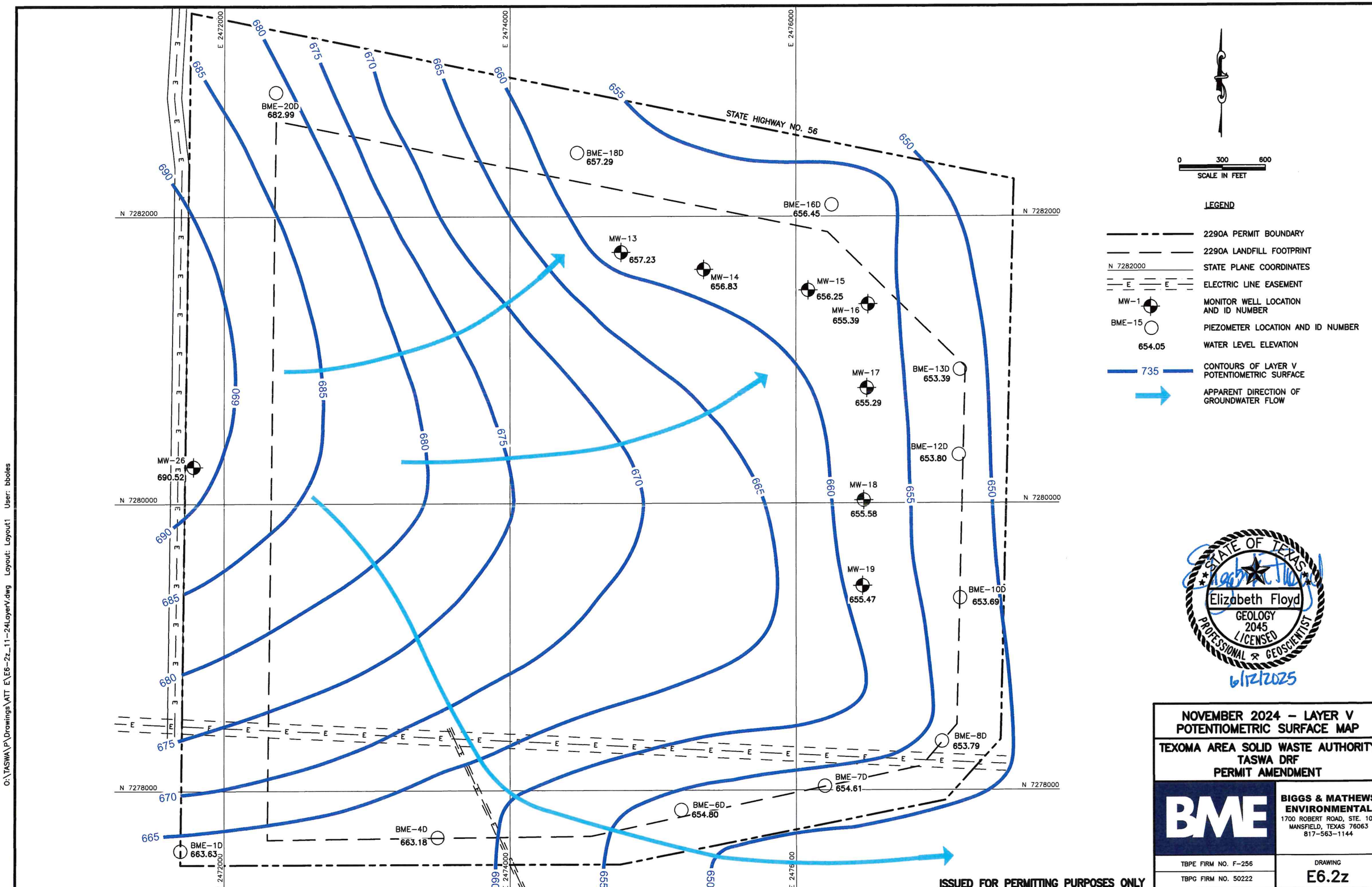

NOVEMBER 2024 – LAYER V
POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

BME

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TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

DRAWING
E6.2z

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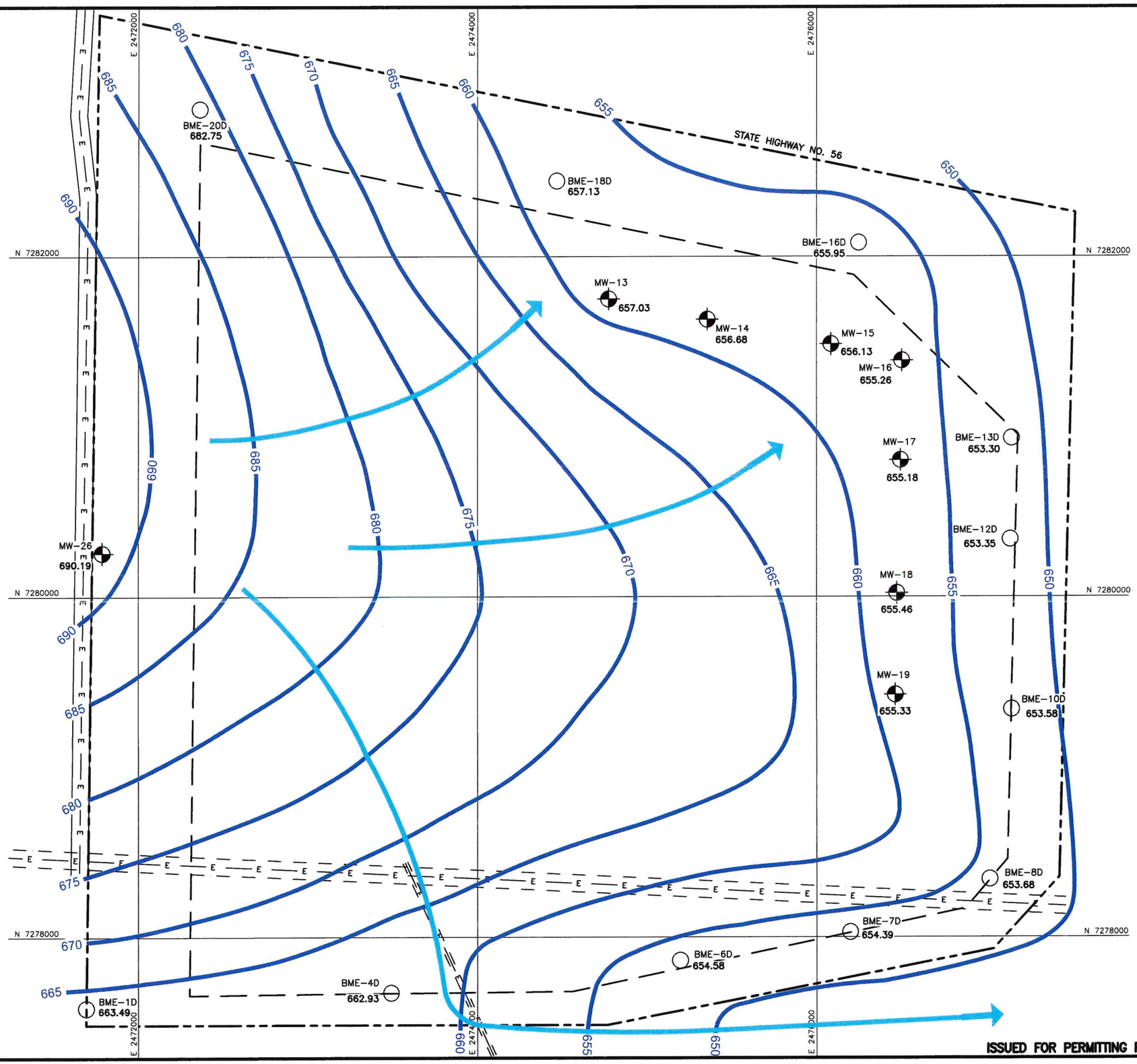

0 300 600
SCALE IN FEET

LEGEND

- 2290A PERMIT BOUNDARY
- 2290A LANDFILL FOOTPRINT
- N 7282000 — STATE PLANE COORDINATES
- E E — ELECTRIC LINE EASEMENT
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STATE OF TEXAS
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DECEMBER 2024 – LAYER V POTENTIOMETRIC SURFACE MAP

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

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TBPG FIRM NO. 50222

DRAWING
E6.2aa

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TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
MSW PERMIT NO. 2290A

PERMIT AMENDMENT APPLICATION

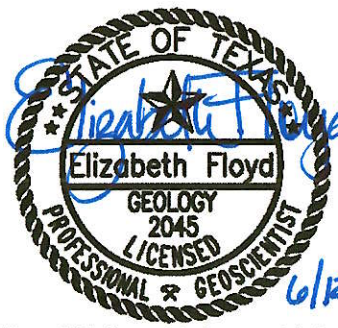
PART III – FACILITY INVESTIGATION AND DESIGN

ATTACHMENT F
GROUNDWATER CHARACTERIZATION REPORT

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised June 2025



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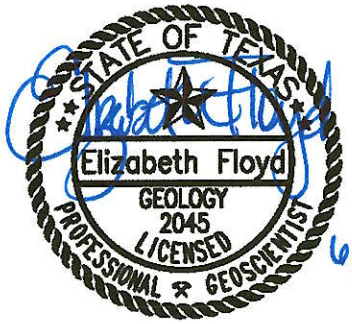
Firm Registration No. 50222

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222



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Permit 2290 Groundwater Monitoring Network Layer V F1.2
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Permit 2290A Groundwater Monitoring Network Layer V F1.4
Monitoring Well Detail F1.5

APPENDIX F2
Groundwater Sampling and Analysis Plan

GROUNDWATER MONITORING SYSTEM DESIGN CERTIFICATION

General Site Information

Site: TASWA Disposal and Recycling Facility

Site Location: Grayson County, Texas

MSW Permit No.: 2290A

Qualified Groundwater Scientist Statement

I, Elizabeth Floyd, am a licensed professional geoscientist in the State of Texas and a qualified groundwater scientist as defined in §330.3. I have reviewed the groundwater monitoring system and supporting data contained herein. In my professional opinion, the groundwater monitoring system is in compliance with the groundwater monitoring requirements specified in 30 TAC §330.401 through §330.421. This system has been designed for specific application to the TASWA Disposal and Recycling Facility (Permit No. MSW 2290A). 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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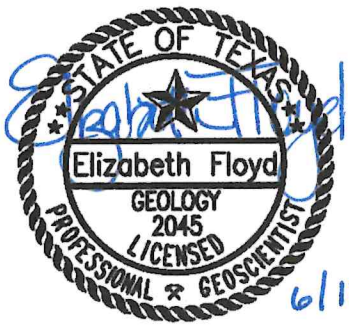
Mansfield, Texas 76063



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side of the site, the excavation bottoms in the very lowest portions of the shaly clays of Layer I, just above the Layer II sand. Layer I permeability was found to be 3.84 $x10^{-8}$ cm/sec. If leachate were to escape the bottom of the excavation in this area it would move slowly downward into the more permeable sand of Layer II where it would be detected in Layer II/III monitoring wells. Groundwater and potential contaminants are not likely to move laterally in Layer I. If leachate were to escape the bottom of the facility below the Layer II sandstone, it would move slowly downward in Layer III and would attempt to migrate through the low permeability shale of Layers III and IV. Groundwater in Layers II and III is separated from groundwater in Layer V by the very low permeability Layer IV shale. Recharge to Layer V comes from its outcrop west of the site as opposed to infiltration through overlying materials. However, because Layer V is a part of a minor aquifer in the area, groundwater monitoring wells are proposed for this zone. Because groundwater flow in Layer V is generally to the east, a contaminant entering the groundwater in Layer V would move downgradient laterally to the east.

2.3.3 Monitoring Well Locations

The uppermost aquifer beneath the TASWA DRF has been identified as Layer V and is the uppermost part of the Woodbine aquifer. Layer V at the site consists of cemented sandstone, interbedded with shaly sandstones. As shown in the cross-sections (Drawings E3.2 through E3.10 in Appendix E3 of Attachment E), Layer V is present and correlatable across the site.

The monitoring network for Permit 2290 consists of 16 monitoring wells. Eight monitoring wells (MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-7, and MW-12) monitor the Layer II/III groundwater zone, and eight monitoring wells (MW-13, MW-14, MW-15, MW-16, MW-17, MW-18, MW-19, and MW-20) monitor the Layer V, the uppermost aquifer. Monitoring well locations are shown on Drawings F1.1 and F1.2.

The groundwater monitoring network for Permit 2290A network will consist of 42 monitoring wells. Eighteen monitoring wells (MW-3R, MW-3A, MW-4R, MW-5R, MW-6R, MW-6A, MW-7R, MW-7A, MW-8, MW-8A, MW-9, MW-9A, MW-10, MW-10B, MW-10A, MW-11, MW-12, and MW-12A) will monitor the Layer II/III groundwater zone. While 24 monitoring wells (MW-13R, MW-14R, MW-14A, MW-15R, MW-16R, MW-16A, MW-17R, MW-18R, MW-19R, MW-20, MW-21, MW-22, MW-23, MW-24, MW-25, MW-26, MW-26A, MW-27, MW-28, MW-29, MW-30, MW-31, MW-32, and MW-33) will monitor Layer V, the uppermost aquifer. Three monitoring wells will be considered upgradient: MW-12 and MW-12A monitor Layer II/III and monitoring well MW-26 monitors Layer V. To accommodate the proposed expansion, seven monitoring wells will be plugged (MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, and MW-7) in Layer II/III, and an additional five monitoring wells (MW-13, MW-14, MW-17, MW-18, and MW-19) will be plugged in Layer V. Twelve replacement wells (MW-3R, MW-4R, MW-5R, MW-6R, MW-7R, MW-13R, MW-14R, MW-15R, MW-16R, MW-17R, MW-18R, and MW-19R) will be installed along the point of compliance. Layer II/III proposed monitoring wells (MW-3R, MW-3A, MW-4R, MW-5R, MW-6R, MW-6A, MW-7R, MW-11, and MW-12A) and Layer V proposed monitoring wells (MW-13R, MW-14R, MW-14A, MW-15R, MW-16R, MW-16A, MW-17R, MW-18R, MW-19R, MW-20, MW-31, MW-32, and MW-33) will be installed within 180 days of permit approval. The remaining 18 monitoring wells in both Layer II/III and V will be installed prior to waste being accepted in Sector 6 (Phase II).

In summary, the groundwater monitoring system for the TASWA DRF will consist of a total of 42 monitoring wells, 18 wells will monitor Layer II/III and 24 wells will monitor Layer V. The groundwater monitoring system has been designed so that monitoring wells have been placed downgradient of each of the leachate sumps. In some cases, downgradient wells are actually on similar flow paths and will monitor more than on sump.

The proposed monitoring system for Permit 2290A is shown on Drawings F1.3 and F1.4. As shown in the table below, the system will ultimately consist of 42 wells of which three are upgradient wells and 39 are downgradient wells. Details of the construction of all monitoring wells included in the groundwater monitor network for Permit 2290A are shown on Drawing F1.5.

Proposed Groundwater Monitoring System

Upgradient Monitoring Wells	Downgradient Monitoring Wells				
Layer II/III					
MW-12 & MW-12A	MW-3R	MW-6R	MW-7A*	MW-9*	MW-10A*
	MW-3A	MW-6A	MW-8*	MW-9A*	MW-10B*
	MW-4R	MW-7R	MW-8A*	MW-10*	MW-11
	MW-5R				
Layer V					
MW-26	MW-13R	MW-16A	MW-21*	MW-26A*	MW-31
	MW-14R	MW-17R	MW-22*	MW-27*	MW-32
	MW-14A	MW-18R	MW-23*	MW-28*	MW-33
	MW-15R	MW-19R	MW-24*	MW-29*	
	MW-16R	MW-20	MW-25*	MW-30*	

* Monitoring well proposed to be installed during Phase II.

2.3.4 Monitoring Well Construction

All monitoring well design and construction will be done in accordance with §330.421. As such, a licensed Texas driller will install monitoring wells. Wells will be drilled by a method that will not introduce contaminants into the borehole or casing. A licensed professional geoscientist or engineer who is familiar with the geology of the area will supervise monitoring well installation and development and will provide a log of the boring. Equivalent alternatives to commission rules may be used if prior written approval is obtained from the Executive Director. Monitoring well construction details, including the protective collar and protective barrier, are shown on Drawing F1.5.

In accordance with 30 TAC §330.421(a), monitoring wells will be constructed in such a manner as to provide integrity, representative samples, prevent migration of water in borehole, and well construction must follow prescribed specifications.

All wells will be drilled by a qualified Texas licensed driller and will be supervised by a licensed professional geologist (P.G.) or professional engineer (P.E.).

If any fluid is required in the drilling of monitoring wells, clean, treated city water shall be used and a chemical analysis provided to the Executive Director. No glue or solvents will be used in monitoring well construction.

After installation, monitoring wells will be developed to remove drilling artifacts and open the water-bearing zone for maximum flow into the well. Development should continue until all water used or affected during drill activities is removed and field measurements of pH, specific conductance, and temperature have stabilized.

Within 60 days of completion of a monitoring well or any other part of a monitoring system, an installation report will be submitted. The report will include construction and installation details for each well on forms available from the commission, a site map drawn to scale showing the location of all monitoring wells and the relevant point(s) of compliance, well elevations to the nearest 0.01 foot above msl (with year of datum shown), latitude and longitude or landfill grid location of each well, copies of detailed geologic logs including soil sample data, and copies of drillers reports required by other agencies.

As part of each monitoring well installation report, a boring log will be included and will be signed, sealed, and dated by a P.G. or P.E.

Damaged monitoring wells that are no longer usable will be reported to the Executive Director for a determination whether to replace or repair the well. In accordance with 30 TAC §305.70, if a compromised well requires replacement a permit modification request will be submitted within 45 days of the discovery.

Plugging and abandonment of monitoring wells will be performed in accordance with 16 TAC §76.702 and §76.104. No abandonment will be performed without prior written authorization.

All parts of the groundwater monitoring system will be operated and maintained so that they perform at least to design specifications through the active life and any required post-closure care period of that solid waste management unit.

When monitoring wells are installed in unusual conditions, all aspects must be approved in writing by the Executive Director.

The facility must notify the Executive Director and local pollution agency with jurisdiction that has requested to be notified, in writing, if changes in site 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 the facility and that may require installation of additional monitoring wells or sampling points. Such additional wells or sampling points require a modification of the site development plan.

2.4 Sampling and Analysis Procedures

A Groundwater Sampling and Analysis Plan is included in Appendix F2. This plan contains the general requirements, sampling procedures and methods required in 30 TAC §330.405(a)(f). A copy of the approved plan will be placed in the site operating record.

Alternate Source Demonstrations Submitted

Event	Well	Constituent	ASD dated	ASD approved
11/2007	MW-15	Chloride	4/10/2008	6/27/2008
11/2007	MW-15	Sulfate	4/10/2008	6/27/2008
6/2008	MW-15	Chloride	11/4/2008	1/2/2009
6/2008	MW-15	Sulfate	11/4/2008	1/2/2009
11/2012	MW-7	Nickel*	1/28/2013	3/27/2013
3/2016	MW-13	Barium*	5/17/2016	6/24/2016
3/2016	MW-17	Barium	5/17/2016	6/24/2016
3/2016	MW-19	Barium*	5/17/2016	6/24/2016
9/2016	MW-3	Barium*	11/8/2016	1/2/2017
3/2018	MW-16	Barium*	5/21/2018	7/17/2018
9/2020	MW-6	Selenium*	11/6/2020	12/11/2020
2/2023	MW-17	Barium*	4/17/2023	8/2/2023
8/2023	MW-6	Selenium	3/11/2024	4/8/2024

*Due to demonstrated natural variability, an ASD was prepared and submitted in lieu of completing a verification re-sampling event.

3.4 Assessment Monitoring

All detections at the facility of hazardous constituents in 40 CFR Part 258, Appendix I, and 30 TAC §330.419 have been either unverified one-time detections, occurred in upgradient wells not located on the facility's point of compliance, or have been demonstrated to have been caused by a source other than the MSW unit. Should such hazardous constituents be detected in the future, and should such detections support the implementation of assessment monitoring, information to establish an assessment monitoring program under §330.409 will be submitted.

3.5 Corrective Action Program

In accordance with §330.63(f)(7), the required information is provided. Should such hazardous constituents be detected in point of compliance wells in the future groundwater monitoring events above the concentration limits established in 30 TAC §330.409, and absent an approved alternate source demonstration, information, data, and analysis to establish a corrective action program meeting the requirements of §330.411 and §330.413 will be submitted, including a description of special wastes previously handled at the landfill and a characterization of the contaminated groundwater, including any detected concentration(s) of assessment constituents

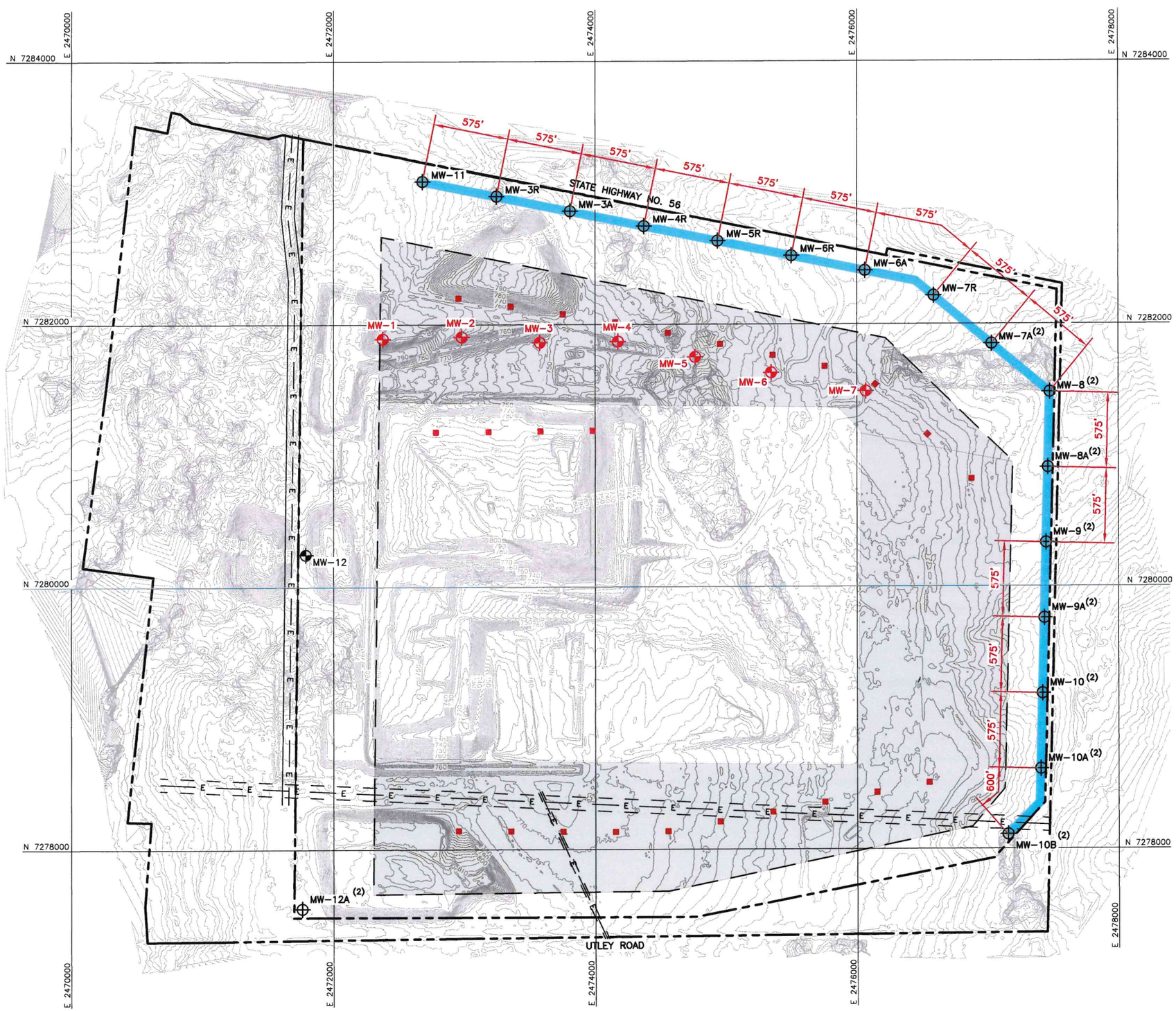
defined in §330.409.

Detailed plans and an engineering report describing the corrective action to be taken will be addressed if hazardous constituents have been measured in the groundwater at levels exceeding the limits established in 30 TAC §330.409. The following will be submitted to comply with 30 TAC §330.411:

- Characterization of the contaminated groundwater, including concentrations of assessment constituents as defined by 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.
- A schedule for a submittal of the information required.

APPENDIX F1

Permit 2290 Groundwater Monitoring Network Layer II/III F1.1
Permit 2290 Groundwater Monitoring Network Layer V F1.2
Permit 2290A Groundwater Monitoring Network Layer II/III F1.3
Permit 2290A Groundwater Monitoring Network Layer V F1.4
Monitoring Well Detail F1.5



0 400 800
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PROPERTY BOUNDARY
- LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
- MW-12 EXISTING MONITORING WELL
- MW-11 PROPOSED MONITORING WELL
- MW-1 MONITORING WELL TO BE PLUGGED OR RELOCATED
- LEACHATE SUMP LOCATION
- POINT OF COMPLIANCE
- EXPANSION AREA

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL FROM DRONE SURVEY FLOWN ON JUNE 1, 2022.
2. MONITORING WELL TO BE INSTALLED IN THE FUTURE IN ACCORDANCE WITH PHASING PLAN DISCUSSED IN ATTACHMENT F.

STATE OF TEXAS
Elizabeth Floyd
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PERMIT 2290A GROUNDWATER MONITORING NETWORK LAYER II/III

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DRAWING
F1.3

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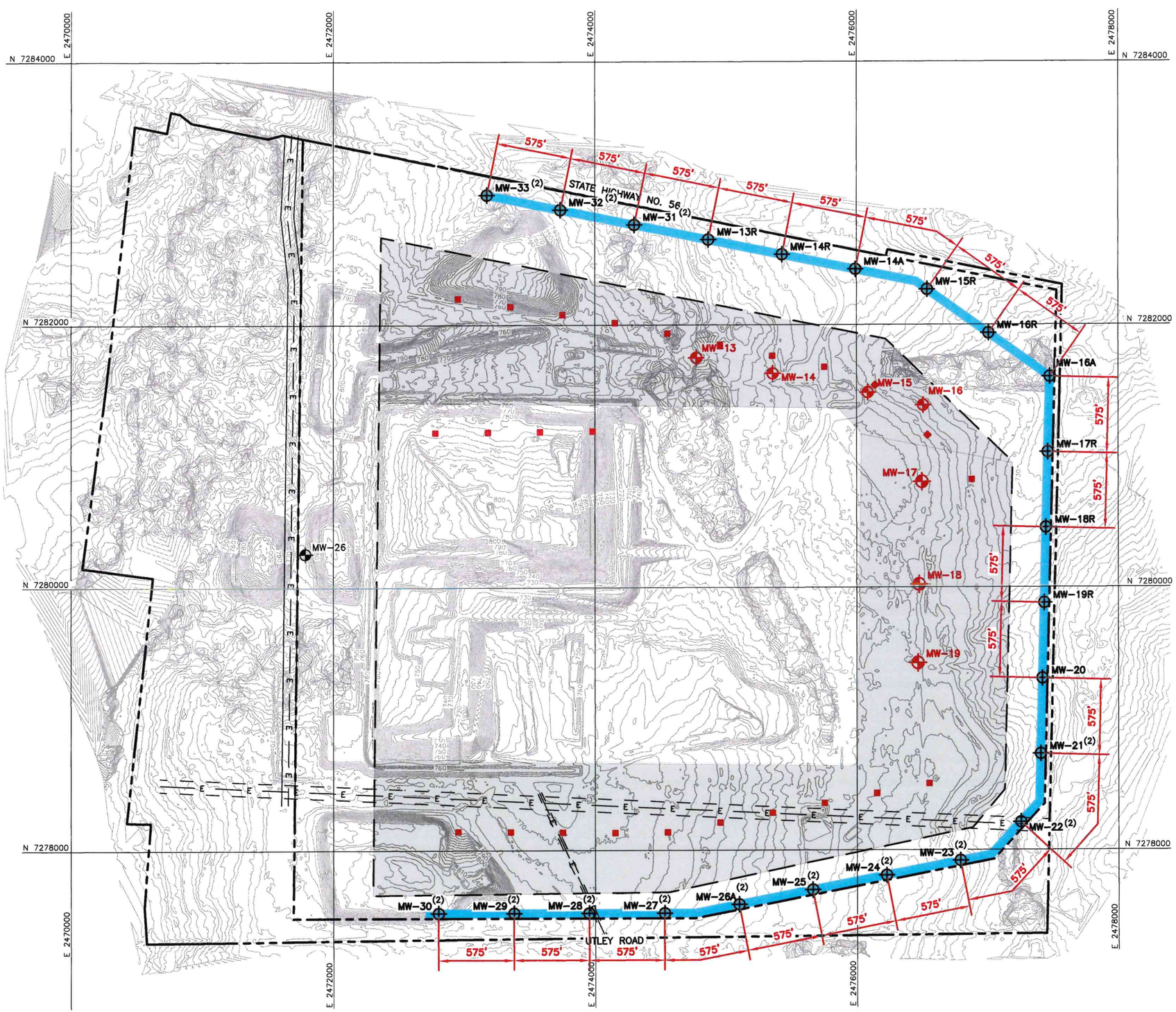

0 400 800
SCALE IN FEET

LEGEND

- PERMIT BOUNDARY
- PROPERTY BOUNDARY
- LANDFILL FOOTPRINT
- 700 EXISTING 10' GROUND CONTOUR
- N 7282000 STATE PLANE COORDINATES
- E E ELECTRIC LINE EASEMENT
- MW-26 EXISTING MONITORING WELL
- MW- PROPOSED MONITORING WELL
- MW-13 MONITORING WELL TO BE PLUGGED OR RELOCATED
- LEACHATE SUMP LOCATION
- POINT OF COMPLIANCE
- EXPANSION AREA

NOTE(S):

1. EXISTING GROUND CONTOURS PROVIDED BY BIGGS & MATHEWS ENVIRONMENTAL FROM DRONE SURVEY FLOWN ON JUNE 1, 2022.
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PERMIT 2290A GROUNDWATER MONITORING NETWORK LAYER V

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DRAWING
F1.4

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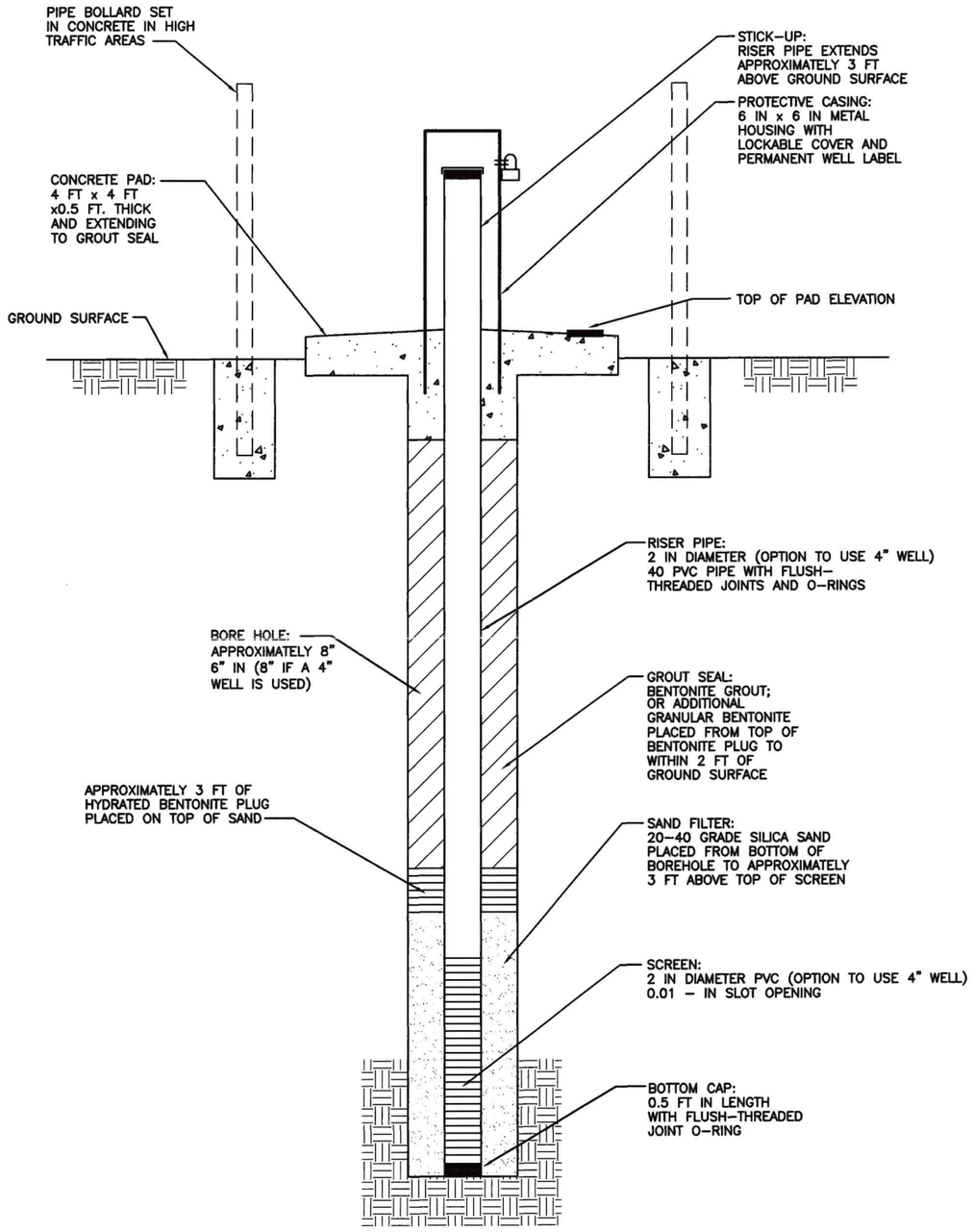

Monitoring Well No.	Northing	Easting	Ground Elevation	Total Depth	Top of Casing Elevation	"Screened Interval (ft/msl)"		"Filter Pack Interval (ft/msl)"	
			(ft/msl)	(ft bgs)	(ft/msl)	From	To	From	To
Existing Layer II/III Monitoring Wells									
MW-12	7280247.1	2471785.4	758.36	20.00	760.32	749.71	739.71	752.71	739.71
Existing Layer V Monitoring Wells									
MW-26	7280247.1	2471785.4	759.76	90.00	762.20	679.76	669.76	682.76	669.76
Proposed Layer II/III Monitoring Wells									
MW-3A	7282862.60	2473807.10	732.50	30.50	735.00	712.00	702.00	715.00	702.00
MW-3R	7282976.20	2473243.40	749.10	44.10	751.60	715.00	705.00	718.00	705.00
MW-4R	7282749.0	2474370.80	720.50	20.50	723.00	710.00	700.00	713.00	700.00
MW-5R	7282635.4	2474934.40	744.00	44.00	746.50	710.00	700.00	713.00	700.00
MW-6A	7281845.5	2475876.3	750.00	33.00	752.50	722.00	717.00	725.00	717.00
MW-6R	7282521.9	2475498.100	752.60	37.60	755.10	725.00	715.00	728.00	715.00
MW-7A	7281375.6	2476631.5	741.00	33.00	743.50	713.00	708.00	716.00	708.00
MW-7R	7282216.4	2476588.1	743.10	38.10	745.60	715.00	705.00	718.00	705.00
MW-8	7281260.6	2477194.9	735.50	33.00	737.00	707.00	702.00	710.00	702.00
MW-8A	7280907.4	2477459.1	727.50	36.00	729.00	696.50	691.50	699.50	691.50
MW-9	7280332.6	2477445.0	737.00	36.00	739.50	706.00	701.00	709.00	701.00
MW-9A	7279757.7	2477431.0	725.00	36.00	727.50	694.00	689.00	697.00	689.00
MW-10	7279182.9	2477416.9	728.00	30.00	730.50	703.00	698.00	706.00	698.00
MW-10A	7278608.1	2477402.8	731.00	35.00	733.50	701.00	696.00	704.00	696.00
MW-10B	7278109.2	2477152.7	744.00	44.00	746.50	695.00	700.00	692.00	700.00
MW-11	7283089.7	2472679.8	750.90	40.90	753.40	720.00	710.00	723.00	710.00
MW-12A	7277551.1	2471757.7	774.99	38.99	777.49	746.00	736.00	749.00	736.00
Proposed Layer V Monitoring Wells									
MW-13R	7282649.7	2474863.7	742.30	99.80	744.80	652.50	642.50	655.50	642.50
MW-14A	7281706.3	2475926.8	749.00	110.00	751.50	649.00	639.00	652.00	639.00
MW-14R	7282536.1	2475427.3	752.30	110.30	754.80	652.00	642.00	655.00	642.00
MW-15R	7282268.9	2476537.4	745.20	105.20	747.70	650.00	640.00	653.00	640.00
MW-16A	7281604.7	2477476.2	736.00	113.00	738.50	633.00	523.00	636.00	623.00
MW-16R	7281936.8	2477006.8	727.80	95.80	730.30	642.00	632.00	645.00	632.00
MW-17R	7281029.9	2477460.3	726.50	120.00	729.00	616.50	606.50	619.50	606.50
MW-18R	7280455.1	2477446.2	736.00	120.00	738.50	626.00	616.00	629.00	616.00
MW-19R	7279880.3	2477432.2	726.00	115.00	728.50	621.00	611.00	624.00	611.00
MW-20	7279305.4	2477418.1	727.00	120.00	729.50	617.00	607.00	620.00	607.00
MW-21	7278730.6	2477404.0	732.00	120.00	734.50	622.00	612.00	625.00	612.00
MW-22	7278211.2	2477252.3	731.00	120.00	733.50	621.00	611.00	624.00	611.00
MW-23	7277918.9	2476790.1	748.00	115.00	750.50	643.00	633.00	646.00	633.00
MW-24	7277808.9	2476225.7	758.50	115.00	760.00	658.00	643.50	656.00	643.50
MW-25	7277698.9	2475661.3	750.00	115.00	752.50	645.00	635.00	648.00	635.00
MW-26A	7277588.9	2475097.0	757.00	115.00	759.50	612.00	602.00	615.00	602.00
MW-27	7277523.7	2474528.3	764.00	125.00	767.50	649.00	639.00	652.00	639.00
MW-28	7277523.7	2473953.3	772.00	125.00	775.50	657.00	647.00	660.00	647.00
MW-29	7277523.7	2473378.3	778.00	125.00	780.50	663.00	653.00	666.00	653.00
MW-30	7277523.7	2472803.3	806.00	125.00	808.50	691.00	681.00	694.00	681.00
MW-31	7282096.3	2473083.5	755.50	96.00	757.00	670.00	660.00	673.00	660.00
MW-32	7281981.3	2473646.9	752.00	112.00	754.50	650.00	640.00	653.00	640.00
MW-33	7281866.4	2474210.3	740.00	90.00	742.50	660.00	650.00	663.00	650.00

NOTES:

1. SCREEN ELEVATIONS AND FILTER PACK ELEVATIONS SHOWN FOR THE PROPOSED WELLS ARE ESTIMATES. ACTUAL ELEVATIONS WILL BE DETERMINED BY LOCATION OF LAYER II AND LAYER V SANDS AS DETERMINED DURING INSTALLATION. WELL CONSTRUCTION MAY VARY IN ORDER TO MEET LOCAL CONDITION; INCLUDING USING A 5 FOOT SCREEN IN LAYER V INSTEAD OF A 10 FOOT SCREEN.
2. LAYER II WELLS WILL HAVE FILTER PACKS PLACED IN THE SATURATED ZONE NEAR THE TOP OF LAYER II. ACTUAL PLACEMENT WILL BE FIELD DETERMINED AT THE TIME OF WELL INSTALLATION.

STATE OF TEXAS
Elizabeth Floyd
GEOLOGY
2045
LICENSED
PROFESSIONAL GEOSCIENTIST
6/12/2025

ISSUED FOR PERMITTING PURPOSES ONLY

MONITORING WELL DETAIL

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF
PERMIT AMENDMENT

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817–563–1144
TBPE FIRM NO. F–256
TBPG FIRM NO. 50222

DRAWING
F1.5

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TASWA SOLID WASTE DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMMENDMENT APPLICATION

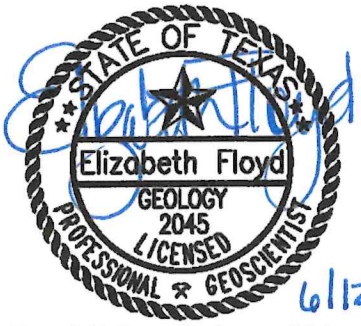
ATTACHMENT F

APPENDIX F2
GROUNDWATER SAMPLING AND ANALYSIS PLAN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
June 2025



6/12/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. 50222

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
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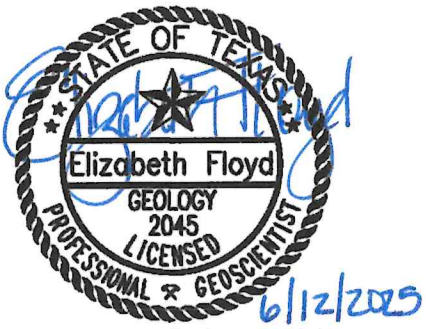

6/12/2025

Biggs & Mathews Environmental, Inc.
Firm Registration No. 50222

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1 GROUNDWATER SAMPLING PROCEDURES 1

2 GROUNDWATER ANALYSIS PROCEDURES 8

3 GROUNDWATER MONITORING REQUIREMENTS 11

6. Identification and explanation of problems associated with the sample results, along with the limitations these problems have on data usability.

7. A statement on the estimated uncertainty of analytical results of the samples when appropriate and/or when requested.

8. A statement of compliance and/or noncompliance with the requirements and specifications. Exceedance of holding times and identification of matrix interferences must be identified. Dilutions shall be identified and if dilutions are necessary, they must be done to the smallest dilution possible to effectively minimize matrix interferences and bring the sample into control for analysis.

9. Identification of any and all applicable quality assurance and quality control samples that will require special attention by the reviewer.

10. A statement on the quality control of the analytical method of the permit and the analytical recoveries information shall be provided when appropriate and/or when requested.

In addition to the LCN, the following information must be submitted for all analytical data:

1. A laboratory checklist. The Laboratory Data Package Cover Page and Data Review Checklist may be included with the TCEQ-0312 forms for each groundwater monitoring event. For every response of "No, NA, or NR" that is reported on the checklist, the permittee will ensure the laboratory provides a detailed description of the "exception report" in the summary of the LCN. The permittee will require the laboratory to do an equivalent of an EPA Level 3 review regarding quality control analysis.

2. Chain of custody.

3. Analytical report that documents the results and methods for each sample and analyte to be included for every analytical testing event. These test reports must document the reporting limit/method detection limit the laboratory used.

Reporting Limits: Practical Quantitation Limits (PQL)

Reporting limits will be quantitation limits that meet the requirements of 30 TAC §330.405(f)(5). Analytical results must be reported to the lowest concentration levels that can be reliably quantified (practical quantitation limits). Practical quantitation limit (PQL) is defined as the lowest concentration reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.. The PQL is method, instrument, and analyte specific and may be updated as more data becomes available.

- The PQL will be at or below the groundwater protection standard established for each analyte in accordance with 30 TAC §330.409(h) unless approved otherwise by the TCEQ.

- The precision and accuracy of the PQL initially will be determined from the PQLs

reported over the course of a minimum of eight groundwater monitoring events. The results obtained from these events will be used to demonstrate that the PQLs meet the specified precision and accuracy:

Constituents/Chemicals of Concern	Precision (percent RSD)	Accuracy (percent recovery)
Metals	10	70-130
Volatiles	20	50-150
Semi- Volatiles	30	50-150

- The PQL will be supported by analysis of a PQL check sample, consisting of a laboratory reagent grade sample matrix spiked with constituents/chemicals of concern at concentrations equal to or less than the PQL. At a minimum, a PQL check sample will be performed quarterly during the calendar year to demonstrate that the PQL continues to meet the specified limits for precision and accuracy.

- Analytical results for data below the limit of detection ("non-detect" results) must be reported as less than the established PQL limit that meets those precision and accuracy requirements.

If a PQL cannot meet specified precision and accuracy limits, the owner or operator will ensure that the laboratory provides sufficient documentation to justify the alternate precision and accuracy limits. This information will be reported to the TCEQ by the owner or operator and will be evaluated on a case-by-case basis.

3 GROUNDWATER MONITORING REQUIREMENTS

Groundwater monitoring for the current and proposed monitoring well system is to follow the TCEQ requirements for background, detection, assessment, and corrective action monitoring as outlined in applicable parts of 30 TAC §§330.401-421.

3.1 Background and Detection Monitoring Parameters and Analytical Methods

In accordance with §330.419, all monitoring wells at the site are to be sampled and analyzed for the total metals and VOCs listed in 40 CFR Part 258, Appendix I. EPA methods are listed for each constituent in the Background and Detection Monitoring Constituents; equivalent or better methods may be substituted. The analytical method used must be able to attain the reporting limits (PQLs), as defined in Section 2.

The water quality parameters, listed in the Water Quality Parameters List, may be sampled and analyzed at the discretion of the facility operator, but the results will not be subject to statistical evaluation.

Background groundwater quality will be established for all new and replacement upgradient and downgradient wells in the groundwater monitoring system.

In accordance with §330.407(a)(1), upon completion of background monitoring and during background updates, the facility will evaluate the background data to ensure that the data are representative of background groundwater constituent concentrations unaffected by waste disposal activities or other sources of contamination. The evaluation will be documented in a report and submitted to the TCEQ before the next subsequent groundwater monitoring event following the updated (or initial) background period.

Once monitoring wells are approved for detection monitoring, those constituents “not reasonably expected to be in or derived from the waste contained in the unit” may be deleted from the detection monitoring list with approval from the executive director, in accordance with 30 TAC §330.419(b). At a future date, when leachate data are further evaluated, the detection monitoring parameter list may be revised to exclude compounds not found in the site leachate in sufficient quantity for statistical contrast.

3.2 Monitoring Frequency

Background sampling will consist of eight background samples taken from each well at approximately three-month intervals. This interval is estimated to be sufficient to obtain "statistically independent" samples. For slow recovery wells that have not completed background collection within two years (due to lack of sufficient groundwater for sampling), the wells will then be sampled, or attempted to be sampled, for background during the subsequent regularly scheduled semiannual events.

Background sampling, as described above, will be implemented for new wells or wells that have had major repairs not later than the calendar quarter after installation or repair, except as may be otherwise required by the TCEQ.

Semiannual detection monitoring of the groundwater monitoring wells will begin about six months after the last background sampling event. An effort will be made to sample consistently in the same two quarters each year.

3.3 Statistical Methods

Statistical evaluation of detection groundwater-monitoring constituents is required by 30 TAC §330.405(e) and (f). Statistical analysis will be performed on each of the analyzed constituents, except as may be otherwise approved by the TCEQ, using methods appropriate for the distribution of the concentration values of the constituents. An appropriate statistical method will be selected once the background samples have been collected and approved. The method selected will be based upon the nature of the constituent, the data available, and the site conditions. In selecting an appropriate statistical test, the following criteria will be met:

1. The statistical method used will be appropriate for the distribution of the data.

2. Multiple comparison procedures (excluding tolerance or prediction intervals and control charts) will use a Type-I error rate of no less than 0.05 for each sampling period, and comparisons between individual wells and background concentrations or groundwater protection standards will use a Type-I error rate of no less than 0.01.

3. If a control-chart approach is used, the control chart parameter values will be protective of human health and the environment.

4. If a tolerance or prediction interval is used, the levels of confidence and/or the percentage of the population that the interval must contain, will be protective of human health and the environment.

5. The statistical test will account for data below the detection limit with procedure(s) that are protective of human health and the environment. Any PQL

used will be the lowest concentration reliably achievable with routine laboratory levels of precision and accuracy.

6. The statistical test will control or correct for seasonal and spatial variability, if necessary, and for temporal correlation in the data.

Figures 1-6 at the end of this section, diagram the decision points and the rational which will be used in selecting an appropriate statistical test for each monitored constituent.

3.4 Reporting Requirements

In accordance with 30 TAC §330.407(a)(1), upon completion of background monitoring and during background updates, TASWA will evaluate the background data to ensure that the data are representative of background groundwater constituent concentrations unaffected by waste management activities or other sources of contamination. The evaluation will be documented in a report and submitted to the executive director before the next subsequent groundwater monitoring event following the updated (or initial) background period.

Within 60 days of each groundwater sampling event, a determination will be made whether an apparent or verified exceedance of a statistically calculated background limit has occurred. The terms "apparent SSI", "apparent exceedance", and “initial exceedance” all correspond to the statistically significant increase (SSI) referred to in the first sentence of 30 TAC §330.407(b) and are based on the statistical evaluation of an initial sample during a detection monitoring event that has not yet been confirmed by verification resampling. Timelines for actions listed in the subsections of §330.407(b) are counted from the date of the initial sampling event. An SSI over background of any tested constituent at any monitoring well, including background wells, is not recorded until the initial exceedance has been verified with verification re-sampling. If an apparent SSI is observed, the executive director and any local pollution agency with jurisdiction that has requested notification, will be notified in writing within 14 days of the apparent SSI determination. If an apparent SSI of any tested constituent at any monitoring well has occurred, the following actions will be initiated, as appropriate for each separate apparent SSI incident, in accordance with 30 TAC §330.407(b).

(1) The facility shall immediately place a notice in the site operating record describing the release and establish an assessment monitoring program meeting the requirements of §330.409, for the well(s) exhibiting the SSI and at the immediately adjacent wells on each side of the well(s) exhibiting the SSI, unless an alternative subset of wells is designated by the executive director, within 90 days of the date of the notice to the TCEQ, except as provided in (2) and (3) below:

(2) The facility shall submit results of resampling as appropriate for the statistical method within 60 days of determining the apparent SSI. The resample data may be used to statistically confirm or disprove the apparent SSI. Resampling will be completed, and the results submitted to the executive director within 60 days of the determination of an initial exceedance.

(3) If there is reasonable cause to think that another source or an error(s) in sampling, analysis, statistical evaluation, or natural variation in groundwater quality caused the SSI, then the facility may submit a report documenting the error or alternate source in accordance with §330.407(b)(3), as follows:

(A) Notify, in writing, the executive director and any local pollution agency with jurisdiction that has requested to be notified within 14 days of determining the SSI.

(B) Submit the demonstration, prepared and certified by a qualified groundwater scientist, within 90 days of SSI determination.

(C) Do not filter the sample for constituents addressed by the demonstration prior to laboratory analysis.

(D) Continue detection monitoring.

If the report is approved, then the monitoring well may remain in detection monitoring. If the owner/operator does not make a demonstration satisfactory to the executive director within 90 days after the date of notice, as evidenced by a letter of denial from the TCEQ, the owner/operator shall initiate an assessment monitoring program within 90 days of the date of the notice, in accordance with §330.409. If the owner/operator receives a response from the executive director that a demonstration is not satisfactory after the deadline for initiating assessment monitoring, then assessment monitoring will be initiated at the next regularly scheduled semiannual monitoring event following receipt of the response.

3.4.1 Assessment Monitoring and Corrective Action

Groundwater sampling for assessment monitoring and corrective action will be done in accordance with 30 TAC 330 Subchapter J rules.

Assessment monitoring is required whenever the owner or operator determines there has been a statistically significant increase over background for one or more of the constituents listed in 30 TAC §330.419.

Within 90 days of determining that an SSI has occurred, the owner or operator must sample and analyze each affected well and the two wells adjacent to each affected well for the full set up constituents listed in Appendix II to 40 CFR Pa 258. After sampling for the full set of Appendix II constituents, the executive director may delete any of Appendix II constituents.

If any new constituents are detected in the well as a result of the Appendix II analysis, a background level must be established for the additional constituents. This background level consists of four statistically independent samples from each background well.

If the concentration of any 40 CFR Part 258, Appendix II constituent is above its respective background limit, but below its GWPS, the facility must continue assessment monitoring. If the concentrations of all 40 CFR Part 258, Appendix II

constituents are shown to be at or below background values for two (2) consecutive sampling events, the owner or operator may return the well to detection monitoring status, after notifying the executive director and receiving approval.

If any 40 CFR Part 258, Appendix II constituents were detected at statistically significant levels above the groundwater protection standard, the facility must notify the executive director and appropriate local government officials within 7 days of the determination.

Groundwater protection standards will be established for Appendix II constituents in the point of compliance monitoring wells. Groundwater protection standards will be provided for constituents for which a maximum (MCL) has been promulgated under 40 CFR Part 141, Safe Drinking Water Act Maximum Contaminant Level (MCL). Groundwater protection standards will be provided for constituents for which no MCL is promulgated. Groundwater protection standards will be provided for background constituents that are higher than MCL or health-based level. The Executive Director may establish alternative groundwater protection standards in accordance with 30 TAC §330.409(i).

The owner or operator shall also install any additional monitoring wells necessary to characterize the nature and extent of the release, notify in writing all persons that own or occupy the land that directly overlies any part of the plume of contamination, and initiate an assessment of corrective measures within 90 days of the notice to the executive director.

The owner or operator shall also install any additional monitoring wells necessary to characterize the nature and extent of the release and install at least one additional monitoring well between the monitoring well with the statistically significant level and the next adjacent wells along the point of compliance before the next sampling event.

Within 90 days of reporting Appendix II results, and semiannually thereafter, all wells will be resampled for Appendix I and any new constituent detected from Appendix II. The results of resampling will be submitted within 60 days after each sampling event.

An annual assessment monitoring report will be submitted within 60 days of 2nd semiannual sampling event that includes the following information;

1. A Statement of any statistically significant exceedances of groundwater protection standards in accordance with 30 TAC §330.409(i).

2. Groundwater monitoring results, summary of background, statistical calculations, graphs, and drawings.

3. Groundwater flow rate and direction based on data from sampling events and supporting documentation.

4. A piezometric water level contour map and supporting documentation.

5. Recommendations for any changes.

6. Any other information required by the Executive Director.

If the owner or operator determines that the assessment monitoring program no longer satisfies the requirements of this section, the owner or operator must, within 90 days, submit an application for a permit amendment or modification to make any appropriate changes to the program.

3.4.2 Annual Report

In accordance with 30 TAC §330.407(c), the annual report will include the results of all groundwater monitoring, testing, and analytical work obtained or prepared under the requirements of the permit (that is, all facility groundwater sample and field quality control sample analytical data in hard-copy format on form TCEQ- 0312, Groundwater Sampling Report, and in any other format requested by the executive director, for example, electronic format). The annual report will include a summary of background groundwater quality values, groundwater monitoring analyses, and statistical calculations, as well as graphs, and drawings.

Annually, within 90 days after the facility's last groundwater monitoring event in a calendar year, a report will be submitted that includes the following information gathered since the previous annual report:

(1) A statement regarding SSI(s) in any well and the status of same.

(2) The facility will submit the laboratory case narrative and either a laboratory checklist or a copy of the laboratory QA/QC and analytical data. The analytical data will be submitted in either electronic or in hard copy format, as requested by the executive director.

(3) The facility will explain any problems encountered in the laboratory analysis, either by adding additional explanations to the laboratory checklist or by extending the laboratory case narrative.

(4) Any information required in the laboratory case narrative that cannot be completed by the laboratory will be completed by the permittee.

(5) Groundwater flow rate and direction in the uppermost aquifer, using the previous year's data collected, including documentation used to determine the flow rate and direction.

(6) Contour map(s) of piezometric water levels in the uppermost aquifer based on concurrent measurements at all monitoring wells, including supporting data.

(7) Any recommendations for changes to the groundwater monitoring program.

(8) Any other items requested by the executive director.

Recommended Containers, Preservation, and Storage for Groundwater Monitoring

Parameter	Recommended Containers	Preservation	Maximum Holding Time	Minimum Volume
pH	P, G	None	Analyze immediately	25 ml
Spec. cond.	P, G	None	Analyze immediately	100 ml
Temperature	P, G	None	Analyze immediately	
Heavy metals (includes iron and manganese)	P, G	Acidify w/HNO_3 to pH<2, 4°C	6 months except 28 days for Hg	1 liter
Calcium, magnesium, sodium, potassium, fluoride, sulfate, chloride, and hardness	P, G	4°C	28 days	1 liter
TDS (may be included with above parameters)	P, G	4°C	7 days	1 liter
Nitrate	P, G	4°C	48 hrs	100 ml
Ammonia	P, G	Acidify w/H_2SO_4 to pH<2, 4°C	7 days; 28 days if acidified	500 ml
Alkalinity	P, G	4°C	14 days	200 ml
NPOC	G amber, T-lined caps	Acidify w/HCl to pH<2, 4°C	48 hrs; 28 days if acidified	100 ml/replicate
COD	P, G	Acidify w/H_2SO_4 to pH<2, 4°C	48 hrs; 28 days if acidified	100 ml
SVOC	G, T-lined caps	4°C	7 days until extraction, then analyze within 40 days	1 liter
BOD	P, G	4°C	24 hrs	1 liter
VOC	G, T-lined septa	Acidify w/HCl to pH<2, 4°C	14 days	2 x 40 ml
P = Polyethylene, G = Glass, T = Teflon				

Background and Detection Monitoring Constituents

Parameter	CAS RN	Method[1]
Appendix I Metals:		
Antimony	Total	EPA 6010B
Arsenic	Total	EPA 6010B
Barium	Total	EPA 6010B
Beryllium	Total	EPA 6010B
Cadmium	Total	EPA 6010B
Chromium	Total	EPA 6010B
Cobalt	Total	EPA 6010B
Copper	Total	EPA 6010B
Lead	Total	EPA 6010B
Nickel	Total	EPA 6010B
Selenium	Total	EPA 6010B
Silver	Total	EPA 6010B
Thallium	Total	EPA 6010B
Vanadium	Total	EPA 6010B
Zinc	Total	EPA 6010B
Appendix I Volatile organic compounds:		
Acetone	67-64-1	EPA 8260B
Acrylonitrile	107-13-1	EPA 8260B
Benzene	71-43-2	EPA 8260B
Bromochloromethane	74-97-5	EPA 8260B
Bromodichloromethane	75-27-4	EPA 8260B
Bromoform (tribromomethane)	75-25-2	EPA 8260B
Carbon disulfide	75-15-0	EPA 8260B
Carbon tetrachloride	56-23-5	EPA 8260B
Chlorobenzene	108-90-7	EPA 8260B
Chloroethane (ethyl chloride)	75-00-3	EPA 8260B
Chloroform (tichloromethane)	67-66-3	EPA 8260B
Dibromochloromethane (chlorodibromomethane)	124-48-1	EPA 8260B

Background and Detection Monitoring Constituents (continued)

Parameter	CAS RN	Method[1]
1,2-Dibromo-3-chloropropane (DBCP)[2]	96-12-8	EPA 8260B
1,2-Dibromoethane (ethylene dibromide, EDB)[2]	106-93-4	EPA 8260B
o-Dichlorobenzene (1,2-dichlorobenzene)	95-50-1	EPA 8260B
p-Dichlorobenzene (1,4-dichlorobenzene)	106-46-7	EPA 8260B
trans-1, 4-Dichloro-2-butene	110-57-6	EPA 8260B
1,1-Dichlorethane (ethylidene chloride)	75-34-4	EPA 8260B
1,2-Dichlorethane (ethylene dichloride)	107-06-2	EPA 8260B
1,1-Dichloroethylene (1,1-dichloroethene, vinylidene chloride)	75-35-4	EPA 8260B
cis-1,2-Dichloroethylene (cis-1,2-dichloroethene)	156-59-2	EPA 8260B
trans-1, 2-Dichloroethylene (trans-1,2-dichloroethene)	156-60-5	EPA 8260B
1,2-Dichloropropane (propylene dichloride)	78-87-5	EPA 8260B
cis-1,3-Dichloropropene	10061-01-5	EPA 8260B
trans-1,3-Dichloropropene	10061-02-6	EPA 8260B
Ethylbenzene	10041-4	EPA 8260B
2-Hexanone (methyl butyl ketone)	591-78-6	EPA 8260B
Methyl bromide (bromomethane)	74-83-9	EPA 8260B
Methyl chloride (chloromethane)	74-87-3	EPA 8260B
Methylene bromide (dibromomethane)	74-95-3	EPA 8260B
Methylene chloride (dichloromethane)	75-09-2	EPA 8260B
Methyl ethyl ketone (MEK, 2-butanone)	78-93-3	EPA 8260B
Methyl iodide (iodomethane)	74-88-4	EPA 8260B
4-Methyl-2-pentanone (methyl isobutyl ketone)	108-10-1	EPA 8260B
Styrene	100-42-5	EPA 8260B
1,1,1,2-Tetrachloroethane	630-20-6	EPA 8260B
1,1,2,2-Tetrachloroethane	79-34-5	EPA 8260B
Tetrachloroethylene (tetrachloroethene, perchloroethylene)	127-18-4	EPA 8260B
Toluene	108-88-3	EPA 8260B
1,1,1-Trichloroethane (methychloroform)	71-55-6	EPA 8260B

Background and Detection Monitoring Constituents (continued)

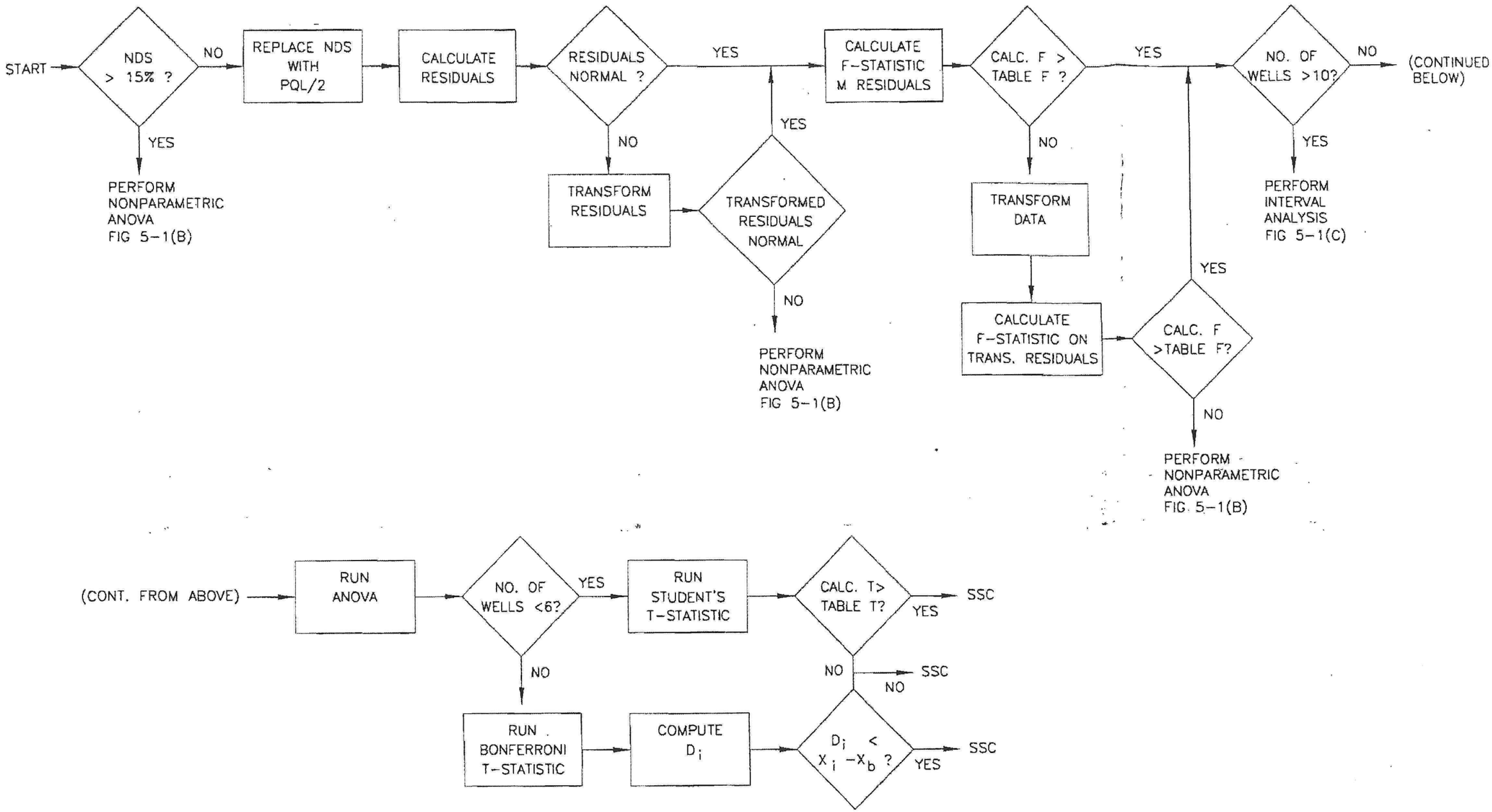
Parameter	CAS RN	Method[1]
1,1,2-Trichloroethane	79-00-5	EPA 8260B
Trichloroethylene (trichloroethene)	79-01-6	EPA 8260B
Trichlorofluoromethane (CFC-11)	75-69-4	EPA 8260B
1,2,3-Trichloropropane	96-18-4	EPA 8260B
Vinyl acetate	108-05-4	EPA 8260B
Vinyl chloride	75-01-4	EPA 8260B
Xylenes	1330-20-7	EPA 8260B

Notes:
[1] Equivalent or better methods may be substituted.
[2] For DBCP and EDB, any detections between the MDL (method detection limit) and PQL will be reported and flagged as estimated values.

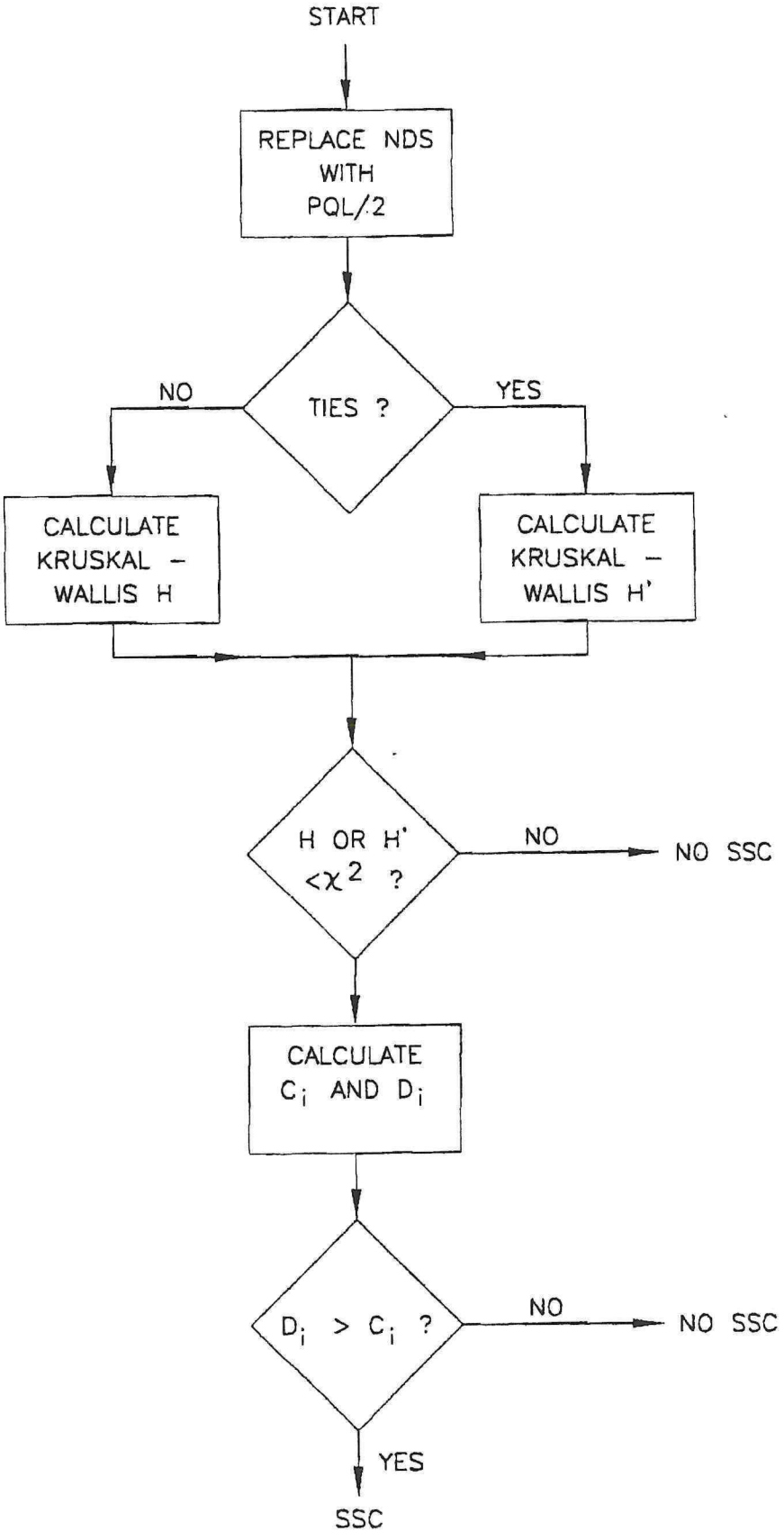
Water Quality Parameters List

Parameter	Method[1]	CAS RN
Inorganic Indicator Constituents:		
Ammonia	EPA 350.1	Total
Calcium	EPA 6010	Total
Magnesium	EPA 6010	Total
Sodium	EPA 6010	Total
Potassium	EPA 6010	Total
Chloride	EPA 300.0	
Sulfate	EPA 300.0	
Alkalinity	EPA 310.1	Total

Notes:
[1] Equivalent or better methods may be substituted.

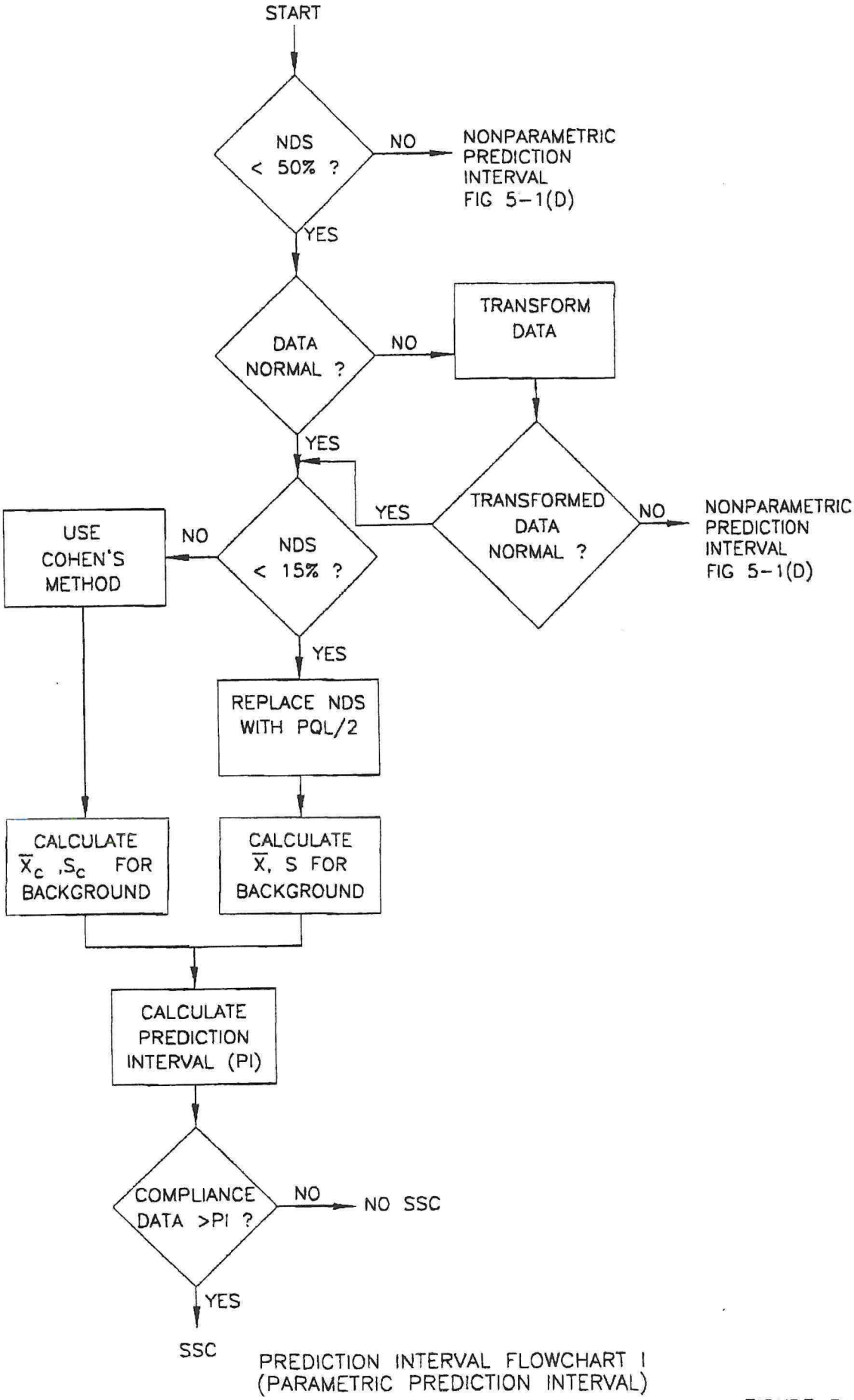


ANOVA FLOWCHART I
(PARAMETRIC ONE-WAY ANOVA)
FIGURE 1



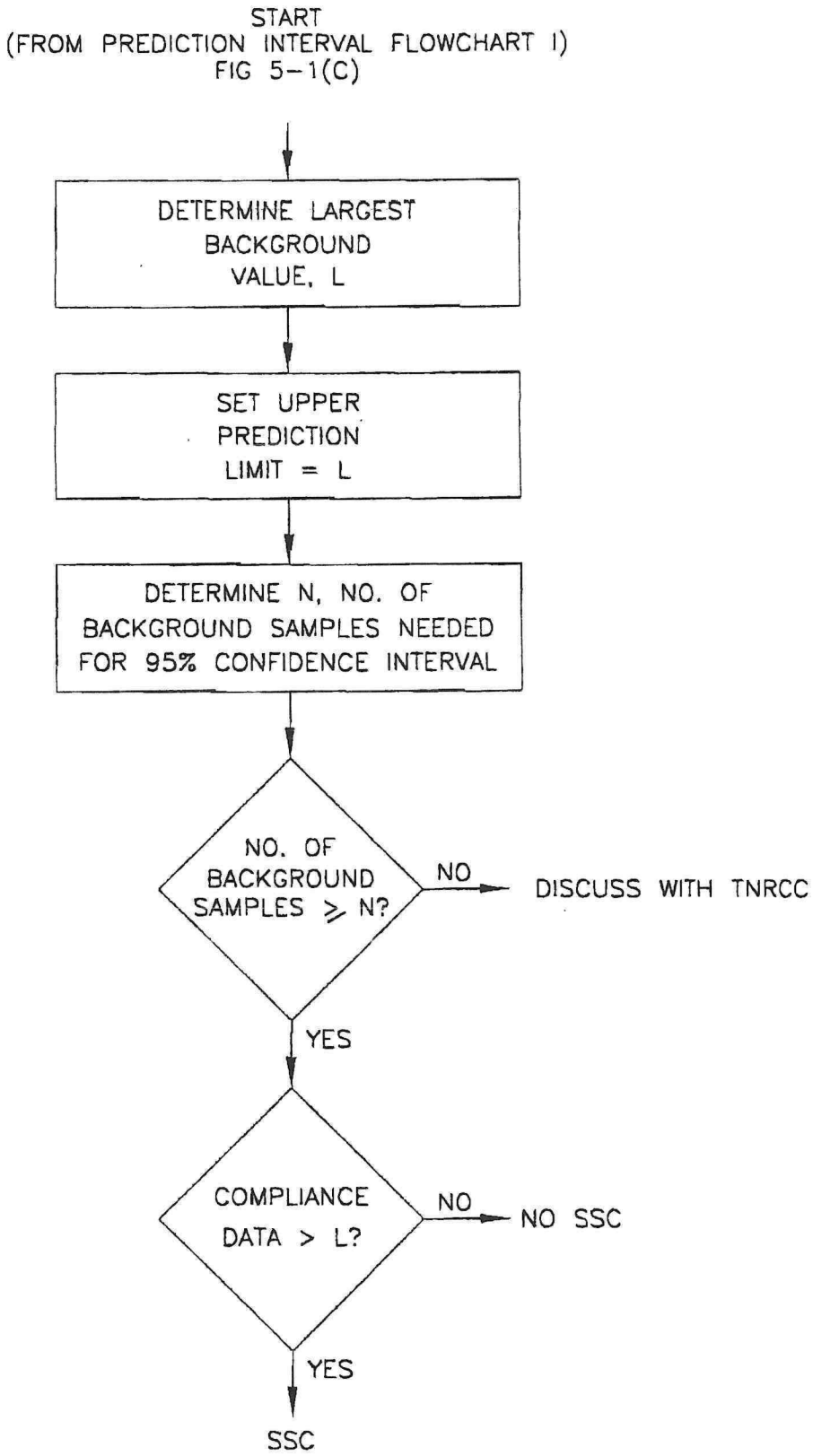
ANOVA FLOWCHART II
(NONPARAMETRIC ONE–WAY ANOVA)

FIGURE 2



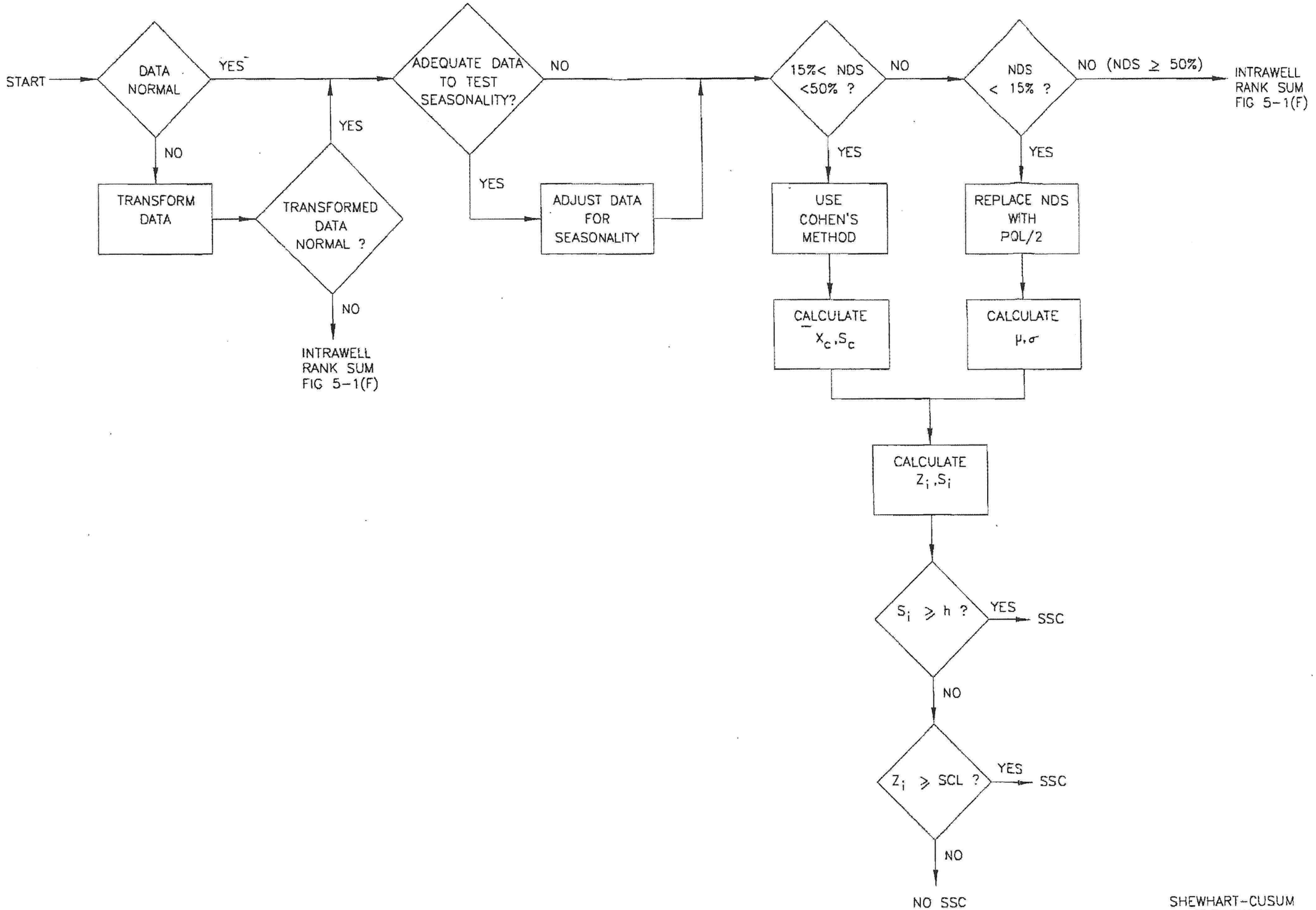
PREDICTION INTERVAL FLOWCHART I
(PARAMETRIC PREDICTION INTERVAL)

FIGURE 3



PREDICTION INTERVAL FLOWCHART II
(NONPARAMETRIC PREDICTION INTERVAL)

FIGURE 4



SHEWHART-CUSUM FLOWCHART

FIGURE 5

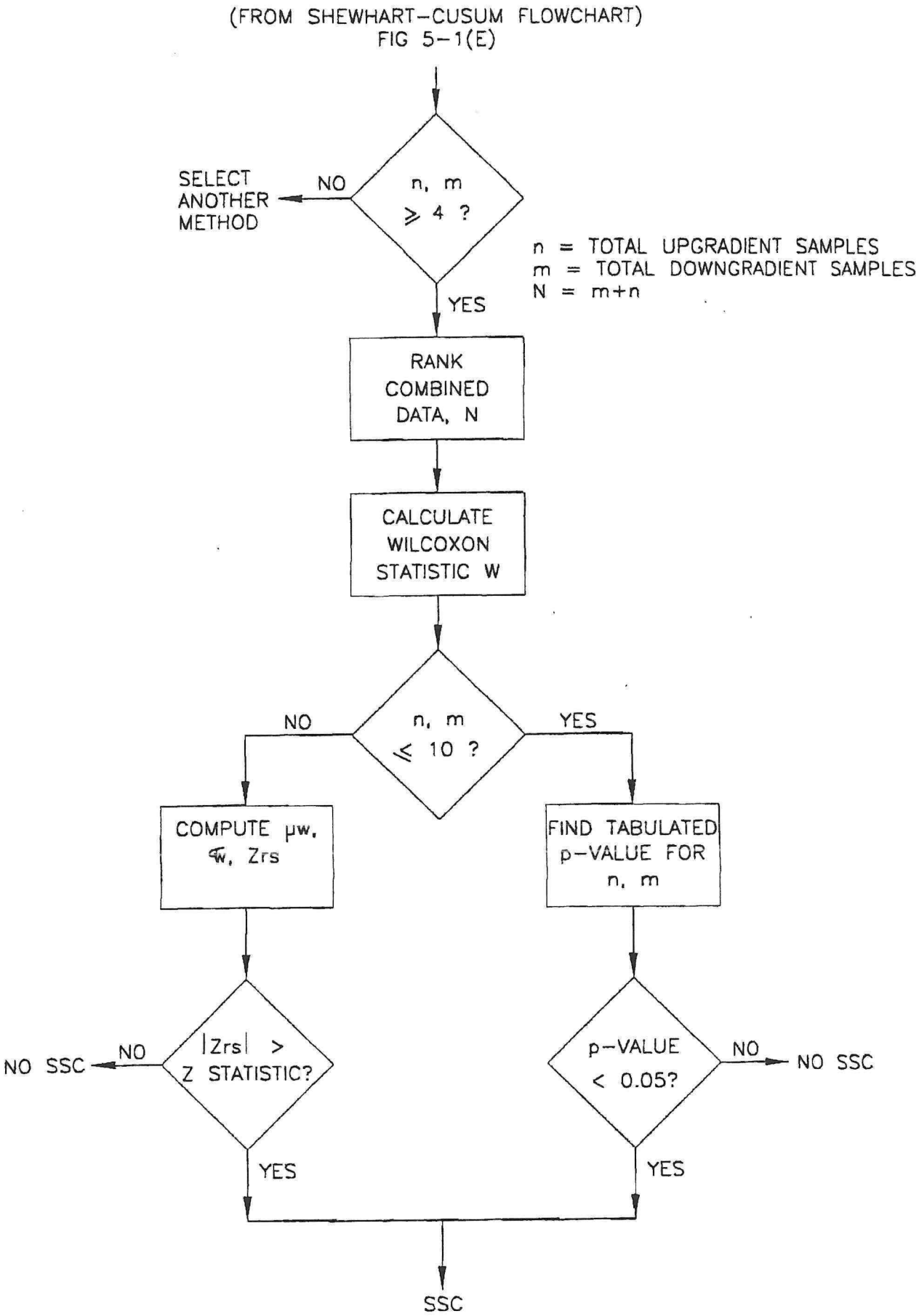

(FROM SHEWHART–CUSUM FLOWCHART)
FIG 5–1(E)
n, m ≥ 4 ?
NO
SELECT ANOTHER METHOD
YES
n = TOTAL UPGRADIENT SAMPLES
m = TOTAL DOWNGRADIENT SAMPLES
N = m+n
RANK COMBINED DATA, N
CALCULATE WILCOXON STATISTIC W
n, m ≤ 10 ?
NO
YES
COMPUTE μw, σw, Zrs
FIND TABULATED p–VALUE FOR n, m
|Zrs| > Z STATISTIC?
NO
NO SSC
YES
p–VALUE < 0.05?
NO
NO SSC
YES
SSC
MANN–WHITNEY OR INTRAWELL WELL RANK–SUM FLOWCHART

FIGURE 6

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

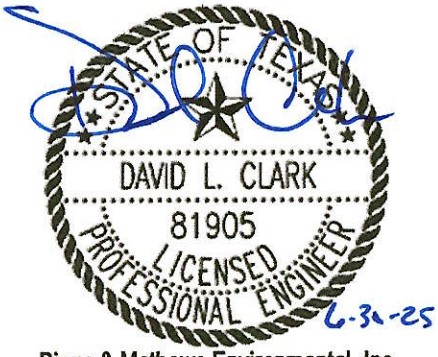
PERMIT AMENDMENT APPLICATION

VOLUME 4 OF 4

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY, INC.

February 2025
Revised March 2025
Revised June 2025



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 ◆ Mansfield, Texas 76063 ◆ 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS
FIRM REGISTRATION NO. F-256

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

VOLUME 4 OF 4

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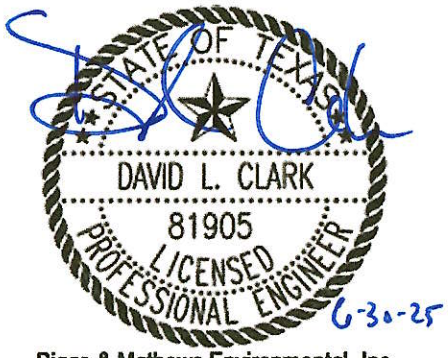
Attachment G – Landfill Gas Management Plan
Attachment H – Closure Plan
Attachment I – Postclosure Plan
Attachment J – Cost Estimates for Closure and Postclosure Care

PART IV SITE OPERATING PLAN



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT G
LANDFILL GAS MANAGEMENT PLAN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised June 2025

06/30/2025

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

CONTENTS

1 INTRODUCTION 1

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4 ACTION PLAN 9

5 REMEDIATION PLAN 10

6 LFG CONTROL SYSTEM 11

APPENDIX G1
Landfill Gas Monitoring Probe Plan

APPENDIX G2
Reporting and Recording Forms

APPENDIX G3
Landfill Gas Monitoring Probe Boring/Completion Logs

APPENDIX G4
Landfill Gas Collection and Control System Plan

06/30/2025

APPENDIX G3
LANDFILL GAS MONITORING
PROBE BORING/COMPLETION LOGS

LOG OF GAS MONITORING PROBE NO. GMP-2

Project Description: **Texoma Area Solid Waste Authority**
Grayson County, Texas

BIGGS & MATHEWS ENVIRONMENTAL
6031 Interstate 20 West, Suite 242
Arlington, Texas 76017-1045
Phone: 817-563-1144
Fax: 817-563-1224

Location: **E 4165.680 N 3796.200**

Surface El.: **746.50 ft. msl**
Completion Depth: **23.0 ft.**
Date Boring Started: **8/30/04**
Date Boring Completed: **8/30/04**

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Gas Monitoring Probe Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0–10			CLAY, brown, yellow-orange, tan and light gray, iron stains, calcareous										
10–23			SHALEY CLAY, tan and light gray, very stiff to hard, iron stains, manganese dioxide, fine grain, gypsum partings										

736.50

723.50

Depth scale: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50

Drilling Contractor: **H/ET**
Drilling Method:
Sampling Method:
Geologist/Engineer: **Boyce**
Project No.: **202.01.200**

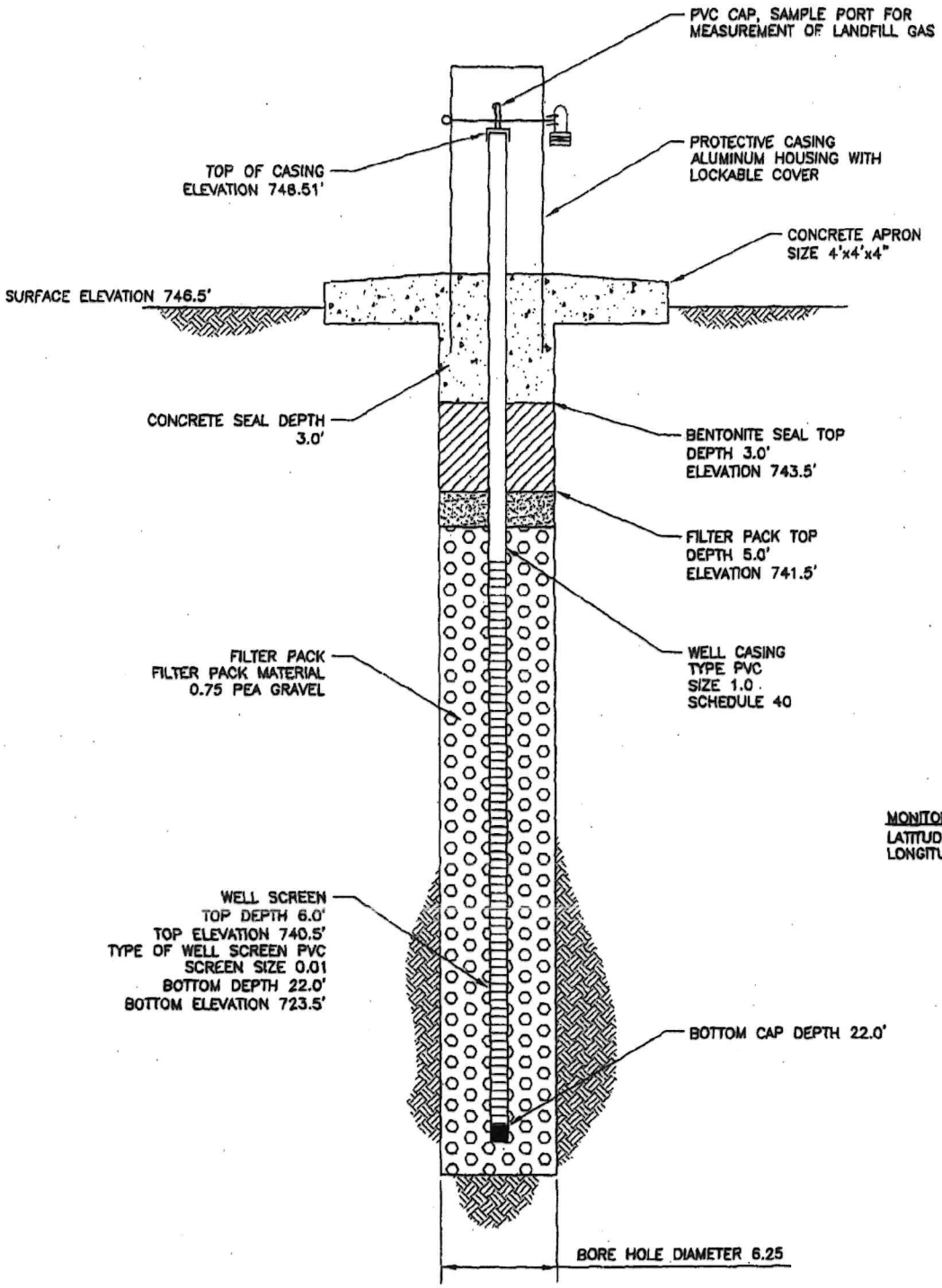
Groundwater Observations	
Date	Depth

Remarks:

BME LOG TA_ .GPJ BME.GDT 9/20/04

LOG OF GAS MONITORING PROBE NO. GMP-2 The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

PAGE 1 OF 1



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GAS MONITORING PROBE DETAIL GMP 2

TEXOMA AREA SOLID WASTE AUTHORITY DISPOSAL AND RECYCLING FACILITY PROBE INSTALLATION REPORT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
6031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. MRW	DATE : 09/04	DRAWING 1
DWN. RMP	SCALE : GRAPHIC	
CHK. MRW	DWG : MontProbeDetail-2.dwg	

LOG OF GAS MONITORING PROBE NO. GMP-3

Project Description: **Texoma Area Solid Waste Authority**
Grayson County, Texas

BIGGS & MATHEWS ENVIRONMENTAL
6031 Interstate 20 West, Suite 242
Arlington, Texas 76017-1045
Phone: 817-563-1144
Fax: 817-563-1224

Location: **E 3189.570 N 3980.420**

Surface El.: **735.00 ft. msl**
Completion Depth: **15.0 ft.**
Date Boring Started: **8/30/04**
Date Boring Completed: **8/30/04**

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Gas Monitoring Probe Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0			CLAY, dark gray, brown to olive brown, yellow-orange and light gray										
			731.00										
5			SHALEY CLAY, yellow-orange and light gray, hard iron stains and sandstone										
			727.50										
10			SHALE with sand, gray, soft rock - very hard										
			720.00										
15													
20													
25													
30													
35													
40													
45													
50													

Drilling Contractor: **H/ET**
Drilling Method:
Sampling Method:
Geologist/Engineer: **Boyce**
Project No.: **202.01.200**

Groundwater Observations

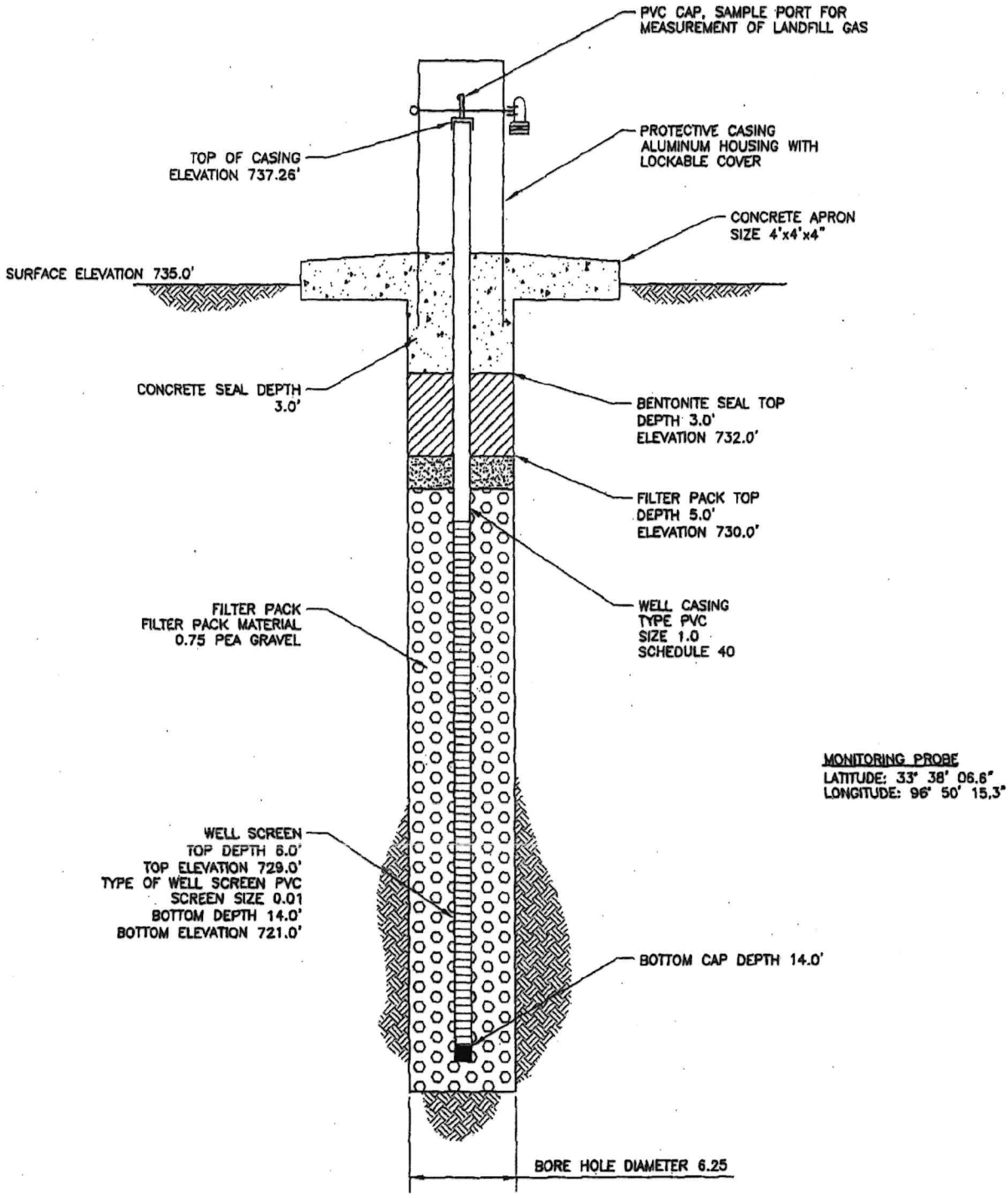
Date	Depth

Remarks:

LOG OF GAS MONITORING PROBE NO. GMP-3
PAGE 1 OF 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

JPJ BME.GDT 9/20/04
BME LOG TA



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GAS MONITORING PROBE DETAIL GMP 3

TEXOMA AREA SOLID WASTE AUTHORITY DISPOSAL AND RECYCLING FACILITY PROBE INSTALLATION REPORT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
6031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. MRW	DATE : 09/04	DRAWING 2
DWN. RMP	SCALE : GRAPHIC	
CHK. MRW	DWG : MontProbeDetail-3.dwg	

LOG OF GAS MONITORING PROBE NO. GMP-4

Project Description: **Texoma Area Solid Waste Authority**
Grayson County, Texas

BIGGS & MATHEWS ENVIRONMENTAL
6031 Interstate 20 West, Suite 242
Arlington, Texas 76017-1045
Phone: 817-563-1144
Fax: 817-563-1224

Location: **E 2220.550 N 4166.650**

Surface El.: **749.50 ft. msl**
Completion Depth: **20.0 ft.**
Date Boring Started: **8/30/04**
Date Boring Completed: **8/30/04**

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Gas Monitoring Probe Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0			CLAY, dark, gray brown to yellowish brown, firm to very stiff										
5			743.50										
10			SHALEY CLAY, yellow-tan and light gray, very stiff to hard iron stains										
15			729.50										
20													
25													
30													
35													
40													
45													
50													

Drilling Contractor: **H/ET**
Drilling Method:
Sampling Method:
Geologist/Engineer: **Boyce**
Project No.: **202.01.200**

Groundwater Observations

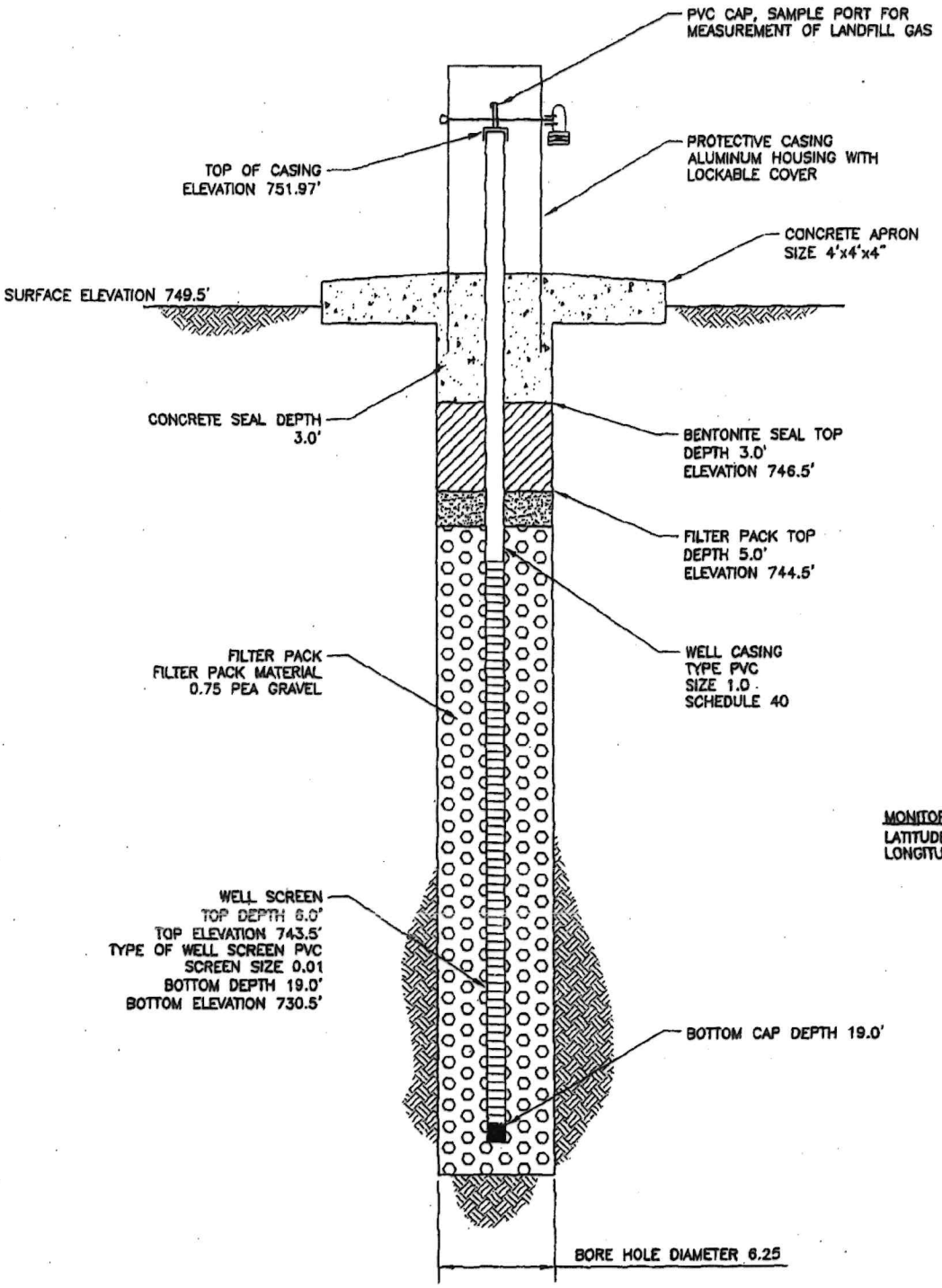
Date	Depth

Remarks:

BME LOG TAS... JPJ BME.GDT 9/20/04

LOG OF GAS MONITORING PROBE NO. GMP-4
PAGE 1 OF 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.



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GAS MONITORING PROBE DETAIL GMP 4

TEXOMA AREA SOLID WASTE AUTHORITY DISPOSAL AND RECYCLING FACILITY PROBE INSTALLATION REPORT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
6031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. MRW	DATE : 09/04	DRAWING 3
DWN. RMP	SCALE : GRAPHIC	
CHK. MRW	DWG : MontProbeDetail-4.dwg	

LOG OF GAS MONITORING PROBE NO. GMP-5

Project Description: **Texoma Area Solid Waste Authority**
Grayson County, Texas

BIGGS & MATHEWS ENVIRONMENTAL
6031 Interstate 20 West, Suite 242
Arlington, Texas 76017-1045
Phone: 817-563-1144
Fax: 817-563-1224

Location: **E 1216.350 N 4358.830**

Surface El.: **759.00 ft. msl**
Completion Depth: **20.0 ft.**
Date Boring Started: **8/30/04**
Date Boring Completed: **8/30/04**

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Gas Monitoring Probe Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0			CLAY, dark gray brown to olive brown and light gray, firm to hard										
			754.00										
5			SHALEY CLAY, yellow-orange and light gray, hard, iron stains										
			748.00										
10			SANDSTONE, yellow-orange, hard										
			746.00										
			SHALE with sand, gray, soft rock, carbonaceous										
15													
			739.00										
20													
25													
30													
35													
40													
45													
50													

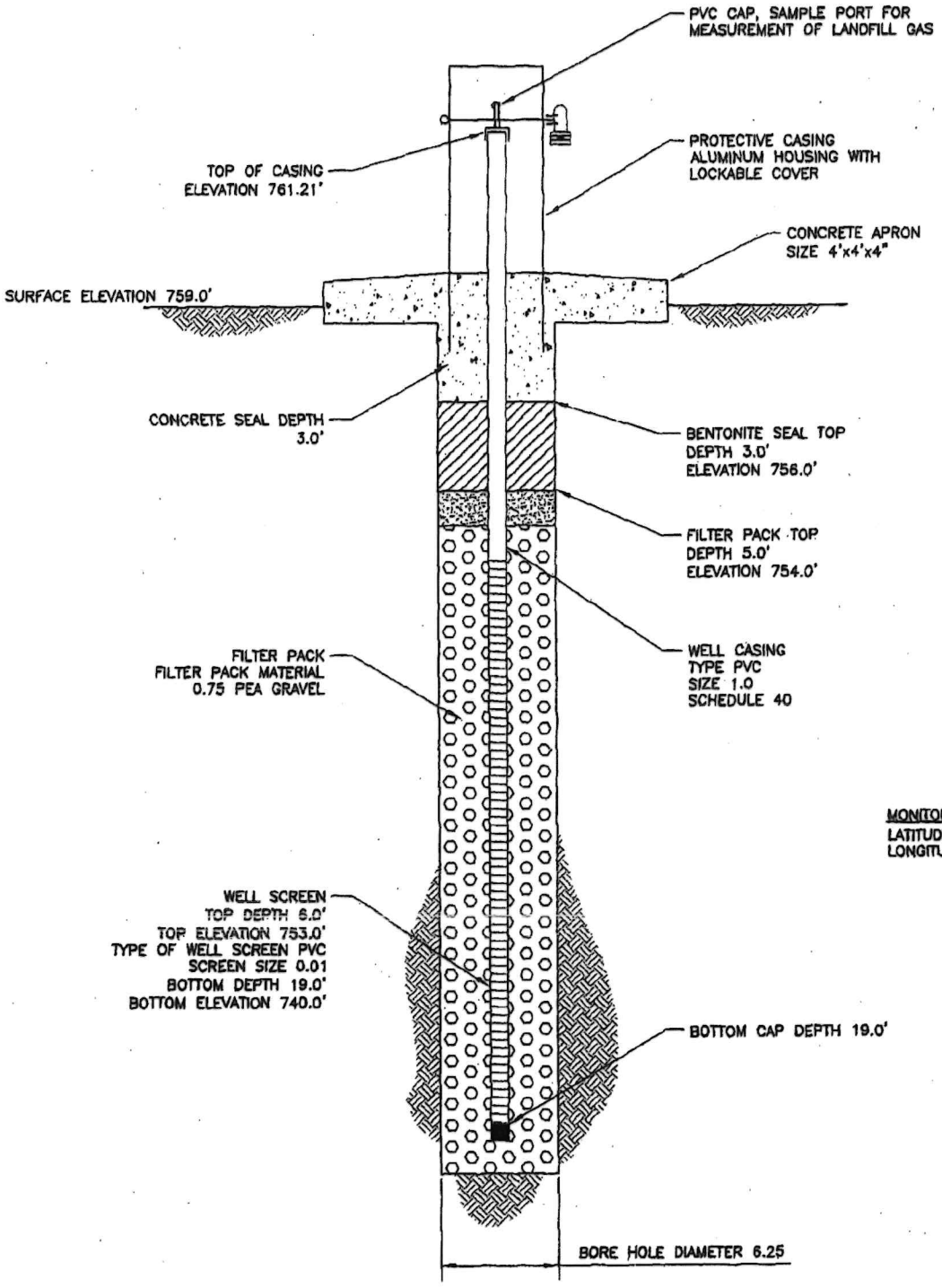
Drilling Contractor: **H/ET**
Drilling Method:
Sampling Method:
Geologist/Engineer:
Project No.: **202.01.200**

Groundwater Observations	
Date	Depth

Remarks:

LOG OF GAS MONITORING PROBE NO. GMP-5 The stratification lines represent approximate strata boundaries.
PAGE 1 OF 1 In situ, the transition may be gradual.

BME LOG TA...3PJ BME.GDT 9/20/04



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GAS MONITORING PROBE DETAIL GMP 5

TEXOMA AREA SOLID WASTE AUTHORITY DISPOSAL AND RECYCLING FACILITY PROBE INSTALLATION REPORT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
6031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. MRW	DATE : 09/04	DRAWING 4
DWN. RMP	SCALE : GRAPHIC	
CHK. MRW	DWG : MontProbeDetail-5.dwg	

LOG OF GAS MONITORING PROBE NO. GMP-6

Project Description: **Texoma Area Solid Waste Authority**
Grayson County, Texas

BIGGS & MATHEWS ENVIRONMENTAL
6031 Interstate 20 West, Suite 242
Arlington, Texas 76017-1045
Phone: 817-563-1144
Fax: 817-563-1224

Location: **E 506.670 N 4250.410**

Surface El.: **756.00 ft. msl**
Completion Depth: **41.0 ft.**
Date Boring Started: **8/30/04**
Date Boring Completed: **8/30/04**

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Gas Monitoring Probe Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0			SHALEY SAND with sandy shale, yellow-orange, soft rock, iron stains, calcareous, sandstone at top										
			751.00										
5			SHALE with sand, olive green, yellow-orange and yellow, iron stains, carbonaceous										
10													
15													
20													
25													
30													
35													
40													
			715.00										
45													
50													

Drilling Contractor: **H/ET**
Drilling Method:
Sampling Method:
Geologist/Engineer: **Boyce**
Project No.: **202.01.200**

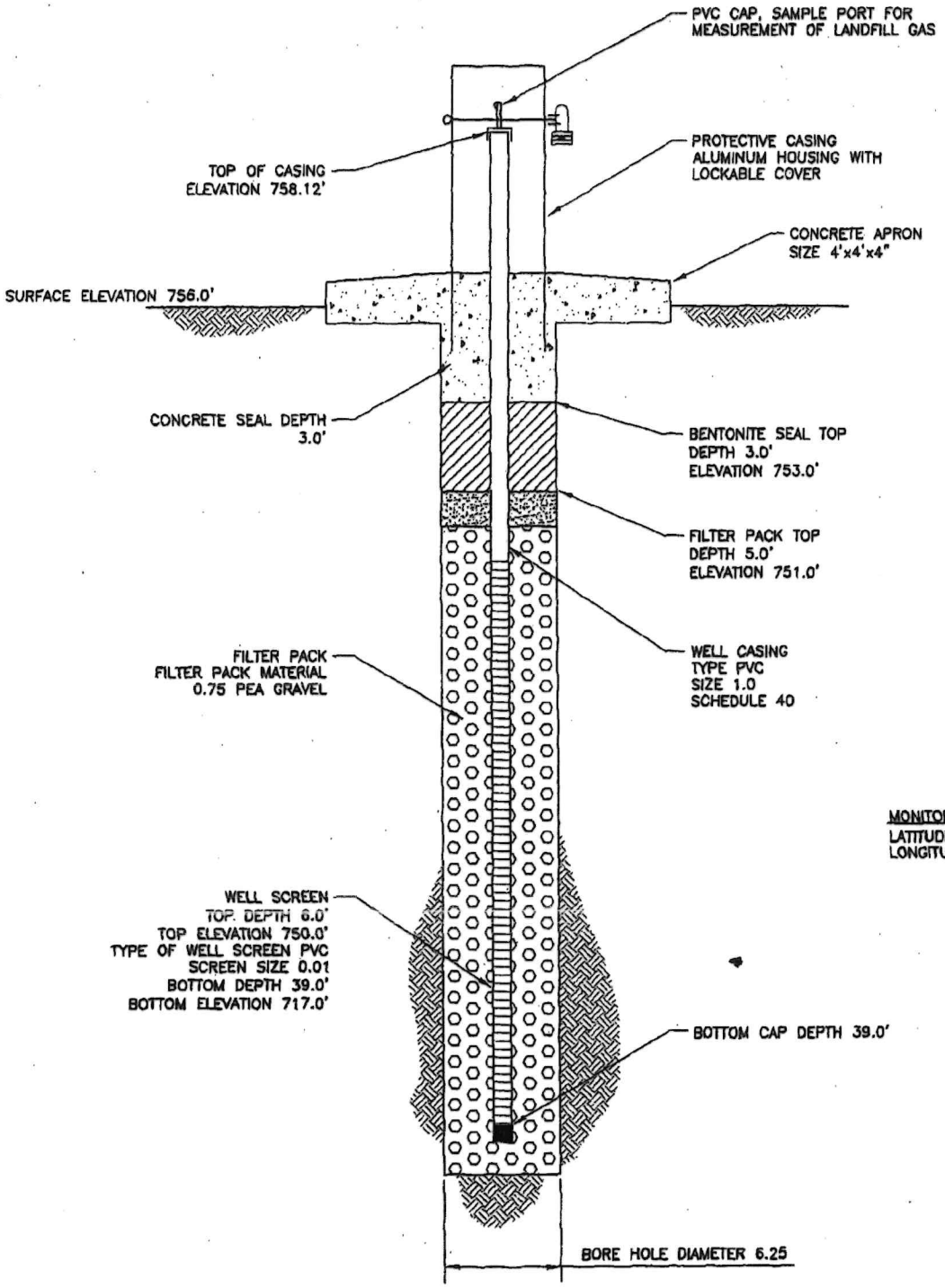
Groundwater Observations	
Date	Depth

Remarks:

LOG OF GAS MONITORING PROBE NO. GMP-6
PAGE 1 OF 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

BME LOG TA...GPJ BME.GDT 9/20/04



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GAS MONITORING PROBE DETAIL GMP 6

TEXOMA AREA SOLID WASTE AUTHORITY DISPOSAL AND RECYCLING FACILITY PROBE INSTALLATION REPORT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
6031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. MRW	DATE : 09/04	DRAWING 5
DWN. RMP	SCALE : GRAPHIC	
CHK. MRW	DWG : MontProbeDetail-6.dwg	

LOG OF GAS MONITORING PROBE NO. GMP-7

Project Description: **Texoma Area Solid Waste Authority**
Grayson County, Texas

BIGGS & MATHEWS ENVIRONMENTAL
6031 Interstate 20 West, Suite 242
Arlington, Texas 76017-1045
Phone: 817-563-1144
Fax: 817-563-1224

Location: **E 506.580 N 3244.620**

Surface El.: **755.50 ft. msl**
Completion Depth: **41.0 ft.**
Date Boring Started: **8/30/04**
Date Boring Completed: **8/30/04**

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Gas Monitoring Probe Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0			CLAY, dark gray-brown to yellowish brown, firm to very stiff										
5			749.50										
			SHALEY SAND with sandy shale, yellow-orange, soft rock, iron stains, calcareous sandstone at top										
10			745.50										
			SHALE with sand, olive gray, yellow-orange and yellow, iron stains, carbonaceous										
15													
20													
25													
30			- mudstone										
35													
40			714.50										
45													
50													

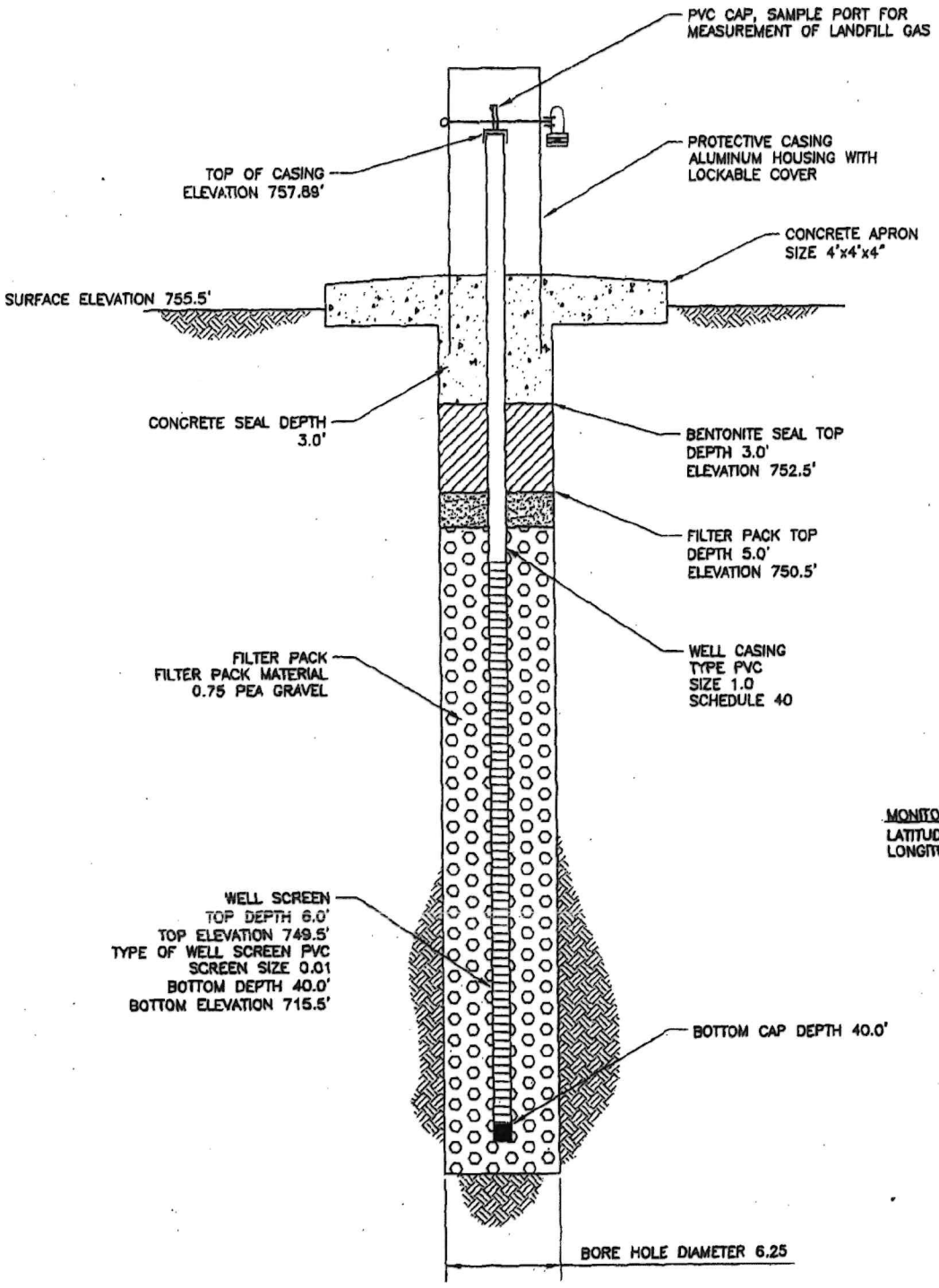
Drilling Contractor: H/ET
Drilling Method:
Sampling Method:
Geologist/Engineer: Boyce
Project No.: 202.01.200

Groundwater Observations	
Date	Depth

Remarks:

LOG OF GAS MONITORING PROBE NO. GMP-7 The stratification lines represent approximate strata boundaries.
PAGE 1 OF 1 In situ, the transition may be gradual.

JPJ BME.GDT 9/20/04
BME LOG TA



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GAS MONITORING PROBE DETAIL GMP 7

TEXOMA AREA SOLID WASTE AUTHORITY DISPOSAL AND RECYCLING FACILITY PROBE INSTALLATION REPORT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
6031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. MRW	DATE : 09/04	DRAWING 6
DWN. RMP	SCALE : GRAPHIC	
CHK. MRW	DWG : MontProbeDetail-7.dwg	

LOG OF GAS MONITORING PROBE NO. GMP-8

Project Description: **Texoma Area Solid Waste Authority**
Grayson County, Texas

BIGGS & MATHEWS ENVIRONMENTAL
6031 Interstate 20 West, Suite 242
Arlington, Texas 76017-1045
Phone: 817-563-1144
Fax: 817-563-1224

Location: **E 508.520 N 2244.010**

Surface El.: **759.50 ft. msl**
Completion Depth: **45.0 ft.**
Date Boring Started: **8/31/04**
Date Boring Completed: **8/31/04**

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Gas Monitoring Probe Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0			CLAY, dark gray brown, firm to very stiff										
			754.50										
5			SHALEY CLAY, yellow-tan and light gray, very stiff to hard, iron stains										
			750.50										
10			SHALEY SAND, yellow-orange to brown, fine to very fine, soft rock, iron stains										
15			740.50										
20			SHALE with sand, olive gray, yellow, iron stains, carbonaceous										
25													
30													
			- mudstone lines										
35													
40													
			714.50										
45													
50													

Drilling Contractor: **H/ET**
Drilling Method:
Sampling Method:
Geologist/Engineer: **Boyce**
Project No.: **202.01.200**

Groundwater Observations

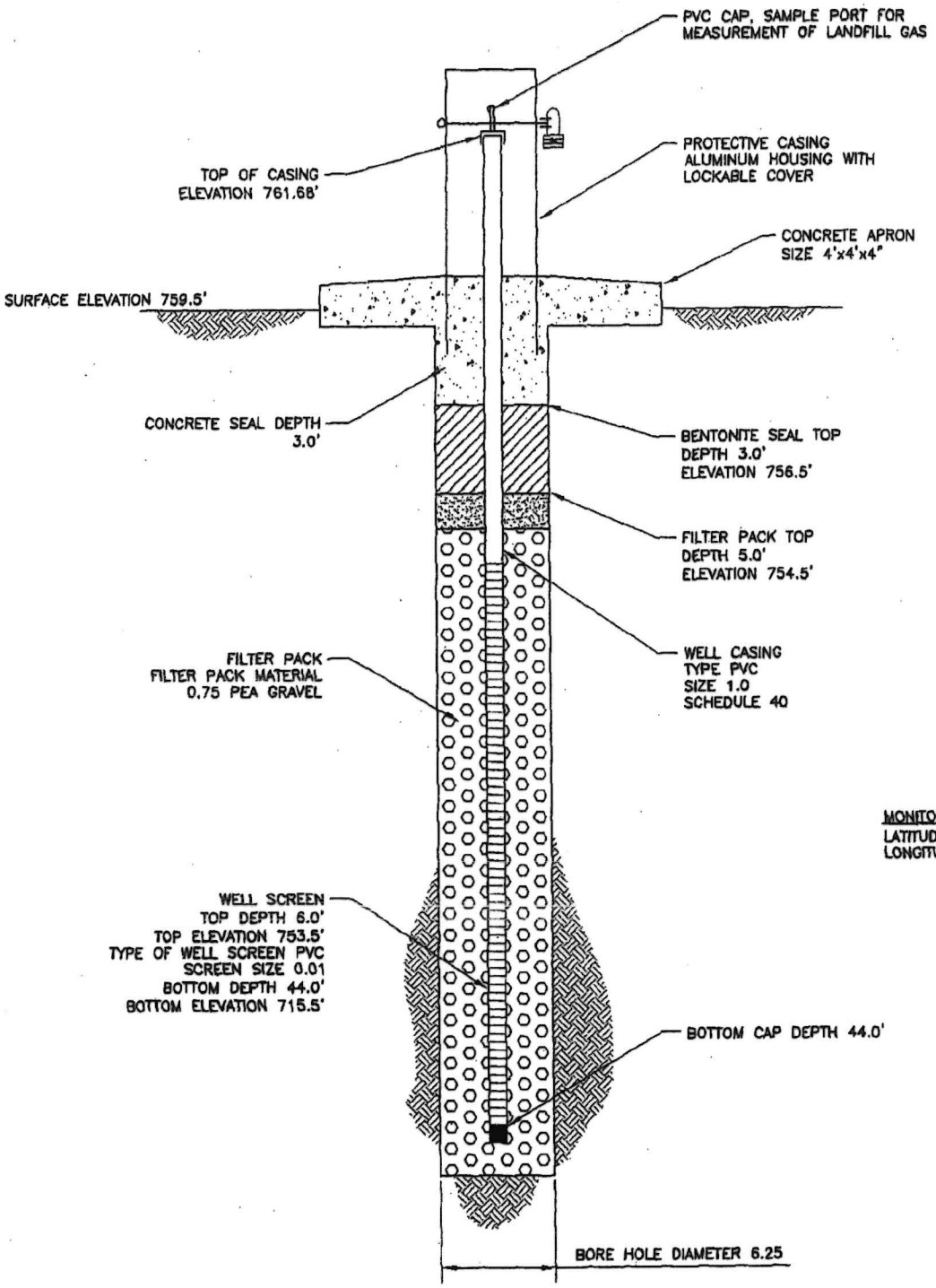
Date	Depth

Remarks:

LOG OF GAS MONITORING PROBE NO. GMP-8
PAGE 1 OF 1

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.

BME LOG TA...GPJ BME.GDT 9/20/04



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GAS MONITORING PROBE DETAIL GMP 8

TEXOMA AREA SOLID WASTE AUTHORITY DISPOSAL AND RECYCLING FACILITY PROBE INSTALLATION REPORT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
6031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. MRW	DATE : 09/04	DRAWING 7
DWN. RMP	SCALE : GRAPHIC	
CHK. MRW	DWG : MontProbeDetail-8.dwg	

LOG OF GAS MONITORING PROBE NO. GMP-9

Project Description: **Texoma Area Solid Waste Authority**
Grayson County, Texas

BIGGS & MATHEWS ENVIRONMENTAL
6031 Interstate 20 West, Suite 242
Arlington, Texas 76017-1045
Phone: 817-563-1144
Fax: 817-563-1224

Location: **E 510.090 N 1223.280**

Surface El.: **756.00 ft. msl**
Completion Depth: **41.0 ft.**
Date Boring Started: **8/31/04**
Date Boring Completed: **8/31/04**

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Gas Monitoring Probe Construction Details	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0			CLAY, dark gray brown, firm to very stiff										
			752.00										
5			SHALEY CLAY, yellow-tan, light-gray, very stiff to hard, iron stains										
10													
			742.00										
15			SHALE with sand, olive gray, yellow iron stains, carbonaceous										
20													
25													
30													
35													
40													
			715.00										
45													
50													

Drilling Contractor: **H/ET**
Drilling Method:
Sampling Method:
Geologist/Engineer: **Boyce**
Project No.: **202.01.200**

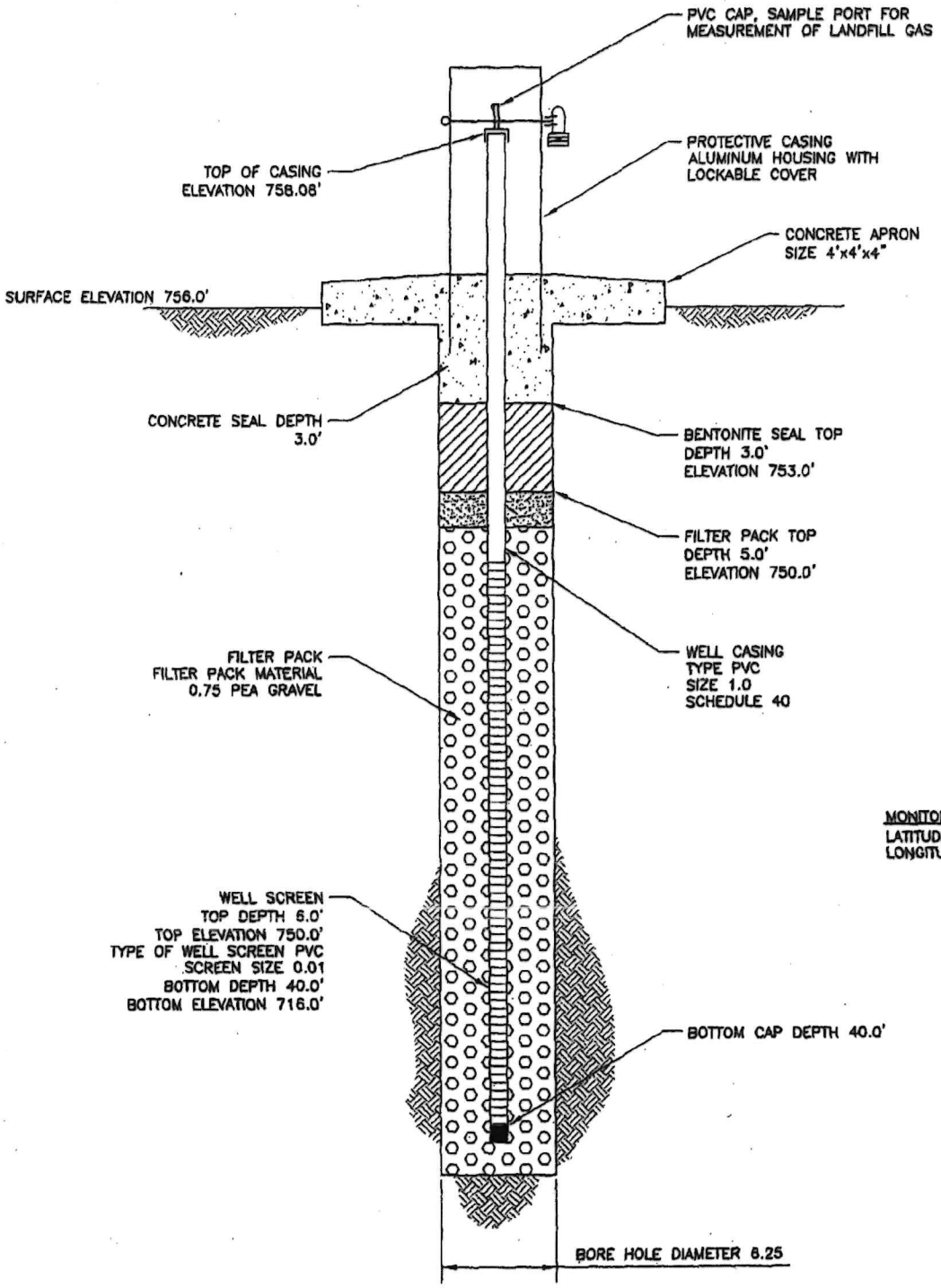
Groundwater Observations

Date	Depth

Remarks: Installed monitoring well upon completion of borehole.

LOG OF GAS MONITORING PROBE NO. GMP-9 The stratification lines represent approximate strata boundaries.
PAGE 1 OF 1 In situ, the transition may be gradual.

BME LOG T..GPJ BME.GDT 9/20/04



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GAS MONITORING PROBE DETAIL GMP 9

TEXOMA AREA SOLID WASTE AUTHORITY DISPOSAL AND RECYCLING FACILITY PROBE INSTALLATION REPORT

BIGGS & MATHEWS ENVIRONMENTAL
CONSULTING ENGINEERS
8031 I-20 WEST, SUITE 242
ARLINGTON, TEXAS

REVISIONS						
REV	DATE	DESCRIPTION	DWN BY	DES BY	CHK BY	APP BY

DSN. MRW	DATE : 09/04	DRAWING 8
DWN. RMP	SCALE : GRAPHIC	
CHK. MRW	DWG : MontProbeDetail-9.dwg	

LOG OF GAS MONITORING PROBE NO. GMP-10

Project Description: Texoma Area Solid Waste Authority
Grayson County

Biggs and Mathews Environmental
1700 Robert Road, Ste 100
Mansfield, Texas 76063-5892
Phone: 817-563-1144

Location: **E 2472202.2 N 7278580.1**

Surface El.: **766.68 ft. msl**
Completion Depth: 64.0 ft.
Date Boring Started: 3/24/2022
Date Boring Completed: 3/28/2022

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0			Clay, dark brown, stiff									
			760.18									
5			Clay, shaley, tan, stiff									
10												
15												
20												
25												
			736.68									
30			Shale, with sand, dark gray, hard									
35												
			726.69									
40			Shale, with sand, dark gray, hard									
45												
50												

Contractor: H/ET
Project No.:

Groundwater Observations	
Date	Depth

Remarks:

Continued Next Page

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.
LOGS ARE NOT INTENDED TO BE USED SEPARATELY FROM THE ORIGINAL REPORT.

TARZAN 2022 TASWA2022.GPJ B&M DATA TEMPLATE.GDT 10/13/22

LOG OF GAS MONITORING PROBE NO. GMP-10

Project Description: **Texoma Area Solid Waste Authority**
Grayson County

Biggs and Mathews Environmental
1700 Robert Road, Ste 100
Mansfield, Texas 76063-5892
Phone: 817-563-1144

Location: **E 2472202.2 N 7278580.1**

Surface El.: **766.68 ft. msl**
Completion Depth: 64.0 ft.
Date Boring Started: 3/24/2022
Date Boring Completed: 3/28/2022

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
55			Shale, with sand, dark gray, hard *(continued)*									
60			702.68									
65												
70												
75												
80												
85												
90												
95												
100												

Contractor: H/ET
Project No.:

Groundwater Observations

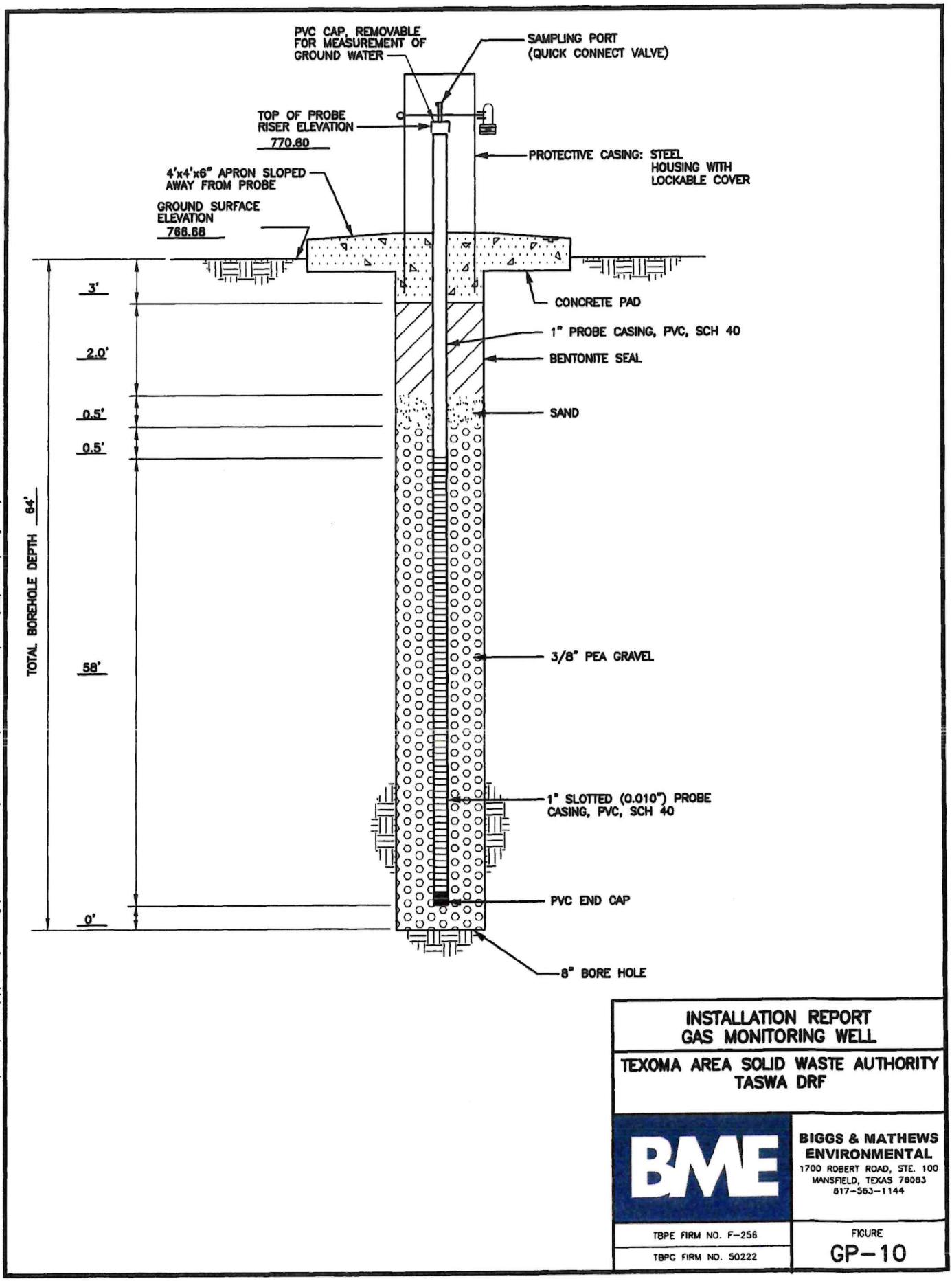
Date	Depth

Remarks:

BME

TARZAN 2022 TASWN2022.GPJ B&M DATA TEMPLATE.GDT 10/13/22

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.
LOGS ARE NOT INTENDED TO BE USED SEPARATELY FROM THE ORIGINAL REPORT.



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INSTALLATION REPORT
GAS MONITORING WELL

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

FIGURE
GP-10

LOG OF GAS MONITORING PROBE NO. GMP-11

Project Description: **Texoma Area Solid Waste Authority**
Grayson County

Biggs and Mathews Environmental
1700 Robert Road, Ste 100
Mansfield, Texas 76063-5892
Phone: 817-563-1144

Location: **E 2473202.4 N 7278534.6**

Surface El.: **768.21 ft. msl**
Completion Depth: 66.0 ft.
Date Boring Started: 3/24/2022
Date Boring Completed: 3/28/2022

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
0			Clay, dark brown, stiff									
			760.21									
10			Clay, shaley, tan and gray, hard									
			734.21									
35			Shale, sandy, dark gray, hard									
50												

Contractor: **H/ET**
Project No.:

Groundwater Observations	
Date	Depth

Remarks:

BME

Continued Next Page

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.
LOGS ARE NOT INTENDED TO BE USED SEPARATELY FROM THE ORIGINAL REPORT.

TARZAN 2022 TASWA2022.GPJ B&M DATA TEMPLATE.GDT 10/13/22

LOG OF GAS MONITORING PROBE NO. GMP-11

Project Description: **Texoma Area Solid Waste Authority**
Grayson County

Biggs and Mathews Environmental
1700 Robert Road, Ste 100
Mansfield, Texas 76063-5892
Phone: 817-563-1144

Location: **E 2473202.4 N 7278534.6**

Surface El.: **768.21 ft. msl**
Completion Depth: 66.0 ft.
Date Boring Started: 3/24/2022
Date Boring Completed: 3/28/2022

Depth, feet	Samples	Symbol / USCS	MATERIAL DESCRIPTION	Hand Penetrometer, tsf	Penetration Blows/Foot	Moisture Content, %	Unit Dry Weight, lb/cu ft.	Liquid Limit	Plastic Limit	Plasticity Index	% Passing No. 200 Sieve	Unc. Compressive Strength, tsf
55			Shale, sandy, dark gray, hard *(continued)*									
60												
65			702.21									
70												
75												
80												
85												
90												
95												
100												

Contractor: H/ET
Project No.:

Groundwater Observations

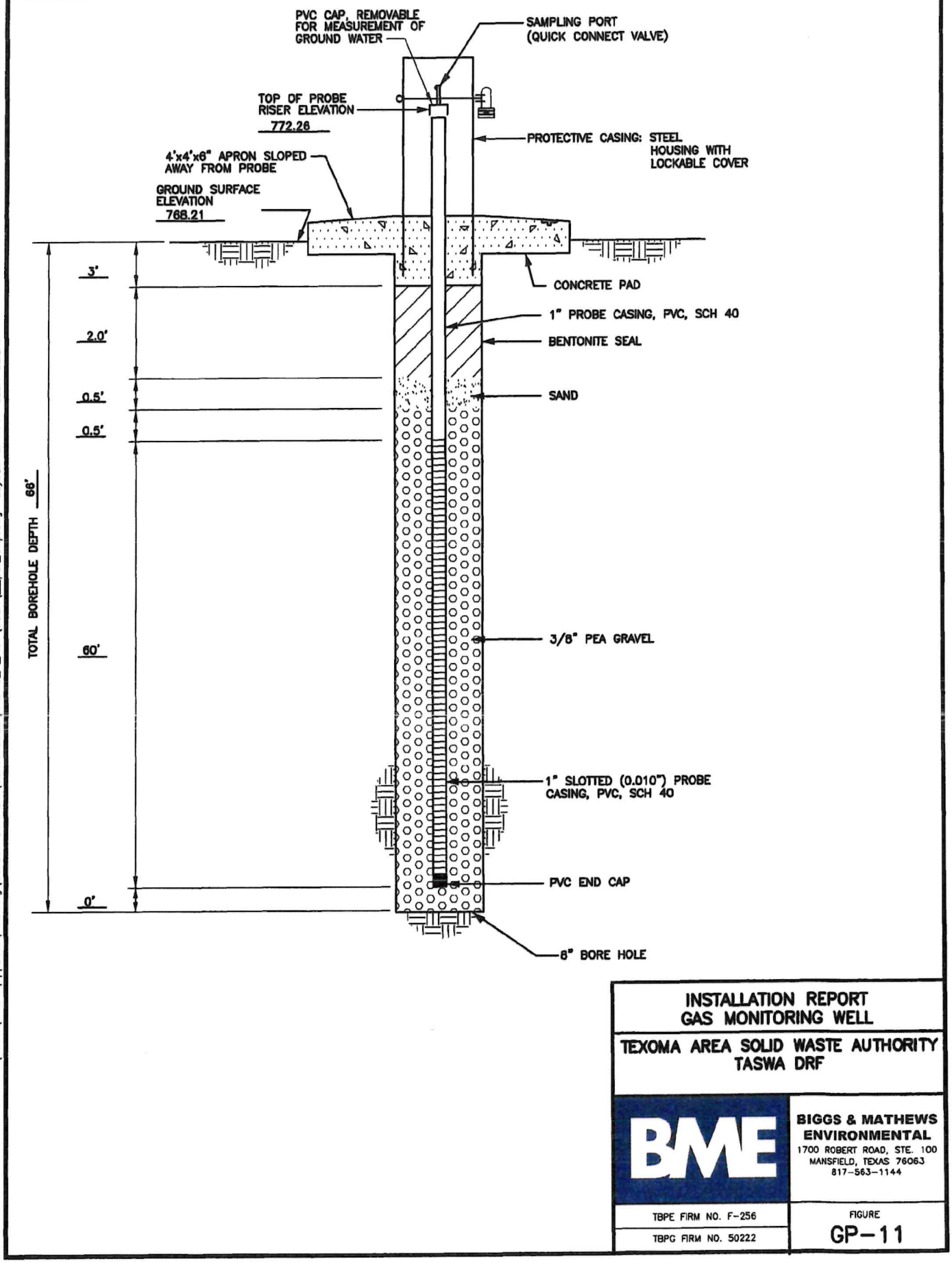
Date	Depth

Remarks:

BME

TARZAN 2022 TASWA2022.GPJ B&M DATA TEMPLATE.GDT 10/13/22

The stratification lines represent approximate strata boundaries. In situ, the transition may be gradual.
LOGS ARE NOT INTENDED TO BE USED SEPARATELY FROM THE ORIGINAL REPORT.



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INSTALLATION REPORT
GAS MONITORING WELL

TEXOMA AREA SOLID WASTE AUTHORITY
TASWA DRF

BME
BIGGS & MATHEWS ENVIRONMENTAL
1700 ROBERT ROAD, STE. 100
MANSFIELD, TEXAS 76063
817-563-1144
TBPE FIRM NO. F-256
TBPG FIRM NO. 50222

FIGURE
GP-11

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 2290A

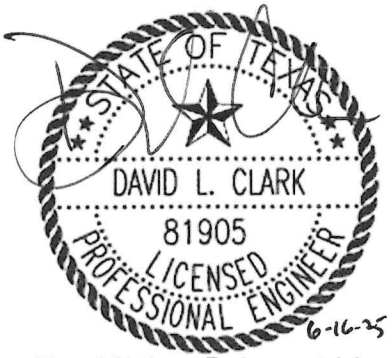
PERMIT AMENDMENT APPLICATION

PART III – FACILITY INVESTIGATION AND DESIGN
ATTACHMENT H
CLOSURE PLAN

Prepared for

TEXOMA AREA SOLID WASTE AUTHORITY

February 2025
Revised March 2025
Revised June 2025



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222

Landfill Unit Name or Descriptor	Type of Final Cover System	Final Cover System Components Description	Other Information (Enter other information as applicable)

B. Design Details

Table 6. Design Details of the Final Cover Top and Side Slopes for the Landfill Units.

Landfill Unit Name or Descriptor	Maximum Final Elevation of Waste (feet above mean sea level [ft-msl])	Maximum Elevation of Top of Final Cover (ft-msl)	Minimum Grade of the Final Cover Top Slope (%)	Maximum Grade of the Final Cover Side Slope (%)	Other Information (enter other information as applicable, e.g. above-grade Class 1 Cell Dikes)
TASWA DRF	1102.2	1106.7	<4	25	

C. Final Cover Drainage Features

Storm water drainage and erosion and sediment control features incorporated on the final cover of the landfill units to protect the integrity and effectiveness of the final cover system include *(please list and describe the drainage features to be installed on the final cover at or prior to closure for each landfill unit, or list the drainage features and provide cross references on the location(s) of the descriptive and details (drawing) information in other parts of the SDP)*:

Vegetation, Swales, downchutes, perimeter drainage channel and detention ponds as designed and detailed in Part III, Attachment C3.

VII. Professional Engineer's Statement, Seal, and Signature

Name: David Clark, PE

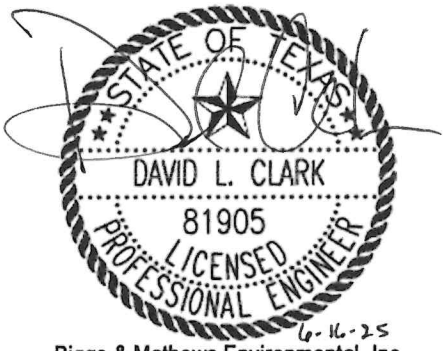
Title: Engineer

Date: 6/16/25

Company Name: Biggs and Mathews Environmental

Firm Registration Number: F-256

Professional Engineer's Seal



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

_____

Signature

TASWA DISPOSAL AND RECYCLING FACILITY
GRAYSON COUNTY, TEXAS
TCEQ PERMIT NO. MSW 2290A

PERMIT AMENDMENT APPLICATION

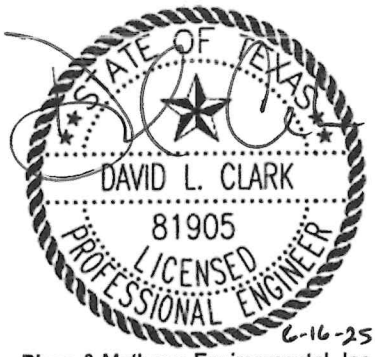
PART IV

SITE OPERATING PLAN

Prepared for

Texoma Area Solid Waste Authority

February 2025
Revised June 2025



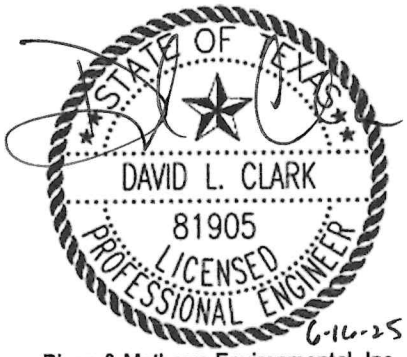
Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

Prepared by

BIGGS & MATHEWS ENVIRONMENTAL
1700 Robert Road, Suite 100 • Mansfield, Texas 76063 • 817-563-1144

TEXAS BOARD OF PROFESSIONAL ENGINEERS AND LAND SURVEYORS
FIRM REGISTRATION NO. F-256 AND NO. 10194895

TEXAS BOARD OF PROFESSIONAL GEOSCIENTISTS
FIRM REGISTRATION NO. 50222



Biggs & Mathews Environmental, Inc.
Firm Registration No. F-256

CONTENTS

LIST OF ACRONYMS iii

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3 PERSONNEL AND TRAINING 7

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6 GENERAL INSTRUCTIONS 20

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8 OPERATIONAL PROCEDURES 27

APPENDIX IVA – EXAMPLE LOAD INSPECTION REPORT

APPENDIX IVB – FIRE PROTECTION SOILS CALCULATIONS

delivery routes within two miles of the entrance on SH56 and FM 901 when the facility is in operation. Cleanup of the spilled materials will be performed once per day for the following regular delivery routes:

- SH56 – two miles east of the site entrance and two miles west of the site entrance
- FM 901 North – one mile north of the intersection with SH56

TASWA DRF will consult with officials of TxDOT concerning the cleanup of state highways and right-of-ways consistent with §330.145.

8.9 Disposal of Large Items

An area designated for large items and white goods staging and salvage will be provided near the scalehouse as shown on Part III, Attachment 1B. The large items and white goods include items such as ovens, dishwashers, freezers, air conditioners, and other large items. These items will be recycled or disposed of at the working face to prevent a nuisance and to preclude discharge but will not be staged in excess of 180 days.

Refrigerators, freezers, air conditioning units, or other items containing chlorinated fluorocarbon (CFC) refrigerant will be handled in accordance with 40 CFR §82.156(f).

Items which may contain PCBs will be excluded from waste fill. Procedures for detecting and excluding PCBs are provided in Section 5.

Large items that are not recycled will be disposed of at the working face. Care will be taken during disposal of large items to ensure that: (1) large items and/or brush are excluded from the initial 5 feet of waste placed over the protective cover of a liner, (2) large items are placed such that they do not interfere with continued waste filling, and (3) that other smaller municipal solid waste is placed and compacted around them.

8.10 Odor Management Plan

The TASWA DRF will manage odors associated with waste acceptance and disposal operations, and operation of the storage and processing areas consistent with this Odor Management Plan. This plan addresses sources of odors and includes general instructions to control odors or sources of odors.

Measures to control odors and sources of odors may include, but are not limited to, the following items:

- The facility will accept wastes that may generate odors including stabilized liquid wastes, Type I municipal solid waste, and dead animals. The stabilized liquid wastes are required to pass a paint filter test prior to disposal at the active working face.
- Other sources of odors may include ponded water, decomposition of wastes, leachate, contaminated water, and landfill gas (LFG).

8.20.2 Dead Animals

The site may receive dead animals or slaughterhouse wastes that are delivered to the site independent of other wastes. Dead animals and slaughterhouse wastes will be buried and covered with a minimum of 3 feet of other solid wastes or a minimum of 2 feet of earthen material immediately upon arrival in accordance with §330.171(c)(2).

8.20.3 Empty Containers

Empty containers, which have been used for pesticides, herbicides, fungicides, or rodenticides, may be accepted and disposed of in accordance with 30 TAC §330.171(c)(5). Empty containers will be disposed if they have been triple rinsed prior to receipt, rendered unusable prior to receipt, and covered by the end of the same working day with solid waste or daily cover.

8.20.4 Nonregulated Asbestos-Containing Materials

Non-regulated asbestos-containing materials (non-RACM) may be accepted for disposal provided the wastes are placed on the active working face and covered in accordance with §330.171(c)(4) and Section 8.18. Under no circumstances shall any material containing non-RACM be placed on any surface or roadway which is subject to vehicular traffic or disposed of by any other means by which the material could be crumbled into a friable state.

8.20.5 Used Oil Filters

Used oil filters from internal combustion engines must not be intentionally and knowingly accepted for disposal unless conditions are met in accordance with 330.171(d).

8.20.6 Regulated Asbestos-Containing Materials

Regulated asbestos-containing materials (RACM) may not be accepted for disposal.

8.21 Disposal of Industrial Waste

Industrial waste is defined by §330.3 as solid waste resulting from or incidental to any process of industry or manufacturing, or mining or agricultural operations. Class 2 and Class 3 industrial solid wastes may be accepted at the facility, provided disposal of these wastes does not interfere with proper operation of the facility. Class 1 industrial solid waste will not be accepted. Refer to Section 5 and Section 8.2 for waste screening procedures.

8.22 Visual Screening of Deposited Waste

Existing topography and vegetation provide natural screening of deposited waste. Visual screening of deposited waste is provided as part of normal waste disposal and cover placement operations and sequence of development. Final cover will be placed as the landfill reaches final contours. As the site is developed, the visual effect of the disposal activities will be minimized through the use of screening provided by fencing, constructed berms, planted vegetation, and natural vegetation located within the buffer zone.

8.23 Leachate and Gas Condensate Recirculation

The TASWA DRF may recirculate leachate and landfill gas condensate in accordance with Part III, Attachment D6. Consistent with Subtitle D regulations, recirculation of leachate will only occur within the active waste fill area over the areas underlain by a Subtitle D liner system. In addition to the above, 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, leachate will be applied to that no seeps or ponding is observed in the vicinity of the recirculation area.

- 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.

Refer to Part III, Attachment D6 for additional information regarding the leachate collection system and leachate recirculation.

8.24 Contaminated Water Discharge

The TASWA DRF will take all steps necessary to control and prevent the discharge of contaminated water from the facility. Should the discharge of contaminated water become necessary, the landfill will obtain specific written authorization from the TCEQ prior to discharge. All water coming in contact with 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 Part III, Attachment D6. The landfill will be operated consistent with §330.15(h)(1)-(4) regarding discharge of solid wastes or pollutants into waters of the United States.

8.25 Processing and/or Storage Units Operations

8.25.1 Large Item Staging Area

A staging area for large items and white goods may be provided near the active working face. Large items and white goods include overs, dishwashers, freezers, air conditioners, and other large items. These items will be recycled every 180 days or less or disposed at the active working face within 180 days of acceptance at the facility. The procedures for the acceptance, storage, processing, and disposal of large items are addressed in Section 8.9.

A staging area for large items and white goods may be provided near the citizen's convenience area. The large items and white goods are transferred into steel roll-off containers for storing until transport to an off-site recycler or disposed of. Surface water runoff will be diverted around the large item staging area by placement of earthen diversion berms. Surface water runoff from the large item storage area will be managed

as contaminated water and contained by placement of earthen containment and diversion berms to preclude discharge from this area. Containment and diversion berms will be placed consistent with Part III, Attachment D6.

8.25.2 Recyclable Materials Staging Area

Inert materials such as brick, concrete, etc., and non-inert materials such as asphalt may be received and staged at the facility for use as roadbase materials for facility access roads and staging areas or erosion control in drainage structures. Asphalt pavement will not be used for erosion control in drainage structures. The size of the stockpiles may vary depending on the amount of inert materials received at any given time. Since the brick and concrete materials are inert, runon and runoff from rainfall will not be controlled in a special manner for these materials. Since asphalt pavement or asphaltic concrete is not an inert material, it will be managed in a manner that will prevent runoff of contaminated water, discharge of waste, or creation of nuisance conditions. These inert and non-inert materials will continuously be reused for site operations, and there is no time limit on the staging of these materials.

A recyclable materials staging area may be provided for source-separated recyclable materials, including asphalt and other materials.

8.25.3 Citizen's Convenience Center

A citizen's drop-off and recyclable area is provided which is separate from the landfill operation. Citizen's drop off boxes and covered storage pads may be provided for household waste, source-separated recyclable materials, large items/white goods, batteries, used oil and oil filters, scrap metal, and whole tires. Used oil and oil filters are stored in leakproof, durable containers with secondary containment such as prefabricated secondary containment, plastic liners, concrete vaults, or other suitable containment designed for the safe handling of used oil and oil filters. The containers for used oil and oil filter storage will be located to minimize potential for damage due to vehicle or equipment traffic. Should an oil spill occur, the procedures identified in the facility's Stormwater Pollution Prevention Plan (SWPPP) will be implemented to contain and clean up a spill. Tires will be staged in enclosed, lockable trailers and no more than 2,000 tires will be on-site at any time. The TASWA DRF will provide a sufficient number of drop-off boxes for the citizen's drop-off and recyclable area consistent with the amount of incoming waste/recyclables. A sign will be displayed at the scalehouse which states who may use the citizen's drop-off and recyclable area, what may or may not be accepted, and fees for disposal (if applicable). The maximum time that recyclables will remain at the citizen's drop-off and recyclable area is 180 days. Supervision of the citizen's drop-off recyclable area will be provided to prevent nuisance conditions from developing.

Control will be used to confine the citizen's drop-off and recyclable area to a minimum size consistent with the rate of incoming recyclables, while allowing for safe and efficient operation. The large items/white goods staging area is further discussed in Section 8.9.

Signs with directional arrows and portable traffic barricades will help to restrict traffic to designated disposal locations. Signs will be placed along the access route to the current

disposal area or other designated disposal areas that may be established. In addition, rules for waste disposal and prohibited waste will be prominently displayed on signs at the site entrance. Refer to Section 5 for additional waste handling procedures.

8.25.4 Woodwaste/Brush Mulching Area

Source separated yard trimmings, clean wood materials, and vegetative material may be directed to the woodwaste/brush mulching area. The woodwaste/brush mulching area will be located within the waste footprint and will process yard trimmings, clean wood materials and vegetative materials, which will include trees and brush, into mulch after visual inspection. The resulting wood chips and mulch will only be used on-site and will be staged in the processing area for a maximum time of 60 days after being processed. The average length of time that wood chips and mulch is 30 days after being processed. The resulting wood chips and mulch will be staged in small piles within the processing area so as not to result in litter and will be managed to prevent fire, safety, or health hazards in accordance with 30 TAC §330.209(a).

APPENDIX IVB
FIRE PROTECTION SOILS CALCULATIONS

Fire Protection Soil Calculations

The working area cannot be larger than is able to be covered by 6" of soil within 1 hour.

The maximum working area is determined by:

- Available equipment to haul and spread soil
- Available soil in borrow source and in adjacent stockpiles

Table 4-1 of the SOP provides a list of the equipment dedicated to the TASWA DRF.

The following tables provide the production, transport, and application rates for the equipment listed in Table 4-1.

Note: The precision of the calculations is for demonstration purposes only and is not meant to imply exact conditions in the field.

Table 1. Load time for soil loading equipment.

Equipment	Cubic Yards per Load	Loads per Hour	Time per Load	Cubic Yards per Hour
Excavator	3	240	0.25 min	720[1]

Table 2. Load, transport, and unload capacity for soil transport equipment.

Equipment	Cubic Yards per Load	Load Time	Transport Time (2500 ft at 15 mph, x2 for round trip)	Unload Time	Total Load, Transport, and Unload Time	Loads per Hour	Cubic Yards Delivered per Hour
Haul Truck	16	1.33 min (loaded by excavator)	3.8 min	1 min	6.13 min	9.8	157
Scraper	20	4.9 min (self-loaded)	3.8 min	1 min	9.7 min	6.19	124

Table 3. Spreading capacity for soil spreading equipment.

Equipment	Spreading Rate (cubic yards per hour)	Area that Can Be Covered 6 Inches Deep in 1 Hour	Nominal Working Face Dimensions (square)	Nominal Working Face Dimensions (rectangle 2:1 width:depth)
Dozer	600[2]	32,400 sq ft	180 ft x 180 ft	254.6 ft x 127.3 ft
Compactor	600[2]	32,400 sq ft	180 ft x 180 ft	254.6 ft x 127.3 ft

Fire Protection Soil Calculations (Continued)

Table 4. Example scenarios of equipment capacity and soil needs for covering working face within 1 hour. Other combinations achieving equivalent capacity may be used.

Working Face Dimensions (width x depth, ft)	Working Face Area (sq ft)	Volume of Soil to Cover 6 Inches Deep (cu yd)	Transport Equipment	Volume of Soil Transport from Borrow Source within 2500 ft (cu yd)	Volume of Soil Stockpile at Working Face (cu yd)	Equipment for Spreading Soil within 1 Hour
150 x 150	22,500	417	1 Haul Truck	157	260	1 Dozer or 1 Compactor
250 x 150	37,500	694	1 Haul Truck and 1 Scraper	281	413	1 Dozer and 1 Compactor
350 x 200	70,000	1,296	2 Haul Trucks and 1 Scraper	438	858	2 Dozers and 1 Compactor
450 x 200	90,000	1,667	2 Haul Trucks and 2 Scrapers	562	1,105	2 Dozers and 1 Compactor
550 x 250	137,500	2,546	3 Haul Trucks and 2 Scrapers	719	1,827	2 Dozers and 3 Compactors

[1] One excavator can produce enough soil to load a haul truck 45 times per hour (up to 4 haul trucks).

[2] Low end of range published in *Excavation Handbook*, Horace C. Church 1991.