Texas Commission on Environmental Quality

# Waste Permits Division Correspondence Cover Sheet

Date: September 18, 2023
Facility Name: Beck Landfill
Permit or Registration No.: 1848A

Nature of Correspondence:
☐ Initial/New
☒ Response/Revision to TCEQ Tracking No.: 27818258 (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 |
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| ☐ CCR Registration | ☐ Extension Request |
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| ☐ 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: | |

Municipal Solid Waste Permit Amendment No. 1848A
Beck Landfill
Fourth Notice of Technical Deficiency

| NOD ID | MRI ID | App. Part | Citation | Location | NOD Description | |
|---|---|---|---|---|---|---|
| 1 | 2 and 849 | Part I | 330.59(b) and 330.143(b)(8) | Part I Form, Section 12 | Revise the Part I form, Section 12, to correct the benchmark location and elevation. Drawing I-5, Lease Boundary Survey, dated June 30, 2023, indicates at the benchmark moved north 13,748,565.11 feet and east of 2,202,086.12 feet. Permit 1848 indicates the benchmark location is 702.9ft and the elevation is 775ft. Indicate if the benchmark location is changing. | The benchmark location is changing from the one shown in permit 1848. The Part I form and several figures in Part I and Part II have been updated to accurately reflect the new benchmark location. |
| 2 | 85 | Part I | 330.59(d) | Part I, Attachment 5 (Section 5 in initial application and NOD1 response) | Clarify the acreage within the permit boundary and provide a revised legal description. The legal description dated August 29, 2022, in the initial application and response to the first notice of technical deficiency (NOD) indicated 256.935 acres. The legal description dated July 19, 2022, in the response to the second NOD indicates 266.474 acres. | The correct acreage is 256.935 acres. An older version of the legal description was mistakenly included with the 2nd NOD response. The correct legal description has been provided with this response. |
| 3 | 849 | Part I | 330.59(b) and (d), and 330.143(b)(8) | Part I, Attachment 5 (Section 5 in initial application and NOD1 response) | Revise Drawing I-5, Lease Boundary Survey, to indicate the correct latitude and longitude that corresponds to the change of the benchmark location found in the Part I form, Section 12. The revised drawing must include the surveyor's seal, signature, and signature date. | A revised version of Drawing I-5 has been provided with an updated Lat/Long for the benchmark. |
| 4 | 12 | General | 330.57(d) | Parts I through IV | Correct references to the facility permit number to indicate 1848A, instead of 1848. | Corrected as observed. Please provide any missed references if found. |

| NOD ID | MRI ID | App. Part | Citation | Location | NOD Description | |
|---|---|---|---|---|---|---|
| 5 | 22 | General | 330.57(g)(3) | Parts I through IV | Revise the application master table of contents to be consistent with the structure and titles within the application parts. Also check for spelling of titles [example: "metes and bonds" in title of Part I, Attachment 5] and use correct case for letters in rule citations [example: 330.61(L) should be 330.61(l)]. | The application master table of contents has been revised to reflect the organization of the application. |
| 6 | 24 | General | 330.57(d)(5) and (6) | Parts I through IV | Many pages in the application do not have page numbers. Provide a page number and most recent revision date in either the header or footer on all pages in the application, using a consistent numbering system that includes attachment identifier.<br><br>The marked copy of the response to the third NOD includes revised pages that are not included in the unmarked ("clean") copy of the response. Provide a complete unmarked copy of all pages of the application in response to the fourth NOD and include the revision dates for each page formatted as described previously. | We have added page numbers where We saw that they were missing.<br><br>The attached clean copies reflect the current versions of the sections of the application that were changed as part of this response. We are compiling an updated clean copy of entire application as requested, and will send that under separate cover. |
| 7 | 24 | General | 330.57(g)(5) and (6) | Parts I through IV | Ensure all references to figures, tables, etc. throughout the application correctly cite the part and attachment in which the items. are located. Example: Part II, Attachment C, General Topo Maps and Aerial Photography refer to Figures 1-1B and 1-1C in Attachment C of Part I; however, in Part I the attachments are numbered and not lettered. | References to Part I Attachment 3 maps are updated. Other figure references have been reviewed for accuracy. Part IV has been formatted (font and tables inserted) to facilitate use. |

| NOD ID | MRI ID | App. Part | Citation | Location | NOD Description | |
|---|---|---|---|---|---|---|
| 8 | 148 | Part II | 330.61(j)(1) | Part II, Attachment G | (a) Correct the reference in the first paragraph of Part II, Attachment G to the 1989 geotechnical investigation. The referenced information appears to be in Attachment E of Part III.<br>b) In the third paragraph of Part II, Attachment G, indicate the location of the referenced Figure 3-1.<br>c) Revise the second paragraph on page G-3 in Part II (which begins "Prior to construction. . .") to indicate what year the geologic fault assessment was performed, and to replace rule reference from §325.74(b)(5)(J) to §330.555. | a) The reference has been corrected.<br><br>b) Added reference to Part III, Attachment E Geology Report, Figure 3-1.<br><br>c) The regulatory citation has been corrected and a date for the re-evaluation of the fault assessment was added. |
| 9 | 150 | Parts II and III | 330.61(j)(3) and 330.557 | Part II, Attachment G, and Part III, Attachment E | Provide information on seismic impact zones in the form required by 330.557. Use the 2014 map showing peak horizontal acceleration with 2% probability of exceedance in 50 years, available at https://pubs.usgs.gov/sim/3325/ (on that webpage, scroll down to Contents, click on Sheets, pick SIM3325_sheet2.pdf). | The referenced Sheet 3325 was reviewed and incorporated into Part II, Attachment G of this response. |
| 10 | 136 | Part II | 330.61(h)(5) | Part II, Attachment I | Revise the first paragraph of Part II, Attachment I to indicate there are two wells within 500 feet of the permit boundary, shown on Figure 2-5 in Part II and Figure E-7 in Part III, Attachment E. | Added information regarding the two wells within 500 feet of the permit boundary to Part II, Attachment I. |

| NOD ID | MRI ID | App. Part | Citation | Location | NOD Description | |
|---|---|---|---|---|---|---|
| 11 | 296 | Part III | 330.305(e) | Appendix C1-E and C1-F | (a) Explain how the sediment will be collected/separated from stormwater prior to discharging at outfall points in the absence of sedimentation basin during interim and final phases of landfill operation.<br>(b) Ensure that the source indicated in the narrative on Page 7/23 (Attachment C1-E) and on Page 3/23 (Attachment C1-G) is correct for Figure 5.4 (Velocities for Upland Method of Estimating Time of Concentration). | a) The facility will utilize a combination of vegetation and interim and permanent structural controls to control sediment creation. Soil loss calculations are provided in Appendix C1 that demonstrate that the expected worst-case conditions for the interim and final phases of the landfill produce less sediment than the maximum recommended values provided in Section 2.5 of TCEQ guidance document RG-417. The site operations are regulated through the Texas Pollutant Discharge Elimination System program for stormwater discharges and interim controls will be continuously evaluated to ensure that the minimum amount of sediment possible will be discharged from the site.<br><br>b) The reference has been adjusted to state that the chart comes from the 2004 version of the TxDOT Hydraulic Design Manual. |

| NOD ID | MRI ID | App. Part | Citation | Location | NOD Description | |
|---|---|---|---|---|---|---|
| 12 | 298 | Part III | 330.305(e) | Appendix C1-F | (a) Revise Appendix C1-G to provide cross-sections for berms/benches on the slopes, letdowns, perimeter berms, and detention ponds/sedimentation basins for an interim phase of landfill operation. Provide dimensions and construction specifications on drawings for each of the cross sections.<br>(b) Include reference materials in the application used for soil loss calculations in Universal Soil Loss Equation by Natural Resource Conservation Service of the United States Department of Agriculture. | Figure C3-4 has been added to Appendix C3 to provide typical details for the proposed interim drainage controls. |
| 13 | 311 | Part III | 330.63(c)(1)(D)<br>(ii) and (iii) | Appendix C1-B and Appendix C1-C | (a) Provide a drainage plan, including details of stormwater collection system for Sub-drainage Area, DA-P09 (35.9 Acres).<br>(b) Identify pond outlets #1 and #2, and a cross-section mark on Figure C3-1 to match Figure C3-2 (Stormwater Pond Inlet /Outlet Channel Protection). Also, provide design calculations for outlets #1 and #2, and include cross sectional details of the outlets.<br>(c) Indicate the detention pond layout plan, including inlets and outlets on Figure C1-2. | a) Drainage area DA-P9 has been added to the proposed HEC-HMS calculations and the comparison tables have been adjusted in Attachment C and Appendix C-1 to reflect this correction. There are no improvements proposed in this area and the entire area is inundated by Cibolo Creek in the 24-hour, 25-year event.<br><br>b) The pond outlets have been labelled on Figure C3-1. Design calculations are included in Appendix C1-C, starting on Page 9. A cross-section through the outlets has been added to Figure C3-2.<br><br>c) The detention pond has been labeled on Figure C1-2 as requested. |
| 14 | 313 | Part III | 330.63(c)(1)(D)(iv) | Appendix C1-D and C1-E | Provide structural design/drawings, including cross-sectional details for the proposed drainage structures (e.g., berm/benches on slopes, chutes, perimeter berms, intersections of chutes and berms, toe of chutes, ponds, etc.) for an interim phase of landfill operation. | Figure C3-4 has been added to Appendix C3 to provide typical details for the proposed interim drainage controls. |

| NOD ID | MRI ID | App. Part | Citation | Location | NOD Description | |
|---|---|---|---|---|---|---|
| 15 | 335 | Part III | 330.63(c)(2)(D) | Attachment C2 | Provide a Letter of Map Revision (LOMR) from FEMA. | The LOMR is still under review by FEMA. The most recent correspondence letters with FEMA have been added to Appendix C-2. |
| 16 | 12 | Part III | 330.57(d) | Attachment E | Revise in Attachment E the figure titles in the table of contents and the figure title pages to be consistent with the titles on the figures themselves. | Corrected. |
| 17 | 476 | Part III | 330.63(e)(2) | Attachment E | Revise Figure E-4 to show the location of the Balcones Fault Zone mentioned in text to explain what fault area "Class B" means, and to show the locations of Quaternary faults. If there are no Quaternary faults in the map area, add a note to the figure indicating there are none. | The Balcones Fault Zone is not shown on Figure E-4 since it is not a Quaternary faulting system. The text has been corrected including an image of the landfill relative to the Balcones Fault Zone.<br><br>Class B has been clarified on an updated Figure E-4. |
| 18 | 487 | Part III | 330.63(e)(4) | Attachment E, Section 1.4 (formerly Section 3.1.3) | Review the titles and locations of appendices containing information from site investigations in 1989 and 2020, and revise tables of contents and references within text accordingly. Example: the first paragraph of Section 1.4 states that data from the 2020 borings is in Part III, Attachment D, Appendix D5-C; however, it appears those data are in Attachment E, Appendix E-1. Also, the table of contents for Attachment E does not correctly identify Appendix E-1. What is listed in the table of contents for Appendix E-1 appears to be in Attachment D. | Removed Appendix E-1 to refer to Part III, D-5.<br><br>Updated Tables in the TOC |
| 19 | 505 | Part III | 330.63(e)(5) | Attachment E | Include in Part III, Attachment E a copy of the documentation provided to TNRCC on January 27, 1999, regarding damage to groundwater monitoring records by a flood in October 1998. | Added January 27, 1999 letter, per request. See Appendix E-1 (new) |

| NOD ID | MRI ID | App. Part | Citation | Location | NOD Description | |
|---|---|---|---|---|---|---|
| 20 | 494 | Part III | 330.63(e)(4)(G) | Attachment E, Section 3.1.4 | Revise the geologic cross sections in Appendix E-4 to address the following deficiencies (some noted in the third NOD, but not addressed in the response):<br>(a) Add page numbers, figure numbers, and complete dates;<br>(b) Add horizontal bar scales, delete text scales;<br>(c) Add references to locations in the application where boring logs and subsurface data are documented;<br>(d) Provide cross sections through the entire facility, and a boring location map that shows the entire facility boundary;<br>(e) Increase the font size of labels on the stratigraphic units, and label all units; and<br>(f) Modify colors to ensure the units are distinguishable and the labels are legible when drawings are reproduced in black and white. | Revised Geologic Cross Sections (found in Appendix E-3)<br>Added<br>Added/Deleted<br>Added<br>Added with all borings, per discussion<br>Corrected.<br>Corrected. |
| 21 | 508 | Part III | 330.63(f) | Attachment F | List Attachment F figures in the table of contents and reference the figures in the text. | Corrected. |
| 22 | 508 | Part III | 330.63(f) | Attachment F | Delete the extra entries for Table 1 from the table of contents. | Corrected. |
| 23 | 508 | Part III | 330.63(f) | Attachment F | Correct the number of Subsection 1.1.2 under Section 1.4 (it appears 1.1.2 should be 1.4.1). | Corrected. |
| 24 | 651 | Part III | 330.63(f) and 330.421(e) | Attachment F | Revise Figure 3-F-1, Groundwater Gradient Map, to include a title block with complete version information, map legend, labeling on contours, labeling on all monitor wells, landfill unit boundary, and permit boundary. | Corrected. |
| 25 | 650 | Part III | 330.421(d) and (e) | Attachment F, Section 1.4 | Correct the reference (currently indicated as Part II, Figure 2-4) to the drawing showing monitor well locations. Monitor well locations appear to be shown on Figure 3-F-1. | Corrected. |

| NOD ID | MRI ID | App. Part | Citation | Location | NOD Description | |
|---|---|---|---|---|---|---|
| 26 | 651 | Part III | 330.421(e) | Attachment F, Section 1.4 (formerly 3.1.4) | Provide complete reference to the location of boring logs for monitor wells, including application part, attachment, and appendix. | Corrected. |
| 27 | 651 | Part III | 330.421(e) | Attachment F, Appendix F-1 | The monitor well data sheets in the responses to each issued NOD have differed. Determine which are the correct data sheets that show the correct monitor well completion data and provide those in Attachment F. | The well data sheets in the last submittal represent best available information. A survey was conducted on 9/10/23 to obtain the existing stick up elevations. This information was added to the Appendix. |
| 28 | 508 | Part III | 330.63(f) | Attachment F, Appendix F-3 | Correct the appendix number in the text of Appendix F-3 and on each sheet in Appendix F-3. | Corrected. |
| 29 | 574 | Part III | 330.417(b) | Attachment F, Appendix F-3, Section VI | Revise Section VI, Sample Filtration, to clarify that samples for metals will not be filtered and will be analyzed for total concentrations. | Corrected. |

BECK LANDFILL
GUADALUPE COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 1848A

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STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED PROFESSIONAL ENGINEER
9-15-23

No-Rise Certification for Proposed Stormwater Pond

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STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED PROFESSIONAL ENGINEER
9-15-23

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STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED PROFESSIONAL ENGINEER

9-15-23

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9 SEQUENCE OF DEVELOPMENT

10 RECYCLING ACTIVITIES


STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED
PROFESSIONAL ENGINEER
9-15-23

BECK LANDFILL
GUADALUPE COUNTY, TEXAS
TCEQ PERMIT APPLICATION NO. MSW 1848A

**APPLICATION CORRESPONDENCE**

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# MUNICIPAL SOLID WASTE PERMIT
# MAJOR AMENDMENT

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## Part I Application for Permit Amendment
## (TAC Title 30 Rule §330.59)

BECK COMPANIES

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

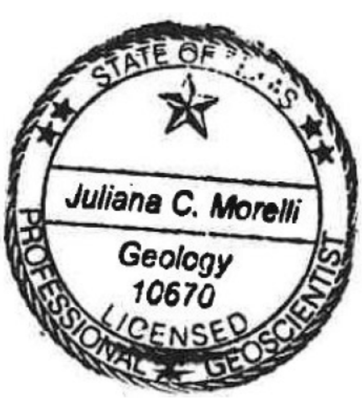
***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: September ~~2022~~2023*

Prepared by:

POWER ENGINEERS

PROJECT NUMBER: 150051.05.01
PROJECT CONTACT: Julie Morelli
EMAIL: Julie.Morelli@powereng.com
PHONE: 210-951-6424




Julie Morelli 9/15/2023

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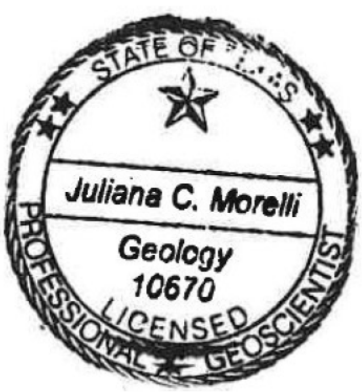
**Attachment 8 Appointments**

**Attachment 9 Application Fee (330.59(h))**




Julie Morelli 9/15/2023

# Form TCEQ-0650 (305.45(aa)(1-(5))

Formatted: All caps

# Texas Commission on Environmental Quality

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

## Application Tracking Information

Facility Name: Beck Landfill

Permittee or Registrant Name: Nido, Ltd

MSW Authorization Number: 1848A

Initial Submission Date: September 9, 2022

Revision Date: September 15, 2023

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 another Core Data Form for the operator if different from the owner. If you have questions, contact the Municipal Solid Waste Permits Section by email to mswper@tceq.texas.gov, or by phone at 512-239-2335.

## 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

## 4. Application Fee

**Amount**

☒ \$2,050—New Landfill Permits, and Landfill Permit Major Amendments Described in 30 TAC 305.62(j)(1)

☐ \$150—Other Permits, Landfill Limited Scope Major Amendments, Permit Amendments for Storage and Processing Facilities, and Registrations

**Payment Method**

☐ Check

☒ Online through ePay portal www3.tceq.texas.gov/epay/

If paid online, enter ePay Trace Number: 582EA000504507

## 5. Application URL

For applications other than those for arid exempt landfills, provide the URL address of a publicly accessible internet web site where the application and all revisions to the application will be posted.

http://downloads.cecinc.com/Beck Landfill MSW 1848A Amendment/

## 6. Party Responsible for Publishing Notice

Indicate who will be responsible for publishing notice:

☐ Applicant ☐ Agent in Service ☒ Consultant

Contact Name: Cindy Wilson

Title: Project Assistance

Email Address: cindy.wilson@powereng.com

## 7. Alternative Language Notice

Use the Alternative Language Checklist on Public Notice Verification Form TCEQ-20244-Waste-NORI, TCEQ-20244-Waste-NAPD, or TCEQ-20244-Waste-NAORPM available at www.tceq.texas.gov/permitting/waste_permits/msw_permits/msw_notice.html to determine if an alternative language notice is required.

Is an alternative language notice required for this application?

☒ Yes ☐ No

Indicate the alternative language: spanish

## 8. Public Place for Copy of Application

Name of the Public Place: Schertz Library

Physical Address: 798 Schertz Parkway

City: Schertz County: Guadalupe State: TX Zip Code: 78154

Phone Number: 210-619-1700

## 9. Consolidated Permit Processing

Is this submittal part of a consolidated permit processing request, in accordance with 30 TAC Chapter 33?

☐ Yes ☒ No

If "Yes", indicate the other TCEQ program authorizations requested:

## 10. Confidential Documents

Does the application contain confidential documents?

☐ Yes ☒ No

If "Yes", reference the confidential documents in the application, but submit the confidential documents as an attachment in a separate binder marked "CONFIDENTIAL."

## 11. Permits and Construction Approvals

Mark the following table to indicate status of other permits or approvals.

***Table 1. Permits and Construction Approvals.***

| Permit or Approval | Received | Pending | Not Applicable |
|---|---|---|---|
| Hazardous Waste Management Program under Texas Solid Waste Disposal Act | | | X |
| Underground Injection Control Program under Texas Injection Well Act | | | X |
| National Pollutant Discharge Elimination System Program under Clean Water Act; Waste Discharge Program under Texas Water Code, Chapter 26 | X | | |
| Prevention of Significant Deterioration Program under Federal Clean Air Act (FCAA); Nonattainment Program under the FCAA | | | X |
| National Emission Standards for Hazardous Air Pollutants Preconstruction Approval under the FCAA | | | X |

| Permit or Approval | Received | Pending | Not Applicable |
|---|---|---|---|
| Ocean Dumping Permits under Marine Protection Research and Sanctuaries Act | | | X |
| Dredge or Fill Permits under Clean Water Act | | | X |
| Licenses under the Texas Radiation Control Act | | | X |
| Other (describe): | | | |
| Other (describe): | | | |

## 12. Facility General Information

Facility Name: Beck Landfill

Contact Name: Grant Norman Title: General Manager

MSW Authorization Number (if existing): 1848

Regulated Entity Reference Number: **RN** 102310968

Physical or Street Address (if available): 550 FM 78

City: Schertz County: Guadalupe State: TX Zip Code: 78154

Phone Number: 210-349-2491

Latitude (Degrees, Minutes Seconds): 29º 33' 03.08"

Longitude (Degrees, Minutes Seconds): -98º 15' 55.04"

Benchmark Elevation (above mean sea level): 693.84 feet

Description of facility location with respect to known or easily identifiable landmarks:

Gated entrance located directly off FM 78 in Schertz, TX, next door to Sonic Drive In

Access routes from the nearest United States or state highway to the facility:

Approx. 2.1 miles northeast of Loop 1604 and FM78; gated entrance on the south side.

**Coastal Management Program**

Is the facility within the Coastal Management Program boundary?

☐ Yes ■ No

## 13. Facility Types

- [ ] Type I
- [x] Type IV
- [ ] Type V
- [ ] Type IAE
- [ ] Type IVAE
- [ ] Type VI

## 14. Activities Conducted at the Facility

- [x] Storage
- [x] Processing
- [x] Disposal

## 15. Facility Waste Management Units

Check the box for each type of waste management unit proposed.

- [x] Landfill Unit(s)
- [x] Container(s)
- [ ] Incinerator(s)
- [x] Roll-off Boxes
- [ ] Class 1 Landfill Unit(s)
- [ ] Surface Impoundment
- [ ] Process Tank(s)
- [ ] Autoclave(s)
- [x] Storage Tank(s)
- [ ] Refrigeration Unit(s)
- [ ] Tipping Floor
- [x] Mobile Processing Unit(s)
- [ ] Storage Area
- [ ] Compost Pile(s) or Vessel(s)
- [x] Other (specify):

brush grinding and other recycling activities

## 16. Description of Proposed Facility or Changes to Existing Facility

Provide a brief description of the proposed activities if application is for a new facility, or the proposed changes to an existing facility or permit conditions if the application is for an amendment.

Updates to MSW Permit 1848A are proposed to incorporate all prior minor and major modifications and amendments to the current MSW Permit No. 1848A. In addition, this facility proposes a vertical expansion of the landfill that will increase capacity and address recent changes to the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 (Volume 8 Version 2).

## 17. Facility Contact Information

**Site Operator (Permittee or Registrant)**

Name: Nido, Ltd.

Customer Reference Number: **CN** 603075011

Contact Name: Grant Norman Title: General Manager

Mailing Address: P.O. Box 790641

City: San Antonio County: Bexar State: TX Zip Code: 78279

Phone Number: 210-349-2491

Email Address: gnorman@beckcompanies.com

Texas Secretary of State (SOS) Filing Number: 0800579842

**Operator (if different from *Site Operator*)**

Name: Beck Landfill

Customer Reference Number: **CN** 603075011

Contact Name: Grant Norman Title: General Manager

Mailing Address: P.O. Box 790641

City: San Antonio County: Bexar State: TX Zip Code: 78279

Phone Number: 210-349-2491

Email Address: gnorman@beckcompanies.com

Texas Secretary of State (SOS) Filing Number: 0800579842

**Consultant (if applicable)**

Firm Name: Civil and Environmental Consultants, Inc.

Consultant Name: Adam Mehevec

Texas Board of Professional Engineers Firm Registration Number: F-83

Contact Name: Adam Mehevec Title: ____

Mailing Address: 3711 S MoPac Expressway, Bldg. 1, Suite 550

City: Austin County: Travis State: TX Zip Code: 78746

Phone Number: 512-329-0006

Email Address: amehevec@cecinc.com

**Agent in Service (required for out-of-state applicants)**

Name: N/A

Mailing Address: ____

City: ____ County: ____ State: TX Zip Code: ____

Phone Number: ____

Email Address: ____

## 18. Facility Supervisor License

Indicate the level of Municipal Solid Waste Facility Supervisor license, as defined in 30 TAC Chapter 30, Occupational Licenses and Registrations, Subchapter F that the individual who supervises or manages the operations will obtain prior to commencing operations.

☒ Class A Supervisor License ☐ Class B Supervisor License

## 19. Ownership Status of the Facility

**Business Type**

☐ Corporation
☐ Individual
☐ Sole Proprietorship
☐ General Partnership
☒ Limited Partnership
☐ City Government
☐ County Government
☐ State Government
☐ Federal Government
☐ Other Government
☐ Military
☐ Other (specify): ____________________

**Facility Owner**

Does the Site Operator (Permittee or Registrant) own all the facility units and all the facility property?

☐ Yes ☒ No

If "No", provide the following information for other owners.

Owner Name: Cibolo Industries, LTD

Mailing Address: P.O. Box 790641

City: San Antonio County: Bexar State: TX Zip Code: 78279

Phone Number: 210-349-2491

Email Address: gnorman@beckcompanies.com

## 20. Other Government Entities Information

**Texas Department of Transportation**

District: San Antonio

District Engineer's Name: Gina E. Gallegos, P.E.

Mailing Address: 4615 NW Loop 410

City: San Antonio County: Bexar State: TX Zip Code: 78229

Phone Number: 210-615-1110

Email Address: Gina.Gallegos@txdot.gov

**Local Government Authority Responsible for Road Maintenance (if applicable)**

Government or Agency Name: City of Schertz

Contact Person's Name: Suzanne Williams

Mailing Address: 10 Commercial Place

City: Schertz County: Guadalupe State: TX Zip Code: 78154

Phone Number: 210-619-1800

Email Address: swilliams@schertz.com

**City Mayor Information**

City Mayor's Name: Ralph Gutierrez

Mailing Address: 1400 Schertz Parkway

City: Schertz County: Guadalupe State: TX Zip Code: 78154

Phone Number: 210-619-1000

Email Address: Ralphgutierrez@schertz.com

**City Health Authority**

Authority Name: City of Schertz

Contact Person's Name: Amanda Cantu, Sanitarian

Mailing Address: 1400 Schertz Parkway

City: Schertz County: Guadalupe State: TX Zip Code: 78154

Phone Number: 210-619-1673

Email Address: acantu@schertz.com

**County Judge Information**

County Judge's Name: Kyle Kutscher

Mailing Address: 211 W. Court Street

City: Seguin County: Guadalupe State: TX Zip Code: 78155

Phone Number: 830-303-8857

Email Address: Kyle.Kutcher@co.guadalupe.tx.us

**County Health Authority**

Agency Name: Guadalupe County Environmental Heath Department

Contact Person's Name: Shelly Reed Jackson

Mailing Address: 2605 N. Guadalupe Street

City: Seguin County: Guadalupe State: TX Zip Code: 78155

Phone Number: 830-303-4188

Email Address: shelly.jackson@co.guadalupe.tx.us

**State Representative Information**

District Number: 44

State Representative's Name: John Kuempel

District Office Mailing Address: 200 N. River Street #100-E

City: Seguin County: Guadalupe State: TX Zip Code: 78155

Phone Number: 830-379-8732

Email Address: John.Kuempel@house.texas.gov

**State Senator Information**

District Number: 25

State Senator's Name: Donna Campbell

District Office Mailing Address: 229 Hunters Village, Ste. 105

City: New Braunfels County: Comal State: TX Zip Code: 78132

Phone Number: 830-626-0065

Email Address: Donna.Campbell@senate.texas.gov

**Council of Governments (COG)**

COG Name: Alamo Area Council of Governments

COG Representative's Name: Diane Rath

COG Representative's Title: Executive Director

Mailing Address: 2700 NE Loop 410, Suite 101

City: San Antonio County: Bexar State: TX Zip Code: 78217

Phone Number: 210-362-5200

Email Address: drath@aacog.com

**River Basin Authority**

Authority Name: San Antonio River Authority

Contact Person's Name: Derek Bose, General Manager

Watershed Sub-Basin Name: Mid Cibolo Creek

Mailing Address: 201 W. Sheridan

City: San Antonio County: Bexar State: TX Zip Code: 78204

Phone Number: 210-302-3616

Email Address: Dboese@sara-tx.org

**U.S. Army Corps of Engineers District**

Indicate the U.S. Army Corps of Engineers district in which the facility is located:

☐ Albuquerque, NM ☐ Galveston, TX

☒ Ft. Worth, TX ☐ Tulsa, OK

**Local Government Jurisdiction**

Within City Limits of: Schertz

Within Extraterritorial Jurisdiction of: ______________________________

Is the facility located in an area in which the governing body of the municipality or county has prohibited the storage, processing, or disposal of municipal or industrial solid waste?

☐ Yes ☒ No

If "Yes", provide a copy of the ordinance or order as an attachment.

## Signature Page

### Site Operator 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: Grant Norman Title: General Manager

Email Address: gnorman@beckcompanies.com

Signature: ______________________________ Date: __________

### Operator or Principal Executive Officer Designation of Authorized Signatory

*To be completed by the operator if the application is signed by an authorized representative for the operator.*

I hereby designate Grant Norman as my representative and hereby authorize said representative to sign any application, submit additional information as may be requested by the Commission; and/or appear for me at any hearing or before the Texas Commission on Environmental Quality in conjunction with this request for a Texas Water Code or Texas Solid Waste Disposal Act permit. I further understand that I am responsible for the contents of this application, for oral statements given by my authorized representative in support of the application, and for compliance with the terms and conditions of any permit which might be issued based upon this application.

Operator or Principal Executive Officer Name: Ben Davis

Email Address: bdavis@beckcompanies.com

Signature: ______________________________ Date: __________

### Notary

SUBSCRIBED AND SWORN to before me by the said ______________________________

On this _____ day of __________, _____

My commission expires on the _____ day of __________, _____

________________________

Notary Public in and for

________________________ County, Texas

Note: Application Must Bear Signature & Seal of Notary Public

## Part I Attachments

Refer to instruction document 00650-instr for professional engineer seal requirements.

***Attachments Table 1. Required attachments.***

| Required Attachments | Attachment Number |
|---|---|
| Supplementary Technical Report | 2.0 |
| Property Legal Description | 5.0 |
| Property Metes and Bounds Description | 5.0 |
| Facility Legal Description | 5.0 |
| Facility Metes and Bounds Description | 5.0 |
| Metes and Bounds Drawings | 5.0 |
| On-Site Easements Drawing | 5.0 |
| Land Ownership Map | 4.0 |
| Landowners List | 4.0 |
| Mailing Labels (printed and electronic) | 4.0 |
| Texas Department of Transportation (TxDOT) County Map | 3.0 |
| General Location Map | 3.0 |
| General Topographic Map | 3.0 |
| Verification of Legal Status | 6.0 |
| Property Owner Affidavit | 6.0 |
| Evidence of Competency | 7.0 |

***Attachments Table 2. Additional attachments as applicable.***

| Additional Attachments as Applicable (select all that apply and add others as needed) | Attachment Number |
|---|---|
| ☒ TCEQ Core Data Form(s) | 1.0 |
| ☐ Signatory Authority Delegation | N/A |
| ☒ Fee Payment Receipt | 9.0 |
| ☐ Confidential Documents | N/A |
| ☐ Waste Storage, Processing and Disposal Ordinances | N/A |
| ☐ Final Plat Record of Property | N/A |

| **Additional Attachments as Applicable (select all that apply and add others as needed)** | **Attachment Number** |
|---|---|
| ☒ Certificate of Fact (Certificate of Incorporation) | 6.0 |
| ☐ Assumed Name Certificate | N/A |
| Other (describe): | |
| Other (describe): | |
| Other (describe): | |

# ~~Attachment~~ Attachment 1 ~~core daTA form~~Core Data Form

# ~~Attachment~~ Attachment 2 S~~s~~upplemental ~~t~~Technical ~~r~~Report

## General Description of the Facility (305.45(a)(8))

Beck Landfill is located on approximately 163 256.935 acres in Schertz, Texas. The Landfill is operated in accordance with the existing Municipal Solid Waste (MSW) Permit Number 1848A as a Type IV construction and demolition debris disposal site. Waste loads are inspected at the entrance to the landfill and approved loads, transported by third-party haulers, are weighed and directed to the active, working face of the Landfill. Loads containing unauthorized waste streams are rejected and are directed off the premises. Access to the site is controlled through a lockable gate and manned scale office. Appropriate signage is posted to instruct haulers regarding permitted activities.

The majority of industrial activities are conducted outdoors. Outdoor activities include the occasional use of a screening plant, operation of a Type IV landfill, a truck scale, a ticket office, equipment parking, and material storage areas. Soil cover on the working face is applied weekly or more frequently, as needed. Rainwater that comes into contact with the active working face is captured and isolated to prevent a discharge. Liquids derived from areas where trash is placed is collected and pumped back to the working face for dust control. No discharge or removal of leachate is performed.

Following unloading, haul trucks return to the scale to determine the weight of material disposed. Haulers are issued a ticket to track the costs and quantities associated with the disposal. Windblown trash is collected daily, or as needed, to prevent nuisance conditions.

Beck Landfill does not operate a collection or transportation service for waste disposed at the Landfill. Beck does not perform treatment of wastes prior to disposal. No injection activity occurs on-site or is planned to occur on-site in the future.

## Facility Location (330.59(b))

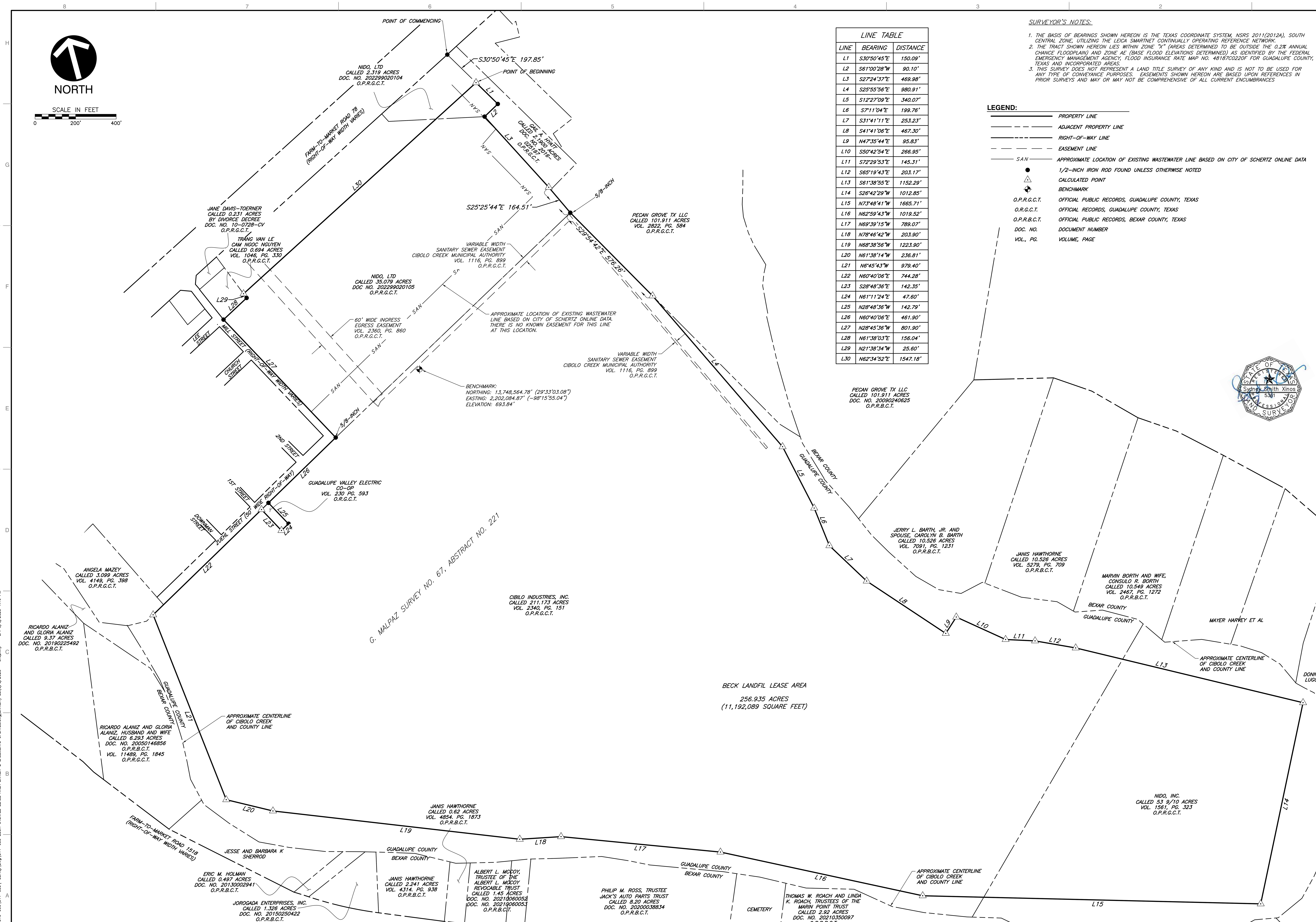
Beck Landfill is located off of Farm to Market Road (FM) 78 in Schertz, Guadalupe County, Texas. Travel west along FM78, approximately 2.6 miles from East Loop 1604 in San Antonio, Texas. The Landfill is located on the south side of FM78, next door to the Sonic Drive-In.

The coordinates to the entrance of the landfill are: -98º 16’ 3.14” West and .2645733º North, 29º 33’ 11.25” North. The benchmark coordinates are .5545795º West.-98º 15” 55.04” West and 29º 33’ 03.08” North.

# ~~Attachment~~ Attachment 3 ~~m~~Maps

General location maps and land ownership maps are included as attachments to Part I of this Application in conformance with 30 TAC 305.46 and 335.59(c). Part I of this major ~~modification~~ amendment application includes General Location Maps showing the property boundary, latitudes and longitudes, and other required information. In addition, Part I includes the Land Ownership Map. Additional information is provided in Section 5.0 below.

# ~~Attachment~~ Attachment 4 Land Ownership Map, Landowner List and Mailing Labels~~LAND OWNERSHIP MAP, LANDOWNER LIST AND MAILING LABELS~~




LINE TABLE

| LINE | BEARING | DISTANCE |
|---|---|---|
| L1 | S30°50'45"E | 150.09' |
| L2 | S61°00'28"W | 90.10' |
| L3 | S27°24'37"E | 469.98' |
| L4 | S25°55'56"E | 980.91' |
| L5 | S12°27'09"E | 340.07' |
| L6 | S7°11'04"E | 199.76' |
| L7 | S31°41'11"E | 253.23' |
| L8 | S41°41'06"E | 467.30' |
| L9 | N47°35'44"E | 95.83' |
| L10 | S50°42'54"E | 266.95' |
| L11 | S72°29'53"E | 145.31' |
| L12 | S65°19'43"E | 203.17' |
| L13 | S61°38'55"E | 1152.29' |
| L14 | S26°42'29"W | 1012.85' |
| L15 | N73°48'41"W | 1665.71' |
| L16 | N62°59'43"W | 1019.52' |
| L17 | N69°39'15"W | 789.07' |
| L18 | N78°46'42"W | 203.90' |
| L19 | N68°38'56"W | 1223.90' |
| L20 | N61°38'14"W | 236.81' |
| L21 | N6°45'43"W | 979.40' |
| L22 | N60°40'06"E | 744.28' |
| L23 | S28°48'36"E | 142.35' |
| L24 | N61°11'24"E | 47.60' |
| L25 | N28°48'36"W | 142.79' |
| L26 | N60°40'06"E | 461.90' |
| L27 | N28°45'36"W | 801.90' |
| L28 | N61°38'03"E | 156.04' |
| L29 | N21°38'34"W | 25.60' |
| L30 | N62°34'52"E | 1547.18' |

SURVEYOR'S NOTES:

1. THE BASIS OF BEARINGS SHOWN HEREON IS THE TEXAS COORDINATE SYSTEM, NSRS 2011(2012A), SOUTH CENTRAL ZONE, UTILIZING THE LEICA SMARTNET CONTINUALLY OPERATING REFERENCE NETWORK.
2. THE TRACT SHOWN HEREON LIES WITHIN ZONE "X" (AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOODPLAIN) AND ZONE AE (BASE FLOOD ELEVATIONS DETERMINED) AS IDENTIFIED BY THE FEDERAL EMERGENCY MANAGEMENT AGENCY, FLOOD INSURANCE RATE MAP NO. 48187C0220F FOR GUADALUPE COUNTY, TEXAS AND INCORPORATED AREAS.
3. THIS SURVEY DOES NOT REPRESENT A LAND TITLE SURVEY OF ANY KIND AND IS NOT TO BE USED FOR ANY TYPE OF CONVEYANCE PURPOSES. EASEMENTS SHOWN HEREON ARE BASED UPON REFERENCES IN PRIOR SURVEYS AND MAY OR MAY NOT BE COMPREHENSIVE OF ALL CURRENT ENCUMBRANCES

**LEGEND:**

PROPERTY LINE
ADJACENT PROPERTY LINE
RIGHT-OF-WAY LINE
EASEMENT LINE
SAN — APPROXIMATE LOCATION OF EXISTING WASTEWATER LINE BASED ON CITY OF SCHERTZ ONLINE DATA
1/2-INCH IRON ROD FOUND UNLESS OTHERWISE NOTED
CALCULATED POINT
BENCHMARK
O.P.R.G.C.T. OFFICIAL PUBLIC RECORDS, GUADALUPE COUNTY, TEXAS
O.R.G.C.T. OFFICIAL RECORDS, GUADALUPE COUNTY, TEXAS
O.P.R.B.C.T. OFFICIAL PUBLIC RECORDS, BEXAR COUNTY, TEXAS
DOC. NO. DOCUMENT NUMBER
VOL., PG. VOLUME, PAGE

REVISION RECORD

| NO | DATE | DESCRIPTION |
|---|---|---|
| 1 | 09/15/2023 | RESPONDING TO TCEQ COMMENTS |


Civil & Environmental Consultants, Inc.
1221 South MoPac Expressway, Suite 350 · Austin, TX 78746
Ph: 512.439.0400 · Fax: 512.329.0096
www.cecinc.com
Texas Registered Surveying Firm 10194419
Texas Registered Engineering Firm F-38


# LEASE BOUNDARY SURVEY
# BECK LANDFILL
# 550 FM 78
# CITY OF SCHERTZ
# GUADALUPE COUNTY, TEXAS

NIDO, INC. AND CIBOLO INDUSTRIES, INC.
DOC. NOS. 202299020104, 202299020105,
VOL. 2340, PG. 151 AND VOL. 1561 PG. 323
GUADALUPE COUNTY, TEXAS

| | | | |
|---|---|---|---|
| DATE: | SEPTEMBER 06, 2023 | DRAWN BY: | APV |
| DWG SCALE: | 1"=200' | CHECKED BY: | ESH |
| PROJECT NO: | | | 317-935 |
| APPROVED BY: | | | SSX |

DRAWING NO.: I-5
SHEET 1 OF 1

256.935 ACRES
BECK LANDFILL
SCHERTZ, TX

PROJECT NO.: 311-653
AUGUST 29, 2022

## LEGAL DESCRIPTION

**BEING A 256.935 ACRE TRACT OF LAND OUT OF THE G. MALPAZ SURVEY NO. 67, ABSTRACT NO. 221, AND BEING A PORTION OF A CALLED 2.319 ACRE TRACT CONVEYED TO NIDO, LTD. PER DEED RECORDED AS DOCUMENT NO. 202299020104 OF THE OFFICIAL PUBLIC RECORDS OF GUADALUPE COUNTY, TEXAS (O.P.R.G.C.T.), AND BEING A PORTION OF A CALLED 35.079 ACRE TRACT CONVEYED TO NIDO, LTD. PER DEED RECORDED AS DOCUMENT NO. 202299020105, O.P.R.G.C.T., AND BEING OUT OF A CALLED 211.173 ACRE TRACT CONVEYED TO CIBOLO INDUSTRIES, INC. PER DEED RECORDED AS VOLUME 2340, PAGE 151, O.P.R.G.C.T., AND BEING OUT OF A CALLED 53 9/10 ACRE TRACT CONVEYED TO NIDO, INC. PER DEED RECORDED AS VOLUME 1561, PAGE 323, O.P.R.G.C.T.; SAID 256.935 ACRE TRACT BEING DESCRIBED MORE PARTICULARLY BY METES AND BOUNDS AND FOLLOWS:**

**COMMENCING,** for reference, at a 1/2 inch iron rod found at the common north corner of a called 2.1900 acre tract conveyed to Gail A. Hyatt per deed recorded as Document No. 2016-025197, O.P.R.G.T.C., and of said 2.319 acre tract, said point being on the southeasterly right-of-way line of Farm-to-Market Road 78 (right-of-way width varies);

**THENCE,** along the common line of said 2.319 acre tract and of said 2.1900 acre tract, S30°50'45"E, a distance of 197.85 feet to a calculated point for the **POINT OF BEGINNING** and most northerly corner hereof;

**THENCE,** , along the common line of said 2.319 acre tract and of said 2.1900 acre tract and then of a called 101.911 acre tract conveyed to Pecan Grove TX LLC per deed recorded as Volume 2822, Page 584, O.P.R.G.C.T., the following four (4) courses and distances:

1. S30°50'45"E, a distance of 150.09 feet to a found 1/2 inch iron rod;
2. S61°00'28"W, a distance of 90.10 feet to a found 1/2 inch iron rod;
3. S27°24'37"E, a distance of 469.98 feet to a calculated point;
4. S25°25'44"E, a distance of 164.51 feet to a 5/8 inch iron rod found at the common northeast corner of said 35.079 acre tract and of said 211.173 acre tract;

**THENCE,** over and across said 211.173 acre tract, and of said 59 9/10 acre, the following nineteen (19) courses and distances:

1. S29°54'42"E, a distance of 576.26 feet to a calculated point;
2. S25°55'56"E, a distance of 980.91 feet to a calculated point;
3. S12°27'09"E, a distance of 340.07 feet to a calculated point;

4. S07°11'04"E, a distance of 199.76 feet to a calculated point;
5. S31°41'11"E, a distance of 253.23 feet to a calculated point;
6. S41°41'06"E, a distance of 467.30 feet to a calculated point;
7. N47°35'44"E, a distance of 95.83 feet to a calculated point;
8. S50°42'54"E, a distance of 266.95 feet to a calculated point;
9. S72°29'53"E, a distance of 145.31 feet to a calculated point;
10. S65°19'43"E, a distance of 203.17 feet to a calculated point;
11. S61°38'55"E, a distance of 1,152.29 feet to a calculated point;
12. S26°42'29"W, a distance of 1,012.85 feet to a calculated point;
13. N73°48'41"W, a distance of 1,665.71 feet to a calculated point;
14. N62°59'43"W, a distance of 1,019.52 feet to a calculated point;
15. N69°39'15"W, a distance of 789.07 feet to a calculated point;
16. N78°46'42"W, a distance of 203.90 feet to a calculated point;
17. N68°38'56"W, a distance of 1223.90 feet to a calculated point;
18. N61°38'14"W, a distance of 236.81 feet to a calculated point
19. N06°45'43"W, a distance of 979.40 feet to a calculated point on the common line of said 211.173 acre tract and a called 3.099 acre tract conveyed to Angela Mazey per deed recorded as Volume 4149, Page 398, O.P.R.G.C.T.;

**THENCE,** along the common line of said 211.173 acre tract, and of said 3.099 acre tract and then of the southeasterly right-of-way line of Zuehl Street (50 foot wide right-of-way) N60°40'06"E, a distance of 744.28 feet to a calculated point at a common corner of said 211.173 acre tract and of that certain tract of land conveyed to Guadalupe Valley Electric Co-op per deed recorded as Volume 230, Page 593, O.R.G.C.T.;

**THENCE,** along the common line of said 211.173 acre tract, and of said Guadalupe Valley Electric Co-op tract, the following three (3) courses and distances:

1. S28°48'36"E, a distance of 142.35 feet to a calculated point;

2. N61°11'24"E, a distance of 47.60 feet to a found 1/2 inch iron rod;

3. N28°48'36"W, a distance of 142.79 feet to a 1/2 inch iron rod found on the southeasterly right-of-way line of Zuehl Street;

**THENCE,** along the common line of said 211.173 acre tract, and of the southeasterly right-of-way line of Zuehl Street, N60°40'06"E, a distance of 461.90 feet to a 5/8-inch iron rod found at the southeasterly corner of the intersection of Mill Street (right-of-way width varies) and of Zuehl Street, being the common corner of said 211.173 acre tract and of said 35.079 acre tract;

**THENCE,** along the common line of Mill Street and of said 35.079 acre tract, N28°45'36"W, a distance of 801.90 feet to a 1/2-inch iron rod found at the westerly common corner of a called 0.694 acre tract conveyed to Trang Van Le and Cam Ngoc Nguyen per deed recorded in Volume 1046, Page 330, O.P.R.G.C.T. and of said 35.079 acre tract;

**THENCE,** along the common line of said 35.079 acre tract, and of said 0.694 acre tract and then of a called 0.231 acre tract conveyed to Jane Davis-Toerner per Divorce Decree recorded as Document No. 10-0728-CV, O.P.R.G.C.T., the following two (2) courses and distances:

1. N61°38'03"E, a distance of 156.04 feet to a found 1/2-inch iron rod;

2. N21°38'34"W, a distance of 25.60 feet to a calculated point;

**THENCE,** over and across said 35.079 tract, N62°34'52"E, a distance of 1,547.18 feet to the **POINT OF BEGINNING,** and containing 256.935 acres (11,192,089 square feet) of land, more or less.

THE BASIS OF BEARING OF THIS SURVEY IS TEXAS STATE PLANE COORDINATE SYSTEM, CENTRAL ZONE, NSRS 2011(2012A), SOUTH CENTRAL ZONE, UTILIZING THE LEICA SMARTNET CONTINUALLY OPERATING REFERENCE NETWORK.

Witness my hand and seal this 29th day of August, 2022.

Sydney Smith Xinos, R.P.L.S. 5361
Civil & Environmental Consultants, Inc.
3711 S. MoPac Expressway, Building 1, Suite 550
Austin, TX 78746
Texas Registered Surveying Firm No. 10194419

STATE OF TEXAS
REGISTERED
SYDNEY SMITH XINOS
5361
PROFESSIONAL
LAND SURVEYOR

# ~~Attachment~~ Attachment 5 ~~f~~Facility ~~l~~Legal ~~d~~Description, ~~f~~Facility ~~m~~Metes and ~~b~~Bounds, and ~~o~~On-site ~~e~~Easements ~~d~~Drawing

Nido, LTD and Cibolo Industries, LTD are now the two legal entities owning all parcels within the permitted boundary for MSW Permit #1848A. The recently executed deeds are provided herein. The records at the Guadalupe County Appraisal District (GCAD) are still updating, so GCAD Maps do not represent the current ownership.

# ~~Attachment~~ Attachment 6 ~~v~~Verification of L~~l~~egal ~~s~~Status

## Verification of Legal Status (30 TAC §218.5 and §330.59(e))

Attach to this form verification of legal status. This may be a one-page certificate of incorporation (Certificate of Fact) issued by the Texas SOS. If providing an alternative document documenting legal status, attach that form instead. In addition, provide a list of all persons having over 20% ownership in this facility in the table below (attach additional pages as necessary):

**Nido LTD dba Beck Landfill:**

| Name | Title | Contact Information |
|---|---|---|
| Nido, LTD | Owner/Operator | 210-349-2491 |
| Cibolo Industries, LTD | Owner (landowner) | 210-349-2491 |

## Property Owner Affidavit – Cibolo Industries, LTD

Complete the form below. If the individual signing the affidavit is the property owner of record, enter the name on the "Printed Signatory Name" line only and omit the "Signatory Capacity" and "Printed Name of Property Owner of Record" lines. Otherwise, complete this form in its entirety.
For Landfill Facilities:

"I/We, ______________________, as __________________________________

(Printed Signatory Name) (Signatory Capacity)

As authorized signatory for ___________________________________________

(Printed Name of Property Owner of Record)

acknowledge that the State of Texas may hold me either jointly or severally responsible for the operation, maintenance, and closure and post-closure of the facility. For a facility where waste will remain after closure, I acknowledge that I have a responsibility to file with the county deed records an affidavit to the public advertising that the land will be used for a solid waste facility prior to the time that facility actually begins operating as a municipal solid waste landfill facility, and to file a final recording upon completion of disposal operations and closure of the landfill units in accordance with Title 30 Texas Administrative Code §330.19, Deed Restriction. I further acknowledge that I or the operator and the State of Texas shall have access to the property during the active life and post-closure care period."

_____________________________ ___________________________

(Property Owner Signature) (Date)

## Property Owner Affidavit – Nido, LTD

Complete the form below. If the individual signing the affidavit is the property owner of record, enter the name on the “Printed Signatory Name” line only and omit the “Signatory Capacity” and “Printed Name of Property Owner of Record” lines. Otherwise, complete this form in its entirety.
For Landfill Facilities:

“I/We, ______________________, as __________________________________

(Printed Signatory Name) (Signatory Capacity)

As authorized signatory for ___________________________________________

(Printed Name of Property Owner of Record)

acknowledge that the State of Texas may hold me either jointly or severally responsible for the operation, maintenance, and closure and post-closure of the facility. For a facility where waste will remain after closure, I acknowledge that I have a responsibility to file with the county deed records an affidavit to the public advertising that the land will be used for a solid waste facility prior to the time that facility actually begins operating as a municipal solid waste landfill facility, and to file a final recording upon completion of disposal operations and closure of the landfill units in accordance with Title 30 Texas Administrative Code §330.19, Deed Restriction. I further acknowledge that I or the operator and the State of Texas shall have access to the property during the active life and post-closure care period.”

_____________________________ ___________________________

(Property Owner Signature) (Date)

# Attachment 7 ~~e~~Evidence of ~~c~~Competency

Provide the below information per 30 TAC §330.59(f) as applicable to the facility (attach additional sheets as needed).

List of all Texas solid waste sites that the owner and operator have owned or operated within the last ten years:

| Site Name | Site Type | Permit/Reg No. | County | Dates of Operation |
|---|---|---|---|---|
| Beck Landfill | MSW Type IV | 1848A | Guadalupe | 1985-Now |
| | | | | |

List of all solid waste sites in all states, territories, or counties in which the owner and operator have a direct financial interest:

| Site Name | Location | Dates of Operation | Regulatory Agency (Provide Name and Address) |
|---|---|---|---|
| Beck Landfill | Guadalupe County | 1985-Now | TCEQ<br>12100 Park 35 Circle, Austin, TX |
| | | | |

Names of the principals and supervisors of the owner's and operator's organization, together with previous affiliations with other organizations engaged in solid waste activities.

| Name | Previous Affiliation | Other Organization |
|---|---|---|
| Ben Davis, Principal/Owner | 30+ years Beck Landfill, Nido, LTD (MSW Permit #1848A) | None |
| Ken McCarty, Principal/Owner | 30+ years Beck Landfill, Nido, LTD (MSW Permit #1848A) | Multi-Source Sand and Gravel Company, Ltd. |
| Lee McCarty, Principal/Owner | 30+ years Beck Landfill, Nido, LTD (MSW Permit #1848A) | Multi-Source Sand and Gravel Company, Ltd. |
| Grant Norman, Managing Director | 30+ years of waste industry and landfill operations experience<br><br>Beck Landfill, Nido, LTD (MSW Permit # 1848A) | Browning Ferris Industries<br>Type I Landfill: Industrial Waste and Landfill Operations<br><br>Waste Management<br>Type I Landfill: Industrial Waste Operations<br><br>Texas Disposal Systems<br>Type I Landfill: Environmental Management and Sales Management |

For landfill permit applications only, evidence of competency to operate the facility shall also include landfilling and earthmoving experience if applicable, and other pertinent experience, or licenses as described in 30 TAC 30 possessed by key personnel. The number and size of each equipment type to be dedicated to facility operation should be specified in greater detail on Part IV of the application within the site operating plan.

**Beck Landfill Equipment List**

| Equipment Description | Number of Units per CU Yards | | Equipment Size | Equipment Function |
|---|---|---|---|---|
| | ≤1.5 million cubic yards/year | >1.5 million cubic yards/year | | |
| Landfill compactor | 1 | 2 | Minimum weight of 50,000 pounds | Waste compaction and fire protection |
| Bulldozer | 1 | 1 | Caterpillar D6 or equivalent | Waste spreading, waste compaction, cover soil spreading, slope maintenance and fire protection |
| Excavator | 1 | 1 | Minimum weight of 20,000 pounds | Cover soil excavation, cell excavation, construction and fire protection |
| Front End Loader | 1 | 2 | John Deere 544 equivalent or larger | Loading of soil, fire protection, retrieval of recyclable materials and removal of non-conforming wastes from the working face, road maintenance |
| Dump Truck | 1 | 2 | Minimum heaped capacity of 10 cubic yards | Hauling of cover soil, hauling of excavated cell materials, and fire protection |
| Motor Grader/Maintainer | 1 | 1 | Minimum eight of 10,000 pounds | Site road maintenance, slope maintenance |
| Water Pump | 1 | 1 | 4" or 6" Pump | Removal of below grade stormwater and perched groundwater |
| Water Truck | 1 | 1 | Minimum 1,500-gallon tank capacity | Site maintenance, dust control, and fire protection |
| Sweeper | 1 | 1 | Minimum 4ft broom width | Site maintenance, hard surface sweeping, dust and mud control |

**Landfill Staffing Levels**

| Landfill Position | Name(s) | License/Certification and Expiration |
|---|---|---|
| Landfill Facility Manager (LFM) | Grant Norman | MWSOL MSW Operator A<br>No. SW0005998<br>Exp. 6/20/2023 |
| Landfill Supervisor (LS) | 1 | Working on Operator A licensing |
| Equipment Operators | 3 – 5 | N/A |
| Gate Attendants | 1 – 2 | N/A |
| Landfill Spotters | 2 – 5 | N/A |
| Other Personnel (laborers) | 1 – 3 | N/A |

# Attachment 8 ~~a~~Appointments

# Attachment 9 ~~a~~Application ~~f~~Fee (330.59(h))

# MUNICIPAL SOLID WASTE PERMIT

# MAJOR AMENDMENT

**Part II Application for Permit Amendment**

**(TAC Title 30 Rule §330.61)**

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: ~~September 2022~~September 2023*

Prepared by:

PROJECT NUMBER: 150051.05.01
PROJECT CONTACT: Julie Morelli
EMAIL: Julie.Morelli@powereng.com
PHONE: 210-951-6424

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# TCEQ Form 20885 ~~—~~ Application for M~~m~~SW Permit, Part II

## Attachment A~~a~~ Existing Conditions Summary (§330.61(a))

Beck Landfill is an existing Type IV landfill that is in operation at 550 FM 78 in Schertz, Guadalupe County, Texas. This facility was initially authorized in 1989 by the Texas Department of Health (TDH) in accordance with the design standards of the Municipal Solid Waste Management Regulations adopted in December 1986. The original Site Development Plan (hard copy only) includes the solid waste and design data required by Section 325.74, Technical Information Required for Landfill Sites Serving 5000 Persons or More. The TCEQ (formerly the Texas Natural Resource Conservation Commission (TNRCC)) took jurisdiction over Type IV Landfills in Texas in October 1993. Revisions to MSW regulations have occurred over time, the most significant of which occurred in 2006. Part IV of MSW Permit No. 1848A was modified to conform with relevant regulatory updates.

Necessary revisions to MSW Permit No. 1848A have occurred over time, and as a result, the applicant and TCEQ acknowledge that a formal update to the format of the permit will be useful for the successful operation and compliance tracking for the facility. We further acknowledge that this existing facility was constructed prior to the current site selection and design criteria. To the extent practicable, this application conforms with 30 TAC 330.61, as applicable.

At the time of the 1989 application to the TDH, the applicant documented that waste disposal was taking place “in the southwest end of the site, and in the northwest portion of the site. These areas contain the ancient fill from Randolph Air Force Base, and part of the fill which has been placed while operating under the "Grandfather Status" set out in the compliance letter from the Texas Department of Health Bureau of Solid Waste Management dated October 16, 1985.

# Attachment B Waste Acceptance Plan

# Attachment C Maps

## General Location Maps (§330.61(c))

A General Location Map has been prepared and are included as **Attachment C, Figures 2-1 through 2-8** of Part II of the application. These General Location Maps are provided in addition to those provided in Part I of the application and accurately show the following surrounding features:

- the prevailing wind direction with a wind rose;
- all known water wells within 500 feet of the proposed permit boundary with the state well numbering system designation for Water Development Board "located wells";
- all structures and inhabitable buildings within 500 feet of the proposed facility;
- schools, licensed day-care facilities, churches, hospitals, cemeteries, ponds, lakes, and residential, commercial, and recreational areas within one mile of the facility;
- the location and surface type of all roads within one mile of the facility that will normally be used by the owner or operator for entering or leaving the facility;
- latitudes and longitudes;
- area streams;
- airports within six miles of the facility;
- the property boundary of the facility;
- drainage, pipeline, and utility easements within or adjacent to the facility;
- facility access control features; and
- archaeological sites, historical sites, and sites with exceptional aesthetic qualities adjacent to the facility.

## Facility Layout Maps (§330.61(d))

Facility Layout Maps have been prepared and are included **Part III, Attachment D-1** of the application. A more general Facility Layout Map is provided as Figure 2-1 of this Section. These Facility Layout Maps accurately show the following surrounding features:

- the outline of the units;
- general locations of main interior facility roadways, and for landfill units, the general locations of main interior facility roadways that can be used to provide access to fill areas;
- locations of monitor wells;
- locations of buildings;
- any other graphic representations or marginal explanatory notes necessary to communicate the proposed construction sequence of the facility;
- fencing;
- provisions for the maintenance of any natural windbreaks, such as greenbelts, where they will improve the appearance and operation of the facility and, where appropriate, plans for screening the facility from public view;
- all site entrance roads from public access roads; and
- for landfill units:
    - sectors with appropriate notations to communicate the types of wastes to be disposed of in individual sectors;
    - the general sequence of filling operations;
    - sequence of excavations and filling;
    - dimensions of cells or trenches; and
    - maximum waste elevations and final cover.

## General Topo Maps (§330.61(e))

A General Topographic Map has is included as **Part I~~I~~, Attachment ~~C~~3, Figure 1-1B** of the application. This map is excerpted from a United States Geological Survey 7 1/2-minute quadrangle sheets or equivalent for the facility. The scale is at least one inch equals 2,000 feet.

## Aerial Photography (§330.61(f))

An Aerial Photograph is included in **Part I~~I~~, Attachment 3~~C~~, Figure 1-1C** of the application. This map is excerpted an aerial photograph approximately nine inches by nine inches with a scale within a range of one inch equals 1,667 feet to one inch equals 3,334 feet and showing the area within at least a one-mile radius of the site boundaries. The site boundaries and actual fill areas are marked.

## Land-Use Map (§330.61(g))

A Land-Use Map depicting the actual land-use within the facility and those properties within one-mile of the facility is included as **Part II, Attachment C, Figure 2-3.** As shown on the land-use map, Cibolo Creek flows roughly parallel to the southwestern, southeastern and a portion of the northeastern property line, and at some locations crosses into the facility property.

Samuel Clemens High School and Schertz Elementary School are shown to be located approximately 0.61 miles and 0.33 miles north of the facility, respectively. The Allison L. Steele Enhanced Learning Center, a drop-out prevention high school, is located approximately 0.42 miles northwest of the facility. Randolph Elementary School (Randolph Airforce Base), in Bexar County, is 0.78 miles southwest of the facility. Rose Garden Elementary School is located slightly southeast of the facility property boundary, approximately 0.51 miles.

Three cemeteries are located within one mile of the facility. Schneider Memorial Cemetery is the closest and abuts the northern portion of the northeastern facility property line. The Jacob Christian Seiler Cemetery and Seiler Cemetery are family cemeteries located approximately 0.17 and 0.42 miles, respectively, northeast of the northern portion of the facility. Five parks, Palm (0.18 miles) Cut Off (0.30 miles), Veterans (0.32 miles), Pickrell (0.49 miles) and Thulemeyer (0.72 miles), are located north and northwest of the facility. Randolph Airforce Base is located approximately 0.6 miles southwest of the facility boundary at its nearest point.

Nine church/chapel buildings were found to be located within one mile of the facility boundaries. Seven are located north of the facility, one to the northwest, and one lies to the southwest on Randolph Airforce Base. **Table C-1** listed the names of these churches/chapels, distance from the facility boundaries, and compass direction from the facility.

**TABLE C-1 COMMUNITY FEATURES WITHIN ONE MILE OF THE FACILITY BOUNDARY**

| CHURCH NAME | DISTANCE FROM FACILITY BOUNDARY IN MILES | COMPASS DIRECTION FROM FACILITY |
|---|---|---|
| Church of the First Born | 0.70 | Northwest |
| First Baptist Church of Schertz | 0.42 | North |
| Grace Community Center Bible Church | 0.06 | Southwest |
| New Covenant Family Church | 0.40 | North |
| Pentecostal Life Church | 0.2 | North |
| Randolph AFB Chapel | 0.96 | Southwest |
| Salvation and Deliverance Church of Texas | 0.14 | North |
| Schertz Church of Christ | 0.27 | North |
| The Vineyard Followship Church | 0.19 | North |

Four licensed daycare facilities are located within one mile of the landfill facility. These four day-cares are the First Baptist Church of Schertz listed in Table 2-1 above; the Brighter Futures Learning Center located approximately 0.95 miles northeast of the landfill facility; Mary's Little Lambs situated approximately 0.91 miles to the northwest, and A2Z Alphabet Alley Learning Center located approximately 0.19 miles northwest of the facility boundary.

# Attachment D~~d~~ Facility Impact and Existing Conditions (§330.61(h))

Beck Landfill operates the existing facility to avoid adverse impacts to human health or the environment. The following sections demonstrate both historical and forward-thinking information regarding likely impacts of the facility on cities, communities, groups or 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.

## Zoning and Governing Jurisdiction

The facility is in Guadalupe County adjacent to the county line shared with Bexar County, parts of which are within two miles of the facility. The facility property is now located entirely within the City of Schertz corporate limits which has local authoritative jurisdiction over the facility. Other than the City of Schertz, portions of the cities of Universal City and Cibolo are also located within two miles of the facility boundary.

The site was originally authorized by the Texas Department of Health in 1989. At that time, the Landfill was totally within Guadalupe County and the service area of the Cibolo Creek Municipal Authority. The site was only partially within the City of Schertz, Texas. The additional political boundaries of Bexar County and the partial corporate limits of Universal City and Cibolo were within one mile of the original Landfill boundary, as well as a large portion of Randolph Air Force Base. The City of Schertz was however the only local municipality having an authoritative jurisdiction relevant to the site.

The City of Schertz enacted zoning, in the form of "use districts", in the 1960's. Major revisions of the use districts have subsequently occurred in the 1970's and 1980's as corporate limits were extended. The Landfill, in general, was predominately zoned pre-development. A portion of the access road to this site was zoned general business. The balance of the site was not within the City of Schertz' city limits, and therefore, was not zoned. None of the above conditions restricted the site's use as a landfill.

As shown on the Schertz zoning map below, the facility property is zoned for heavy manufacturing (M-2). The frontage along FM-78, zoned "General Business" (GB) has been excluded from the permit boundary. Most of the properties within the City of Schertz located north of the landfill facility are zoned for residential, planned development or public uses. Some commercial use and pre-development zoned properties are interspersed with the residential zoned areas, but most are located along or near the corporate limits shared with Universal City, along Highway 78, F.M. 3009. Properties located within the City of Schertz corporate limits that lie south, east and west of the facility property are zoned mainly as residential, public use and pre-development with intermingled commercial zoned properties and non-zoned unincorporated properties. A large portion of a military installation, Randolph Air Force Base, falls within two miles of the western side of the facility property. A published zoning map for the base is not available.



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**Figure 2-3 City of Schertz Zoning Map (2022)**


1 City of Schertz Zoning Map (https://schertz.maps.arcgis.com/apps/webappviewer/index.html?id=1750bcfcad3642eeac482bddcbad3d91).

Zoned properties located within the corporate limits of the City of Cibolo lie within two miles east of the landfill facility. Most of the Cibolo properties are zoned for residential use. Much of the commercial and industrial zoned properties are located along Highway 78 between Borgfeld Road and E. Schaefer Road. Some agricultural zoned land is present south of E. Schaefer Road and adjoins Cibolo Creek. Those properties that lie within the corporate limits of Universal City and two mile west of the landfill facility are mostly zoned for residential use and open spaces. Commercial zoned properties are located mainly along FM 218 and Universal City Boulevard.

## Character of Surrounding Land Use within One Mile

The current character of the surrounding land use within one mile of the facility property can be described as follows:

- Land located north of Highway 78, which borders the northern most facility property line, is mainly use for residential purposes, parks/open spaces and civic services (e.g., schools, police department, fire department).

[1] The City of Schertz (arcgis.com)



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- South of Highway 78, the land is used mainly for agriculture and military (Randolph Airforce Base) uses with scattered residential and civic (school) uses.

## Growth Trends within Five Miles

The area within five miles of the facility boundary extends beyond the northern and western county lines of Guadalupe County into Bexar and Comal countries. Population growth projections specific to this five-mile coverage area are not available. Therefore, census data for the cities of Schertz, Cibolo and Universal City and the three referenced counties, as well as growth projections from a 2021 regional water plan were used to represent the potential population growth trend for the coverage area.
Census data for the years 2010 and 2020 and percent population increase for the cities of Schertz, Cibolo and Universal City and the counties of Guadalupe, Bexar and Comal are listed below in **Table D-1**. As shown on this table, the population within the three cities and all three counties did increase with the highest percent increase occurring with the City of Cibolo.

### TABLE D-1 2010 AND 2020 POPULATION

| CITY OR COUNTY | 2010 POPULATION | 2020 POPULATION | PERCENT INCREASE |
|---|---|---|---|
| Schertz | 31,465 | 42,002 | 33.5 |
| Cibolo | 15,349 | 32,276 | 110.3 |
| Universal City | 18,530 | 19,720 | 6.4 |
| Bexar | 1,714,773 | 2,009,324 | 17.2 |
| Comal | 109,472 | 161,501 | 47.5 |
| Guadalupe | 131,533 | 172,706 | 31.3 |

Population growth projections for Guadalupe, Bexar and Comal counties were obtained from the Texas Water Development Board (TWDB) 2021 South Central Texas Regional Water Plan. The population projections for these three counties are listed below in **Table D-2**. The projected population data listed in Table 2-3 indicates that a positive growth can be expected within the five-mile coverage area through the Year 2070.

### TABLE D-2 POPULATION PROJECTIONS

| COUNTY | PROJECTED POPULATION BY DECADE | | | | |
|---|---|---|---|---|---|
| | 2030 | 2040 | 2050 | 2060 | 2070 |
| Bexar | 2,231,550 | 2,468,254 | 2,695,668 | 2,904,319 | 3,094,726 |
| Comal | 193,188 | 234,515 | 276,239 | 317,682 | 357,464 |
| Guadalupe | 235,318 | 276,064 | 315,934 | 356,480 | 396,261 |

## Residential and Other Uses within One Mile of the Facility

Beck Landfill is an existing facility. The online mapping and screening tool, EJScreen, which is maintained by the US Environmental Protection Agency (USEPA) was used obtain information regarding the of residences within a one-mile radius of the facility. Based on that information, there are approximately 4,014 housing units within a mile of the facility. The nearest residence abuts the western

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side of the facility boundary near the entrance to the facility off Highway 78. The population density within the coverage radius is approximately 1,340 per square mile. Numerous commercial establishments are also present within one mile of the facility boundary. The nearest commercial business is the CEMEX Concrete Plant which is located at the northern portion of the facility property (co-located).  Other land uses (e.g., schools, cemeteries, churches) within the one-mile coverage radius and the proximity of the closest specific uses are as follows:

- Five schools of the Schertz-Cibolo-Universal City Independent School District are located within one mile of the landfill facility. The closest of these schools is Schertz Elementary School located approximately 0.33 miles north of the facility property. Other land uses (e.g., schools, cemeteries, parks) within the one-mile coverage radius and the closest
- Three family cemeteries are within one mile of the landfill facility. Schneider Memorial Cemetery is the closest and abuts the northern portion of the northeastern facility property line.
- Five parks are located to the north and northwest of the facility. The closest is Palm Park, a city park, that is within approximately 0.18 miles of the landfill boundary.
- A large area of Randolph Airforce Base is located approximately 0.6 miles southwest of the facility boundary at its nearest point. Most on the runway on the eastern side of the base is within the one-mile land use radius.
- Nine church/chapel buildings were identified to be present within one mile of the facility boundaries. Eight of the nine are located north of Highway 78. The ninth lies to the southwest on Randolph Airforce Base. The closest of these church buildings is Grace Community Center Bible Church, located approximately 0.06 miles southwest of the northern leg of the facility property.
- Four licensed daycare facilities were identified within one mile of the landfill facility. The closest day-care facility to the landfill is A2Z Alphabet Alley Learning Center, which lies approximately 0.19 miles to the northwest.

## Wells Within 500 feet

The online TWDB Groundwater Data Viewer and Texas Commission on Environmental Quality (TCEQ) Water Well Report Viewer were reviewed for information pertaining to existing water wells within 500 feet of the facility boundary. Two water wells were found to be within 500 feet of the facility boundaries. These wells are identified as 75’ feet and 55’ deep, respectively, for domestic water supply, in the Leona Formation, as noted in **Table D-3**, below.

### TABLE D-3     WATER WELLS WITHIN ONE MILE OF THE BECK LANDFILL BOUNDARIES

| TWDB WELL REPORT NUMBER | LOCATION | BORE DEPTH (FT.) | USE | AQUIFER NAME |
|---|---|---|---|---|
| 68306D | 29.550645°<br>-98.268163° | 75 | Domestic | Leona |
| 68314 | 29.555336°<br>-98.264186° | 55 | Domestic | Leona |

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# ~~ATTACHMENT~~ Attachment E TXDOT Coordination (§330.61(i)(4))

As an existing facility served by existing roadway infrastructure, the Beck Landfill does not anticipate the need for roadway improvements to FM-78 as part of this permit amendment. The Beck Landfill's management has coordinated with TxDOT and the City of Schertz regarding traffic and location restrictions for the facility and that no roadway improvements will be requested. Documentation of coordination with TxDOT and the City of Schertz are included with this submittal as **Attachment E**.

# Attachment ~~f~~F Airport Impacts and Coordination with FAA (§330.61(i)(5))

Beck Landfill re-evaluated the potential need for coordination and construction constraints with the United States Department of Transportation (DOT), Federal Aviation Administration (FAA) for the proposed alteration described in the 2020 Amendment. Airspace Designations are “A” to “G” where “A” is most restrictive. The nearest airspace to Beck Landfill is Randolph Air Force Base which has an Airspace “D” Designation, as noted in the Air Traffic Organization Policy, Subj: Airspace Designations and Reporting Points Order J.O. 7400-11C (Last Updated: August 13, 2018):

**ASW TX D San Antonio, Randolph AFB, TX**
San Antonio, Randolph AFB, TX
(lat. 29°31'47"N., long. 98°16'44"W.)

That airspace extending upward from the surface to and including 3,300 feet MSL within a 4.4-mile radius of Randolph AFB excluding that airspace within the San Antonio International Airport, TX, Class C airspace area. This Class D airspace area is effective during the specific dates and times established by a Notice to Airmen. The effective date and time will thereafter be continuously published in the Airport/Facility Directory.

**AMENDMENTS 06/23/94 59 FR 24344 (Revised)**
https://www.faa.gov/documentLibrary/media/Order/JO_7400.11C.pdf
Additional information regarding Class D Airspace was reviewed in Title 14 Chapter I Subchapter E Part 71 Subpart D—Class D Airspace:

**§71.61 Class D airspace.**
The Class D airspace areas listed in subpart D of FAA Order 7400.11C (incorporated by reference, see §71.1) consist of specified airspace within which all aircraft operators are subject to operating rules and equipment requirements specified in part 91 of this chapter. Each Class D airspace area designated for an airport in subpart D of FAA Order 7400.11C (incorporated by reference, see §71.1) contains at least one primary airport around which the airspace is designated.

An Obstruction Evaluation / Airport Airspace Analysis (OE/AAA) is required for proposed off-airport construction or alteration to promote air safety and efficient use of the navigable airspace. The affecting regulations included 14 CFR Part 77, Advisory Circular 70/7460-1L Change 2 (re: obstruction marking and lighting), and Forms 7460-1 and 7460-2. Forms will be submitted electronically through this website: NEW USER REGISTRATION

The requirements for filing with the Federal Aviation Administration for proposed structures vary based on a number of factors: height, proximity to an airport, location, and frequencies emitted from the structure, etc., In accordance with 14 CFR Part 77.9, Beck Landfill filed notice with the FAA on June 21, 2022. Aeronautical Study Number(s) (ASN): 2022-ASW-13343-OE, 2022-ASW-13344-OE, 2022-ASW-13345-OE, and 2022-ASW-13342-O have been assigned. An approved FAA study is required for construction of surface extending outward and upward at any of the following slopes:



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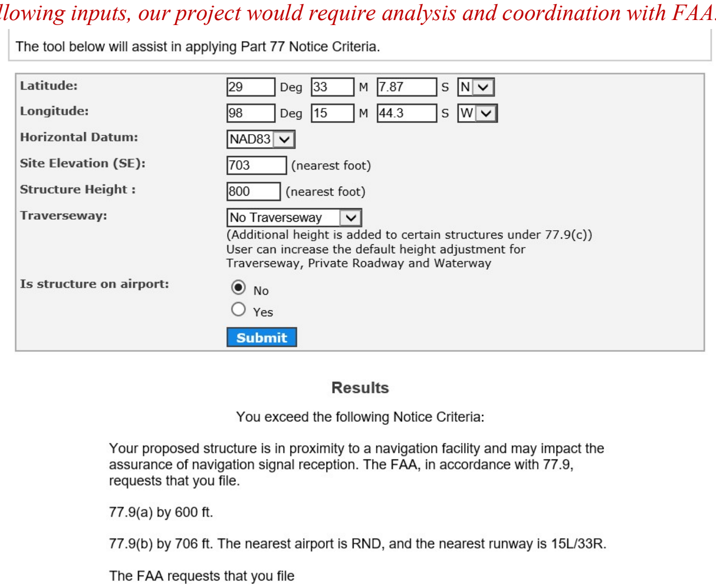
- 100 to 1 for a horizontal distance of 20,000 ft. from the nearest point of the nearest runway of each airport described in 14 CFR 77.9(d) with its longest runway more than 3,200 ft. in actual length, excluding heliports
- 50 to 1 for a horizontal distance of 10,000 ft. from the nearest point of the nearest runway of each airport described in 14 CFR 77.9(d) with its longest runway no more than 3,200 ft. in actual length, excluding heliports
- 25 to 1 for a horizontal distance of 5,000 ft. from the nearest point of the nearest landing and takeoff area of each heliport described in 14 CFR 77.9(d)

Beck Landfill has conducted an in-person interview with Randolph Air Force Base and obtained site-specific constraint requirements and will conform with these requirements. A figure depicting the FAA constraints is provided as **Attachment F**.

*NOTE: An online tool is available to facilitate an initial review of potential to obstruct. Based on the following inputs, our project would require analysis and coordination with FAA.*


The tool below will assist in applying Part 77 Notice Criteria.

| | |
|---|---|
| **Latitude:** | 29 Deg 33 M 7.87 S N |
| **Longitude:** | 98 Deg 15 M 44.3 S W |
| **Horizontal Datum:** | NAD83 |
| **Site Elevation (SE):** | 703 (nearest foot) |
| **Structure Height :** | 800 (nearest foot) |
| **Traverseway:** | No Traverseway (Additional height is added to certain structures under 77.9(c)) User can increase the default height adjustment for Traverseway, Private Roadway and Waterway |
| **Is structure on airport:** | (•) No ( ) Yes |
| | Submit |

**Results**

You exceed the following Notice Criteria:

Your proposed structure is in proximity to a navigation facility and may impact the assurance of navigation signal reception. The FAA, in accordance with 77.9, requests that you file.

77.9(a) by 600 ft.

77.9(b) by 706 ft. The nearest airport is RND, and the nearest runway is 15L/33R.

The FAA requests that you file

*NOTE: Following the Analysis of the potential to obstruct airspace for the offsite airport construction, coordinate with the FAA representative of their state and region. Randolph AFB is in the Central Texas Region and the contacts provided by FAA* (https://oeaaa.faa.gov/oeaaa/external/public/aorMap.jsp) *are below:*

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Air Traffic State Contacts for Texas - Central - Internet Explorer

https://oeaaa.faa.gov/oeaaa/external/public/aorDetails.jsp?aorID=66

| Air Traffic Contacts for Texas - Central | | | |
|---|---|---|---|
| **Position** | **Name** | **Email** | **Telephone** |
| Technician | Patterson, Kenneth | kenneth.ctr.patterson@faa.gov | (817) 222-5935 |
| Specialist | Shoulders, Chris | chris.shoulders@faa.gov | (817) 222-5929 |
| Crane Specialist | Shoulders, Chris | chris.shoulders@faa.gov | (817) 222-5929 |

| Air Traffic Wind Turbine Contacts for Texas - Central | | | |
|---|---|---|---|
| **Position** | **Name** | **Email** | **Telephone** |
| Technician | Rosgen, Tracy | tracy.rosgen@faa.gov | (424) 405-7644 |
| Specialist | Kieffer, Bill | bill.kieffer@faa.gov | (816) 329-2526 |
| Backup Technician | Rosgen, Tracy | tracy.rosgen@faa.gov | (424) 405-7644 |

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As a facility located within 10,000 feet of an airport runway end utilized by turbojet aircraft, the Beck Landfill maintains operations such that bird hazards to arriving and departing aircraft are not created. The waste accepted for disposal at the Beck Landfill is Type IV, non-putrescible waste only. No putrescible wastes that may serve to attract birds to the facility are accepted for disposal at the Beck Landfill. Putrescible wastes including general plant trash and lunch wastes that are generated on-site are managed through the strict requirement for employees to dispose of such wastes in covered and regularly emptied waste receptacles for off-site disposal. Employees are provided regular training on good housekeeping practices, including the proper management of wastes on-site. The Beck Landfill provide notice of the proposed vertical expansion to all airports within a six-mile radius as indicated on **Part II, Attachment C, Figure 2-2.**

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# Attachment G~~g~~ General Geology and Soil Statement (§330.61(j))

General geology and soils were originally discussed in several sections of the Snowden, 1989 permit application, including the Geotechnical Investigation in Attachment 11 and Soils Section (Snowden, 1989). Attachment 11 is included in **Part III, Attachment** ~~G~~ E of this amendment application. Supplemental geotechnical borings were drilled at the southern and northern ends of the landfill site during two separate investigations in 2020 (see **Part III, Attachment D5- Geotechnical Reports**). The principal findings of these investigations regarding site geology, soil stratigraphy, and soil properties are summarized below.

## General Geology

A review of historical and supplemental geotechnical information identified strata having characteristics matching the Pleistocene-age fluviatile terrace deposits overlying the undivided Cretaceous-age Navarro Group and Marlbrook Marl strata. Several of the geotechnical borings also penetrated discontinuous strata that may be Leona Formation deposits, or possibly basal terrace deposit beds.

The general area encompassing the project site is situated upon an alluvial deposit overlying shale of the Navarro and Taylor Formations. According to the Geologic Database of Texas, the Beck Landfill is wholly situated on an outcrop of Pleistocene Series fluviatile terrace deposits (Qt)[2]. These terrace deposits are comprised of gravel, sand, silt, and clay that were laid down as point bars, oxbows, and abandoned channel segments in low terrace deposits mainly above flood level along entrenched streams. The Pleistocene Series terrace deposits overlie the older Pleistocene Series Leona Formation, which outcrops adjacent to the terrace deposits near the landfill site. Calcareous silt that grades down into coarse gravel make up the Leona Formation. Where the Leona Formation was removed by erosion prior to fluviatile terrace deposition, the terrace deposits directly overlie the undivided Cretaceous Series Navarro Group and Marlbrook Marl (upper Taylor Group). The Navarro Group and Marlbrook Marl strata are comprised of marl, clay, sandstone, and siltstone. The undivided Navarro and Marlbrook outcrop several miles south, east and west of the landfill site (See **Part III, Attachment E – Geology Report Figure 3-1**).

The stratigraphy is extremely variable within the Alluvial Deposit and somewhat variable in the Navarro and Taylor Deposits due to historic erosion of Cibolo Creek. The lithologies and corresponding formations initially encountered at the Beck Landfill site are as follows. The sand and gravel deposits are removed at the time of this application and waste placement has occurred within the active permit footprint of the landfill.

| Formation or Group Name | Depth Range in Feet[3] | Lithology |
|---|---|---|
| Pleistocene Series Fluviatile Terrace Deposits | 0 to 38 | High Plasticity Clay, Low Plasticity Clay and Sandy Clay, Clayey Sand and Clayey Gravel |
| Pleistocene Series Leona Formation | 20 to 35 | Clayey Gravel |

[2] USGS, Texas Geology Web Map Viewer. Accessed online at txpub.usgs.gov/txgeology/ on June 5, 2020.
[3] Below ground surface



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| Formation or Group Name | Depth Range in Feet[3] | Lithology |
|---|---|---|
| Cretaceous Series Navarro Group and Marlbrook Marl | 0 to 50+ | High Plasticity Clay, Low Plasticity Clay and Clay-Shale |

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## Soil Information

The landfill sits within Black Land Prairie which is the beginning of the Coastal Plains that extend from Mexico into New England. According to the Web Soil Survey of the Natural Resources Conservation Service (NRCS), soils underlying the landfill include the following:

- Sunev loam 0 to 1 percent slopes – the majority of the landfill was underlain by these soils, though nearly all removed as result of operations.
- Barbarosa silty clay, 0 to 1 percent slopes – located north of the landfill embankment dike.

The following soils are primarily located adjacent to the Cibolo Creek.

- Lewisvile silty clay, 0 to 1 percent slopes
- Patrick soils, 1 to 3 percent slopes, rarely flooded
- Tinn and Frio soils, 0 to 1 percent slopes, frequently flooded
- Bosque and Seguin soils, frequently flooded

The National Hydric Soil List and Web Soil Survey identifies the soil map unit Bosque and Seguin soils, frequently flooded (BO) as having the potential to contain hydric soil components. This soil map unit is mapped in association with an NHD-mapped stream adjacent to and within the Cibolo Creek. **Figure 2-8** contains a graphic representation of the soils mapped with the permit boundary.

## Geologic Fault Assessment

The Beck Landfill site is located along the extreme southeastern edge of the northeast trending Balcones Fault Zone. The Balcones Fault Zone is generally comprised of a series of slip-drip normal faults with downward displacements to the southeast. Movement along these faults has displaced the Cretaceous-age strata outcrops within the general area of the Beck Landfill site. Movement along Balcones faults occurred primarily during the Miocene Epoch.

According to the Bureau of Economic Geology San Antonio Sheet, no mapped Balcones faults are located within or within 200 feet of the Beck Landfill. The nearest mapped fault is located approximately 1.5 miles to the northwest with a northeast-southwest trend. However, a fault located about 3 miles northeast of the landfill site does trend towards the southern end of the Beck Landfill. The southwestern extent of this fault has not been mapped due to the deposition of Quaternary-age sediments over the faulted Cretaceous formations covering any surficial evidence of fault line (**see Part III, Attachment E,**

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**Figure 3-4**). A review of the USGS Quaternary Fault and Fold Database[4] using the agency's Quaternary Faults Web Application found no reported Holocene displacement of faults within the Balcones Fault System.

~~Prior to construction, a~~A geologic fault assessment was performed at the initial permitting action and again in 2023 for the landfill site ~~in accordance with subparagraph 325.74(b)(5)(J)~~to conform with 30 TAC 330.555 of the Municipal Solid Waste Management Regulations. The work involved during the conduct of this study includes the following elements:

1. Review of geologic literature documenting surface fault evidence;
2. Analysis of topographic and subsurface structure contour maps for geomorphic features which are resultant of the manifestation of fault activity;
3. Site general area reconnaissance to locate physical evidence of distress which may be caused by fault activity; and
4. Preparation of a report presenting our findings and opinions based on the data obtained above (Snowden Attachment 11).

As any faulting would be associated with the inactive Balcones System, no movement associated with faults should be anticipated in the area of the landfill site. A joint trend as theorized in Snowden's Attachment 11 and as described therein would likewise have no effect upon the landfill substructure.

## Analysis

The topographic map (one-foot contour) was analyzed to identify geomorphic features often associated with faulting. These features include minor topographic scarps, aligned drainage, or aligned natural ponds. None of these features were recognized within and surrounding the project site due to the overlying mantle of Alluvial Deposits.

A reconnaissance of the proposed Type IV landfill site and the surrounding area was performed to document physical evidence of possible geologic fault activity. Area roads were examined for pavement breaks. Building structures were examined for structural damage, and drainage ditches and area streams were examined for features which might be fault-related. No evidence of surface displacements which could be related to fault activity were identified within the site or the immediate surrounding area.

## Conclusion

Assessment of this site based on our professional evaluation, geologic data gathered and experience with fault related features, indicates general geologic conditions favorable to development as a landfill site. Along with the proposed slurry trench design the site should be capable of development into an adequate

[4] USGS Quaternary Faults Web Application accessed online at usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf on April 13, 2021



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Type IV Landfill. The geologic evaluations rendered in this report meet the standard of care of our profession. No other warranty or representation, either expressed or implied, is included or intended.

## Seismic Impact Zones (§330.557)

30 TAC 330.557 defines a seismic impact zone as an area with a 10% or greater probability that the maximum horizontal acceleration in lithified earth material, expressed as a percentage of the earth's gravitational pull, will exceed 0.10g in 250 years. A review of the 2018 National Seismic Hazard Model for the conterminous United States found that the Beck Landfill site is not located in an area having a 10% or greater probability that the peak horizontal acceleration will exceed 0.10g. Additionally, the Beck Landfill is located within an area of the State where Holocene displacement of faults has not occurred.

The image below depicts the Federal Emergency Management Agency (FEMA) Earthquake Hazard Map of the W~~w~~estern United States, include Guadalupe County. The Beck Landfill is located within Zone A with a "very small probability of experiencing damaging earthquake effects", as noted by the blue triangle below. See **Part III, Attachment G, Figure 3-8** for the FEMA National Risk Index Map for earthquakes.~~he Federal Emergency Management Agency (FEMA) Earthquake Hazard Map of the Western United States, include Guadalupe County. The Beck Landfill is located within Zone A with a "very small probability of experiencing damaging earthquake effects", as noted by the blue triangle below. See Part III, Attachment G, **Figure 3-8** for the FEMA National Risk Index Map for earthquakes.~~

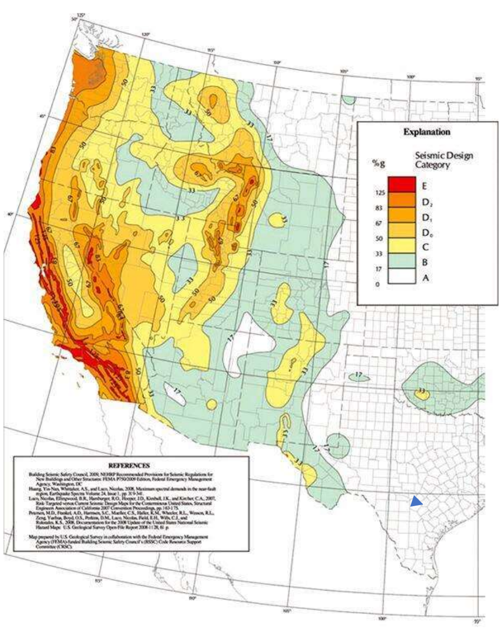


Image from "fema_hazard_maps_western-map_graphic.jpg (600×744)"

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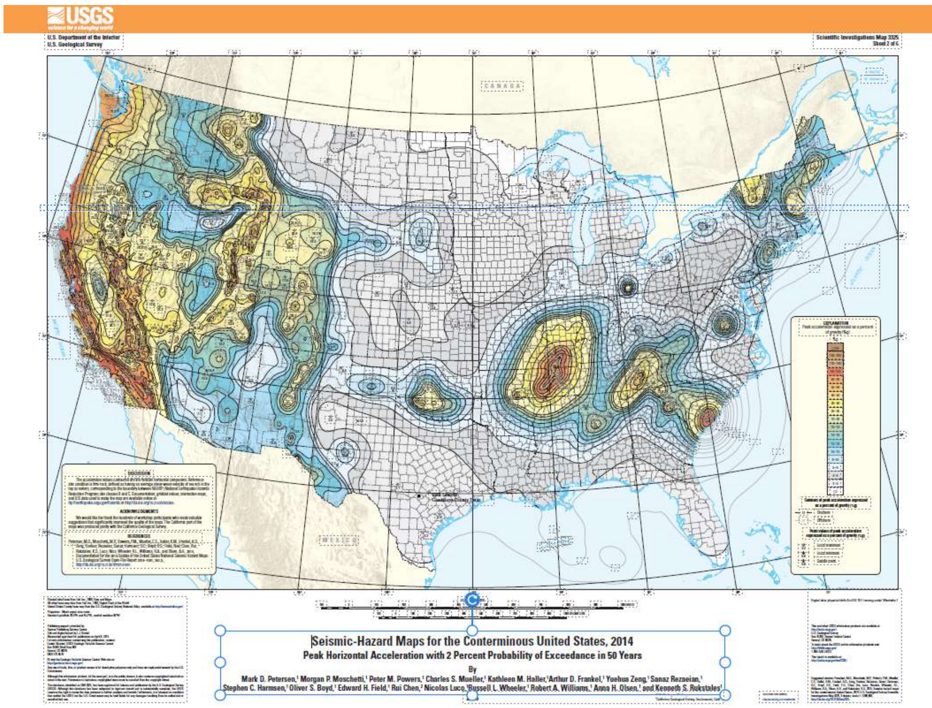
In addition, the USGS Seismic Hazard Maps for the Coterminous United States depict the probabilistic seismic-hazard from 2014 portraying peak horizontal acceleration and horizontal spectral response acceleration for 0.02 and 1.0-second periods with probabilities of exceedance of 2 percent in 50 years and 2 percent in 50 years. Based on Sheet SIM3325-sheet 2[5] (image below) the Beck Landfill is mapped in a peak horizontal acceleration zone of 2-4% within the Horizontal Acceleration with 2% probability exceedance in 50 years. Therefore, the Beck Landfill does not appear to be at seismic risk.

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## Data on Unstable Areas (§330.559)

30 TAC 330.559 defines an unstable area as a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all of a landfill's structural components responsible for preventing releases from the landfill. Unstable areas can include poor foundation conditions, areas susceptible to mass movement, and karst terrains. The owner or operator shall consider the following factors, at a minimum, when determining whether an area is unstable:

(1) on-site or local soil conditions that may result in significant differential settling;

[5] Seismic-Hazard Maps for the Conterminous United States, 2014 Peak Horizontal Acceleration with 2 Percent Probability of Exceedance in 50 years (usgs.gov)

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(2) on-site or local geologic or geomorphologic features; and
(3) on-site or local human-made features or events (both surface and subsurface).

The Beck Landfill excavates through Pleistocene-age terrace deposits (clay, sand and gravel) and into the undivided Cretaceous-age Navarro Group and Marlbrook Marl, which consist of clay and shale material (impermeable). No on-site geologic or geomorphologic features have been observed. No on-site or local human-made features or events are observed to have created unstable conditions. The Beck Landfill does not appear to meet the definition of an "unstable area".



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# Attachment H~~h~~ Groundwater and Surface Water (§330.61(k))

## Site Specific Groundwater Conditions

The uppermost groundwater-bearing unit at The Beck Landfill is encountered within the Pleistocene Series Leona Formation. The undivided Cretaceous Series Marlbrook Marl and Navarro Group are not known to produce groundwater within Guadalupe County (see **Part III, Attachment E - Geology Report**). Groundwater Detection monitoring events have been conducted in accordance with the requirements of MSW Permit No. 1848A since August 2000. Based on a review of the historical detection monitoring water level measurement record and water level observations recorded on landfill geotechnical boring logs, it appears that the uppermost groundwater-bearing unit is in an unconfined condition. Evaluation of the historical detection monitoring water level measurements and historical rainfall events found that groundwater levels in the uppermost unit are highly influenced by rainfall amounts and the fluctuation of water levels within the adjacent Cibolo Creek. This finding strongly suggests that the uppermost unit is hydraulically connected to the creek and that Cibolo Creek may receive discharge from the uppermost groundwater-being unit (effluent stream).

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Generally, groundwater flow is from the northwest to southeast towards Cibolo Creek further supporting the likelihood that groundwater from the uppermost unit discharges to the creek. Five monitor wells (MW) are installed at Beck Landfill. Due to the southerly groundwater flow direction and depth to groundwater being shallowest at MW-A and deepest at MW-F, annual detection monitoring events begin at ~~rotate around the landfill from~~ MW-A , moving counterclockwise around the Landfill (MW-C, MW-D, MW-F, and MW-G) ~~and then in a counterclockwise direction~~. Monitor wells are depicted in **Part III, Attachment D1, Figure D1**.1 Site Layout Plan. Average historical well readings from the five monitor wells indicate that the average saturated thickness within the groundwater-bearing unit at the monitor wells ranges from approximately 5 feet to approximately 11 feet. Monitor wells MW-F and MW-G typically purge "dry" before three well volumes can be removed. However, recharge occurs within 24 hours such that sample volumes are typically obtained as required. This slow recharge rate suggests that the hydraulic conductivity of the uppermost unit variable across the site and possibly low. Historical water-level elevations at the Beck Landfill are presented in **Part III, Attachment F** of this application.

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## Surface Water at or near the Site

The Beck Landfill is surrounded to the west, south, and east by the Mid Cibolo Creek (TCEQ Stream Segment ID. No. 1913). The Mid Cibolo Creek flows from a point 100 meters (110 yards) downstream of IH-10 in Bexar/Guadalupe County to the Missouri-Pacific Railroad bridge west of Bracken in Comal County. This perennial, freshwater stream is not listed as impaired on the EPA-approved 2020 Texas Integrated Report Index of Surface Water Quality. Aquatic life use (ALU) is defined as "limited".

## TPDES Stormwater Permits

The Beck Landfill has an active Texas Pollutant Discharge Elimination System (TPDES) Multi-Sector General Permit (MSGP) that authorizes discharges of stormwater associated with industrial activities. A site-specific Stormwater Pollution Prevention Plan (SWPPP) has been written and is implemented at the Facility. Sector-specific compliance practices are described for Sector L (Activity Code LF: Landfill) and Sector J (SIC Code 1442: construction sand and gravel). The Permit No. is **TXR05AW45**. Upon expiration, Beck Landfill will renew its authorization by submitting required documentation to the TCEQ. Copies of the SWPPP and permit correspondence are maintained at the Landfill and are available upon request.

Stormwater that comes in contact with solid waste will be treated as contaminated water and will be retained on-site. This water may be used as dust suppression on within the landfill working face but will not be applied in areas where solid waste is not exposed.

Stormwater that falls within the future excavations, outside of the dikes below the active waste, will be treated as uncontaminated stormwater and be diverted to site drainage systems and ultimately used for dust control on areas of the site where solid waste is not exposed, such as haul roads and within the sand and gravel mining operation footprint.

This permit amendment represents a vertical change within the existing landfill footprint on-site and no exceedances of state water quality standards, applicable effluent limitations, or non-compliances under the Clean Water Act are anticipated.

# Attachment I Abandoned Oil and Water Wells (§330.61(l))

As noted in the original application for this permit, the Texas Department of Health (TDH) guidelines for drinking water protection stated that water wells located within 500 feet of actual disposal areas should be evaluated to show that adequate protection to drinking water sources is provided. Texas Water Commission records indicate ~~no~~ there are two (2) water wells ~~to exist~~ known to have been located within 500 feet of the proposed disposal site: Well No. 683006D and Well No. 683014.

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[6]Well No. 683006D was drilled May 1, 1965 for Mack Kardys of 308 2nd Street, Schertz, Texas. The well bore was 8.5 inches to a total depth of 75 feet into blue shale. Casing was set to 56 feet and perforated casing from 28-52 feet by Kutscher Drilling Company, Registration No. 635. This well produced 35 gallons per minute for personal use.

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Well No. 683014 was drilled March 21, 1986 for H.J. Herb of Rt. 3, Box 147 J, Cibolo, Texas. The well bore up to 6.75 inches to a total depth of 45 feet into clay. Casing was set to 45 feet and perforated casing from 29 to 45 feet by Deharde's W.W. Service, Registration No. 2328. This well produced 15 gallons per minute for domestic use. No records of plugging or abandonment have been found.

At the time of initial permitting, two recorded water wells Kx 68 - 30 6A and Kx 68 - 30 - 9A were known to be completed in Alluvial Aquifers similar to that anticipated at this site but each were located on the opposite side of Cibolo Creek which creates a hydraulic divide within the aquifer water system. Water wells within approximate 1000-foot radius at the time of application included Kx 68 - 30 - 603 completed in September 1956 producing from the Edwards Aquifer at depths of' 535 to 550 feet.

Interconnection with the Edwards Aquifer is precluded by the Navarro/Taylor shales. The review of other water wells within a one-mile radius of the site indicates one additional alluvial well and several municipal Edwards wells. The landfill operation is not expected to endanger the water supplies of any existing wells due to the differing aquifers and the divide created by Cibolo Creek.

The municipal waters for each of the surrounding Municipalities, including Randolph Air Force Base, are derived from Edwards Aquifer wells. All of the municipal wells with the exception of Randolph's wells, are in excess of three miles upgradient from the landfill site. Randolph's wells are located just beyond a one-mile radius in an upgradient segment of the Edwards Aquifer. The intake of surface waters intended for human consumption does not occur within any reasonable proximity to the site. The nearest application of surface waters for such purposes occurs at New Braunfels and Seguin each approximately 15 miles from the site along the Guadalupe River.

Sources of drinking water should thus in no way be impacted by the landfill development. The Alluvial Aquifer is further considered adequately protected by naturally occurring characteristics and the application of the slurry trench wall.

[6] ~~(Appendix A of Attachment 11 Geotechnical Investigation, 1989 – see **Part III, Attachment G**)~~

## On-Site Oil or Water Wells

The locations of all existing and abandoned wells have been re-evaluated for this amendment application. A current list of identified existing and abandoned wells near the Beck Landfill is depicted in **Table I-1** below. The on-site wells are utilized for groundwater quality monitoring in accordance with the existing MSW permit. No other active or historical wells within the Beck Landfill facility are depicted on the Texas Water Development Board (TWDB) Groundwater Data Viewer (TWDB, accessed June 8, 2020).

## TABLE I-1 – WATER WELLS AT THE BECK LANDFILL

| WELL | USE | LATITUDE AND LONGITUDE |
|---|---|---|
| MW-A | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.548880°, -98.268411° |
| MW-C | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.544524°, -98.265643° |
| MW-D | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.543768°, -98.258393° |
| MW-F | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.547263°, -98.260227° |
| MW-G | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.551674°, -98.262166° |
| Piezometer A | Groundwater monitoring of leachate inside of the landfill dike-line | 29.548868°, -98.268394° |
| Piezometer C | Groundwater monitoring of leachate inside of the landfill dike-line | 29.544557°, -98.265645° |
| Piezometer D | Groundwater monitoring of leachate inside of the landfill dike-line | 29.543796°, -98.258427° |
| Piezometer F | Groundwater monitoring of leachate inside of the landfill dike-line | 29.547273°, -98.260264° |
| Piezometer G | Groundwater monitoring of leachate inside of the landfill dike-line | 29.551662°, -98.262213° |

No existing or abandoned on-site crude oil, natural gas wells, or other mineral recovery infrastructure regulated by the Railroad Commission of Texas (TXRRC) are present on-site (TRRC Public GIS Viewer, accessed June 8, 2022).

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# Attachment J~~i~~ Floodplains and Wetland Statement (§330.61(m))

At the time of application, the minimum required separating distance of 50 feet to be maintained between disposal operations and the boundary of the site to allow area for visual screening (it needed), surface drainage facilities, flood protection facilities, and a safety margin for methane gas and leachate monitoring will, in most cases, actually be exceeded due to the location of the flood protection levees. Upon completion of the landfill, the access roads will be widened, it necessary, onto completed portions of landfill. A minimum 3.5-foot tall barbed wire fence, or higher barrier marking the site perimeter, will be installed and maintained by the landfill supervisor, after construction of the dike.

A buffer zone of 200 feet, from the center line of the dike, is used parallel to Zuehl Street. This zone is deemed adequate as the 100-year flood plain dike to be constructed and the existing vegetation will totally screen the operation. In addition, the area in question is the area of long existing fill which the department is requiring be encapsulated and protected by the trench. It seems therefore reasonable that as fill already exists at a distance of less than 300 yards and prevents construction of the encapsulation trench and dike any further from Zuehl Street, a variance needs to be granted waving the required 300 yard buffer set out in the regulations, Section 325.42(4), and is so requested of the TDH (*excerpted from "Buffer Zones" (Snowden, 1989)*.

## Buffer Zones

No solid waste unloading, storage, disposal, or processing operations are anticipated to impact buffer zones, easements, or rights-of-way on-site. This permit amendment represents a vertical change within an existing landfill footprint on-site that does not cross these features. All on-site landfill activities will continue to be conducted within the existing landfill footprint.

## Floodplains

Data associated with floodplains in accordance with Chapter 301, Subchapter C of this title (relating to Approval of Levees and Other Improvements are reviewed and addressed in **Part III, Attachment C-2** of this Application.

# Attachment Kk Wetlands

An on-site field investigation to identify surface waters and wetlands and to assess their potential for regulation as waters of the United States (WOTUS), was conducted on September 27 and 28, 2021. No impacts to wetlands or WOTUS regulated by the U.S. Army Corps of Engineers (USACE) are anticipated as a result of this vertical expansion and permit modification. Results of a literature review and field survey are included in **Attachment L** to this Part.

## Attachment L Endangered or Threatened Species (§330.61(n))

As noted in the original application (*"Protection of Endangered Species" (Snowden, 1989),* the existence of any listed or proposed endangered species in the general area of the landfill is not anticipated. Migratory foul and other animals utilizing the creek system as a habitat corridor are however occasionally reported in the proximity of the site. The development of the proposed landfill is not anticipated to have any adverse effect on the existing wildlife.

A review of the U.S. Fish and Wildlife Service (USFWS) Information for Planning and Consultation was (IPaC) tool was performed on December 29, 2021. An on-site field investigation by qualified biologists was conducted on September 27 and 28, 2021. Based on the background literature review and the on-site field investigation, suitable habitat for federally listed species was observed for one species: the monarch butterfly. As a candidate species, the monarch butterfly does not currently have protections under the Endangered Species Act. The Project occurs within the primary migration corridor for the whooping crane, however, suitable habitat for the whooping crane, as well as other federally-listed bird species, was not observed during the on-site investigation. The ability of federally-listed birds to migrate through the Project Area is possible, however, these species are not anticipated in the Project Area due to the lack of suitable habitat.

No impacts listed threatened or endangered species nor their habitat are anticipated as a result of this vertical expansion (permit modification). See **Attachment L** to this Part for the full report.

# Attachment M Texas Historical Commission Review (§330.61(o))

## Historic Sites and Cultural Resources

On January 14, 2022, POWER performed a file review to identify cultural resources recorded within and near the Project Area. The file review included data from the online restricted-access Texas Historical Commission's Texas Archeological Sites Atlas and Texas Historic Sites Atlas (THC 2022a and 2022b); National Park Service databases (NPS 2022a and 2022b); and the Texas Department of Transportation's NRHP Listed and Eligible Bridges database (TxDOT 2022a) and Historic Districts and Properties of Texas database (TxDOT 2022b). No cultural resources are recorded within or adjacent to the Project. The nearest recorded cultural resources, archeological site 41BX565 and the Rittiman Addition Cemetery are 435 feet and 135 feet, respectively, from the Project boundary.

Due to the lack of cultural resources recorded within the Project, POWER concludes the Project will have no effect on known cultural resources. However, the Project has not undergone a cultural resources survey. A survey may be required if Project permitting requires compliance with Section 106 of the National Historic Preservation Act or the Texas Antiquities Code. If cultural resources are encountered during construction of the Project, all activities at the location should be halted until the Texas Historical Commission is notified and an appropriate course of action is determined. See **Attachment M** to this Part for the full report.

# Attachment N — Council of Governments and Local Government Review (§330.61(p))

## Alamo Area Council of Governments (AACOG)

Parts I and II of this application were submitted to AACOG on September 12, 2022. A review letter was requested as part of the submission. A response has not been received as of the submittal of this application. Records of correspondence with AACOG are included in **Attachment N** of this application.

## City of Schertz Approval Letter

Parts I and II of this application were submitted to the City of Schertz on September 12, 2022. A review letter was requested as part of the submission. A response has not been received as of the submittal of this application. Records of correspondence with the City of Schertz are included in **Attachment N** of this application.

## Cibolo Creek Municipal Authority (CCMA)

Parts I and II of this application were submitted to the CCMA on September 12, 2022. A review letter was requested as part of the submission. A response has not been received as of the submittal of this application. Records of correspondence with the CCMA are included in **Attachment N** of this application.

## Schertz Fire Department Letter

Parts I and II of this application were submitted to the Schertz Fire Department on September 12, 2022. A review letter was requested as part of the submission. A response has not been received as of the submittal of this application. Records of correspondence with the Schertz Fire Department are included in **Attachment N** of this application.

# MUNICIPAL SOLID WASTE PERMIT
# MAJOR AMENDMENT

## PART III-ATTACHMENT C
## FACILITY SURFACE WATER DRAINAGE REPORT

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: Revised September 2023~~2~~*

Prepared by:

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9-15-23

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- 1.2 Attachment C2 – Flood Control Analysis .......... 2~~2~~
- 1.3 Attachment C3 – Drainage System Plans and Details .......... 3~~3~~

# 1.0 NARRATIVE

This facility surface water drainage report has been prepared consistent with the requirements of §330.63(c) and §§330.301 through 330.307. Attachment C-Facility Surface Water Drainage Report is organized to include the drainage analysis and design, flood control and analysis, and drainage system plans and details. The facility design complies with the requirements of §330.303(a)-(b) concerning the management of run on and runoff during peak discharge of a 25-year rainfall event, the prevention of off-site discharge of waste and feedstock materials, and the control of surface water discharge in and around the facility. Surface water drainage in and around the facility will also be controlled to minimize surface water running onto, into and off the treatment area. The following is a brief description of each of the attachments.

## 1.1 ATTACHMENT C1 – DRAINAGE ANALYSIS AND DESIGN

Attachment C1 is the drainage analysis and design of the facility, which includes calculations and demonstrations consistent with the requirements of §330.63(c), and §§330.301-330.307. This attachment includes a comparison of surface water runoff from the existing permitted condition to the post-development condition at each location where surface water enters or exits the facility boundary for the 25-year and 100-year, 24-hour rainfall event. The results of this comparison for the 25-year storm event are shown below and more detailed information is provided in Attachment C1. The comparison between the existing condition and the post-developed condition demonstrates that the proposed vertical expansion of the Beck Landfill will not adversely alter the existing drainage patterns. In addition, this attachment includes the drainage design for the final cover system, drainage benches, downchutes, perimeter channels, and detention ponds. The drainage design will also provide effective erosional stability to top dome surfaces and external embankment side slopes during all phases of landfill operation, closure, and post-closure care in accordance with these rules.

| **Reach Summary** | | $Q_{25}$ (cfs) | $Vol_{25}$ (ac-ft) | $Vel_{25}$ (fps) | Runoff/on |
|---|---|---|---|---|---|
| Outfall North | existing | 322.7 | 67.2 | 2.9 | runoff |
| | proposed | 291.2~~290.5~~ | 60.7~~60.4~~ | 2.5 | |
| | *difference %* | *-10%~~-10%~~* | *-10%~~-10%~~* | *-1.4%* | |
| Outfall West | existing | 179.3 | 27.7 | 9.6~~12~~ | runoff |
| | proposed | 112.5 | 13.9 | 9.6~~12~~ | |
| | *difference %* | *-37%* | *-50%* | *0%* | |
| Outfall South | existing | 209.0~~209.9~~ | 40.2 | 5.2~~7.5~~ | runoff |
| | proposed | 183.0~~24.0~~ | 40.1~~17.8~~ | 5.2~~7.5~~ | |
| | *difference %* | -13%~~-89%~~ | -0%~~-56%~~ | *0%* | |
| Outfall East | existing | 739.5 | 151.0 | 7.3~~7.25~~ | runoff |
| | proposed | 729.5~~569.1~~ | 147.1~~124.5~~ | 7.3~~7.25~~ | |
| | *difference %* | *-1%~~-23%~~* | *-3%~~-18%~~* | *0%* | |
| | | | | | |

1. Peak flowrates and volumes computed using HEC-HMS.
2. Velocities for Outfalls West, South, and East taken from HEC-HMS model of Cibolo Creek and represent the 25-year velocity in the creek at the discharge location.

## 1.2 ATTACHMENT C2 – FLOOD CONTROL ANALYSIS

Attachment C2 is the flood control analysis, which includes demonstrations consistent with the requirements of §330.63(c)(2). The flood control analysis demonstrates that the proposed expansion of the Beck Landfill will not adversely impact flooding conditions in the area. The landfill is proposed to be protected by an earthen berm, which is constructed at least three feet above the calculated water surface for the 100-year flood. The current FEMA map shows that the 100-year floodplain extends onto a portion of the landfill footprint, however, this map is based on topographic data from before the perimeter berm associated with the current landfill was completed. A Letter of Map Revision (LOMR) application has been submitted to FEMA to revise the map to accurately depict the extents of the floodplain. Additional discussion related to the LOMR application is included in Attachment C2.

The proposed stormwater pond for the landfill is within the 100 year floodplain and a no-rise certification has been submitted to the City of Schertz for the pond. In order to offset the loss of flow area in the floodplain from the pond berm, the area south of the new pond is proposed to be excavated to enhance flow through Cibolo Creek. Based on the modeling in the no-rise certification, there is no increase in the calculated water surface elevation of the floodplain from the pond construction, since the areas along the creek will be excavated to completely offset any effects of the new pond.

## 1.3 ATTACHMENT C3 – DRAINAGE SYSTEM PLANS AND DETAILS

This attachment includes the permit level site plans and details for the drainage system consistent with §330.63(c) and §§330.301-330.307.

# MUNICIPAL SOLID WASTE PERMIT MAJOR AMENDMENT

## PART III-ATTACHMENT C-1
## FACILITY SURFACE WATER DRAINAGE REPORT

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: Revised ~~July~~ September 2023*


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**APPENDIX C1-A**
Drainage Maps and Existing/Post-development Comparison

**APPENDIX C1-B**
Existing Condition Hydrologic Calculations

**APPENDIX C1-C**
Post-development Hydrologic Calculations

**APPENDIX C1-D**
Perimeter Drainage System Design

**APPENDIX C1-E**
Final Cover Drainage Structure Design

**APPENDIX C1-F**
Intermediate Cover Erosion and Sedimentation Control Plan

**APPENDIX C1-G**
Intermediate Cover Erosion Control Structure Design

# 1 INTRODUCTION

*30 TAC §330.63(c) and 330.301-330.307*

## 1.1 Purpose

This drainage analysis and design is prepared as part of a permit application for the expansion of the Beck Landfill and includes the demonstrations consistent with the requirements of 30 TAC Chapter §§330.63(c) and §§330.301-307. The drainage analysis and design is organized to include a narrative description of the existing and post-development conditions, the proposed drainage system design, effective erosional stability of top dome surfaces and external embankment side slopes during all phases of landfill operation, and a discussion of the existing/post-development comparison at the facility and property boundaries. Drainage calculations are included in the appendices to this section. Drainage design plans and details are included in Attachment C3. The following is a brief description of each of the appendices.

**Appendix C1-A- Drainage Maps and Existing/Post-Development Comparison**

Appendix C1-A includes drainage area maps that delineate the drainage areas that contribute surface water run-on and runoff at the facility and property boundaries and provide a summary of the peak flow rates, runoff volumes, and runoff velocities at locations along the facility boundary for the existing and post-development conditions. Appendix C1-A also includes a table summarizing the existing/post-development drainage analysis comparison.

**Appendix C1-B- Existing Hydrologic Calculations**

The existing hydrologic and hydraulic condition is the final permitted condition depicted in TCEQ MSW Permit 1848. The existing hydrologic and hydraulic evaluation is included in Appendix C1-B. The existing analysis includes delineations of drainage areas that contribute surface water run-on and runoff at comparison locations along the facility boundary.

The results of the existing hydrologic evaluation are provided on the existing conditions drainage analysis summary, which shows the 25- and 100-year peak flow rates, runoff volumes, and runoff velocities at comparison locations along the proposed facility boundary.

**Appendix C1-C- Post-Development Hydrologic Calculations**

The post-development hydrologic and hydraulic evaluation included in Appendix C1-C represents the proposed final closure landfill configuration. The post-development analysis includes delineations of drainage areas that contribute surface water run-on and runoff at comparison points along the proposed facility boundary.

The results of the post-development hydrologic evaluation are provided on the post-development boundary analysis summary, which shows the 25- and 100-year peak flow rates, runoff volumes, and runoff velocities at the comparison locations along the proposed permit boundary.

**Appendix C1-D- Perimeter Drainage System Design**

Appendix C1-D presents the hydraulic design of the perimeter drainage system. The perimeter drainage plan shows the locations of the perimeter drainage berms and detention ponds. The detention ponds are designed to provide the necessary storage and outlet control to mitigate impacts to the receiving channels downstream of the Beck Landfill. The perimeter berms are designed to convey the 25-year and 100-year, 24-hour storm event.

**Appendix C1-E- Final Cover Drainage Structure Design**

Appendix C1-E is limited to the design of the permanent final cover drainage structures (i.e., downchute and bench system). The calculations demonstrate that the structures are designed to convey runoff produced from a 25-year storm event, to provide erosion protection, and to minimize sediment loss from the final cover condition.

**Appendix C1-F - Intermediate Cover Erosion and Sedimentation Control Plan**

Appendix C1-F provides a detailed erosion and sediment control plan during the intermediate cover phase of the landfill development.

**Appendix C1-G- Intermediate Cover Erosion Control Structure Design**

Appendix C1-G provides the supporting documentation to evaluate and design temporary erosion and sediment control structures for the intermediate cover phase of the landfill development.

# 2 METHODOLOGY

*30 TAC §330.305(f) and §330.307*

## 2.1 Concepts and Methods

The hydrologic and hydraulic methods employed in this study are consistent with the TCEQ regulations. The United States Army Corps of Engineers (COE) HEC-HMS computer program was used to compute peak flow rates and runoff volumes. The HEC-HMS peak flow rates, the NRCS Method, the Universal Soil Loss Equation, and the values defined in the 2018 NOAA Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0:Texas, as required by the TxDOT Hydraulic *Design Manual,* September, 2019, were used to design the final cover drainage system and erosion control features. The drainage analysis proceeded in the following sequence:

- Maps were prepared that provided information about the surface runoff characteristics based on the existing conditions. These maps are included in Appendix C1-B.
- Surface water runoff hydrographs for the existing condition were developed using HEC-HMS. The existing HEC-HMS evaluation is included in Appendix C1-B.
- Maps were prepared that provide information about the surface water runoff characteristics of the post-developed final cover drainage conditions for the Beck Landfill. These maps are included in Appendix C1-C.
- Surface water hydrographs for the post-developed condition, including the perimeter drainage channel and detention ponds, were evaluated using HEC-HMS. The post-developed evaluation is included in Appendix C1-C.
- The final cover system was evaluated for soil loss using the Natural Resources Conservation Service (NRCS) Revised Universal Soil Loss Equation. Final cover drainage systems were evaluated for capacity using the peak flow rates from HEC-HMS, the NRCS Method, and the methods defined in the TxDOT *Hydraulic Design Manual,* October 2011. Final cover drainage systems calculations are included in Appendix C1-E.
- The intermediate cover system was evaluated for soil loss using the Revised Universal Soil Loss Equation. Intermediate cover erosion and sediment control plan and structure design were evaluated for capacity using the NRCS Method and the values defined in the 2018 NOAA Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0:Texas, as required by the TxDOT Hydraulic *Design Manual,* September, 2019. Intermediate and final cover erosion and sediment control plans are included in

Appendix C1-F and C1-G.

## 2.2 Hydrologic and Hydraulic Modeling

### 2.2.1 HEC-HMS

The COE HEC-HMS program was developed to simulate the surface water runoff response of a watershed. The HEC-HMS model represents a watershed as a network of hydrologic and hydraulic components. The modeling process results in the computation of stream-flow hydrographs at desired locations in the watershed. HEC-HMS v4.1~~0~~1 was used to perform the hydrologic modeling. Refer to Appendix C1-B for a detailed discussion of the input parameters used for the existing conditions analysis and Appendix C1-C for a detailed discussion of the input parameters used for the post-developed condition.

## 2.3 Hydrologic Elements Naming Convention

The following naming convention was used in the existing and post-developed hydrologic evaluations:

| | |
|---|---|
| DA-E - | existing drainage rea associated with current permit 1848 (examples: DA-E1, DA-E2) |
| DA-PX - | existing drainage rea associated with current permit 1848 (examples: DA-P01, DA-P02) |
| POND#- | pond reservoir element, (examples: POND1) |
| Outfall-XX - | comparison point where surface water runoff exits the property boundaries (examples: Outfall-N, Outfall-W) |

# 3 EXISTING CONDITIONS

*30 TAC §330.305(f) and §330.307*

The Beck Landfill includes a Type IV municipal solid waste facility located in Guadalupe County, Texas within the city limits of Schertz, Texas. The Beck Landfill site entrance is located at 550 Farm to Market Road 78.

The Beck Landfill permit boundary encompasses about 257~~8~~ acres. The area within the permit boundary primarily consists of the landfill footprint with the remaining being flat grasslands or the slope of the perimeter berm down toward Cibolo Creek. The property has been historically used as sand and gravel mining dating back at least to the 1970s. The property is bordered by Cibolo Creek on three sides and slopes towards the creek. The northern portion of the property generally slopes to the south toward the creek.

The facility is located on the south side of FM 78, east of Randolph Air Force base. The proposed landfill footprint is 155 acres and the entire footprint has been excavated and is partially filled with waste. No lateral expansion of the landfill is proposed in this application.

As shown on Drawing C1-1, Cibolo Creek enters the area around the site from the north and runs adjacent to the west permit boundary edge and then bends approximately 180 degrees and runs along the south and east permit boundary borders. The only offsite stormwater entering the permit boundary is via the flow in Cibolo Creek and two drainage areas south of FM 78 (OS-1 and OS-2).

Appendix C1-B includes the existing condition hydrologic calculations. Appendix C1-B includes drawings that depict the existing condition drainage areas and comparison points. Refer to Drawing C1-1 for the existing condition drainage area map, including all offsite drainage areas. Refer to drawing C1-1 also for a detailed drainage area map of the property, which includes the area, peak flow rate, and volume for the 25-year 24-hour rainfall event for each drainage area.

The following table includes a summary of the existing conditions drainage analysis, providing the peak flow rate, volume, and velocity at each comparison point for the 25-year, 24-hour rainfall event. The table also identifies the contributing drainage areas, and states that surface water either enters (run-on) or exits (runoff) at each comparison point.

| Reach Summary | | Q25 (cfs) | Vol25 (ac-ft) | Vel25 (fps) | Runoff/on |
|---|---|---|---|---|---|
| Outfall North | existing | 322.7 | 67.2 | 2.9 | Runoff |
| Outfall West | existing | 179.3 | 27.7 | ~~8.4~~9.6 | Runoff |
| Outfall-South | existing | 209.0~~9~~ | 40.2 | 5.2~~4.8~~ | Runoff |
| Outfall East | existing | 739.5 | 151.0 | 7.3~~6.63~~ | Runoff |

1. Peak flowrates and volumes computed using HEC-HMS.
2. Velocities for Outfalls ~~North~~East, West, and South taken from 25~~-~~Year HEC-~~HMS~~RAS model of Cibolo Creek, these discharge points are all inundated during this storm event.

# 4 POST-DEVELOPED CONDITIONS

*30 TAC §330.305(f) and §330.307*

The post-developed condition discussion relates to surface water entering and exiting the facility and property boundary, and the comparison points along the facility and property boundary identified in the existing conditions remain unchanged in the post-developed condition. The offsite drainage areas and runoff characteristics outside the Beck Landfill property boundary remain unchanged from the existing conditions. Offsite drainage areas and runoff characteristics that are located within the permit boundary and outside the landfill footprint remain unchanged from existing conditions, except those that are affected by the location of the proposed pond. All drainage areas within the landfill footprint are revised to consider the landfill vertical expansion.

The total drainage area for comparison points Outfall North, Outfall West, Outfall South, and Outfall East remains unaffected by the facility development. However, these drainage areas have been sub-divided where appropriate and runoff characteristics adjusted as appropriate to evaluate the effect of the vertical expansion of the landfill.

The locations where surface water enters and exits the facility and property boundary in the post-development conditions remains unchanged from existing conditions.

Appendix C1-C includes the post-developed hydrologic calculations. Appendix C1-C includes drawings that depict the post-developed drainage areas and comparison points. Refer to drawing C1-2 for the post-developed drainage area map, including all offsite drainage areas. Refer to drawing C1-2 for a detailed drainage area map of the existing property, which includes the area, peak flow rate, and volume for the 25-year and 100-year 24-hour rainfall event for each drainage area. Refer to drawing C1-2 for the post-developed runoff summary for each comparison point.

The following table includes a summary of the post-development conditions drainage analysis, which provides the peak flow rate, volume, and velocity at each comparison point for the 25-year, 24-hour rainfall event. The table also identifies the contributing drainage area, and states that surface water either enters (run-on) or exits (runoff) at each comparison point.

| **Reach Summary** | | Q25 (cfs) | Vol25 (ac-ft) | Vel25 (fps) | Runoff/on |
|---|---|---|---|---|---|
| Outfall North | proposed | ~~290.5~~291.2 | 60.~~4~~7 | 2.5 | Runoff |
| Outfall West | proposed | 112.5 | 13.9 | 9.6~~8.4~~ | Runoff |
| Outfall-South | proposed | ~~24.0~~183.0 | ~~17.8~~40.1 | 5.2~~4.8~~ | Runoff |
| Outfall East | proposed | ~~569.1~~729.5 | ~~124.5~~147.1 | 7.3~~6.63~~ | Runoff |

3. Peak flowrates and volumes computed using HEC-HMS.
4. Velocities for Outfalls ~~North~~East, West, and South taken from HEC-~~HMS~~ RAS model of Cibolo Creek for the ~~and interpolating between 50 year and 10~~25-year storm event~~s~~.

# 5 ANALYSIS OF EXISTING AND PROPOSED CONDITIONS

*30 TAC §330.305(f) and §330.307*

The tables below ~~Table 6-8~~ provide~~s~~ a comparison of the 25 and 100-year peak flow rates at each outfall. All of the proposed values are lower than the existing values due to the detention and retention effects of the proposed pond on the south side of the landfill.

**~~Table 6-8~~**

| Reach Summary | | Q25 (cfs) | Vol25 (ac-ft) | Vel25 (fps) | Runoff/on |
|---|---|---|---|---|---|
| Outfall North | existing | 322.7 | 67.2 | 2.9 | runoff |
| | proposed | ~~290.5~~291.2 | 60.7~~4~~ | 2.5 | |
| | *difference %* | *-10%* | *-10%* | *-1.4%* | |
| Outfall West | existing | 179.3 | 27.7 | ~~8.4~~9.6 | runoff |
| | proposed | 112.5 | 13.9 | ~~8.4~~9.6 | |
| | *difference %* | *-37%* | *-50%* | *0%* | |
| Outfall South | existing | 209.0~~9~~ | 40.2 | ~~4.8~~5.2 | runoff |
| | proposed | ~~24.0~~183.0 | ~~17.8~~40.1 | ~~4.8~~5.2 | |
| | *difference %* | -13~~89~~% | -0~~56~~% | *0%* | |
| Outfall East | existing | 739.5 | 151.0 | ~~6.63~~7.3 | runoff |
| | proposed | ~~569.1~~729.5 | ~~124.5~~147.1 | ~~6.63~~7.3 | |
| | *difference %* | *-~~23~~1%* | *-~~18~~3%* | *0%* | |
| | | | | | |

1. Peak flowrates and volumes computed using HEC-HMS.
2. Velocities for Outfalls West, South, and East taken from 25 Year HEC-~~HMS~~ RAS model of Cibolo Creek and represent the velocity in the creek at the discharge location.

**100 Year Return Period**

| Reach Summary | | Q100 (cfs) | Vol100 (ac-ft) | Vel100 (fps) | Runoff/on |
|---|---|---|---|---|---|
| Outfall North | existing | 491.1 | 102.4 | 3.3 | runoff |
| | proposed | 431.4 | 90.7 | 2.8 | |
| | *difference %* | *-12%* | *-12%* | *-1.4%* | |
| Outfall West | existing | 281.9 | 43.6 | 12.2 | runoff |
| | proposed | 165.7 | 20.8 | 12.2 | |
| | *difference %* | *-41%* | *-52%* | *0%* | |
| Outfall South | existing | 329.8 | 63.4 | 7.0 | runoff |
| | proposed | 267.1 | 72.7 | 7.0 | |
| | *difference %* | -19% | 15% | *0%* | |
| Outfall East | existing | 1,146.8 | 234.4 | 7.3 | runoff |
| | proposed | 1075.8 | 232.8 | 7.3 | |
| | *difference %* | *-6%* | *-1%* | *0%* | |

1. Peak flowrates and volumes computed using HEC-HMS.
2. Velocities for Outfalls West, South, and East taken from HEC-RAS model of Cibolo Creek and represent the velocity in the creek at the discharge location.

The proposed drainage system for the Beck Landfill will consist of drainage benches, berms, downchutes, perimeter ditches, detention ponds and outlet structures.

The facility has been designed to prevent discharge of pollutants into waters of the state or waters of the United States, as defined by the Texas Water Code and the Federal Clean Water Act, respectively. Beck Landfill will receive authorization from the TCEQ to discharge stormwater runoff consistent with Texas Pollutant Discharge Elimination System General Permit No. TXR050000 relating to stormwater discharges associated with industrial activity. Landfills are authorized under the General Permit. This stormwater permit must remain in effect throughout the active life of the facility and will contain limitations on stormwater discharge parameters.

## 5.1 Perimeter Drainage System Design

The perimeter drainage system is designed to convey the 25-year runoff from the developed landfill consistent with TCEQ regulations. In addition, the perimeter berms have been designed to convey the runoff from a 100-year rainfall event. The perimeter channel system design calculations are referenced in Appendix C1-D. The perimeter drainage structure plans are included in Attachment C3.

The detention pond is designed to provide the necessary storage and outlet control to mitigate impacts to the receiving channels downstream of Beck Landfill. Detention pond design parameters are included in the hydrologic modeling for post-developed conditions in Appendix C1-C. The detention pond details are shown in Attachment C3. The detention pond outlet structures are designed as energy dissipaters to reduce the velocity and turbulence of the flow leaving the detention ponds.

## 5.2 Final Cover Drainage Structure Design

Stormwater runoff will be collected via berms and benches located near the upper grade break on the landfill and on the 4:1 (horizontal to vertical) side slopes, leading to drainage letdown structures or downchutes and to the perimeter drainage system. The perimeter drainage system will be constructed as the landfill is developed.

The final cover drainage system benches and downchutes are designed to convey the 25-year peak flow rate. These benches, channels, and downchutes will also reduce maintenance at the site after closure by minimizing erosion. The final cover erosion control design calculations are included in Appendix C1-E. The final cover design, showing the locations of the drainage benches, downchutes, and final cover drainage structure details, is illustrated in Appendix C1-E.

The downchute/letdown structures are designed to convey the 25-year, 24-hour peak flow rate. The downchutes are designed using Maccaferri gabion mattresses, rock riprap, geomembranes, or articulating concrete blocks to minimize erosive conditions along the downchute and at bench/downchute confluences. The downchute structures convey stormwater into Cibolo Creek or directly into the detention pond. The downchute structures are designed using concrete, Maccaferri gabion mattresses, rock riprap, geomembranes, or articulating concrete blocks to provide erosion protection at the downchute/creek confluence and where downchutes convey stormwater directly into the detention pond. The downchute design calculations are included in Appendix C1-E. Final cover drainage system details, including the downchute details, are shown in Attachment C3.

# 6 EROSION AND SEDIMENTATION CONTROL

*30 TAC §330.305(f) and §330.307*

## 6.1 Final Cover Stormwater System Control Plan

Perimeter drainage channels and the detention pond will be constructed as the subsequent phased development of the landfill progresses. Erosion will be minimized in these structures by establishment of vegetation or with rock riprap, gabions, or other materials as provided for in the drainage design calculations for these permanent structures as found in Appendix C1-E Final Cover Drainage Structure Design.

Berms, benches, and chutes will be constructed upon placement of the final cover. The final cover includes an erosion layer that is a minimum of 6 inches of earthen material capable of sustaining native plant life and will be seeded with native and introduced grasses immediately following the application of final cover in order to minimize erosion. A soil loss demonstration for the erosion layer is included in Appendix C1-E of this attachment. The benches and chutes include establishment of vegetation, Maccaferri gabion mattress, and other materials as provided in the drainage calculations for these permanent structures.

## 6.2 Final Cover Stormwater System Maintenance Plan

Beck Landfill will inspect, restore, and repair constructed permanent stormwater systems such as channels, drainage benches, chutes, and flood control structures in the event of washout or failure from extreme storm events. Excessive sediment will be removed, as needed, so that the drainage structures, such as the perimeter channels and detention pond, function as designed. Site inspections by landfill personnel will be performed weekly or within 48 hours of a rainfall event of 0.5 inches or more. The time frame for correction of damaged or deficient items under normal conditions will be within five working days after the inspection identifying these items. Normal conditions are weather, ground and other site-specific conditions that do not impede access to the item, result in additional damage to the site attempting to access or repair the item, or risk equipment or personnel safety. Documentation of the inspection will be included in the site operating record.

The following items will be evaluated during the inspections:

- Erosion of final cover areas, perimeter ditches, chutes, benches, detention pond, berms, and other drainage features
- Settlement of final cover areas, perimeter ditches, chutes, benches, and other drainage features
- Silt and sediment build-up in perimeter ditches, chutes, benches, and the detention pond
- Obstructions in drainage features

- Presence of erosion or sediment discharge at perimeter stormwater discharge locations
- Presence of sediment discharges along the site boundary in areas that have been disturbed by site activities
- Maintenance activities will be performed to correct damaged or deficient items noted during the site inspections. These activities will be performed as soon as reasonably possible after the inspection. The time frame for correction of damaged or deficient items will vary based on weather, ground conditions, and other site-specific conditions.
- Maintenance activities will consist of the following, as needed:
    - Placement of additional temporary or permanent vegetation
    - Placement, grading, and stabilization of additional soils in eroded areas or in areas that have experienced settlement
    - Replacement of Maccaferri gabion mattresses or other structural lining
    - Placement of additional Maccaferri gabion mattresses in eroded areas or in areas that have experienced settlement
    - Removal of obstructions from drainage features
    - Removal of silt and sediment build-up from drainage features
    - Repairs to erosion and sedimentation controls
    - Installation of additional erosion and sedimentation controls

### 6.3 Intermediate Cover Erosion and Sedimentation Control Plan

Erosion and sediment controls have been designed for the intermediate cover phase of landfill development. The intermediate cover erosion and sedimentation control plan includes temporary structures and establishment of vegetation to minimize erosion of the intermediate cover and documentation requirements. Refer to Appendix C1-F-Intermediate Cover Erosion and Sedimentation Control Plan, and Appendix C1-G-Intermediate Cover Erosion Control Structure Design. Details for the interim drainage and sedimentation controls are included in Appendix C-3.

### 6.4 Operations Cover Erosion and Sedimentation Control Plan

Erosion and sediment controls for the operational cover phase of landfill development will be consistent with the requirements of Part IV-Site Operating Plan, Landfill Cover. Operational cover will be placed over all solid waste at the end of each operating week as required by Part IV, Section Landfill Cover. The operational cover will be sloped to drain. Runoff from areas that have intact operational cover constructed of a well-compacted earthen material is considered uncontaminated stormwater runoff. Erosion and sediment controls for operational cover will include the following procedures:

- Areas with operational cover will be inspected daily for erosion that may cause contaminated runoff from the daily cover.
- After each rainfall event, all operational cover areas will be inspected for erosion or other damage and repaired as necessary. Runoff from damaged or eroded areas will be handled as contaminated water until repairs are completed.
- Erosion and sediment controls will be implemented within operational cover areas, including compaction of operational cover to minimize infiltration of stormwater.
- Should erosion of operational cover be observed, the operational cover will be replaced so that no solid waste is exposed at the end of the operating day. In the event that additional soil stabilization or erosion control measures are deemed necessary, one or more of the following measures will be constructed: temporary sediment control fence, silt fence, swales, or filter berms.

# 7 EXISTING AND POST-DEVELOPMENT COMPARISON

*30 TAC §330.305(f) and §330.307*

Consistent with 30 TAC §330.63(c)(1 )(D)(iii) and §330.305(a), the proposed facility development will not adversely alter existing drainage patterns. Refer to Appendix C1-A for a summary of the existing conditions, post-developed conditions, and a comparison of the peak flow rate, volume, and velocity for each comparison point evaluated. Comparisons are provided for the 25-year and 100-year, 24-hour rainfall events. The comparison points established in the existing condition evaluation remain unchanged in the post-developed condition.

Drawing C1-1 - Existing Drainage Area Map: This drawing depicts the existing locations (comparison points) where surface water enters or exits the facility and property boundaries. Each comparison point is shown on the drawing and the peak flow rate, runoff volume, and runoff velocity is provided for each runoff comparison point.

Drawing C1-2 – Proposed Drainage Map: This drawing depicts the existing locations (comparison points) where surface water enters or exits the facility and property boundaries. Each comparison point is shown on the drawing and the peak flow rate, runoff volume, and runoff velocity is provided for each runoff comparison point.

A table comparing the existing condition runoff summary and the post-developed runoff summary is provided in Section 5 of this Attachment. The existing condition and post-developed peak flow rate, runoff volume, and velocity at each comparison point for both the 25- and 100-year, 24-hour rainfall event is provided. The difference, if any, between the existing and post-developed runoff results is also provided in the table.

Given that: (1) drainage from the permit boundary and/or property boundary does not significantly adversely alter the peak flow rates, velocities, or runoff volumes at the facility and property boundaries and receiving channels, and (2) the stormwater discharge outfalls are consistent with the existing site configuration, it is concluded that the proposed landfill development will not adversely alter existing drainage patterns consistent with §330.305(a).

# 8 CONCLUSIONS

*30 TAC §330.305(f) and §330.307*

The following conclusions summarize the results of the drainage analysis and design:

- The drainage design criteria and analyses used for these drainage calculations meet and exceed the requirements of 30 TAC Chapter 330.
- The final cover drainage structures (berms, benches, chutes) are designed in accordance with the rules to convey peak flow rates from the 25-year rainfall event.
- Perimeter channels are designed in accordance with the rules for the 25-year rainfall event and will also accommodate the peak flow rate from the 100-year rainfall event.
- Detention pond capacities and outlets are designed in accordance with the rules for the 25-year rainfall event, will also accommodate the peak runoff from the 100-year rainfall event.
- Erosion will be minimized by using Best Management Practices.
- The proposed landfill development will not significantly adversely alter existing drainage patterns at the facility and property boundaries.

# BECK LANDFILL
# APPENDIX C1-A
# FACILITY SURFACE WATER DRAINAGE REPORT
# EXISTING/POST-DEVELOPMENT COMPARISON

Includes pages C1-A-1 through C1-A-6

**NOTES:**

1. CONTOURS WITHIN LANDFILL FOOTPRINT BASED OFF OF FINAL COVER PLAN FOR 1848 PERMIT.
2. CONTOURS OUTSIDE OF THE LANDFILL FROM FIRMATEK LIDAR SCAN (2021)
3. IMPERVIOUS COVER PERCENTAGE FOR OS-1 ASSUMED BASED ON TYPICAL VALUES FOR SINGLE FAMILY DEVELOPMENTS.
4. VELOCITIES FOR OUTFALLS E, W, AND S ARE TAKEN FROM 25 YEAR HEC-RAS MODEL. THESE DISCHARGE POINTS ARE ALL INUNDATED IN THE 25 YEAR EVENT.

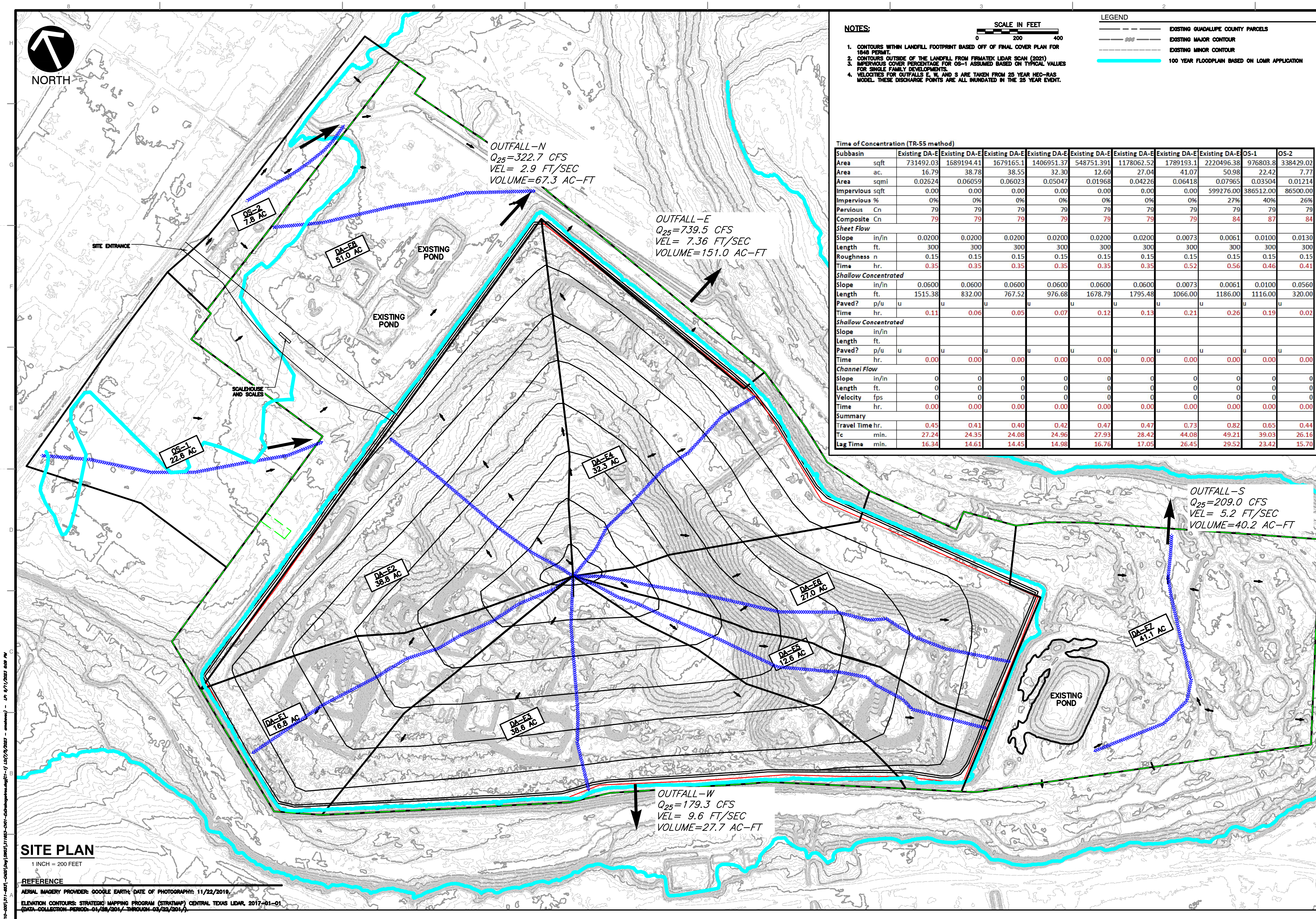
SCALE IN FEET: 0 200 400

LEGEND

- EXISTING GUADALUPE COUNTY PARCELS
- 996 EXISTING MAJOR CONTOUR
- EXISTING MINOR CONTOUR
- 100 YEAR FLOODPLAIN BASED ON LOMR APPLICATION

Time of Concentration (TR-55 method)

| Subbasin | | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | OS-1 | OS-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | sqft | 731492.03 | 1689194.41 | 1679165.1 | 1406951.37 | 548751.391 | 1178062.52 | 1789193.1 | 2220496.38 | 976803.8 | 338429.02 |
| Area | ac. | 16.79 | 38.78 | 38.55 | 32.30 | 12.60 | 27.04 | 41.07 | 50.98 | 22.42 | 7.77 |
| Area | sqmi | 0.02624 | 0.06059 | 0.06023 | 0.05047 | 0.01968 | 0.04226 | 0.06418 | 0.07965 | 0.03504 | 0.01214 |
| Impervious | sqft | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 599276.00 | 386512.00 | 86500.00 |
| Impervious | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 27% | 40% | 26% |
| Pervious | Cn | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Composite | Cn | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 84 | 87 | 84 |
| *Sheet Flow* | | | | | | | | | | | |
| Slope | in/in | 0.0200 | 0.0200 | 0.0200 | 0.0200 | 0.0200 | 0.0200 | 0.0073 | 0.0061 | 0.0100 | 0.0130 |
| Length | ft. | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| Roughness | n | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Time | hr. | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.52 | 0.56 | 0.46 | 0.41 |
| *Shallow Concentrated* | | | | | | | | | | | |
| Slope | in/in | 0.0600 | 0.0600 | 0.0600 | 0.0600 | 0.0600 | 0.0600 | 0.0073 | 0.0061 | 0.0100 | 0.0560 |
| Length | ft. | 1515.38 | 832.00 | 767.52 | 976.68 | 1678.79 | 1795.48 | 1066.00 | 1186.00 | 1116.00 | 320.00 |
| Paved? | p/u | u | u | u | u | u | u | u | u | u | u |
| Time | hr. | 0.11 | 0.06 | 0.05 | 0.07 | 0.12 | 0.13 | 0.21 | 0.26 | 0.19 | 0.02 |
| *Shallow Concentrated* | | | | | | | | | | | |
| Slope | in/in | | | | | | | | | | |
| Length | ft. | | | | | | | | | | |
| Paved? | p/u | u | u | u | u | u | u | u | u | u | u |
| Time | hr. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Channel Flow* | | | | | | | | | | | |
| Slope | in/in | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Length | ft. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Velocity | fps | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Time | hr. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Summary | | | | | | | | | | | |
| Travel Time | hr. | 0.45 | 0.41 | 0.40 | 0.42 | 0.47 | 0.47 | 0.73 | 0.82 | 0.65 | 0.44 |
| Tc | min. | 27.24 | 24.35 | 24.08 | 24.96 | 27.93 | 28.42 | 44.08 | 49.21 | 39.03 | 26.16 |
| Lag Time | min. | 16.34 | 14.61 | 14.45 | 14.98 | 16.76 | 17.05 | 26.45 | 29.52 | 23.42 | 15.70 |




## SITE PLAN

1 INCH = 200 FEET

**REFERENCE**

AERIAL IMAGERY PROVIDER: GOOGLE EARTH; DATE OF PHOTOGRAPHY: 11/22/2019.

ELEVATION CONTOURS: STRATEGIC MAPPING PROGRAM (STRATMAP) CENTRAL TEXAS LIDAR, 2017-01-01 (DATA COLLECTION PERIOD: 01/28/2017 THROUGH 03/22/2017).

REVISION RECORD

| NO | DATE | DESCRIPTION |
|---|---|---|
| 1 | 07/05/2023 | TECH NOD 3 |
| 2 | 09/15/2023 | NOD 4 RESPONSE |

Civil & Environmental Consultants, Inc.
Texas Registered Engineering Firm F-38
3711 South MoPac Expressway · Building 1, Suite 550 · Austin, TX 78746
Ph: 512.439.0400 · Fax: 512.329.0096
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BECK LANDFILL EXPANSION
600 FM 78, SCHERTZ, TEXAS 78154
GUADALUPE COUNTY, TEXAS

EXISTING DRAINAGE AREA MAP

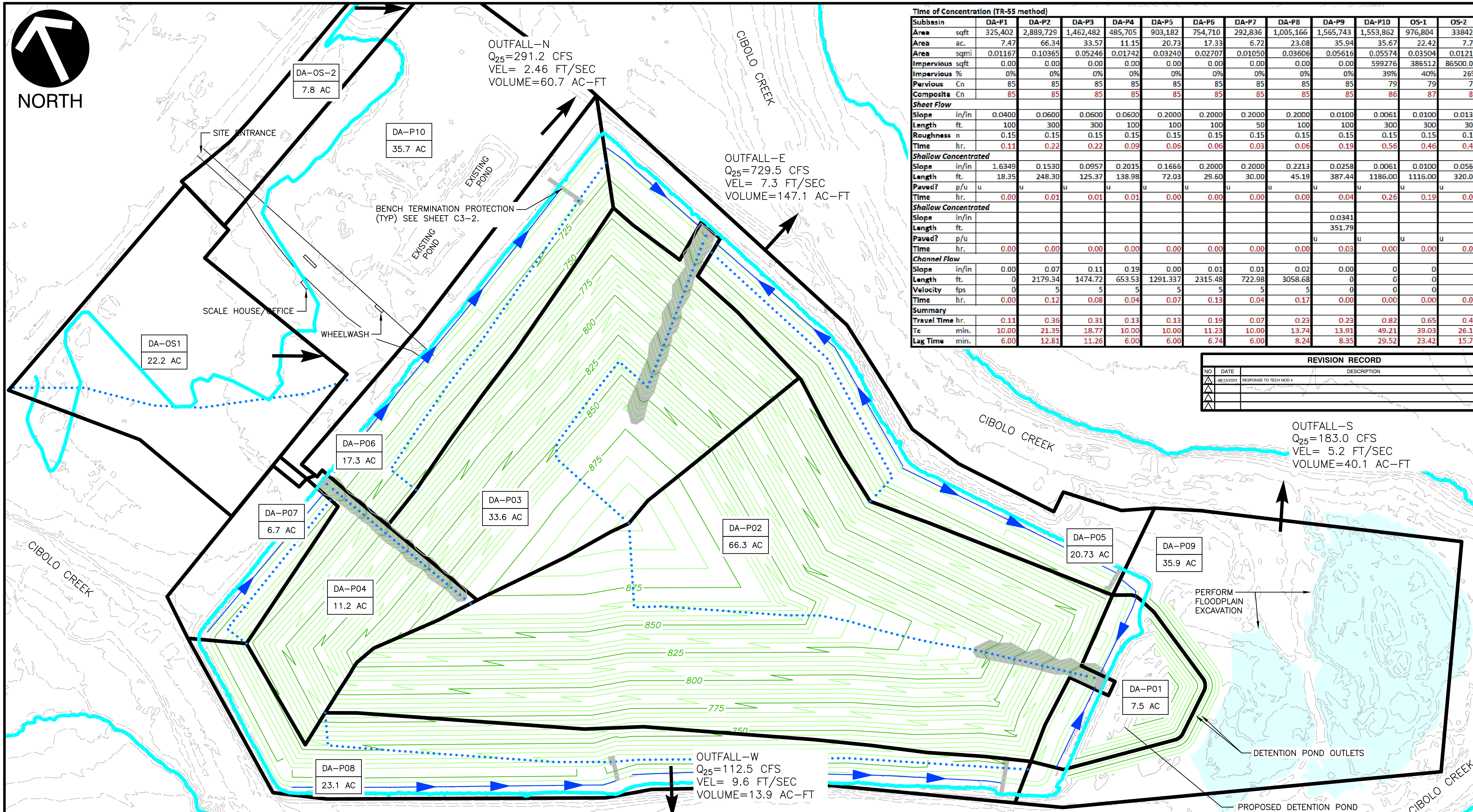
| | | | |
|---|---|---|---|
| DATE: | 7/5/2023 | DRAWN BY: | SP |
| DWG SCALE: | 1" = 200' | CHECKED BY: | JCM |
| PROJECT NO: | 311-653.SITE | | |
| APPROVED BY: | AWM | | |

DRAWING NO.: C1-1

## 25 Year Storm Existing Condition Runoff Summary

| **Reach Summary** | | Q25 (cfs) | Vol25 (ac-ft) | Vel25 (fps) | Runoff/on |
|---|---|---|---|---|---|
| Outfall North | existing | 322.7 | 67.2 | 2.9 | Runoff |
| Outfall West | existing | 179.3 | 27.7 | 9.6~~8.4~~ | Runoff |
| Outfall-South | existing | 209.0~~9~~ | 40.2 | 5.2~~4.8~~ | Runoff |
| Outfall East | existing | 739.5 | 151.0 | 7.3~~6.63~~ | Runoff |

1. Peak flowrates and volumes computed using HEC-HMS.
2. Velocities for Outfalls East~~North~~, West, and South taken from 25 Year HEC-~~HMS~~ RAS model of Cibolo Creek.




**Time of Concentration (TR-55 method)**

| Subbasin | | DA-P1 | DA-P2 | DA-P3 | DA-P4 | DA-P5 | DA-P6 | DA-P7 | DA-P8 | DA-P9 | DA-P10 | OS-1 | OS-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | sqft | 325,402 | 2,889,729 | 1,462,482 | 485,705 | 903,182 | 754,710 | 292,836 | 1,005,166 | 1,565,743 | 1,553,862 | 976,804 | 338429 |
| Area | ac. | 7.47 | 66.34 | 33.57 | 11.15 | 20.73 | 17.33 | 6.72 | 23.08 | 35.94 | 35.67 | 22.42 | 7.77 |
| Area | sqmi | 0.01167 | 0.10365 | 0.05246 | 0.01742 | 0.03240 | 0.02707 | 0.01050 | 0.03606 | 0.05616 | 0.05574 | 0.03504 | 0.01214 |
| Impervious | sqft | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 599276 | 386512 | 86500.00 |
| Impervious | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 39% | 40% | 26% |
| Pervious | Cn | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 79 | 79 | 79 |
| Composite | Cn | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 86 | 87 | 84 |
| *Sheet Flow* | | | | | | | | | | | | | |
| Slope | in/in | 0.0400 | 0.0600 | 0.0600 | 0.0600 | 0.2000 | 0.2000 | 0.2000 | 0.2000 | 0.0100 | 0.0061 | 0.0100 | 0.0130 |
| Length | ft. | 100 | 300 | 300 | 100 | 100 | 100 | 50 | 100 | 100 | 300 | 300 | 300 |
| Roughness | n | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Time | hr. | 0.11 | 0.22 | 0.22 | 0.09 | 0.06 | 0.06 | 0.03 | 0.06 | 0.19 | 0.56 | 0.46 | 0.41 |
| *Shallow Concentrated* | | | | | | | | | | | | | |
| Slope | in/in | 1.6349 | 0.1530 | 0.0957 | 0.2015 | 0.1666 | 0.2000 | 0.2000 | 0.2213 | 0.0258 | 0.0061 | 0.0100 | 0.0560 |
| Length | ft. | 18.35 | 248.30 | 125.37 | 138.98 | 72.03 | 29.60 | 30.00 | 45.19 | 387.44 | 1186.00 | 1116.00 | 320.00 |
| Paved? | p/u | u | u | u | u | u | u | u | u | u | u | u | u |
| Time | hr. | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.26 | 0.19 | 0.02 |
| *Shallow Concentrated* | | | | | | | | | | | | | |
| Slope | in/in | | | | | | | | | 0.0341 | | | |
| Length | ft. | | | | | | | | | 351.79 | | | |
| Paved? | p/u | | | | | | | | | u | u | u | u |
| Time | hr. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 |
| *Channel Flow* | | | | | | | | | | | | | |
| Slope | in/in | 0.00 | 0.07 | 0.11 | 0.19 | 0.00 | 0.01 | 0.01 | 0.02 | 0.00 | 0 | 0 | 0 |
| Length | ft. | 0 | 2179.34 | 1474.72 | 653.53 | 1291.337 | 2315.48 | 722.98 | 3058.68 | 0 | 0 | 0 | 0 |
| Velocity | fps | 0 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | 0 | 0 | 0 |
| Time | hr. | 0.00 | 0.12 | 0.08 | 0.04 | 0.07 | 0.13 | 0.04 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 |
| Summary | | | | | | | | | | | | | |
| Travel Time | hr. | 0.11 | 0.36 | 0.31 | 0.13 | 0.13 | 0.19 | 0.07 | 0.23 | 0.23 | 0.82 | 0.65 | 0.44 |
| Tc | min. | 10.00 | 21.35 | 18.77 | 10.00 | 10.00 | 11.23 | 10.00 | 13.74 | 13.91 | 49.21 | 39.03 | 26.16 |
| Lag Time | min. | 6.00 | 12.81 | 11.26 | 6.00 | 6.00 | 6.74 | 6.00 | 8.24 | 8.35 | 29.52 | 23.42 | 15.70 |

**REVISION RECORD**

| NO | DATE | DESCRIPTION |
|---|---|---|
| 1 | 09/15/2023 | RESPONSE TO TECH NOD 4 |
| | | |
| | | |
| | | |

## REFERENCE

TOPOGRAPHIC INFORMATION FROM AERIAL SURVEY BY FIRMATEK: (SEPTEMBER 15, 2021) AUGMENTED WITH A PORTION OF THE EXISTING GROUND SURFACE PREPARED BY CEC.

SCALE IN FEET

0 400 800

## NOTES

1. VELOCITIES AT OUTFALLS W, S, AND E TAKEN FROM CALCULATED FLOW VELOCITY OF CIBOLO CREEK IN HEC–RAS FLOODPLAIN MODELING. VELOCITIES INTERPOLATED BETWEEN 10 YEAR AND 50 YEAR EVENTS.
2. VELOCITY FOR OUTFALL–N ASSUMES 20' WIDE GRASS CHANNEL AT 0.1% SLOPE.
3. PERIMETER DITCHES SHOWN MAY BE MODIFIED TO MATCH FIELD CONDITIONS AT TIME OF CLOSURE.

## LEGEND

- PROPOSED DRAINAGE AREAS
- TIME OF CONCENTRATION LINE
- DA–P10 — DRAINAGE AREA DESIGNATION
- 41.8 AC — DRAINAGE AREA ACREAGE
- 100 YEAR FLOODPLAIN BASED ON LOMR APPLICATION
- TYPICAL DRAINAGE DITCH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BECK COMPANIES

NIDO, LTD
BECK LANDFILL
BEXAR COUNTY, TEXAS

PROPOSED DRAINAGE MAP

| | | | | | |
|---|---|---|---|---|---|
| DRAWN BY: | MFV | CHECKED BY: | AWM | APPROVED BY: | AWM |
| DATE: | 03/07/2022 | DWG SCALE: | 1" = 400' | PROJECT NO: | 311-653 |
| FIGURE NO.: | C1-2 | | | | |

**25 Year Storm Post-Developed Condition Runoff Summary**

| **Reach Summary** | | Q25 (cfs) | Vol25 (ac-ft) | Vel25 (fps) | Runoff/on |
|---|---|---|---|---|---|
| Outfall North | proposed | 291.2~~0.5~~ | 60.7~~4~~ | 2.5 | Runoff |
| Outfall West | proposed | 112.5 | 13.9 | 9.6~~8.4~~ | Runoff |
| Outfall-South | proposed | 183.0~~24.0~~ | 40.1~~17.8~~ | 5.2~~4.8~~ | Runoff |
| Outfall East | proposed | 729.5~~569.1~~ | 147.1~~124.5~~ | 7.3~~6.63~~ | Runoff |

1. Peak flowrates and volumes computed using HEC-HMS.
2. Velocities for Outfalls East~~North~~, West, and South taken from 25- Year HEC-~~HM~~RAS model of Cibolo Creek.

# Existing/Post-Developed Drainage Analysis Summary Tables

## 25 Year Return Period

| Reach Summary | | Q25 (cfs) | Vol25 (ac-ft) | Vel25 (fps) | Runoff/on |
|---|---|---|---|---|---|
| Outfall North | existing | 322.7 | 67.2 | 2.9 | runoff |
| | proposed | 291.2~~0.5~~ | 60.7~~4~~ | 2.5 | |
| | *difference %* | *-10%* | *-10%* | *-1.4%* | |
| Outfall West | existing | 179.3 | 27.7 | 9.6~~8.4~~ | runoff |
| | proposed | 112.5 | 13.9 | 9.6~~8.4~~ | |
| | *difference %* | *-37%* | *-50%* | *0%* | |
| Outfall South | existing | 209.9 | 40.2 | 5.2~~4.8~~ | runoff |
| | proposed | 183.0~~24.0~~ | 40.1~~17.8~~ | 5.2~~4.8~~ | |
| | *difference %* | -13~~89~~% | -0~~56~~% | *0%* | |
| Outfall East | existing | 739.5 | 151.0 | 7.3~~6.63~~ | runoff |
| | proposed | 729.5~~569.1~~ | 147.1~~24.5~~ | 7.3~~6.63~~ | |
| | *difference %* | *-1~~23~~%* | *-3~~18~~%* | *0%* | |

1. Peak flowrates and volumes computed using HEC-HMS.
2. Velocities for Outfalls West, South, and East taken from 25 Year HEC-RAS~~HMS~~ model of Cibolo Creek and represent the velocity in the creek at the discharge location.

## 100 Year Return Period

| Reach Summary | | Q100 (cfs) | Vol100 (ac-ft) | Vel100 (fps) | Runoff/on |
|---|---|---|---|---|---|
| Outfall North | existing | 491.1 | 102.4 | 3.3 | runoff |
| | proposed | 431.4~~0~~ | 90.7~~4~~ | 2.8 | |
| | *difference %* | *-12%* | *-12%* | *-1.4%* | |
| Outfall West | existing | 281.9 | 43.6 | 12.2 | runoff |
| | proposed | 165.7 | 20.8 | 12.2 | |
| | *difference %* | *-41%* | *-52%* | *0%* | |
| Outfall South | existing | 329.8 | 63.4 | 7.0~~5~~ | runoff |
| | proposed | 267.1~~75.5~~ | 72.7~~39.6~~ | 7.0~~5~~ | |
| | *difference %* | -19~~77~~% | ~~-38~~15% | *0%* | |
| Outfall East | existing | 1,146.8 | 234.4 | 7.3~~25~~ | runoff |
| | proposed | 1075.8~~840.8~~ | 232.8~~199.4~~ | 7.3~~25~~ | |
| | *difference %* | *-~~23~~6%* | *-1~~15~~%* | *0%* | |

1. Peak flowrates and volumes computed using HEC-HMS.
2. Velocities for Outfalls West, South, and East taken from the 100-year HEC-RA~~HM~~S model of Cibolo Creek and represent the velocity in the creek at the discharge location.

# BECK LANDFILL

# APPENDIX C1-B
# FACILITY SURFACE WATER DRAINAGE REPORT
# EXISTING CONDITION HYDROLOGIC CALCULATIONS

Includes pages C1-B-1 through C1-B-14~~20~~

# EXISTING CONDITION NARRATIVE

*30 TAC §330.305*

This existing condition site evaluation represents the hydrologic calculations for Beck Landfill, in accordance with §330.305.

## EXISTING CONDITION DRAINAGE AREA DRAWINGS

The existing condition drainage area maps depict the Beck Landfill property, facility boundary, and surrounding contributing areas. These maps reflect each individual drainage area, peak runoff, velocity, and volume for the 25-year rainfall event. Further, the existing condition runoff summary provides the peak flow rate, volume, and velocity at each comparison point along the property boundary. Offsite drainage areas are designated by the prefix "DA". Refer to Drawing C1-1 for the existing condition offsite drainage areas map.

The figure below is a soils map that depicts Beck Landfill drainage areas and the existing soil types. The Soil Survey of Guadalupe County, Texas, published by the Natural Resource Conservation Service is the reference for the base map and soils information. Based on the soils types, most of the soils surrounding the landfill are Hydrologic Group B. The map unit legend following the soils map list the various soil types within the contributing drainage area.

Soil Map—Bexar County, Texas, and Guadalupe County, Texas
(Beck Landfill)


USDA **Natural Resources Conservation Service** Web Soil Survey National Cooperative Soil Survey 8/27/2022 Page 1 of 3

## Map Unit Legend

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| Tf | Tinn and Frio soils, 0 to 1 percent slopes, frequently flooded | 6.5 | 1.8% |
| **Subtotals for Soil Survey Area** | | **6.5** | **1.8%** |
| **Totals for Area of Interest** | | **370.5** | **100.0%** |

| Map Unit Symbol | Map Unit Name | Acres in AOI | Percent of AOI |
|---|---|---|---|
| BaA | Barbarosa silty clay, 0 to 1 percent slopes | 50.2 | 13.5% |
| Bo | Bosque and Seguin soils, frequently flooded | 90.0 | 24.3% |
| SuA | Sunev loam, 0 to 1 percent slopes | 210.8 | 56.9% |
| SuB | Sunev loam, 1 to 3 percent slopes | 0.6 | 0.2% |
| SuC3 | Sunev loam, 3 to 5 percent slopes, eroded | 12.3 | 3.3% |
| **Subtotals for Soil Survey Area** | | **364.0** | **98.2%** |
| **Totals for Area of Interest** | | **370.5** | **100.0%** |

## WATERSHED CHARACTERISTICS

Watershed characteristics have been developed for the existing condition hydrologic evaluation. The watershed characteristics address drainage area runoff characteristics, unit hydrograph data, and reach characteristics.

The Existing Condition Watershed Characteristics, provides the summary of drainage areas, soil types, Curve Numbers (CN) values, initial loss, reach slope calculations, and determination of Manning's "n" values. The Soil Conservation Service (NRCS) CN were derived from watershed characteristic tables from the Urban Hydrology for Small Watersheds, Technical Report 55 (TR-55), which included evaluation of soil and surface cover/condition characteristics.

## RAINFALL DATA

The rainfall depth, duration, and frequency relationships for the storm event for the facility was taken from the <u>2018 NOAA Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0: Texas</u>. Return periods of 25 and 100 years and a duration of 24 hours were used for the design storms. The synthetic rainfall distribution is the NRCS 24-hour Type III storm. The Depth-Duration Frequency rainfall depths for the facility located in Guadalupe County, Texas are 8.56” for the 25-year storm event and 12.2” for the 100-year storm event. The maximum Tc for the model is sub-basins DA-E8 with 49.21 minutes and the minimum for is DA-E3 with 24.1 minutes.

## HEC-HMS SCHEMATIC

The schematic for the HEC-HMS model is included in the appendix to this section. The schematic provides the hydrologic element number and routing used for evaluating the existing condition in HEC-HMS.

## HYDROLOGIC ANALYSIS

For the hydrologic evaluation, HEC-HMS version 4.11~~0~~ was used for the precipitation-runoff simulation for the existing condition.

### Watershed Subareas and Schematization

The drainage areas that contribute flow to Beck Landfill were delineated into subareas to derive peak flows to determine existing entering and exiting flows. Hydrographs are developed for each subarea and appropriately combined and routed through existing surface drainage features. The subareas are shown on Drawings C1-1 and C1-2 - Existing Condition Offsite Drainage Areas.

### Time Step

The time step, or the program computation interval, selected for the analysis is 1 minute, which results in 1,440 hydrograph ordinates in 24 hours.

### Hypothetical Precipitation

Return periods of 25 and 100 years and duration of 24 hours were used for the design storms. The precipitation is assumed to be evenly distributed over the entire basin for each time interval.

### Precipitation Losses

Precipitation losses (the precipitation which does not contribute to the runoff) are calculated using the Soil Conservation Service (NRCS) Curve Number (CN) method. CN is a function of soil cover, land use, and antecedent moisture conditions. The CN values used for each drainage area are shown in the Watershed Characteristics tables.

### Synthetic Unit Hydrographs and Routing

The rainfall/runoff transformation was performed with the NRCS method. The parameters and input values for this model are included in the Watershed Characteristics tables.

The Lag Method was used for routing flow through the existing drainage channels. A minimum 6-minute lag time was used to reflect a minimum 10 minute time of concentration.

## EXISTING CONDITION FLOW SUMMARY

The existing condition flow summary table lists the peak flow rate and volume of runoff for each drainage area for the 25- and 100-year rainfall event. This table summarizes the results of the hydrologic evaluation.

## EXISTING CONDITION VELOCITY SUMMARY

Surface water velocities were determined for each discharge point where the surface water exits the facility boundary. For Outfalls West, South, and East, which discharge directly into Cibolo Creek, the calculated 25-year flow velocity of the creek from the HEC-RAS model was used for both existing and proposed conditions. For Outfall North, the 25- and 100-year, 24-hour peak flow rates were used to determine the velocity at the drainage area boundary. Manning's Equation via the Flowmaster software was used to evaluate the velocities. Refer to the appendix to this report section for the existing condition velocity calculations.

## EXISTING CONDITION DRAINAGE ANALYSIS SUMMARY

The analysis summary for the existing condition for each comparison point (Outfall-W, Outfall-S, Outfall-N, and Outfall-E) the peak flow rate, velocity, and volume resulting from the HEC-HMS evaluation for the 25- and 100-year, 24 hour rainfall is shown in the appendix to this report section.

## WATERSHED CHARACTERISTICS

The curve numbers (Cn) used in the HEC-HMS model for non-landfill and the existing condition landfill were taken from Table 4-18 in the TxDOT Hydraulic *Design Manual,* September 2019. The curve numbers assume Hydrologic Soil Group B and Poor Condition grass coverage. See Table 4-18 below. The Cn for the proposed landfill was taken from the TCEQ Surface Water Drainage and Erosional Stability Guidelines for a Municipal Solid Waste Landfills Section 1.4.3, which recommends a range between 85 and 90 for the landfill final cover. Since the soils surrounding the Beck Landfill are predominately Hydrologic Group B and there is no synthetic component to the final cover to limit infiltration, a Curve Number of 85 was selected. The table below summarizes the selected Curve Numbers.

| **Cn Values Selected** | |
|---|---|
| Offsite and Onsite Areas Outside of Landfill Footprint and Existing Landfill Final Cover | 79 |
| Area Within Landfill Footprint Affected by Vertical Expansion | 85 |

Note: Curve numbers were adjusted to account for impervious cover within drainage area. Impervious areas were assigned a Cn of 98.

**Table 4-18: Runoff Curve Numbers For Urban Areas**

| Cover type and hydrologic condition | Average percent impervious area | A | B | C | D |
|---|---|---|---|---|---|
| Open space (lawns, parks, golf courses, cemeteries, etc.): | | | | | |

Notes: Values are for average runoff condition, and $I_a = 0.2S$.
The average percent impervious area shown was used to develop the composite CNs.
Other assumptions are: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition.

| Cover type and hydrologic condition | Average percent impervious area | A | B | C | D |
|---|---|---|---|---|---|
| Poor condition (grass cover < 50%) | | 68 | 79 | 86 | 89 |
| Fair condition (grass cover 50% to 75%) | | 49 | 69 | 79 | 84 |
| Good condition (grass cover > 75%) | | 39 | 61 | 74 | 80 |
| Paved parking lots, roofs, driveways, etc. (excluding right-of-way) | | 98 | 98 | 98 | 98 |
| Streets and roads: | | | | | |
| Paved; curbs and storm drains (excluding right-of-way) | | 98 | 98 | 98 | 98 |
| Paved; open ditches (including right-of-way) | | 83 | 89 | 92 | 93 |
| Gravel (including right-of-way) | | 76 | 85 | 89 | 91 |
| Dirt (including right-of-way) | | 72 | 82 | 87 | 89 |
| Western desert urban areas: | | | | | |
| Natural desert landscaping (pervious areas only) | | 63 | 77 | 85 | 88 |
| Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-in. sand or gravel mulch and basin borders) | | 96 | 96 | 96 | 96 |
| Urban districts: | | | | | |
| Commercial and business | 85 | 89 | 92 | 94 | 95 |
| Industrial | 72 | 81 | 88 | 91 | 93 |
| Residential districts by average lot size: | | | | | |
| 1/8 acre or less (townhouses) | 65 | 77 | 85 | 90 | 92 |
| 1/4 acre | 38 | 61 | 75 | 83 | 87 |
| 1/3 acre | 30 | 57 | 72 | 81 | 86 |
| 1/2 acre | 25 | 54 | 70 | 80 | 85 |
| 1 acre | 20 | 51 | 68 | 79 | 84 |
| 2 acres | 12 | 46 | 65 | 77 | 82 |
| Developing urban areas: Newly graded areas (pervious area only, no vegetation) | | 77 | 86 | 91 | 94 |

Notes: Values are for average runoff condition, and $I_a = 0.2S$.
The average percent impervious area shown was used to develop the composite CNs.
Other assumptions are: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition.

# RAINFALL DATA

**NOAA Atlas 14, Volume 11, Version 2**
**Location name: Schertz, Texas, USA***
**Latitude: 29.5483°, Longitude: -98.2639°**
**Elevation: 706.71 ft****
* source: ESRI Maps
** source: USGS

**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF tabular | PF graphical | Maps & aerials

## PF tabular

**PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]**

| Duration | Average recurrence interval (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min | 0.443 (0.336-0.585) | 0.524 (0.400-0.684) | 0.655 (0.499-0.860) | 0.765 (0.574-1.02) | 0.918 (0.667-1.26) | 1.04 (0.733-1.46) | 1.16 (0.798-1.68) | 1.29 (0.864-1.91) | 1.46 (0.949-2.25) | 1.60 (1.01-2.53) |
| 10-min | 0.705 (0.534-0.931) | 0.835 (0.637-1.09) | 1.05 (0.796-1.37) | 1.22 (0.918-1.63) | 1.47 (1.07-2.02) | 1.66 (1.18-2.35) | 1.86 (1.28-2.69) | 2.05 (1.38-3.05) | 2.31 (1.50-3.55) | 2.50 (1.58-3.95) |
| 15-min | 0.902 (0.683-1.19) | 1.06 (0.808-1.38) | 1.32 (1.00-1.73) | 1.53 (1.15-2.04) | 1.83 (1.33-2.51) | 2.06 (1.46-2.90) | 2.29 (1.58-3.33) | 2.54 (1.71-3.78) | 2.88 (1.87-4.44) | 3.15 (1.99-4.98) |
| 30-min | 1.27 (0.962-1.68) | 1.49 (1.14-1.95) | 1.84 (1.40-2.42) | 2.14 (1.60-2.85) | 2.54 (1.84-3.48) | 2.85 (2.02-4.02) | 3.17 (2.19-4.60) | 3.53 (2.37-5.25) | 4.03 (2.62-6.21) | 4.43 (2.80-7.00) |
| 60-min | 1.64 (1.24-2.16) | 1.93 (1.48-2.52) | 2.42 (1.84-3.17) | 2.82 (2.12-3.76) | 3.39 (2.45-4.63) | 3.81 (2.69-5.37) | 4.27 (2.94-6.19) | 4.78 (3.22-7.12) | 5.53 (3.59-8.53) | 6.14 (3.89-9.70) |
| 2-hr | 1.95 (1.48-2.56) | 2.38 (1.81-3.05) | 3.04 (2.32-3.95) | 3.62 (2.73-4.80) | 4.46 (3.26-6.09) | 5.14 (3.65-7.21) | 5.88 (4.07-8.48) | 6.73 (4.54-9.96) | 7.98 (5.20-12.3) | 9.03 (5.74-14.2) |
| 3-hr | 2.11 (1.61-2.76) | 2.64 (1.99-3.33) | 3.42 (2.61-4.42) | 4.13 (3.12-5.45) | 5.18 (3.79-7.05) | 6.05 (4.31-8.47) | 7.02 (4.87-10.1) | 8.14 (5.50-12.0) | 9.80 (6.40-15.0) | 11.2 (7.13-17.5) |
| 6-hr | 2.40 (1.84-3.12) | 3.08 (2.32-3.83) | 4.06 (3.11-5.21) | 4.98 (3.79-6.54) | 6.38 (4.70-8.65) | 7.57 (5.43-10.6) | 8.92 (6.22-12.8) | 10.5 (7.12-15.4) | 12.8 (8.42-19.6) | 14.8 (9.49-23.1) |
| 12-hr | 2.71 (2.09-3.50) | 3.52 (2.65-4.32) | 4.67 (3.60-5.95) | 5.77 (4.41-7.53) | 7.46 (5.53-10.1) | 8.91 (6.43-12.4) | 10.6 (7.42-15.0) | 12.6 (8.55-18.3) | 15.6 (10.2-23.6) | 18.1 (11.6-28.1) |
| 24-hr | 3.05 (2.36-3.91) | 3.99 (3.01-4.85) | 5.31 (4.11-6.73) | 6.60 (5.06-8.55) | 8.56 (6.38-11.5) | 10.3 (7.44-14.2) | 12.2 (8.61-17.3) | 14.6 (9.96-21.1) | 18.2 (12.0-27.3) | 21.2 (13.7-32.7) |
| 2-day | 3.46 (2.70-4.42) | 4.54 (3.45-5.50) | 6.07 (4.72-7.64) | 7.54 (5.81-9.71) | 9.78 (7.32-13.0) | 11.7 (8.53-16.1) | 14.0 (9.87-19.6) | 16.6 (11.4-23.9) | 20.7 (13.7-30.9) | 24.1 (15.6-37.0) |
| 3-day | 3.77 (2.94-4.80) | 4.93 (3.76-5.95) | 6.58 (5.13-8.25) | 8.15 (6.30-10.5) | 10.5 (7.91-14.0) | 12.6 (9.20-17.2) | 15.0 (10.6-21.0) | 17.7 (12.2-25.5) | 21.9 (14.6-32.7) | 25.5 (16.5-39.0) |
| 4-day | 4.02 (3.14-5.10) | 5.22 (4.01-6.32) | 6.96 (5.45-8.71) | 8.60 (6.67-11.0) | 11.1 (8.33-14.7) | 13.2 (9.65-18.0) | 15.6 (11.1-21.8) | 18.5 (12.7-26.4) | 22.7 (15.1-33.7) | 26.3 (17.0-40.0) |
| 7-day | 4.60 (3.62-5.81) | 5.90 (4.57-7.15) | 7.80 (6.14-9.73) | 9.56 (7.44-12.2) | 12.2 (9.19-16.1) | 14.4 (10.6-19.5) | 16.9 (12.0-23.5) | 19.7 (13.7-28.1) | 23.9 (16.0-35.5) | 27.5 (17.9-41.7) |
| 10-day | 5.09 (4.01-6.41) | 6.45 (5.03-7.83) | 8.48 (6.69-10.6) | 10.3 (8.06-13.1) | 13.1 (9.87-17.1) | 15.3 (11.3-20.7) | 17.9 (12.7-24.7) | 20.7 (14.4-29.5) | 24.9 (16.6-36.7) | 28.4 (18.5-42.9) |
| 20-day | 6.56 (5.19-8.21) | 8.08 (6.40-9.88) | 10.5 (8.31-13.0) | 12.5 (9.81-15.8) | 15.5 (11.7-20.1) | 17.8 (13.1-23.9) | 20.4 (14.6-28.0) | 23.1 (16.1-32.8) | 27.1 (18.2-39.8) | 30.4 (19.9-45.8) |
| 30-day | 7.76 (6.16-9.66) | 9.40 (7.51-11.5) | 12.0 (9.61-14.9) | 14.3 (11.2-17.9) | 17.4 (13.2-22.6) | 19.8 (14.6-26.5) | 22.4 (16.1-30.7) | 25.1 (17.6-35.4) | 29.0 (19.5-42.4) | 32.1 (21.0-48.1) |
| 45-day | 9.40 (7.48-11.7) | 11.2 (9.04-13.8) | 14.2 (11.4-17.6) | 16.7 (13.2-20.9) | 20.1 (15.3-26.0) | 22.7 (16.8-30.2) | 25.4 (18.3-34.8) | 28.2 (19.8-39.7) | 32.1 (21.7-46.8) | 35.1 (23.1-52.5) |
| 60-day | 10.8 (8.65-13.4) | 12.8 (10.4-15.8) | 16.2 (13.0-19.9) | 18.9 (14.9-23.6) | 22.6 (17.2-29.1) | 25.4 (18.8-33.6) | 28.2 (20.3-38.4) | 31.1 (21.8-43.6) | 35.0 (23.7-50.8) | 38.0 (25.0-56.7) |

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

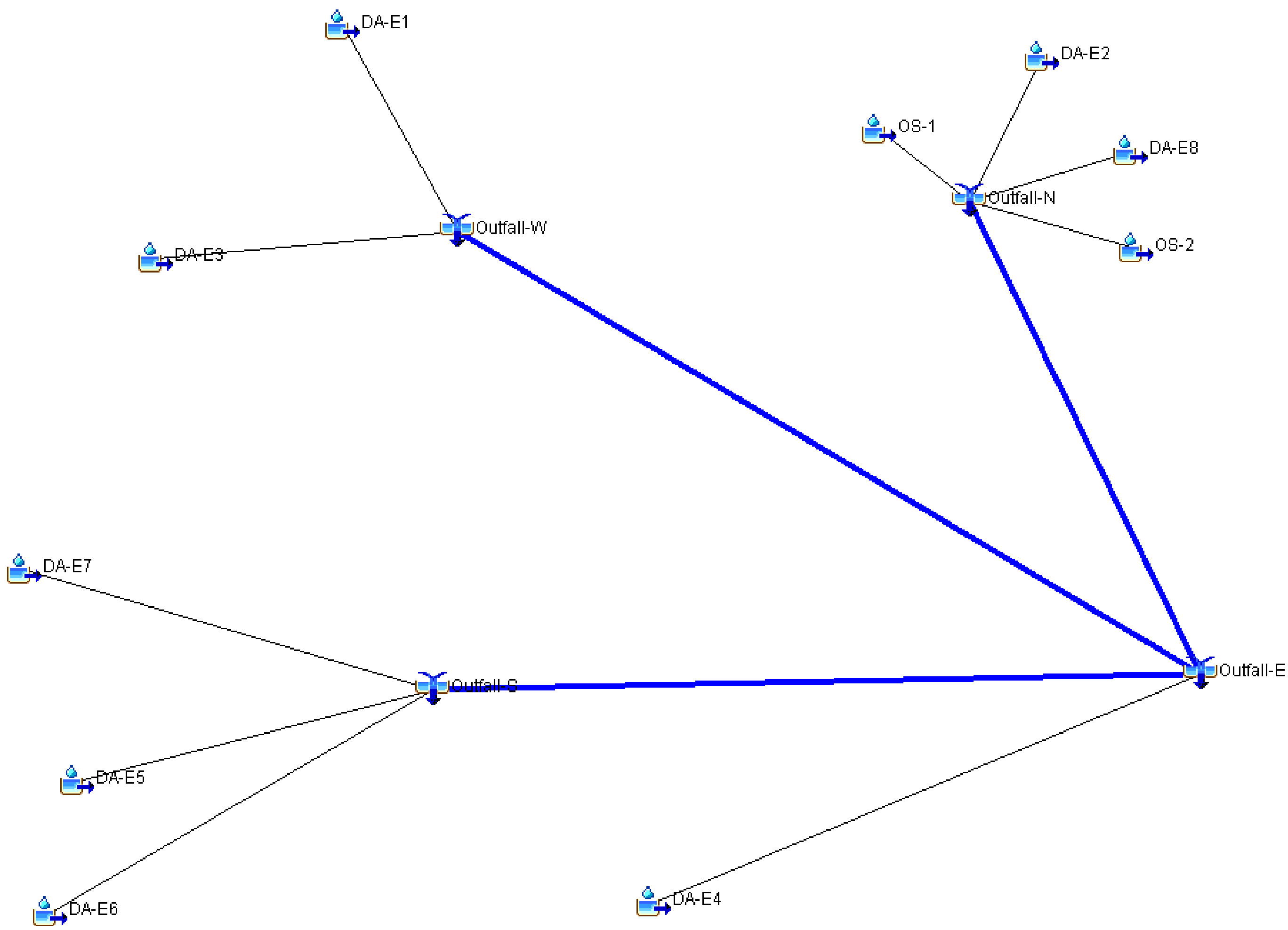
Please refer to NOAA Atlas 14 document for more information.

# EXISTING CONDITIONS TIME OF CONCENTRATION TABLE C1-B-1

Time of Concentration (TR-55 method)

| Subbasin | | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | Existing DA-E | OS-1 | OS-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Area | sqft | 731492.03 | 1689194.41 | 1679165.1 | 1406951.37 | 548751.391 | 1178062.52 | 1789193.1 | 2220496.38 | 976803.8 | 338429.02 |
| Area | ac. | 16.79 | 38.78 | 38.55 | 32.30 | 12.60 | 27.04 | 41.07 | 50.98 | 22.42 | 7.77 |
| Area | sqmi | 0.02624 | 0.06059 | 0.06023 | 0.05047 | 0.01968 | 0.04226 | 0.06418 | 0.07965 | 0.03504 | 0.01214 |
| Impervious | sqft | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 599276.00 | 386512.00 | 86500.00 |
| Impervious | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 27% | 40% | 26% |
| Pervious | Cn | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 79 |
| Composite | Cn | 79 | 79 | 79 | 79 | 79 | 79 | 79 | 84 | 87 | 84 |
| *Sheet Flow* | | | | | | | | | | | |
| Slope | in/in | 0.0200 | 0.0200 | 0.0200 | 0.0200 | 0.0200 | 0.0200 | 0.0073 | 0.0061 | 0.0100 | 0.0130 |
| Length | ft. | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| Roughness | n | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| Time | hr. | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.35 | 0.52 | 0.56 | 0.46 | 0.41 |
| *Shallow Concentrated* | | | | | | | | | | | |
| Slope | in/in | 0.0600 | 0.0600 | 0.0600 | 0.0600 | 0.0600 | 0.0600 | 0.0073 | 0.0061 | 0.0100 | 0.0560 |
| Length | ft. | 1515.38 | 832.00 | 767.52 | 976.68 | 1678.79 | 1795.48 | 1066.00 | 1186.00 | 1116.00 | 320.00 |
| Paved? | p/u | u | u | u | u | u | u | u | u | u | u |
| Time | hr. | 0.11 | 0.06 | 0.05 | 0.07 | 0.12 | 0.13 | 0.21 | 0.26 | 0.19 | 0.02 |
| *Shallow Concentrated* | | | | | | | | | | | |
| Slope | in/in | | | | | | | | | | |
| Length | ft. | | | | | | | | | | |
| Paved? | p/u | u | u | u | u | u | u | u | u | u | u |
| Time | hr. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Channel Flow* | | | | | | | | | | | |
| Slope | in/in | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Length | ft. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Velocity | fps | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Time | hr. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Summary | | | | | | | | | | | |
| Travel Time | hr. | 0.45 | 0.41 | 0.40 | 0.42 | 0.47 | 0.47 | 0.73 | 0.82 | 0.65 | 0.44 |
| Tc | min. | 27.24 | 24.35 | 24.08 | 24.96 | 27.93 | 28.42 | 44.08 | 49.21 | 39.03 | 26.16 |
| Lag Time | min. | 16.34 | 14.61 | 14.45 | 14.98 | 16.76 | 17.05 | 26.45 | 29.52 | 23.42 | 15.70 |

# EXISTING CONDITION HEC-HMS SCHEMATIC



# HYDROLOGIC ANALYSIS

**25-YEAR, TYPE III, NRCS, 24-HOUR STORM EVENT**
**100-YEAR, TYPE III, NRCS, 24-HOUR STORM EVENT**

# EXISTING CONDITION FLOW SUMMARY

## 25-Year Results

Project: Beck with Southern Outfall Simulation Run: EX 100-YR

Start of Run: 01Jan2001, 00:01 Basin Model: Existing Beck
End of Run: 02Jan2001, 00:02 Meteorologic Model: 100-YR
Compute Time: 08Sep2023, 16:10:10 Control Specifications: TypeIII-24Hr

Show Elements: All Elements Volume Units: IN ACRE-FT Sorting: Watershed Explorer

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (ACRE-FT) |
|---|---|---|---|---|
| DA-E3 | 0.1 | 200.4 | 1 January 2001, 10:08 | 30.4 |
| DA-E1 | 0.0 | 82.5 | 1 January 2001, 10:10 | 13.2 |
| Outfall-W | 0.1 | 281.9 | 1 January 2001, 10:09 | 43.6 |
| DA-E8 | 0.1 | 196.5 | 1 January 2001, 10:23 | 44.8 |
| DA-E2 | 0.1 | 201.0 | 1 January 2001, 10:08 | 30.6 |
| OS-1 | 0.0 | 100.1 | 1 January 2001, 10:16 | 20.2 |
| OS-2 | 0.0 | 41.7 | 1 January 2001, 10:09 | 6.8 |
| Outfall-N | 0.2 | 491.1 | 1 January 2001, 10:12 | 102.4 |
| E to N reach | 0.2 | 491.1 | 1 January 2001, 10:15 | 102.3 |
| DA-E7 | 0.1 | 155.5 | 1 January 2001, 10:20 | 32.2 |
| DA-E6 | 0.0 | 129.6 | 1 January 2001, 10:11 | 21.3 |
| DA-E5 | 0.0 | 60.9 | 1 January 2001, 10:10 | 9.9 |
| Outfall-S | 0.1 | 329.8 | 1 January 2001, 10:13 | 63.4 |
| S to E | 0.1 | 329.8 | 1 January 2001, 10:19 | 63.3 |
| W to E Reach | 0.1 | 281.9 | 1 January 2001, 10:27 | 43.4 |
| DA-E4 | 0.1 | 165.1 | 1 January 2001, 10:09 | 25.4 |
| Outfall-E | 0.5 | 1146.8 | 1 January 2001, 10:20 | 234.4 |

# 100-Year Results

Project: Beck with Southern Outfall    Simulation Run: EX 100-YR

Start of Run: 01Jan2001, 00:01    Basin Model: Existing Beck
End of Run: 02Jan2001, 00:02    Meteorologic Model: 100-YR
Compute Time: 08Sep2023, 16:10:10    Control Specifications: TypeIII-24Hr

Show Elements: All Elements    Volume Units: IN ACRE-FT    Sorting: Watershed Explorer

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (ACRE-FT) |
|---|---|---|---|---|
| DA-E3 | 0.1 | 200.4 | 1 January 2001, 10:08 | 30.4 |
| DA-E1 | 0.0 | 82.5 | 1 January 2001, 10:10 | 13.2 |
| Outfall-W | 0.1 | 281.9 | 1 January 2001, 10:09 | 43.6 |
| DA-E8 | 0.1 | 196.5 | 1 January 2001, 10:23 | 44.8 |
| DA-E2 | 0.1 | 201.0 | 1 January 2001, 10:08 | 30.6 |
| OS-1 | 0.0 | 100.1 | 1 January 2001, 10:16 | 20.2 |
| OS-2 | 0.0 | 41.7 | 1 January 2001, 10:09 | 6.8 |
| Outfall-N | 0.2 | 491.1 | 1 January 2001, 10:12 | 102.4 |
| E to N reach | 0.2 | 491.1 | 1 January 2001, 10:15 | 102.3 |
| DA-E7 | 0.1 | 155.5 | 1 January 2001, 10:20 | 32.2 |
| DA-E6 | 0.0 | 129.6 | 1 January 2001, 10:11 | 21.3 |
| DA-E5 | 0.0 | 60.9 | 1 January 2001, 10:10 | 9.9 |
| Outfall-S | 0.1 | 329.8 | 1 January 2001, 10:13 | 63.4 |
| S to E | 0.1 | 329.8 | 1 January 2001, 10:19 | 63.3 |
| W to E Reach | 0.1 | 281.9 | 1 January 2001, 10:27 | 43.4 |
| DA-E4 | 0.1 | 165.1 | 1 January 2001, 10:09 | 25.4 |
| Outfall-E | 0.5 | 1146.8 | 1 January 2001, 10:20 | 234.4 |

# BECK LANDFILL

# APPENDIX C1-C
# FACILITY SURFACE WATER DRAINAGE REPORT
# POST-DEVELOPMENT HYDROLOGIC CALCULATIONS

Includes pages C1-C-1 through C1-C-14~~2~~

POST-DEVELOPMENT NARRATIVE

*30 TAC §330.305*

The post-development hydrologic analysis represents the hydrologic calculations after the proposed landfill is developed in accordance with §330.305(a)-(d).

**POST-DEVELOPMENT DRAINAGE AREA DRAWINGS**

The post-development drainage area drawings depict Beck Landfill facility development and the offsite drainage areas. These drawings depict the drainage areas for the facility development including the entrance facilities, storage and processing facilities, and the landfill development. Further, the post-development runoff summary provides peak discharge, volume, and velocity for the 25- and 100-year rainfall events at each comparison point along the facility and property boundary. Offsite and onsite drainage areas are designated by the prefix "DA".

**WATERSHED CHARACTERISTICS**

Watershed characteristics have been developed for the post-development hydrologic evaluation. The watershed characteristics address drainage area runoff characteristics, unit hydrograph data, reach characteristics, and the proposed final condition drainage system including the detention pond.

The first table, Post-development Watershed Characteristics, provides the summary of drainage areas, soil types, Curve Number (CN) values, initial loss, reach slope calculations, and determination of Manning's "n" values. The Soil Conservation Service (NRCS) CN were derived from watershed characteristic tables from the TxDOT Hydraulic *Design Manual*, September 2019, as discussed in Appendix C1-B, which included evaluation of anticipated post-development soil and surface cover/condition characteristics. The runoff characteristics for the offsite drainage areas did not change from the existing condition.

**POST-DEVELOPMENT SURFACE WATER IMPOUNDMENT DESIGN PARAMETERS**

This appendix to this section of the report includes pond and outlet structure data for the surface water impoundment incorporated in the hydrologic model.

**HEC-HMS SCHEMATIC**

The schematic for the HEC-HMS model provides the hydrologic element number and routing used for evaluating the post-development condition in HEC-HMS.

**HYDROLOGIC ANALYSIS**

For the hydrologic evaluation, HEC-HMS was used for the precipitation runoff simulation for the post-development condition. The following describes the various modeling components.

**Watershed Subareas and Schematization**

The landfill area that contributes flow to Cibolo Creek and the detention pond was delineated into sub basins to derive peak discharge and hydrographs. Hydrographs developed for each sub basin are appropriately combined and routed through the benches and perimeter channels. The sub basins are shown on Figure C1-2, and the HEC-HMS schematic of the post-development condition.

**Time Step**

The time step, or the program computation interval, selected for the analysis is 1 minute, which results in 1,440 hydrograph ordinates in 24 hours.

**Hypothetical Precipitation**

Return periods of 25, and 100 years and duration of 24 hours are used for the design storm. The rainfall distribution is the NRCS 24-hour Type III storm. The precipitation is assumed to be evenly distributed over the entire basin for each time interval.

**Precipitation Losses**

Precipitation losses (precipitation that does not contribute to the runoff) are calculated using the Soil Conservation Service (NRCS) Curve Number (CN) method. CN is a function of soil cover, land use, and antecedent moisture conditions. The CN values used for each drainage area are shown in the Watershed Characteristics table.

**Synthetic Unit Hydrographs and Routing**

The rainfall/runoff transformation was performed with the NRCS Method as described in detail in Urban Hydrology for Small Watersheds, (TR-55). The parameters and input values for this model are included in the Watershed Characteristics tables.

The Lag Method was used for routing through the existing and proposed drainage channels.

**POST-DEVELOPMENT FLOW SUMMARY**

The post-development flow summary table lists the peak flow rate and volume of runoff for each drainage area for the 25- and 100-year rainfall event. This table summarizes the results of the post-development hydrologic evaluation.

**POST-DEVELOPMENT VELOCITY SUMMARY**

Surface water velocities were determined for each discharge point where the surface water exits the facility boundary. For Outfalls West, South, and East, which discharge directly into Cibolo Creek, the calculated 25-year flow velocity of the creek from the HEC-RAS model was used for both existing and proposed conditions. For Outfall North, the 25- and 100-year, 24-hour peak flow rates were used to determine the velocity at the drainage area boundary.

Manning's Equation via the Flowmaster software was used to evaluate the velocities. Refer to the appendix to this report section for the proposed condition velocity calculations.

**POST-DEVELOPMENT DRAINAGE ANALYSIS SUMMARY**

The analysis summary for the proposed condition for each comparison point (Outfall-W, Outfall-S, Outfall-N, and Outfall-E) the peak flow rate, velocity, and volume resulting from the HEC-HMS evaluation for the 25- and 100-year, 24 hour rainfall is shown in the appendix to this report section.

## WATERSHED CHARACTERISTICS

The curve numbers (Cn) used in the HEC-HMS model for non-landfill and the existing condition landfill were taken from Table 4-18 in the TxDOT Hydraulic *Design Manual,* September 2019. The curve numbers assume Hydrologic Soil Group B and Poor Condition grass coverage. See Table 4-18 below. The Cn for the proposed landfill was taken from the TCEQ Surface Water Drainage and Erosional Stability Guidelines for a Municipal Solid Waste Landfill Section 1.4.3, which recommends a range between 85 and 90 for the landfill final cover. Since the soils surrounding the Beck Landfill are predominately Hydrologic Group B and there is no synthetic component to the final cover to limit infiltration, a Curve Number of 85 was selected. The table below summarizes the selected Curve Numbers.

| **Cn Values Selected** | |
|---|---|
| Offsite and Onsite Areas Outside of Landfill Footprint and Existing Landfill Final Cover | 79 |
| Area Within Landfill Footprint Affected by Vertical Expansion | 85 |

Note: Curve numbers were adjusted to account for impervious cover within drainage area. Impervious areas were assigned a Cn of 98.

**Table 4-18: Runoff Curve Numbers For Urban Areas**

| Cover type and hydrologic condition | Average percent impervious area | A | B | C | D |
|---|---|---|---|---|---|
| Open space (lawns, parks, golf courses, cemeteries, etc.): | | | | | |
| Notes: Values are for average runoff condition, and $I_a$ = 0.2S.<br>The average percent impervious area shown was used to develop the composite CNs.<br>Other assumptions are: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. | | | | | |

| Cover type and hydrologic condition | Average percent impervious area | A | B | C | D |
|---|---|---|---|---|---|
| Poor condition (grass cover < 50%) | | 68 | $\boxed{79}$ | 86 | 89 |
| Fair condition (grass cover 50% to 75%) | | 49 | 69 | 79 | 84 |
| Good condition (grass cover > 75%) | | 39 | 61 | 74 | 80 |
| Paved parking lots, roofs, driveways, etc. (excluding right-of-way) | | 98 | $\boxed{98}$ | 98 | 98 |
| Streets and roads: | | | | | |
| Paved; curbs and storm drains (excluding right-of-way) | | 98 | 98 | 98 | 98 |
| Paved; open ditches (including right-of-way) | | 83 | 89 | 92 | 93 |
| Gravel (including right-of-way) | | 76 | 85 | 89 | 91 |
| Dirt (including right-of-way) | | 72 | 82 | 87 | 89 |
| Western desert urban areas: | | | | | |
| Natural desert landscaping (pervious areas only) | | 63 | 77 | 85 | 88 |
| Artificial desert landscaping (impervious weed barrier, desert shrub with 1- to 2-in. sand or gravel mulch and basin borders) | | 96 | 96 | 96 | 96 |
| Urban districts: | | | | | |
| Commercial and business | 85 | 89 | 92 | 94 | 95 |
| Industrial | 72 | 81 | 88 | 91 | 93 |
| Residential districts by average lot size: | | | | | |
| 1/8 acre or less (townhouses) | 65 | 77 | 85 | 90 | 92 |
| 1/4 acre | 38 | 61 | 75 | 83 | 87 |
| 1/3 acre | 30 | 57 | 72 | 81 | 86 |
| 1/2 acre | 25 | 54 | 70 | 80 | 85 |
| 1 acre | 20 | 51 | 68 | 79 | 84 |
| 2 acres | 12 | 46 | 65 | 77 | 82 |
| Developing urban areas: Newly graded areas (pervious area only, no vegetation) | | 77 | 86 | 91 | 94 |
| Notes: Values are for average runoff condition, and $I_a$ = 0.2S.<br>The average percent impervious area shown was used to develop the composite CNs.<br>Other assumptions are: impervious areas are directly connected to the drainage system, impervious areas have a CN of 98, and pervious areas are considered equivalent to open space in good hydrologic condition. | | | | | |

# RAINFALL DATA

**NOAA Atlas 14, Volume 11, Version 2**
**Location name: Schertz, Texas, USA***
**Latitude: 29.5483°, Longitude: -98.2639°**
**Elevation: 706.71 ft****
* source: ESRI Maps
** source: USGS

**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

## PF tabular

**PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]**

| Duration | Average recurrence interval (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min | 0.443 (0.336-0.585) | 0.524 (0.400-0.684) | 0.655 (0.499-0.860) | 0.765 (0.574-1.02) | 0.918 (0.667-1.26) | 1.04 (0.733-1.46) | 1.16 (0.798-1.68) | 1.29 (0.864-1.91) | 1.46 (0.949-2.25) | 1.60 (1.01-2.53) |
| 10-min | 0.705 (0.534-0.931) | 0.835 (0.637-1.09) | 1.05 (0.796-1.37) | 1.22 (0.918-1.63) | 1.47 (1.07-2.02) | 1.66 (1.18-2.35) | 1.86 (1.28-2.69) | 2.05 (1.38-3.05) | 2.31 (1.50-3.55) | 2.50 (1.58-3.95) |
| 15-min | 0.902 (0.683-1.19) | 1.06 (0.808-1.38) | 1.32 (1.00-1.73) | 1.53 (1.15-2.04) | 1.83 (1.33-2.51) | 2.06 (1.46-2.90) | 2.29 (1.58-3.33) | 2.54 (1.71-3.78) | 2.88 (1.87-4.44) | 3.15 (1.99-4.98) |
| 30-min | 1.27 (0.962-1.68) | 1.49 (1.14-1.95) | 1.84 (1.40-2.42) | 2.14 (1.60-2.85) | 2.54 (1.84-3.48) | 2.85 (2.02-4.02) | 3.17 (2.19-4.60) | 3.53 (2.37-5.25) | 4.03 (2.62-6.21) | 4.43 (2.80-7.00) |
| 60-min | 1.64 (1.24-2.16) | 1.93 (1.48-2.52) | 2.42 (1.84-3.17) | 2.82 (2.12-3.76) | 3.39 (2.45-4.63) | 3.81 (2.69-5.37) | 4.27 (2.94-6.19) | 4.78 (3.22-7.12) | 5.53 (3.59-8.53) | 6.14 (3.89-9.70) |
| 2-hr | 1.95 (1.48-2.56) | 2.38 (1.81-3.05) | 3.04 (2.32-3.95) | 3.62 (2.73-4.80) | 4.46 (3.26-6.09) | 5.14 (3.65-7.21) | 5.88 (4.07-8.48) | 6.73 (4.54-9.96) | 7.98 (5.20-12.3) | 9.03 (5.74-14.2) |
| 3-hr | 2.11 (1.61-2.76) | 2.64 (1.99-3.33) | 3.42 (2.61-4.42) | 4.13 (3.12-5.45) | 5.18 (3.79-7.05) | 6.05 (4.31-8.47) | 7.02 (4.87-10.1) | 8.14 (5.50-12.0) | 9.80 (6.40-15.0) | 11.2 (7.13-17.5) |
| 6-hr | 2.40 (1.84-3.12) | 3.08 (2.32-3.83) | 4.06 (3.11-5.21) | 4.98 (3.79-6.54) | 6.38 (4.70-8.65) | 7.57 (5.43-10.6) | 8.92 (6.22-12.8) | 10.5 (7.12-15.4) | 12.8 (8.42-19.6) | 14.8 (9.49-23.1) |
| 12-hr | 2.71 (2.09-3.50) | 3.52 (2.65-4.32) | 4.67 (3.60-5.95) | 5.77 (4.41-7.53) | 7.46 (5.53-10.1) | 8.91 (6.43-12.4) | 10.6 (7.42-15.0) | 12.6 (8.55-18.3) | 15.6 (10.2-23.6) | 18.1 (11.6-28.1) |
| 24-hr | 3.05 (2.36-3.91) | 3.99 (3.01-4.85) | 5.31 (4.11-6.73) | 6.60 (5.06-8.55) | 8.56 (6.38-11.5) | 10.3 (7.44-14.2) | 12.2 (8.61-17.3) | 14.6 (9.96-21.1) | 18.2 (12.0-27.3) | 21.2 (13.7-32.7) |
| 2-day | 3.46 (2.70-4.42) | 4.54 (3.45-5.50) | 6.07 (4.72-7.64) | 7.54 (5.81-9.71) | 9.78 (7.32-13.0) | 11.7 (8.53-16.1) | 14.0 (9.87-19.6) | 16.6 (11.4-23.9) | 20.7 (13.7-30.9) | 24.1 (15.6-37.0) |
| 3-day | 3.77 (2.94-4.80) | 4.93 (3.76-5.95) | 6.58 (5.13-8.25) | 8.15 (6.30-10.5) | 10.5 (7.91-14.0) | 12.6 (9.20-17.2) | 15.0 (10.6-21.0) | 17.7 (12.2-25.5) | 21.9 (14.6-32.7) | 25.5 (16.5-39.0) |
| 4-day | 4.02 (3.14-5.10) | 5.22 (4.01-6.32) | 6.96 (5.45-8.71) | 8.60 (6.67-11.0) | 11.1 (8.33-14.7) | 13.2 (9.65-18.0) | 15.6 (11.1-21.8) | 18.5 (12.7-26.4) | 22.7 (15.1-33.7) | 26.3 (17.0-40.0) |
| 7-day | 4.60 (3.62-5.81) | 5.90 (4.57-7.15) | 7.80 (6.14-9.73) | 9.56 (7.44-12.2) | 12.2 (9.19-16.1) | 14.4 (10.6-19.5) | 16.9 (12.0-23.5) | 19.7 (13.7-28.1) | 23.9 (16.0-35.5) | 27.5 (17.9-41.7) |
| 10-day | 5.09 (4.01-6.41) | 6.45 (5.03-7.83) | 8.48 (6.69-10.6) | 10.3 (8.06-13.1) | 13.1 (9.87-17.1) | 15.3 (11.3-20.7) | 17.9 (12.7-24.7) | 20.7 (14.4-29.5) | 24.9 (16.6-36.7) | 28.4 (18.5-42.9) |
| 20-day | 6.56 (5.19-8.21) | 8.08 (6.40-9.88) | 10.5 (8.31-13.0) | 12.5 (9.81-15.8) | 15.5 (11.7-20.1) | 17.8 (13.1-23.9) | 20.4 (14.6-28.0) | 23.1 (16.1-32.8) | 27.1 (18.2-39.8) | 30.4 (19.9-45.8) |
| 30-day | 7.76 (6.16-9.66) | 9.40 (7.51-11.5) | 12.0 (9.61-14.9) | 14.3 (11.2-17.9) | 17.4 (13.2-22.6) | 19.8 (14.6-26.5) | 22.4 (16.1-30.7) | 25.1 (17.6-35.4) | 29.0 (19.5-42.4) | 32.1 (21.0-48.1) |
| 45-day | 9.40 (7.48-11.7) | 11.2 (9.04-13.8) | 14.2 (11.4-17.6) | 16.7 (13.2-20.9) | 20.1 (15.3-26.0) | 22.7 (16.8-30.2) | 25.4 (18.3-34.8) | 28.2 (19.8-39.7) | 32.1 (21.7-46.8) | 35.1 (23.1-52.5) |
| 60-day | 10.8 (8.65-13.4) | 12.8 (10.4-15.8) | 16.2 (13.0-19.9) | 18.9 (14.9-23.6) | 22.6 (17.2-29.1) | 25.4 (18.8-33.6) | 28.2 (20.3-38.4) | 31.1 (21.8-43.6) | 35.0 (23.7-50.8) | 38.0 (25.0-56.7) |

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

## PROPOSED CONDITIONS TIME OF CONCENTRATION TABLE C1-C-1

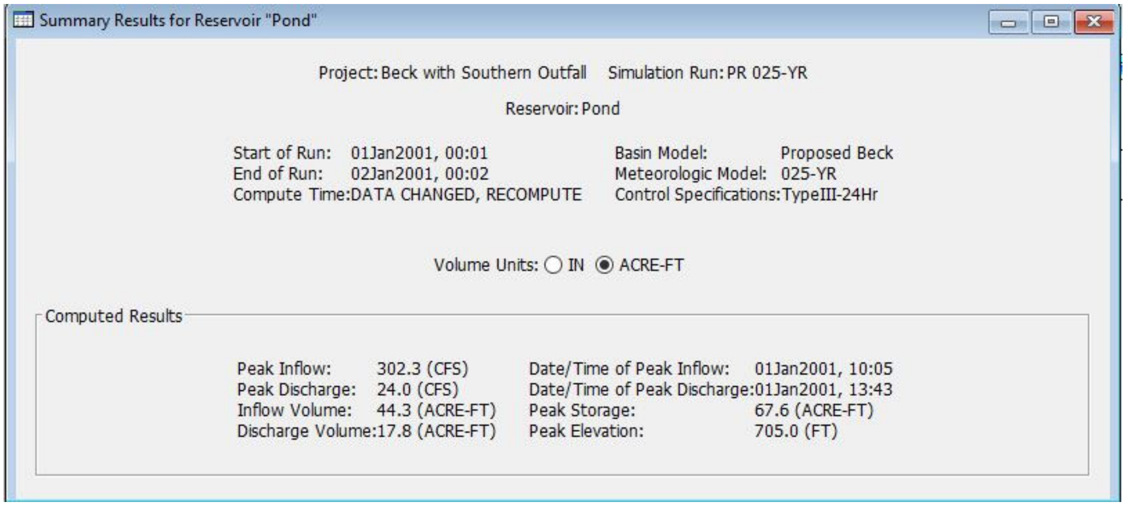
| Subbasin | | DA-P1 | DA-P2 | DA-P3 | DA-P4 | DA-P5 | DA-P6 | DA-P7 | DA-P8 | DA-P9 | DA-P10 | OS-1 | OS-2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Area** | sqft | 325,402 | 2,889,729 | 1,462,482 | 485,705 | 903,182 | 754,710 | 292,836 | 1,005,166 | 1,565,743 | 1,553,862 | 976,804 | 338429 |
| **Area** | ac. | 7.47 | 66.34 | 33.57 | 11.15 | 20.73 | 17.33 | 6.72 | 23.08 | 35.94 | 35.67 | 22.42 | 7.77 |
| **Area** | sqmi | 0.01167 | 0.10365 | 0.05246 | 0.01742 | 0.03240 | 0.02707 | 0.01050 | 0.03606 | 0.05616 | 0.05574 | 0.03504 | 0.01214 |
| **Impervious** | sqft | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 599276 | 386512 | 86500.00 |
| **Impervious** | % | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 39% | 40% | 26% |
| **Pervious** | Cn | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 79 | 79 | 79 |
| **Composite** | Cn | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 86 | 87 | 84 |
| ***Sheet Flow*** | | | | | | | | | | | | | |
| **Slope** | in/in | 0.0400 | 0.0600 | 0.0600 | 0.0600 | 0.2000 | 0.2000 | 0.2000 | 0.2000 | 0.0100 | 0.0061 | 0.0100 | 0.0130 |
| **Length** | ft. | 100 | 300 | 300 | 100 | 100 | 100 | 50 | 100 | 100 | 300 | 300 | 300 |
| **Roughness** | n | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 | 0.15 |
| **Time** | hr. | 0.11 | 0.22 | 0.22 | 0.09 | 0.06 | 0.06 | 0.03 | 0.06 | 0.19 | 0.56 | 0.46 | 0.41 |
| ***Shallow Concentrated*** | | | | | | | | | | | | | |
| **Slope** | in/in | 1.6349 | 0.1530 | 0.0957 | 0.2015 | 0.1666 | 0.2000 | 0.2000 | 0.2213 | 0.0258 | 0.0061 | 0.0100 | 0.0560 |
| **Length** | ft. | 18.35 | 248.30 | 125.37 | 138.98 | 72.03 | 29.60 | 30.00 | 45.19 | 387.44 | 1186.00 | 1116.00 | 320.00 |
| **Paved?** | p/u | u | u | u | u | u | u | u | u | u | u | u | u |
| **Time** | hr. | 0.00 | 0.01 | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.26 | 0.19 | 0.02 |
| ***Shallow Concentrated*** | | | | | | | | | | | | | |
| **Slope** | in/in | | | | | | | | | 0.0341 | | | |
| **Length** | ft. | | | | | | | | | 351.79 | | | |
| **Paved?** | p/u | | | | | | | | | u | u | u | u |
| **Time** | hr. | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 | 0.00 | 0.00 |
| ***Channel Flow*** | | | | | | | | | | | | | |
| **Slope** | in/in | 0.00 | 0.07 | 0.11 | 0.19 | 0.00 | 0.01 | 0.01 | 0.02 | 0.00 | 0 | 0 | 0 |
| **Length** | ft. | 0 | 2179.34 | 1474.72 | 653.53 | 1291.337 | 2315.48 | 722.98 | 3058.68 | 0 | 0 | 0 | 0 |
| **Velocity** | fps | 0 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 0 | 0 | 0 | 0 |
| **Time** | hr. | 0.00 | 0.12 | 0.08 | 0.04 | 0.07 | 0.13 | 0.04 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 |
| **Summary** | | | | | | | | | | | | | |
| **Travel Time** | hr. | 0.11 | 0.36 | 0.31 | 0.13 | 0.13 | 0.19 | 0.07 | 0.23 | 0.23 | 0.82 | 0.65 | 0.44 |
| **Tc** | min. | 10.00 | 21.35 | 18.77 | 10.00 | 10.00 | 11.23 | 10.00 | 13.74 | 13.91 | 49.21 | 39.03 | 26.16 |
| **Lag Time** | min. | 6.00 | 12.81 | 11.26 | 6.00 | 6.00 | 6.74 | 6.00 | 8.24 | 8.35 | 29.52 | 23.42 | 15.70 |

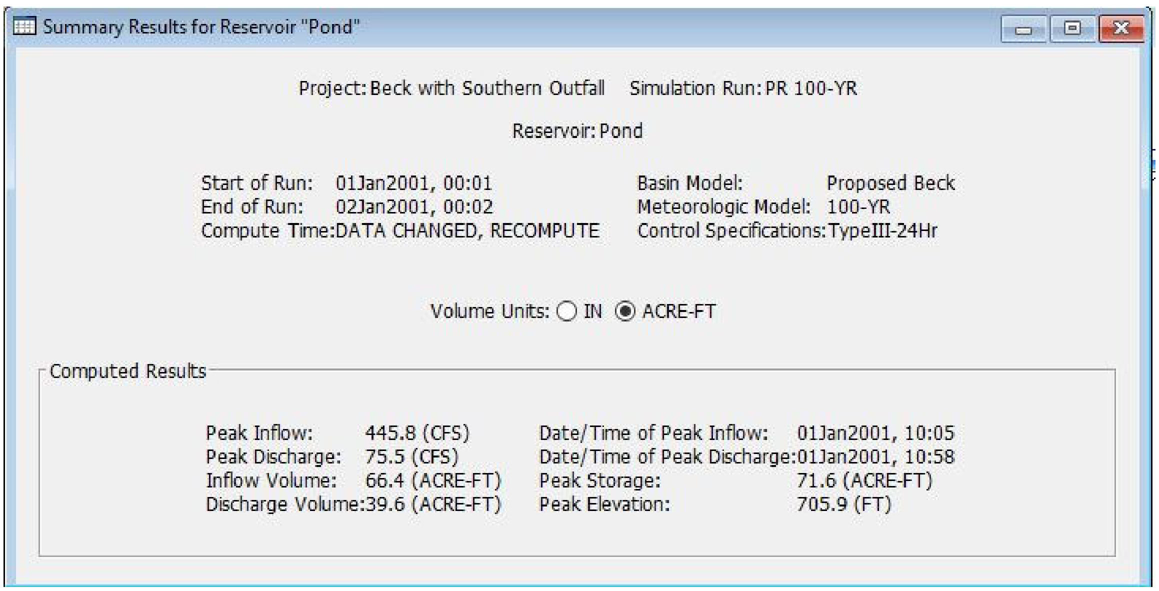
# POST-DEVELOPMENT SURFACE WATER IMPOUNDMENTS DESIGN PARAMETERS

South Pond - Proposed Condition

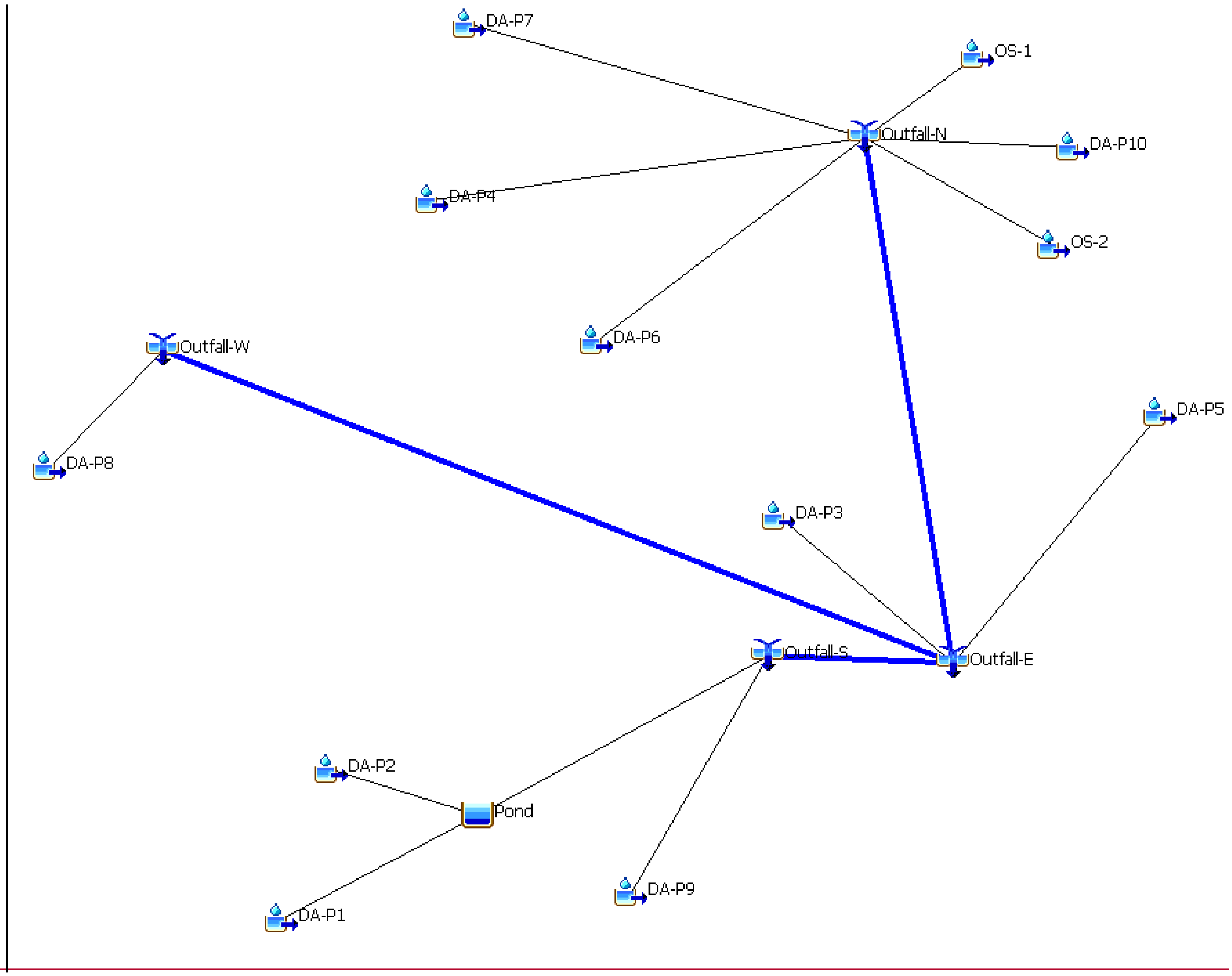
| Outfall Structures | | | | | |
|---|---|---|---|---|---|
| Outfall Number | Outfall Type | Length or Diameter (ft) | Orifice Coefficient | Critical Elevation type | Critical Elevation (msl) |
| 1 | Orifice | 1 | 0.66 | Flowline | 698.0 |
| 2 | Orifice | 4 | 0.66 | Flowline | 703.0 |

| Pond Geometry Summary | | | | | | | |
|---|---|---|---|---|---|---|---|
| Stage (msl) | Pond Area (ac) | Pond Area (sf) | Sectional Volume (cu. Ft.) | Cumulative Volume (cu.ft.) | Outfall 1 Rating (cfs) | Outfall 2 Rating (cfs) | Cumulative Outflow (cfs) |
| 668 | 0.141 | 6,136 | - | - | | | |
| 670 | 0.203 | 8,824 | 17,648 | 17,648 | | | |
| 672 | 0.278 | 12,091 | 24,183 | 41,831 | | | |
| 674 | 0.370 | 16,103 | 32,206 | 74,036 | | | |
| 676 | 0.467 | 20,350 | 40,701 | 114,737 | | | |
| 678 | 0.554 | 24,144 | 48,287 | 163,024 | | | |
| 680 | 0.648 | 28,207 | 56,415 | 219,439 | | | |
| 682 | 0.752 | 32,768 | 65,537 | 284,976 | | | |
| 684 | 0.854 | 37,192 | 74,384 | 359,360 | | | |
| 686 | 1.869 | 81,409 | 162,819 | 522,178 | | | |
| 688 | 2.187 | 95,274 | 190,549 | 712,727 | | | |
| 690 | 2.403 | 104,670 | 209,341 | 922,068 | | | |
| 692 | 2.536 | 110,468 | 220,936 | 1,143,004 | | | |
| 694 | 2.670 | 116,318 | 232,637 | 1,375,640 | | | |
| 696 | 2.934 | 127,805 | 255,610 | 1,631,251 | | | |
| 698 | 3.230 | 140,677 | 281,354 | 1,912,605 | 0 | | 0.0 |
| 700 | 3.527 | 153,649 | 307,298 | 2,219,903 | 5.1 | | 5.1 |
| 702 | 3.737 | 162,784 | 325,567 | 2,545,470 | 7.8 | | 7.8 |
| 703 | 4.167 | 181,528 | 181,528 | 2,726,998 | 8.8 | | 8.8 |
| 704 | 4.363 | 190,065 | 190,065 | 2,917,063 | 9.8 | | 9.8 |
| 706 | 4.643 | 202,267 | 404,533 | 3,321,596 | 11.4 | 66.6 | 78.0 |
| 708 | 4.925 | 214,542 | 429,083 | 3,750,680 | 12.8 | 115.3 | 128.1 |
| 709 | 5.111 | 222,618 | 222,618 | 3,973,298 | 13.5 | 133.1 | 146.6 |


Summary Results for Reservoir "Pond"
Project: Beck with Southern Outfall Simulation Run: PR 025-YR
Reservoir: Pond
Start of Run: 01Jan2001, 00:01
End of Run: 02Jan2001, 00:02
Compute Time: DATA CHANGED, RECOMPUTE
Basin Model: Proposed Beck
Meteorologic Model: 025-YR
Control Specifications: TypeIII-24Hr
Volume Units: IN ACRE-FT
Computed Results
Peak Inflow: 302.3 (CFS)
Peak Discharge: 24.0 (CFS)
Inflow Volume: 44.3 (ACRE-FT)
Discharge Volume: 17.8 (ACRE-FT)
Date/Time of Peak Inflow: 01Jan2001, 10:05
Date/Time of Peak Discharge: 01Jan2001, 13:43
Peak Storage: 67.6 (ACRE-FT)
Peak Elevation: 705.0 (FT)


Summary Results for Reservoir "Pond"
Project: Beck with Southern Outfall Simulation Run: PR 100-YR
Reservoir: Pond
Start of Run: 01Jan2001, 00:01
End of Run: 02Jan2001, 00:02
Compute Time: DATA CHANGED, RECOMPUTE
Basin Model: Proposed Beck
Meteorologic Model: 100-YR
Control Specifications: TypeIII-24Hr
Volume Units: IN ACRE-FT
Computed Results
Peak Inflow: 445.8 (CFS)
Peak Discharge: 75.5 (CFS)
Inflow Volume: 66.4 (ACRE-FT)
Discharge Volume: 39.6 (ACRE-FT)
Date/Time of Peak Inflow: 01Jan2001, 10:05
Date/Time of Peak Discharge: 01Jan2001, 10:58
Peak Storage: 71.6 (ACRE-FT)
Peak Elevation: 705.9 (FT)

# PROPOSED CONDITION HEC-HMS SCHEMATIC



## Peak Velocity Calculation for Pond Outlet 1

**Project Description**

| | |
|---|---|
| Solve For | Discharge Coefficient |

**Input Data**

| | |
|---|---|
| Discharge | 11.40 cfs |
| Headwater Elevation | 705.90 ft |
| Centroid Elevation | 698.50 ft |
| Tailwater Elevation | 698.00 ft |
| Diameter | 12.0 in |

**Results**

| | |
|---|---|
| Discharge Coefficient | 0.665 |
| Headwater Height Above Centroid | 7.40 ft |
| Tailwater Height Above Centroid | -0.50 ft |
| Flow Area | 0.8 $ft^2$ |
| Velocity | 14.51 ft/s |

## Peak Velocity Calculation for Pond Outlet 2

**Project Description**

| | |
|---|---|
| Solve For | Discharge Coefficient |

**Input Data**

| | |
|---|---|
| Discharge | 66.60 cfs |
| Headwater Elevation | 705.90 ft |
| Centroid Elevation | 705.00 ft |
| Tailwater Elevation | 703.00 ft |
| Diameter | 48.0 in |

**Results**

| | |
|---|---|
| Discharge Coefficient | 0.696 |
| Headwater Height Above Centroid | 0.90 ft |
| Tailwater Height Above Centroid | -2.00 ft |
| Flow Area | 12.6 $ft^2$ |
| Velocity | 5.30 ft/s |

# HYDROLOGIC ANALYSIS

**25-YEAR, 24-YEAR STORM EVENT**
**100-YEAR, 24-YEAR STORM EVENT**

## Type III, 24-hour Storm, 25 Year Event - Proposed Condition

Project: Beck with Southern Outfall Simulation Run: PR 025-YR

| | | | |
|---|---|---|---|
| Start of Run: | 01Jan2001, 00:01 | Basin Model: | Proposed B |
| End of Run: | 02Jan2001, 00:02 | Meteorologic Model: | 025-YR |
| Compute Time: | 27Aug2022, 13:07:33 | Control Specifications: | TypeIII-24H |

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (ACRE-FT) |
|---|---|---|---|---|
| DA-P2 | 0.10365 | 274.2 | 01Jan2001, 10:06 | 39.8 |
| DA-P1 | 0.01167 | 39.6 | 01Jan2001, 10:00 | 4.5 |
| Pond | 0.11532 | 24.0 | 01Jan2001, 13:43 | 17.8 |
| Outfall-S | 0.11532 | 24.0 | 01Jan2001, 13:43 | 17.8 |
| DA-P10 | 0.05574 | 93.1 | 01Jan2001, 10:23 | 21.2 |
| OS-1 | 0.03504 | 67.5 | 01Jan2001, 10:16 | 13.5 |
| DA-P6 | 0.02707 | 89.2 | 01Jan2001, 10:01 | 10.4 |
| DA-P4 | 0.01742 | 59.1 | 01Jan2001, 10:00 | 6.7 |
| OS-2 | 0.01214 | 27.8 | 01Jan2001, 10:09 | 4.5 |
| DA-P7 | 0.01050 | 35.6 | 01Jan2001, 10:00 | 4.0 |
| Outfall-N | 0.15791 | 290.5 | 01Jan2001, 10:02 | 60.4 |
| E to N Reach | 0.15791 | 290.5 | 01Jan2001, 10:05 | 60.3 |
| South to East | 0.11532 | 24.0 | 01Jan2001, 13:49 | 17.7 |
| DA-P3 | 0.05246 | 146.6 | 01Jan2001, 10:05 | 20.2 |
| DA-P8 | 0.03606 | 112.5 | 01Jan2001, 10:02 | 13.9 |
| Outfall-W | 0.03606 | 112.5 | 01Jan2001, 10:02 | 13.9 |
| W to E Reach | 0.03606 | 112.5 | 01Jan2001, 10:20 | 13.8 |
| DA-P5 | 0.03240 | 109.9 | 01Jan2001, 10:00 | 12.5 |
| Outfall-E | 0.39415 | 569.1 | 01Jan2001, 10:04 | 124.5 |

Project: Beck with Southern Outfall Simulation Run: PR 025-YR

Start of Run: 01Jan2001, 00:01 Basin Model: Proposed Beck
End of Run: 02Jan2001, 00:02 Meteorologic Model: 025-YR
Compute Time: 08Sep2023, 16:10:21 Control Specifications: TypeIII-24Hr

Show Elements: All Elements Volume Units: IN ACRE-FT Sorting: Watershed Explorer

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (ACRE-FT) |
|---|---|---|---|---|
| DA-P10 | 0.1 | 93.1 | 1 January 2001, 10:23 | 21.2 |
| OS-1 | 0.0 | 67.5 | 1 January 2001, 10:16 | 13.5 |
| DA-P6 | 0.0 | 89.8 | 1 January 2001, 10:01 | 10.8 |
| DA-P4 | 0.0 | 59.1 | 1 January 2001, 10:00 | 6.7 |
| OS-2 | 0.0 | 27.8 | 1 January 2001, 10:09 | 4.5 |
| DA-P7 | 0.0 | 35.6 | 1 January 2001, 10:00 | 4.0 |
| Outfall-N | 0.2 | 291.2 | 1 January 2001, 10:02 | 60.7 |
| DA-P2 | 0.1 | 274.2 | 1 January 2001, 10:06 | 39.8 |
| DA-P1 | 0.0 | 39.6 | 1 January 2001, 10:00 | 4.5 |
| Pond | 0.1 | 24.0 | 1 January 2001, 13:43 | 17.8 |
| DA-P9 | 0.1 | 175.8 | 1 January 2001, 10:02 | 22.3 |
| Outfall-S | 0.2 | 183.0 | 1 January 2001, 10:02 | 40.1 |
| South to East | 0.2 | 183.0 | 1 January 2001, 10:08 | 40.0 |
| E to N Reach | 0.2 | 291.2 | 1 January 2001, 10:05 | 60.7 |
| DA-P3 | 0.1 | 146.6 | 1 January 2001, 10:05 | 20.2 |
| DA-P8 | 0.0 | 112.5 | 1 January 2001, 10:02 | 13.9 |
| Outfall-W | 0.0 | 112.5 | 1 January 2001, 10:02 | 13.9 |
| W to E Reach | 0.0 | 112.5 | 1 January 2001, 10:20 | 13.8 |
| DA-P5 | 0.0 | 109.9 | 1 January 2001, 10:00 | 12.5 |
| Outfall-E | 0.5 | 729.5 | 1 January 2001, 10:05 | 147.1 |

**Type III, 24-hour Storm, 100 Year Event - Proposed Condition**

Project: Beck with Southern Outfall Simulation Run: PR 100-YR

Start of Run: 01Jan2001, 00:01 Basin Model: Proposed B
End of Run: 02Jan2001, 00:02 Meteorologic Model: 100-YR
Compute Time: 27Aug2022, 13:11:08 Control Specifications: TypeIII-24H

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (ACRE-FT) |
|---|---|---|---|---|
| DA-P2 | 0.10365 | 404.4 | 01Jan2001, 10:06 | 59.7 |
| DA-P1 | 0.01167 | 58.3 | 01Jan2001, 10:00 | 6.7 |
| Pond | 0.11532 | 75.5 | 01Jan2001, 10:58 | 39.6 |
| Outfall-S | 0.11532 | 75.5 | 01Jan2001, 10:58 | 39.6 |
| DA-P10 | 0.05574 | 138.7 | 01Jan2001, 10:23 | 31.7 |
| OS-1 | 0.03504 | 100.1 | 01Jan2001, 10:16 | 20.2 |
| DA-P6 | 0.02707 | 131.3 | 01Jan2001, 10:00 | 15.6 |
| DA-P4 | 0.01742 | 87.0 | 01Jan2001, 10:00 | 10.0 |
| OS-2 | 0.01214 | 41.7 | 01Jan2001, 10:09 | 6.8 |
| DA-P7 | 0.01050 | 52.4 | 01Jan2001, 10:00 | 6.1 |
| Outfall-N | 0.15791 | 431.0 | 01Jan2001, 10:02 | 90.4 |
| E to N Reach | 0.15791 | 431.0 | 01Jan2001, 10:05 | 90.3 |
| South to East | 0.11532 | 75.5 | 01Jan2001, 11:04 | 39.5 |
| DA-P3 | 0.05246 | 216.0 | 01Jan2001, 10:05 | 30.2 |
| DA-P8 | 0.03606 | 165.7 | 01Jan2001, 10:02 | 20.8 |
| Outfall-W | 0.03606 | 165.7 | 01Jan2001, 10:02 | 20.8 |
| W to E Reach | 0.03606 | 165.7 | 01Jan2001, 10:20 | 20.7 |
| DA-P5 | 0.03240 | 161.8 | 01Jan2001, 10:00 | 18.7 |
| Outfall-E | 0.39415 | 840.8 | 01Jan2001, 10:04 | 199.4 |

Project: Beck with Southern Outfall Simulation Run: PR 100-YR

Start of Run: 01Jan2001, 00:01 Basin Model: Proposed Beck
End of Run: 02Jan2001, 00:02 Meteorologic Model: 100-YR
Compute Time: 08Sep2023, 16:10:35 Control Specifications: TypeIII-24Hr

Show Elements: All Elements Volume Units: IN ACRE-FT Sorting: Watershed Explorer

| Hydrologic Element | Drainage Area (MI2) | Peak Discharge (CFS) | Time of Peak | Volume (ACRE-FT) |
|---|---|---|---|---|
| DA-P10 | 0.1 | 138.7 | 1 January 2001, 10:23 | 31.7 |
| OS-1 | 0.0 | 100.1 | 1 January 2001, 10:16 | 20.2 |
| DA-P6 | 0.0 | 131.7 | 1 January 2001, 10:00 | 16.0 |
| DA-P4 | 0.0 | 87.0 | 1 January 2001, 10:00 | 10.0 |
| OS-2 | 0.0 | 41.7 | 1 January 2001, 10:09 | 6.8 |
| DA-P7 | 0.0 | 52.4 | 1 January 2001, 10:00 | 6.1 |
| Outfall-N | 0.2 | 431.4 | 1 January 2001, 10:02 | 90.7 |
| DA-P2 | 0.1 | 404.4 | 1 January 2001, 10:06 | 59.7 |
| DA-P1 | 0.0 | 58.3 | 1 January 2001, 10:00 | 6.7 |
| Pond | 0.1 | 75.5 | 1 January 2001, 10:58 | 39.6 |
| DA-P9 | 0.1 | 257.9 | 1 January 2001, 10:02 | 33.1 |
| Outfall-S | 0.2 | 267.1 | 1 January 2001, 10:02 | 72.7 |
| South to East | 0.2 | 267.1 | 1 January 2001, 10:08 | 72.6 |
| E to N Reach | 0.2 | 431.4 | 1 January 2001, 10:05 | 90.6 |
| DA-P3 | 0.1 | 216.0 | 1 January 2001, 10:05 | 30.2 |
| DA-P8 | 0.0 | 165.7 | 1 January 2001, 10:02 | 20.8 |
| Outfall-W | 0.0 | 165.7 | 1 January 2001, 10:02 | 20.8 |
| W to E Reach | 0.0 | 165.7 | 1 January 2001, 10:20 | 20.7 |
| DA-P5 | 0.0 | 161.8 | 1 January 2001, 10:00 | 18.7 |
| Outfall-E | 0.5 | 1075.8 | 1 January 2001, 10:05 | 232.8 |

# BECK LANDFILL
# APPENDIX C1-D
# FACILITY SURFACE WATER DRAINAGE REPORT
# PERIMETER DRAINAGE BERM DESIGN

Includes pages C1-D-1 through C1-D-5

Revised January 2023

# NARRATIVE

*30 TAC §330.305*

This appendix presents the design of Beck Landfill perimeter drainage channels and detention pond in accordance with §330.305(a)-(d).

## PERIMETER DRAINAGE PLAN

Drawing C1-2 depicts the perimeter drainage system and detention pond location for Beck Landfill. The typical section for the perimeter drainage berms is shown on Figure C1-2A and the detention pond details are shown on Figure C3-1 and C3-2. The perimeter berm hydraulic analysis is included for the 25-year rainfall event. Profiles for the perimeter berms are shown on Figures C1-2A through C1-2F.

## PERIMETER BERM DESIGN SUMMARY

The perimeter berms are designed for the peak discharge resulting from the 25-year storm event while maintaining velocities between 2 fps and 6 fps. The typical perimeter berm has 2:1 sideslopes, two feet top width, and is two feet high. The berm slope is 2%. The largest area contributing to a perimeter berm occurs for Berm 8 (See Figure C1-2) and is 6.5 acres. The Rational Method and methods and parameters included in the TxDOT Hydraulic *Design Manual,* September 2019 will be used to calculate the peak flow anticipated in this worst-case perimeter berm.

The rational formula estimates the peak rate of runoff at a specific location in a watershed as a function of the drainage area, runoff coefficient, and mean rainfall intensity for a duration equal to the time of concentration. The rational formula is:

$$Q=CIA$$

Where:

Q = maximum rate of runoff (cfs)

C = runoff coefficient

I = average rainfall intensity (in./hr.)

A = drainage area (ac)

## Runoff Coefficient (C)

The following table from the TxDOT manual lists appropriate run-off coefficients for various uses and surface conditions. Steep grassed slopes was chosen as the most appropriate for the landfill final cover, which corresponds to a coefficient of 0.70.

*Chapter 4 — Hydrology* *Section 12 — Rational Method*

**Table 4-10: Runoff Coefficients for Urban Watersheds**

| Type of drainage area | Runoff coefficient |
|---|---|
| Business: | |
| Downtown areas | 0.70-0.95 |
| Neighborhood areas | 0.30-0.70 |
| Residential: | |
| Single-family areas | 0.30-0.50 |
| Multi-units, detached | 0.40-0.60 |
| Multi-units, attached | 0.60-0.75 |
| Suburban | 0.35-0.40 |
| Apartment dwelling areas | 0.30-0.70 |
| Industrial: | |
| Light areas | 0.30-0.80 |
| Heavy areas | 0.60-0.90 |
| Parks, cemeteries | 0.10-0.25 |
| Playgrounds | 0.30-0.40 |
| Railroad yards | 0.30-0.40 |
| Unimproved areas: | |
| Sand or sandy loam soil, 0-3% | 0.15-0.20 |
| Sand or sandy loam soil, 3-5% | 0.20-0.25 |
| Black or loessial soil, 0-3% | 0.18-0.25 |
| Black or loessial soil, 3-5% | 0.25-0.30 |
| Black or loessial soil, > 5% | 0.70-0.80 |
| Deep sand area | 0.05-0.15 |
| Steep grassed slopes | 0.70 |
| Lawns: | |
| Sandy soil, flat 2% | 0.05-0.10 |
| Sandy soil, average 2-7% | 0.10-0.15 |
| Sandy soil, steep 7% | 0.15-0.20 |
| Heavy soil, flat 2% | 0.13-0.17 |
| Heavy soil, average 2-7% | 0.18-0.22 |

*Hydraulic Design Manual* *4-53* *TxDOT 09/2019*

## Rainfall Intensity (I)

The rainfall intensity (I) is the average rainfall rate in in./hr. for a specific rainfall duration and a selected frequency. The duration is assumed to be equal to the time of concentration. The intensity was taken from the following table from 2018 NOAA Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0: Texas, assuming a time of concentration and storm duration of ten minutes. From the table the 25-year intensity is 8.8 in/hr and the 100-year intensity is 11.1 in/hr.

**NOAA Atlas 14, Volume 11, Version 2**
**Location name: Schertz, Texas, USA***
**Latitude: 29.5483°, Longitude: -98.2639°**
**Elevation: 706.71 ft****
* source: ESRI Maps
** source: USGS

**POINT PRECIPITATION FREQUENCY ESTIMATES**

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

**PF tabular**

**PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]**

| Duration | Average recurrence interval (years) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 5 | 10 | 25 | 50 | 100 | 200 | 500 | 1000 |
| 5-min | 5.32 (4.03-7.02) | 6.29 (4.80-8.21) | 7.86 (5.99-10.3) | 9.18 (6.89-12.2) | 11.0 (8.00-15.1) | 12.4 (8.80-17.5) | 13.9 (9.58-20.1) | 15.4 (10.4-22.9) | 17.5 (11.4-27.0) | 19.2 (12.1-30.3) |
| 10-min | 4.23 (3.20-5.59) | 5.01 (3.82-6.54) | 6.28 (4.78-8.24) | 7.34 (5.51-9.77) | 8.81 (6.42-12.1) | 9.97 (7.07-14.1) | 11.1 (7.68-16.1) | 12.3 (8.27-18.3) | 13.8 (8.99-21.3) | 15.0 (9.50-23.7) |
| 15-min | 3.61 (2.73-4.77) | 4.24 (3.23-5.53) | 5.26 (4.00-6.90) | 6.12 (4.59-8.15) | 7.30 (5.31-10.0) | 8.22 (5.82-11.6) | 9.17 (6.32-13.3) | 10.2 (6.84-15.1) | 11.5 (7.49-17.8) | 12.6 (7.98-19.9) |
| 30-min | 2.54 (1.92-3.36) | 2.98 (2.27-3.89) | 3.68 (2.80-4.84) | 4.27 (3.21-5.69) | 5.08 (3.69-6.96) | 5.70 (4.03-8.04) | 6.35 (4.38-9.20) | 7.05 (4.74-10.5) | 8.05 (5.23-12.4) | 8.86 (5.61-14.0) |
| 60-min | 1.64 (1.24-2.16) | 1.93 (1.48-2.52) | 2.42 (1.84-3.17) | 2.82 (2.12-3.76) | 3.39 (2.45-4.63) | 3.81 (2.69-5.37) | 4.27 (2.94-6.19) | 4.78 (3.22-7.12) | 5.53 (3.59-8.53) | 6.14 (3.89-9.70) |
| 2-hr | 0.974 (0.740-1.28) | 1.19 (0.902-1.52) | 1.52 (1.16-1.98) | 1.81 (1.37-2.40) | 2.23 (1.63-3.04) | 2.57 (1.83-3.61) | 2.94 (2.04-4.24) | 3.37 (2.27-4.98) | 3.99 (2.60-6.13) | 4.52 (2.87-7.10) |
| 3-hr | 0.703 (0.536-0.920) | 0.877 (0.663-1.11) | 1.14 (0.869-1.47) | 1.37 (1.04-1.81) | 1.72 (1.26-2.35) | 2.01 (1.44-2.82) | 2.34 (1.62-3.36) | 2.71 (1.83-4.00) | 3.26 (2.13-4.99) | 3.73 (2.37-5.84) |
| 6-hr | 0.401 (0.307-0.522) | 0.514 (0.387-0.639) | 0.678 (0.520-0.870) | 0.832 (0.632-1.09) | 1.07 (0.786-1.44) | 1.26 (0.907-1.76) | 1.49 (1.04-2.13) | 1.75 (1.19-2.57) | 2.15 (1.41-3.27) | 2.48 (1.58-3.86) |
| 12-hr | 0.225 (0.173-0.290) | 0.292 (0.220-0.358) | 0.387 (0.299-0.494) | 0.479 (0.366-0.625) | 0.619 (0.459-0.835) | 0.739 (0.533-1.03) | 0.879 (0.616-1.25) | 1.04 (0.710-1.52) | 1.29 (0.849-1.96) | 1.51 (0.965-2.33) |
| 24-hr | 0.127 (0.098-0.163) | 0.166 (0.126-0.202) | 0.221 (0.171-0.280) | 0.275 (0.211-0.356) | 0.357 (0.266-0.478) | 0.428 (0.310-0.591) | 0.510 (0.359-0.721) | 0.608 (0.415-0.880) | 0.757 (0.500-1.14) | 0.885 (0.570-1.36) |
| 2-day | 0.072 (0.056-0.092) | 0.095 (0.072-0.115) | 0.126 (0.098-0.159) | 0.157 (0.121-0.202) | 0.204 (0.152-0.272) | 0.244 (0.178-0.335) | 0.291 (0.206-0.409) | 0.346 (0.238-0.499) | 0.430 (0.285-0.644) | 0.502 (0.324-0.770) |
| 3-day | 0.052 (0.041-0.067) | 0.068 (0.052-0.083) | 0.091 (0.071-0.115) | 0.113 (0.088-0.145) | 0.146 (0.110-0.195) | 0.175 (0.128-0.239) | 0.208 (0.147-0.291) | 0.246 (0.170-0.354) | 0.305 (0.202-0.454) | 0.354 (0.229-0.541) |
| 4-day | 0.042 (0.033-0.053) | 0.054 (0.042-0.066) | 0.073 (0.057-0.091) | 0.090 (0.069-0.115) | 0.115 (0.087-0.153) | 0.138 (0.101-0.188) | 0.163 (0.116-0.227) | 0.192 (0.132-0.275) | 0.236 (0.157-0.352) | 0.274 (0.177-0.417) |
| 7-day | 0.027 (0.022-0.035) | 0.035 (0.027-0.043) | 0.046 (0.037-0.058) | 0.057 (0.044-0.073) | 0.073 (0.055-0.096) | 0.086 (0.063-0.116) | 0.101 (0.072-0.140) | 0.117 (0.081-0.168) | 0.143 (0.095-0.211) | 0.164 (0.106-0.248) |
| 10-day | 0.021 (0.017-0.027) | 0.027 (0.021-0.033) | 0.035 (0.028-0.044) | 0.043 (0.034-0.055) | 0.054 (0.041-0.071) | 0.064 (0.047-0.086) | 0.074 (0.053-0.103) | 0.086 (0.060-0.123) | 0.104 (0.069-0.153) | 0.118 (0.077-0.179) |
| 20-day | 0.014 (0.011-0.017) | 0.017 (0.013-0.021) | 0.022 (0.017-0.027) | 0.026 (0.020-0.033) | 0.032 (0.024-0.042) | 0.037 (0.027-0.050) | 0.042 (0.030-0.058) | 0.048 (0.034-0.068) | 0.057 (0.038-0.083) | 0.063 (0.041-0.095) |
| 30-day | 0.011 (0.009-0.013) | 0.013 (0.010-0.016) | 0.017 (0.013-0.021) | 0.020 (0.016-0.025) | 0.024 (0.018-0.031) | 0.028 (0.020-0.037) | 0.031 (0.022-0.043) | 0.035 (0.024-0.049) | 0.040 (0.027-0.059) | 0.045 (0.029-0.067) |
| 45-day | 0.009 (0.007-0.011) | 0.010 (0.008-0.013) | 0.013 (0.011-0.016) | 0.015 (0.012-0.019) | 0.019 (0.014-0.024) | 0.021 (0.016-0.028) | 0.024 (0.017-0.032) | 0.026 (0.018-0.037) | 0.030 (0.020-0.043) | 0.033 (0.021-0.049) |
| 60-day | 0.008 (0.006-0.009) | 0.009 (0.007-0.011) | 0.011 (0.009-0.014) | 0.013 (0.010-0.016) | 0.016 (0.012-0.020) | 0.018 (0.013-0.023) | 0.020 (0.014-0.027) | 0.022 (0.015-0.030) | 0.024 (0.016-0.035) | 0.026 (0.017-0.039) |

For the worst-case perimeter berm:

$Q_{25} = CIA$

= (0.7)(8.8 in/hr)(6.52 Acres)

= 40.16 cfs

$Q_{100}$ = CIA

= (0.7)(11.1 in/hr)(6.52 Acres)

= 50.7 cfs

The Flowmaster software package was utilized to determine flow depth for each of the perimeter berms and the table below lists each berm, the contributing area, and the calculated 25-year flow depth.

**Beck Landfill Perimter Berm Design Calculations**

C= 0.7 Steep grassed slopes
i= 8.8 (in/hr) (25 yr return period)

| BERM | CONTRIBUTING AREA (SF) | CONTRIBUTING AREA (AC) | PEAK FLOW (CFS) | Peak Velocity (FT/SEC) | FLOW DEPTH (FT) |
|---|---|---|---|---|---|
| 1 | 137,456 | 3.16 | 19.44 | 5.41 | 1.1 |
| 2 | 129,787 | 2.98 | 18.35 | 5.33 | 1.1 |
| 3 | 99,459 | 2.28 | 14.06 | 4.99 | 1.0 |
| 4 | 206,752 | 4.75 | 29.24 | 5.99 | 1.3 |
| 5 | 102,102 | 2.34 | 14.44 | 5.02 | 1.0 |
| 6A | 94,439 | 2.17 | 13.36 | 4.93 | 1.0 |
| 6B | 110,462 | 2.54 | 15.62 | 5.12 | 1.0 |
| 7A | 39,377 | 0.90 | 5.57 | 3.96 | 0.7 |
| 7B | 51,131 | 1.17 | 7.23 | 4.22 | 0.8 |
| 7C | 27,391 | 0.63 | 3.87 | 3.62 | 0.6 |
| 8 | 283,991 | 6.52 | 40.16 | 6.49 | 1.4 |
| 9 | 38,656 | 0.89 | 5.47 | 3.94 | 0.7 |
| 10A | 122,091 | 2.80 | 17.27 | 5.25 | 1.0 |
| 10B | 93,610 | 2.15 | 13.24 | 4.92 | 0.9 |

Notes: 1) Flow depths and velocities calculated using FlowMaster Hydraulic Calculator
2) Peak flow calculated using Rational Method with factors shown in the table

**Worst-Case Perimeter Berm**

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

| Input Data | |
|---|---|
| Roughness Coefficient | 0.025 |
| Channel Slope | 0.020 ft/ft |
| Left Side Slope | 2.000 H:V |
| Right Side Slope | 4.000 H:V |
| Discharge | 40.16 cfs |

| Results | |
|---|---|
| Normal Depth | 1.4 ft |
| Flow Area | 6.2 ft² |
| Wetted Perimeter | 9.1 ft |
| Hydraulic Radius | 0.7 ft |
| Top Width | 8.62 ft |
| Critical Depth | 1.6 ft |
| Critical Slope | 0.011 ft/ft |
| Velocity | 6.49 ft/s |
| Velocity Head | 0.65 ft |
| Specific Energy | 2.09 ft |
| Froude Number | 1.349 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 1.4 ft |
| Critical Depth | 1.6 ft |
| Channel Slope | 0.020 ft/ft |
| Critical Slope | 0.011 ft/ft |

## DETENTION POND ANALYSIS

The rainfall depth, duration, and frequency relationships for the storm event for the facility was taken from the 2018 NOAA Atlas 14 Precipitation-Frequency Atlas of the United States, Volume 11, Version 2.0: Texas. Return periods of 25 and 100 years and a duration of 24 hours was used for the design storm. The synthetic rainfall distribution is the NRCS 24-hour Type Ill storm. The rainfall data for the facility located in Guadalupe County, Texas is shown on page C1-C~~B~~-~~7~~7. The details for the detention pond are shown on Figure C3-1 and the pond outlet design and elevation-stage-storage tables are shown on Page C1-C~~B~~-9.

# BECK LANDFILL

# APPENDIX C1-E
# FACILITY SURFACE WATER DRAINAGE REPORT
# FINAL COVER DRAINAGE STRUCTURE DESIGN

Includes pages C1-E-1 through C1-E-11~~7~~

## NARRATIVE

*30 TAC §§330.303 AND 330.305*

This appendix presents the supporting documentation for evaluation of the final cover erosion layer and drainage structures.

### FINAL COVER PLAN

The final cover plans depict the proposed final cover drainage system, which consists of a series of benches and downchutes designed to convey the flow of surface water produced during the 25-year storm event. The locations of the sideslope benches and downchutes are shown on Drawing C1-2. Final cover details are included in Attachment D3.

### EROSION LAYER EVALUATION

The erosion layer evaluation is based on the Universal Soil Loss Equation (USLE) following Natural Resource Soil Conservation Service (NRCS) procedures. The evaluation is based on a 25-year storm event. The proposed 12-inch thick erosion layer is shown to provide sufficient erosion protection. Calculations are included beginning on page C1-E-2.

### DRAINAGE BENCH DESIGN

The drainage bench design calculations are presented for the typical proposed bench flowline slope of 2 percent. The procedures in the TxDOT Hydraulic Design Manual, September 2019 were used to determine the flow depth, bench capacity, and contributing drainage area. The largest contributing area to any bench occurs in the western portion of DA-P02 and is 9.7 acres. Using the Rational Method procedures described in Attachment C1-D, the calculated peak flowrates for the worst-case bench for the 25-year and 100-year storms are 59.8 cfs and 75.4 cfs, respectively. The Flowmaster program was utilized to determine the full-flow capacity of the bench, which is 275.8 cfs. Therefore, the selected downchutes have abundant capacity to convey the 25-year and 100-year runoff flows. The output from the Flowmaster calculation is included below.

### DOWNCHUTE DESIGN

The drainage downchute design calculations are presented for the typical proposed downchute flowline slope of 25 percent. The HEC-HMS model was used to calculate the 25-year flow for the worst-case downchute. The largest contributing area to a downchute is DA-P03 (66.3 acres). The 25-year flow from the HEC-HMS model for this downchute is 274.2 cfs and the 100-year flow is 404.4 cfs. The Flowmaster program was utilized to determine the full-flow capacity of the downchute, which is 802.2 cfs. Therefore, the selected downchutes have abundant capacity to convey the 25-year and 100-year runoff flows. The output from the Flowmaster calculation is included below. The downchutes were also evaluated using the Rational Method. The worst-case downchute has a drainage area of 66.3 acres and a time of concentration of 18 minutes. The 25-year intensity is therefore 7.3 inches/hour. The worst-case Rational Method flow is determined by:

$$\begin{aligned} Q_{25} &= CIA \\ &= (0.7)(7.3\text{ in/hr})(66.3\text{ Acres}) \\ &= 338.8\text{ cfs} \end{aligned}$$

A Flowmaster calculation is provided below for this condition.

## EROSION LAYER EVALUATION

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

The design procedure is as follows:

1. The minimum thickness of the erosion layer is based on the depth of frost penetration, or six inches, whichever is greater. For Guadalupe County, the approximate depth of frost penetration is less than five inches.
2. Soil loss is calculated using the Universal Soil Loss Equation (USLE) by following NRCS procedures. The TCEQ Surface Water Drainage and Erosional Stability Guidelines for a Municipal Solid Waste Landfills, states that acceptable soil erosion for the final cover condition is 3 tons/acre/year. The calculated erosion rates for the top deck and sideslope areas are both less than 3 tons/acre/year. These results show that the thickness of the proposed 6-inch erosion layer is a sufficiently conservative design.
3. Vegetation for the site will be native and introduced grasses with root depths of 6 inches to 8 inches.
4. 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.
5. Slope stability information is included in Attachment D5 -Geotechnical Design.

# MAXIMUM ALLOWABLE BENCH SPACING CALCULATION

Based on the discussion in the TCEQ Surface Water Drainage and Erosional Stability Guidelines for a Municipal Solid Waste Landfills, acceptable soil erosion for the final cover condition is 3 tons/acre/year. The USLE equation was utilized to calculate the bench spacing on the top deck and sideslope required to meet this value. Soil loss is calculated using the Universal Soil Loss Equation (USLE) by following NRCS procedures in Use *of the Universal Soil* Loss *Equation in Final Cover/Configuration Design Procedural Handbook* (October 1997). The soil loss is based on 90 percent vegetative cover. For the top deck, the bench seperation can be up to 1,000 feet, so no benches are required. For the sideslopes, a horizontal bench spacing of 120 feet provides a calculated erosion rate of 2.7 tons/acre/year. The 120 horizontal bench spacing has been used for the Beck landfill.

## SIDESLOPE BENCH SEPARATION CALCULATION

**SOIL EROSION (RUSLE)**

| A = R*K*L*S*C*P | | |
|---|---|---|
| R | 265 | Figure 2-1 Isoerodent Map, USDA 1997 |
| K | 0.32 | Monsic Clay Loam (more conservative than clay factor in Schertz Texas) |
| LS | 5.3 | Using the value of LS that you find go to table 4-3 and use the LS and slope to find bench distance. |
| C | 0.006 | (should be different for Intermediate and Final Cover) (Type D, 90% grass - 0.006) |
| P | 1 | Usually 1 for landfills (conservative case from the table provided in "P" Tab) |
| **A (tons/acre/year)** | **2.697** | 50 tons/ac/yr max for Intermediate Cover, 3 tons/ac/yr max for final cover |
| **Bench Seperation** | **120.000** | Required Bench Horizontal Spacing |

## TOP DECK BENCH SEPARATION CALCULATION

**SOIL EROSION (RUSLE)**

| A = R*K*L*S*C*P | | |
|---|---|---|
| R | 265 | Figure 2-1 Isoerodent Map, USDA 1997 |
| K | 0.32 | Monsic Clay Loam (more conservative than clay factor in Schertz Texas) |
| LS | 3.3 | Using the value of LS that you find go to table 4-3 and use the LS and slope to find bench |
| C | 0.006 | (should be different for Intermediate and Final Cover) (Type D, 90% grass - 0.006) |
| P | 1 | Usually 1 for landfills (conservative case from the table provided in "P" Tab) |
| **A (tons/acre/year)** | **1.679** | 50 tons/ac/yr max for Intermediate Cover, 3 tons/ac/yr max for final cover |
| **Bench Seperation** | **1000** | Required Bench Horizontal Spacing |

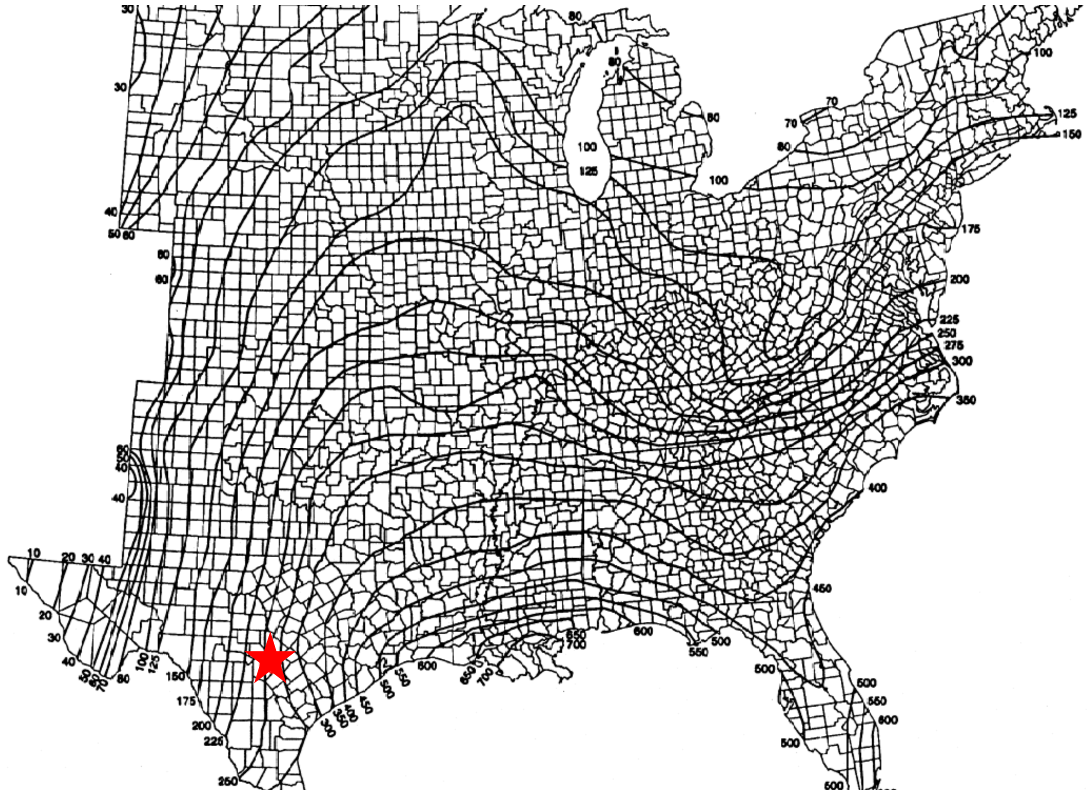


Figure 2-1. Isoerodent map of eastern United States. Units are hundreds ft·tonf·in(ac·h·yr)$^{-1}$.

Rainfall-Runoff Erosivity Factor (R)

47

TABLE 1.—*Computed* **K** *values for soils on erosion research stations*

| Soil | Source of data | Computed **K** |
|---|---|---|
| Dunkirk silt loam | Geneva, N.Y. | [1]0.69 |
| Keene silt loam | Zanesville, Ohio | .48 |
| Shelby loam | Bethany, Mo. | .41 |
| Lodi loam | Blacksburg, Va. | .39 |
| Fayette silt loam | LaCrosse, Wis. | [1].38 |
| Cecil sandy clay loam | Watkinsville, Ga. | .36 |
| Marshall silt loam | Clarinda, Iowa | .33 |
| Ida silt loam | Castana, Iowa | .33 |
| Mansic clay loam | Hays, Kans. | .32 |
| Hagerstown silty clay loam | State College, Pa. | [1].31 |
| Austin clay | Temple, Tex. | .29 |
| Mexico silt loam | McCredie, Mo. | .28 |
| Honeoye silt loam | Marcellus, N.Y. | [1].28 |
| Cecil sandy loam | Clemson, S.C. | [1].28 |
| Ontario loam | Geneva, N.Y. | [1].27 |
| Cecil clay loam | Watkinsville, Ga. | .26 |
| Boswell find sandy loam | Tyler, Tex. | .25 |
| Cecil sandy loam | Watkinsville, Ga. | .23 |
| Zaneis fine sandy loam | Guthrie, Okla. | .22 |
| Tifton loamy sand | Tifton, Ga. | .10 |
| Freehold loamy sand | Marlboro, N.J. | .08 |
| Bath flaggy silt loam with surface stones > 2 inches removed | Arnot, N.Y. | [1].05 |
| Albia gravelly loam | Beemerville, N.J. | .03 |

[1] Evaluated from continuous fallow. All others were computed from rowcrop data.

TABLE 10.—*Factor* **C** *for permanent pasture, range, and idle land*[1]

| Vegetative canopy: Type and height[2] | Percent cover[3] | Type[4] | Cover that contacts the soil surface, Percent ground cover: 0 | 20 | 40 | 60 | 80 | 95+ |
|---|---|---|---|---|---|---|---|---|
| No appreciable canopy | | G | 0.45 | 0.20 | 0.10 | 0.042 | 0.013 | 0.003 |
| | | W | .45 | .24 | .15 | .091 | .043 | .011 |
| Tall weeds or short brush with average drop fall height of 20 in | 25 | G | .36 | .17 | .09 | .038 | .013 | .003 |
| | | W | .36 | .20 | .13 | .083 | .041 | .011 |
| | 50 | G | .26 | .13 | .07 | .035 | .012 | .003 |
| | | W | .26 | .16 | .11 | .076 | .039 | .011 |
| | 75 | G | .17 | .10 | .06 | .032 | .011 | .003 |
| | | W | .17 | .12 | .09 | .068 | .038 | .011 |
| Appreciable brush or bushes, with average drop fall height of 6½ ft | 25 | G | .40 | .18 | .09 | .040 | .013 | .003 |
| | | W | .40 | .22 | .14 | .087 | .042 | .011 |
| | 50 | G | .34 | .16 | .08 | .038 | .012 | .003 |
| | | W | .34 | .19 | .13 | .082 | .041 | .011 |
| | 75 | G | .28 | .14 | .08 | .036 | .012 | .003 |
| | | W | .28 | .17 | .12 | .078 | .040 | .011 |
| Trees, but no appreciable low brush. Average drop fall height of 13 ft | 25 | G | .42 | .19 | .10 | .041 | .013 | .003 |
| | | W | .42 | .23 | .14 | .089 | .042 | .011 |
| | 50 | G | .39 | .18 | .09 | .040 | .013 | .003 |
| | | W | .39 | .21 | .14 | .087 | .042 | .011 |
| | 75 | G | .36 | .17 | .09 | .039 | .012 | .003 |
| | | W | .36 | .20 | .13 | .084 | .041 | .011 |

[1] The listed **C** values assume that the vegetation and mulch are randomly distributed over the entire area.

[2] Canopy height is measured as the average fall height of water drops falling from the canopy to the ground. Canopy effect is inversely proportional to drop fall height and is negligible if fall height exceeds 33 ft.

[3] Portion of total-area surface that would be hidden from view by canopy in a vertical projection (a bird's-eye view).

[4] G: cover at surface is grass, grasslike plants, decaying compacted duff, or litter at least 2 in deep.
W: cover at surface is mostly broadleaf herbaceous plants (as weeds with little lateral-root network near the surface) or undecayed residues or both.

Table 4-3.
Values for topographic factor, LS, for high ratio of rill to interrill erosion.[1]

| Slope (%) | Horizontal slope length (ft) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | <3 | 6 | 9 | 12 | 15 | 25 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 600 | 800 | 1000 |
| 0.2 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| 0.5 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 | 0.08 | 0.09 | 0.09 | 0.10 | 0.10 | 0.10 | 0.11 | 0.12 | 0.12 | 0.13 |
| 1.0 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.10 | 0.13 | 0.14 | 0.15 | 0.17 | 0.18 | 0.19 | 0.20 | 0.22 | 0.24 | 0.26 | 0.27 |
| 2.0 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.16 | 0.21 | 0.25 | 0.28 | 0.33 | 0.37 | 0.40 | 0.43 | 0.48 | 0.56 | 0.63 | 0.69 |
| 3.0 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.21 | 0.30 | 0.36 | 0.41 | 0.50 | 0.57 | 0.64 | 0.69 | 0.80 | 0.96 | 1.10 | 1.23 |
| 4.0 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.26 | 0.38 | 0.47 | 0.55 | 0.68 | 0.79 | 0.89 | 0.98 | 1.14 | 1.42 | 1.65 | 1.86 |
| 5.0 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.31 | 0.46 | 0.58 | 0.68 | 0.86 | 1.02 | 1.16 | 1.28 | 1.51 | 1.91 | 2.25 | 2.55 |
| 6.0 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.36 | 0.54 | 0.69 | 0.82 | 1.05 | 1.25 | 1.43 | 1.60 | 1.90 | 2.43 | 2.89 | 3.30 |
| 8.0 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.45 | 0.70 | 0.91 | 1.10 | 1.43 | 1.72 | 1.99 | 2.24 | 2.70 | 3.52 | 4.24 | 4.91 |
| 10.0 | 0.35 | 0.37 | 0.38 | 0.39 | 0.40 | 0.57 | 0.91 | 1.20 | 1.46 | 1.92 | 2.34 | 2.72 | 3.09 | 3.75 | 4.95 | 6.03 | 7.02 |
| 12.0 | 0.36 | 0.41 | 0.45 | 0.47 | 0.49 | 0.71 | 1.15 | 1.54 | 1.88 | 2.51 | 3.07 | 3.60 | 4.09 | 5.01 | 6.67 | 8.17 | 9.57 |
| 14.0 | 0.38 | 0.45 | 0.51 | 0.55 | 0.58 | 0.85 | 1.40 | 1.87 | 2.31 | 3.09 | 3.81 | 4.48 | 5.11 | 6.30 | 8.45 | 10.40 | 12.23 |
| 16.0 | 0.39 | 0.49 | 0.56 | 0.62 | 0.67 | 0.98 | 1.64 | 2.21 | 2.73 | 3.68 | 4.56 | 5.37 | 6.15 | 7.60 | 10.26 | 12.69 | 14.96 |
| 20.0 | 0.41 | 0.56 | 0.67 | 0.76 | 0.84 | 1.24 | 2.10 | 2.86 | 3.57 | 4.85 | 6.04 | 7.16 | 8.23 | 10.24 | 13.94 | 17.35 | 20.57 |
| 25.0 | 0.45 | 0.64 | 0.80 | 0.93 | 1.04 | 1.56 | 2.67 | 3.67 | 4.59 5.3 | 6.30 | 7.88 | 9.38 | 10.81 | 13.53 | 18.57 | 23.24 | 27.66 |
| 30.0 | 0.48 | 0.72 | 0.91 | 1.08 | 1.24 | 1.86 | 3.22 | 4.44 | 5.58 | 7.70 | 9.67 | 11.55 | 13.35 | 16.77 | 23.14 | 29.07 | 34.71 |
| 40.0 | 0.53 | 0.85 | 1.13 | 1.37 | 1.59 | 2.41 | 4.24 | 5.89 | 7.44 | 10.35 | 13.07 | 15.67 | 18.17 | 22.95 | 31.89 | 40.29 | 48.29 |
| 50.0 | 0.58 | 0.97 | 1.31 | 1.62 | 1.91 | 2.91 | 5.16 | 7.20 | 9.13 | 12.75 | 16.16 | 19.42 | 22.57 | 28.60 | 39.95 | 50.63 | 60.84 |
| 60.0 | 0.63 | 1.07 | 1.47 | 1.84 | 2.19 | 3.36 | 5.97 | 8.37 | 10.63 | 14.89 | 18.92 | 22.78 | 26.51 | 33.67 | 47.18 | 59.93 | 72.15 |

[1] Such as for freshly prepared construction and other highly disturbed soil conditions with little or no cover (not applicable to thawing soil)

Between the proposed benches, the run-off condition will be sheet flow and ~~TxDOT~~ Figure 5-4 from the TxDOT 2004 Hydraulic Manual below demonstrates that sheet flow from the 6% top deck and 25% sideslopes will travel at a velocity less than six feet per second, which will prevent significant erosion from occurring. For areas with final cover, it is assumed that the soil layer will have vegetation equivalent to "short grass pasture and lawns" and the calculated sheet flow velocity for the top deck is 1.9 ft/sec while the calculated sheet flow velocity for the sideslopes is 3.1 ft/sec.

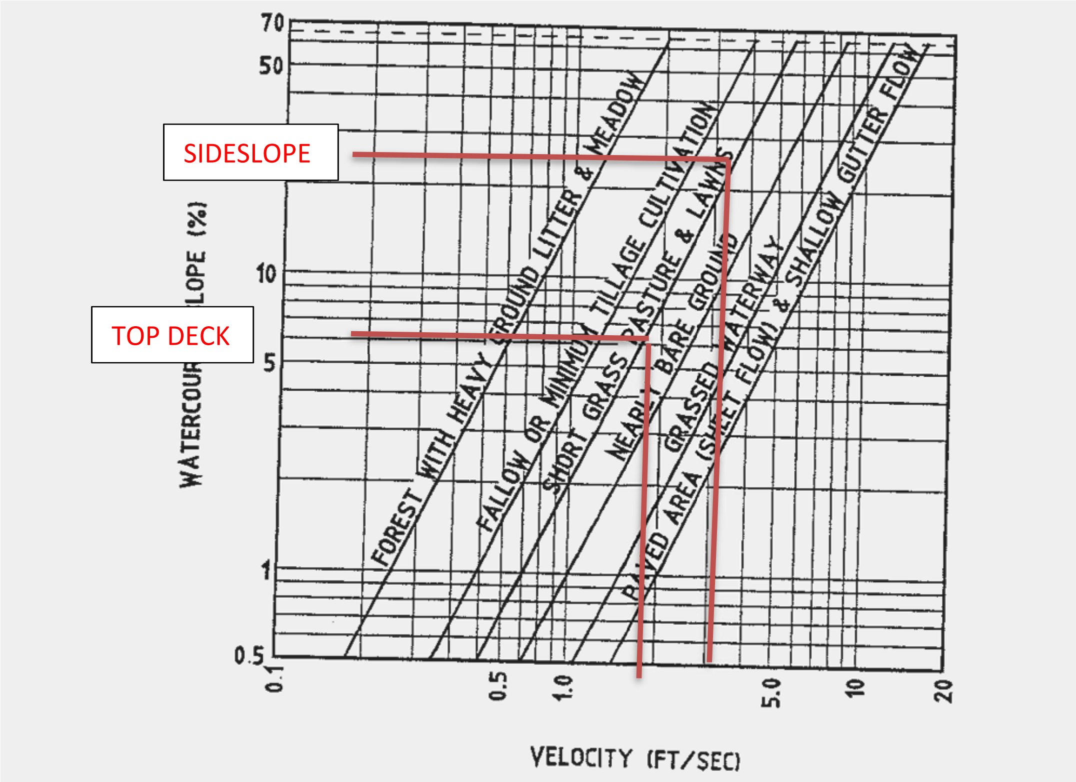



*Figure 5-4. Velocities for Upland Method of Estimating Time of Concentration--English (Adapted from the National Engineering Handbook Volume 4)*

# FINAL COVER BENCH FULL-FLOW CALCULATION

## Full-Flow Bench

### Project Description

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Discharge |

### Input Data

| | |
|---|---|
| Channel Slope | 0.020 ft/ft |
| Normal Depth | 2.6 ft |

### Section Definitions

| Station (ft) | Elevation (ft) |
|---|---|
| 0+00 | 10.00 |
| 0+04 | 8.00 |
| 0+08 | 7.43 |
| 0+20 | 10.40 |

### Roughness Segment Definitions

| Start Station | Ending Station | Roughness Coefficient |
|---|---|---|
| (0+00, 10.00) | (0+20, 10.40) | 0.025 |

### Options

| | |
|---|---|
| Current Roughness Weighted Method | Pavlovskii's Method |
| Open Channel Weighting Method | Pavlovskii's Method |
| Closed Channel Weighting Method | Pavlovskii's Method |

### Results

| | |
|---|---|
| Discharge | 275.75 cfs |
| Roughness Coefficient | 0.025 |
| Elevation Range | 7.4 to 10.4 ft |
| Flow Area | 26.5 ft² |
| Wetted Perimeter | 19.2 ft |
| Hydraulic Radius | 1.4 ft |
| Top Width | 18.38 ft |
| Normal Depth | 2.6 ft |
| Critical Depth | 3.1 ft |
| Critical Slope | 0.008 ft/ft |
| Velocity | 10.41 ft/s |
| Velocity Head | 1.68 ft |
| Specific Energy | 4.25 ft |
| Froude Number | 1.529 |
| Flow Type | Supercritical |

### GVF Input Data

| | |
|---|---|
| Downstream Depth | 0.0 ft |

Beck Hydraulic Calcs.fm8
8/28/2022

Bentley Systems, Inc. Haestad Methods Solution Center
27 Siemon Company Drive Suite 200 W
Watertown, CT 06795 USA +1-203-755-1666

FlowMaster
[10.03.00.03]
Page 1 of 2

# FINAL COVER DOWNCHUTE FULL-FLOW CALCULATION

## Worst-Case Downchute Full Flow Capacity

| Project Description | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Discharge |

| Input Data | |
|---|---|
| Roughness Coefficient | 0.069 |
| Channel Slope | 0.250 ft/ft |
| Normal Depth | 2.0 ft |
| Left Side Slope | 4.000 H:V |
| Right Side Slope | 4.000 H:V |
| Bottom Width | 20.00 ft |

| Results | |
|---|---|
| Discharge | 802.22 cfs |
| Flow Area | 56.0 $ft^2$ |
| Wetted Perimeter | 36.5 ft |
| Hydraulic Radius | 1.5 ft |
| Top Width | 36.00 ft |
| Critical Depth | 3.0 ft |
| Critical Slope | 0.055 ft/ft |
| Velocity | 14.33 ft/s |
| Velocity Head | 3.19 ft |
| Specific Energy | 5.19 ft |
| Froude Number | 2.025 |
| Flow Type | Supercritical |

| GVF Input Data | |
|---|---|
| Downstream Depth | 0.0 ft |
| Length | 0.0 ft |
| Number Of Steps | 0 |

| GVF Output Data | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 2.0 ft |
| Critical Depth | 3.0 ft |
| Channel Slope | 0.250 ft/ft |
| Critical Slope | 0.055 ft/ft |

# FINAL COVER DOWNCHUTE RATIONAL METHOD WORST-CASE CALCULATION

**Project Description**

| | |
|---|---|
| Friction Method | Manning Formula |
| Solve For | Normal Depth |

**Input Data**

| | |
|---|---|
| Roughness Coefficient | 0.069 |
| Channel Slope | 0.250 ft/ft |
| Left Side Slope | 4.000 H:V |
| Right Side Slope | 4.000 H:V |
| Bottom Width | 20.00 ft |
| Discharge | 339.00 cfs |

**Results**

| | |
|---|---|
| Normal Depth | 1.2 ft |
| Flow Area | 31.0 ft² |
| Wetted Perimeter | 30.2 ft |
| Hydraulic Radius | 1.0 ft |
| Top Width | 29.93 ft |
| Critical Depth | 1.8 ft |
| Critical Slope | 0.063 ft/ft |
| Velocity | 10.94 ft/s |
| Velocity Head | 1.86 ft |
| Specific Energy | 3.10 ft |
| Froude Number | 1.896 |
| Flow Type | Supercritical |

**GVF Input Data**

| | |
|---|---|
| Downstream Depth | 0.0 ft |
| Length | 0.0 ft |
| Number Of Steps | 0 |

**GVF Output Data**

| | |
|---|---|
| Upstream Depth | 0.0 ft |
| Profile Description | N/A |
| Profile Headloss | 0.00 ft |
| Downstream Velocity | Infinity ft/s |
| Upstream Velocity | Infinity ft/s |
| Normal Depth | 1.2 ft |
| Critical Depth | 1.8 ft |
| Channel Slope | 0.250 ft/ft |
| Critical Slope | 0.063 ft/ft |

**Permissible Velocities**

Table 8-6 below from the USDA Part 654 Stream Restoration Design National Engineering Handbook provides maximum allowable velocities for grass-lined channels to maintain non-erosive conditions. The clay soils at the site would be considered erosion resistant in this table. For Bermudagrass lined earthen channels with slopes of 0-5%, the maximum non-erosive velocity is 8 feet per second. The highest calculated velocity for any of the final cover control structures is for Perimeter Berm 8 and it is 6.49 ft/sec. The benches and other berms all have lower calculated peak velocities. The velocities in the downchutes are higher than 8 ft/sec, which is why they are proposed to be armored with gabion mattresses.

**Table 8–6** Allowable velocities for channels lined with grass

| Cover | Slope range percent | Allowable velocity (ft/s) | |
|---|---|---|---|
| | | Erosion-resistant soils | Easily eroded soils |
| Bermudagrass | 0–5 | 8 | 6 |
| | 5–10 | 7 | 5 |
| | >10 | 6 | 4 |
| Buffalograss, Kentucky bluegrass, smooth brome, blue grama | 0–5 | 7 | 5 |
| | 5–10 | 6 | 4 |
| | >10 | 5 | 3 |
| Grass mixture | 0–5 | 5 | 4 |
| | 5–10 | 4 | 3 |
| | Not recommended on slopes greater than 10% | | |
| Lespedeza sericea, weeping lovegrass, ischaemum (yellow bluestem), kudzu, alfalfa, crabgrass | 0–5 | 3.5 | 2.5 |
| | Not recommended on slopes greater than 5%, except for side slopes in a compound channel | | |
| Annuals—used on mild slopes or as temporary protection until permanent covers are established, common lespedeza, Sudangrass | 0–5 | 3.5 | 2.5 |
| | Not recommended for slopes greater than 5% | | |

(210–VI–NEH, August 2007) 8–27

# BECK LANDFILL

# APPENDIX C1-F
# FACILITY SURFACE WATER DRAINAGE REPORT
# INTERMEDIATE COVER
# EROSION AND SEDIMENTATION CONTROL PLAN

Includes pages C1-F-1 through C1-F-8

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# NARRATIVE

This appendix presents temporary erosion and sediment control structures for the intermediate cover phase of landfill development. "Temporary", for the purposes of this narrative, is defined as the time between the construction of intermediate cover and the construction of final cover or the placement of additional waste, as the case may be. Intermediate top slope surfaces and external sideslopes, for the purposes of compliance with 30 TAC §330.305(d), are those above-grade slopes that:

a) Drain directly to the site perimeter stormwater management system (i.e., areas where the stormwater directly flows to a perimeter channel or detention pond),
b) Have received intermediate or final cover, and
c) Have either reached their permitted elevation, or will subsequently remain inactive for longer than 180 days.

Slopes that drain to ongoing waste placement, pre-excavated areas, areas that have received only operational cover, or areas under construction that have not received waste are not covered under this appendix and do not contribute to offsite runoff.

## EROSION AND SEDIMENT CONTROL LANDFILL COVER PHASES

The purpose of this section is to define the landfill cover phases and where they are addressed throughout the Beck Landfill Site Development Plan:

> <u>Operational Cover</u>- Operational cover is defined in §330.165(a), except that for Type IV landfills it is required weekly. Operational cover consists of 6 inches of well-compacted earthen material not previously mixed with garbage, rubbish, or other solid waste applied as required in the Site Operating Plan. The placement and erosion control practices for operational cover areas are defined in Part IV- Site Operating Plan and in the Best Management Practices Section of this appendix.
>
> <u>Intermediate Cover</u> - Intermediate cover is defined in §330.165(c). Intermediate cover consists of at least 12 inches of suitable earthen material and is graded and maintained to prevent erosion and ponding of water. The placement requirements and erosion control practices for intermediate cover areas are defined in this appendix.
>
> <u>Final Cover</u> - Final cover is defined in Subchapter K. The placement and erosion control practices for final cover areas are defined in Attachment C1, Appendix C1-E. Final cover at Beck Landfill will be managed as provided for in the closure and post-closure plan required by 30 TAC 330 Subchapter K, Closure and Post-Closure.

During all phases of operation, the goal is keep all run-off from the sideslopes and top dome areas as sheet flow to reduce the formation of erosion rills. Based on the TxDOT <u>(2004 Hydraulic Design Manual)</u> Figure 5-4 below, sheet flow from the 6% top deck and 25% sideslopes will travel at a velocity less than six feet per second, which will prevent significant erosion from occurring. For areas with operational and intermediate cover, it is conservatively assumed that the soil layer will be "nearly bare ground" and the calculated sheet flow velocity for the top deck is 2.5 ft/sec while the calculated sheet flow velocity for the sideslopes is 5.0 ft/sec. In order to maintain sheet flow conditions, temporary structural controls should be placed at 300 to 400 feet maximum spacings. Based on the USLE calculations provided in Appendix C1-<u>G</u>~~F~~, no temporary structural controls are required on the top deck to maintain allowable erosion levels, and temporary structural controls are required at a maximum spacing of 400 feet for the sideslopes.

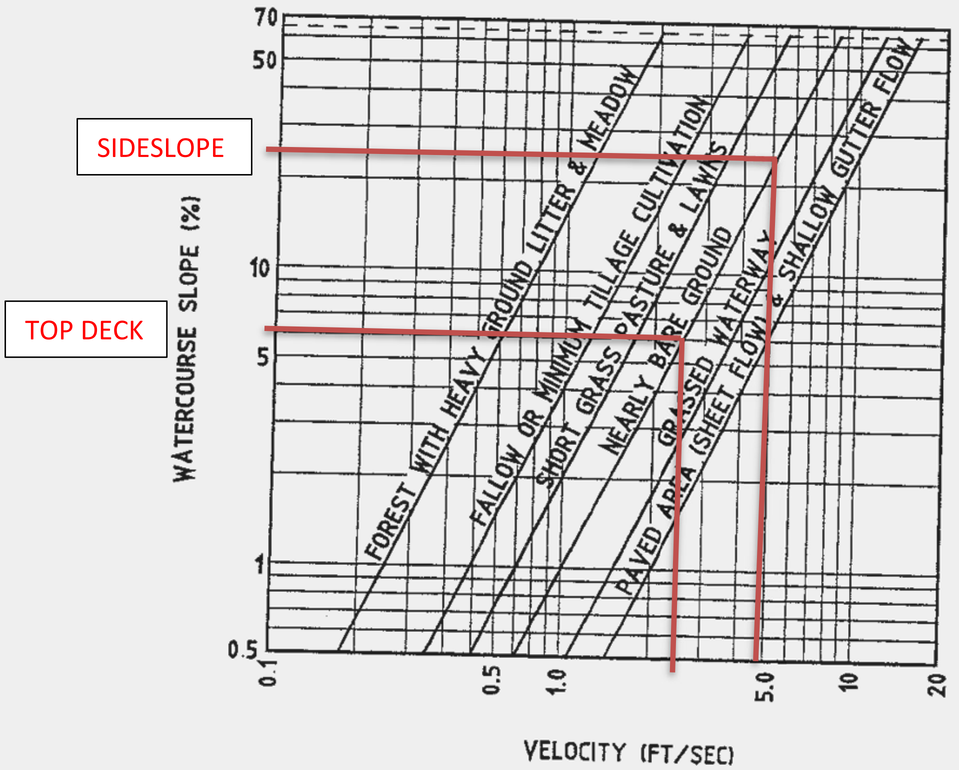


*Figure 5-4. Velocities for Upland Method of Estimating Time of Concentration--English (Adapted from the National Engineering Handbook Volume 4)*

## BEST MANAGEMENT PRACTICES

Vegetation and temporary erosion control structures provide the most effective means of reducing the amount of soil loss during operation of the landfill. Best management practices utilized for erosion and sediment control may be broadly categorized as nonstructural and structural controls. Nonstructural controls addressing erosion include the following:

- Minimization of the disruption of the natural features, drainage, topography, or vegetative cover features
- Phased development to minimize the area of bare soil exposed at any given time
- Disturbing only the smallest area necessary to perform current activities
- Confining sediment to the construction area during the construction phase
- Scheduling of construction activities during the time of year with the least erosion potential, when applicable
- Stabilization of exposed surfaces in a timely manner
- Structural controls are preventative and also mitigative since they control erosion and sediment movement. In the event that additional soil stabilization or erosion control measures are deemed necessary, one or more of the following measures will be implemented:
- Vegetative and Non-Vegetative Stabilization. A soil stabilization and vegetation schedule is provided in this appendix.
- Check Dams. Check dams shall be constructed using gravel, rock, gabions, compost socks, or sand bags to reduce flow velocity and therefore erosion in a perimeter channel or detention pond.
- Filter Berms. Filter berms shall be constructed of mulch, woodchips, brush, compost, shredded wood waste, or synthetic filter materials. Mesh socks shall be filled with compost, mulch, woodchips, brush, or shredded wood waste. Filter berms or filled mesh socks shall be installed at the bottom of slopes, throughout the perimeter drainage system, and on sideslopes. The maximum drainage area to the filter berm or filled mesh sock will not exceed two acres. Specifications for the filter berms are provided on Drawing C3-3.
- Baled Hay, Hay bales, straw bales, or baled hay shall be approximately 30 inches in length and be composed entirely of vegetable matter. Hay bales shall be embedded in the soil a minimum of four inches.

- Sediment Traps. Sediment traps are small, excavated areas that function as sediment basins. Sediment traps allow for the settling of suspended sediment in stormwater runoff. Sediment traps shall be constructed in perimeter channels, temporary internal channels, and at entrances to detention ponds. The maximum drainage area contributing to a sediment trap will not exceed 10 acres.
- Temporary Sediment Control Fence or Silt Fence. Silt fences or fabric filter fences shall be used where there is sheet flow and sediment transport. The maximum drainage area to the silt fence will not exceed the manufacturer's specification, but will in no case be greater than 0.5 acre per 100 feet of fence. To ensure sheet flow, a gravel collar or level spreader may be used upslope of the silt fence.
- Berms. These structures will be constructed of earthen material with the top six inches capable of sustaining native plant growth. Rolled erosion control mats or blankets made from natural materials or synthetic fiber, grass, or compost/mulch/straw may be used as erosion protection along the flowline. These structures direct the flow to the drainage system. These structures decrease downslope velocities of runoff that could cause erosion on the intermediate cover slopes.
- Benches. These structures will be constructed out of the waste material and covered with intermediate cover. Rolled erosion control mats or blankets made from natural materials or synthetic fiber, grass, or compost/mulch/straw may be used as erosion protection along the flowline. These structures direct the flow to the drainage system. These structures decrease downslope velocities of runoff that could cause erosion on the intermediate cover slopes.
- Downchutes. downchutes are bermed conveyance structures constructed on the intermediate cover slopes. Flow will be directed to the downchutes via swales, then conveyed to the perimeter drainage system. The downchutes will be lined with an FML geomembrane, turf reinforcement mats, Maccaferri gabion mattresses, concrete, gabions, crushed concrete, or stone.

## SOIL STABILIZATION AND VEGETATION SCHEDULE

The soil stabilization and vegetation schedule is as follows:

- Areas that will remain inactive for greater than 180 days will receive intermediate cover.
- Intermediate cover on slopes will be stabilized by tracking into the slope. Soil stabilization can be enhanced by mulching, the addition of soil tackifiers, or a combination of these measures. The intermediate cover will be graded to provide positive drainage.
- Temporary erosion control structures will be installed within 180 days from when intermediate cover is constructed.
- The intermediate cover area will be seeded or sodded as soon as practical, following placement of intermediate cover and will be documented in the site operating record. All intermediate cover areas will be managed to control erosion and achieve a predicted soil loss of less than 50 tons per acre per year. A 60 percent vegetative cover will be established over the intermediate cover areas within 180 days from intermediate cover construction unless prevented by climatic events (e.g., drought, rainfall, etc.). Additional temporary erosion control measures will be implemented during these events to promote establishment of vegetative cover.
- Mulch, woodchips, or compost may be used as a layer placed over the intermediate cover to protect the exposed soil surface from erosive forces and conserve soil moisture until vegetation can be established. The mulch, woodchips, or compost will be used to stabilize recently graded or seeded areas. The mulch, woodchips, or compost will be spread evenly over a recently seeded area and tracked into the surface to protect the soil from erosion and moisture loss, if required to promote the establishment of vegetation. These materials are not required for the establishment of vegetation on the intermediate cover; however, they may be used if Beck Landfill determines they are needed to promote vegetative growth or to provide additional erosional stability to the intermediate cover surface. These materials will vary in thickness but will not be placed to a thickness to inhibit vegetative growth.
- The intermediate cover and temporary erosion control structures will be maintained as detailed in the Stormwater System Maintenance Plan.
- Final cover will be constructed as the site develops. Temporary erosion control features will be removed as permanent erosion control structures are constructed.

## STORMWATER SYSTEM MAINTENANCE PLAN

Beck Landfill will restore and repair temporary stormwater systems such as channels, benches, drainage swales, chutes, and flood control structures in the event of washout or failure. In addition, the BMPs discussed in this appendix will also be replaced or repaired in the event of failure. Excessive sediment will be removed, as needed, so that the drainage structures function as designed. Site inspections by facility personnel will be performed weekly or within 48 hours of a rainfall event of 0.5 inches or more. The final cover system and the erosion sediment control structures will be maintained throughout the site life and post-closure period.

The following items will be evaluated during the inspections:

- Erosion of intermediate cover areas, perimeter ditches, temporary chutes, swales, detention ponds, berms, and other drainage features
- Settlement of intermediate cover areas, final cover areas, perimeter ditches, chutes, swales, and other drainage features
- Silt and sediment build-up in perimeter ditches, chutes, swales, and detention ponds
- Presence of ponded water on intermediate cover or behind temporary erosion control structures
- Obstructions in drainage features
- Presence of erosion or sediment discharge at offsite stormwater discharge locations
- Temporary erosion and sediment control features

Maintenance activities will be performed to correct damaged or deficient items noted during the site inspections. These activities will be performed as soon as possible after the inspection. The time frame for correction of damaged or deficient items will vary based on weather, ground conditions, and other site-specific conditions.

Maintenance activities will consist of the following, as needed:

- Placement of additional temporary or permanent vegetation
- Placement, grading, and stabilization of additional soils in eroded areas or in areas which have settled
- Replacement of gabion mattresses or other structural lining
- Removal of obstructions from drainage features
- Removal of silt and sediment build-up from the temporary erosion control structures. Removed sediment will be re-used as daily or intermediate cover.

- Removal of ponded water on the intermediate cover or behind temporary erosion control structures. If removed water has not contacted waste, it may be discharged in accordance with the site's stormwater permit. If the water has potentially contacted waste, it will be managed as contaminated stormwater,
- Repairs to erosion and sedimentation controls
- Installation of additional erosion and sedimentation controls
- Documentation and training requirements are discussed below:
- Site inspections by facility personnel will be performed weekly or within 48 hours of a rainfall event of 1.5 inches or more.
- Documentation of the inspection will be included in the site operating record.
- Documentation of maintenance activities that were performed to correct damaged or deficient items noted during the site inspections will be included in the site operating record.
- Facility personnel will be trained to perform inspections, and to install and maintain temporary erosion control structures.

# BECK LANDFILL

# APPENDIX C1-G
# FACILITY SURFACE WATER DRAINAGE REPORT
# INTERMEDIATE COVER
# EROSION CONTROL STRUCTURE DESIGN

Includes pages C1-G-1 through C1-G-6~~7~~

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# NARRATIVE

This appendix presents the supporting documentation to evaluate and design temporary erosion and sediment control structures for the intermediate cover phase of landfill development.

## INTERMEDIATE COVER PLAN

As intermediate cover is constructed, benches, temporary chutes and berms will be constructed to prevent erosion and sedimentation. Erosion control features (i.e., filter berms, rock check dams, hay bales, or equivalent) may be constructed at the toe of filled areas to minimize erosion and prevent disturbance of the existing grassed slopes. Otherwise, temporary erosion and sediment control features will be installed within 180 days from when the intermediate cover is constructed. An existing conditions summary and Best Management Practices are included in Appendix C1-F. Example intermediate cover drainage calculations are included in this appendix for use in site operations.

## INTERMEDIATE COVER EVALUATION

The intermediate cover evaluation is based on the Universal Soil Loss Equation (USLE) following Natural Resource Conservation Service (NRCS) procedures. The evaluation is based on a 12-inch thick intermediate cover layer with 60 percent vegetated cover. Calculations for the soil loss for intermediate cover on external 6 percent and 25 percent slopes have been provided below.

## TEMPORARY DRAINAGE BERM DESIGN

The temporary drainage berms are designed for typical drainage areas and flowline slopes. The procedures in the TxDOT Hydraulic Design Manual, September 2019, were used to determine peak flow, flow depth, flow velocity, and capacity. The Rational Method and the Manning's Equation were used to calculate the design parameters.

## TEMPORARY DIVERSION CHANNEL DESIGN

The temporary diversion channels are designed for typical drainage areas and flowline slopes. The procedures in the TxDOT Hydraulic Design Manual, September 2019, were used to determine peak flow, flow depth, flow velocity, and diversion channel capacity. The Rational Method and the Manning's Equation were used to calculate the design parameters.

## TEMPORARY DRAINAGE DOWNCHUTE DESIGN

The temporary drainage downchutes are designed for typical drainage areas on a 25 percent external side slope. The procedures in the TxDOT Hydraulic Design Manual, September 2019, were used to determine peak flow, flow depth, flow velocity, and downchute capacity. The Rational Method and the Manning's Equation were used to calculate the design parameters.

# INTERMEDIATE COVER EVALUATION

## SOIL LOSS

This section presents the supporting documentation for evaluation of the potential for intermediate cover soil erosion loss at Beck Landfill. The evaluation is based on the premise of adding excess soil to increase the time required before maintenance is needed as recommended in the EPA Solid Waste Disposal Facility Criteria Technical Manual (EPA 530-R-93-017, November 1993).

The design procedure is as follows:

1. Minimum thickness of the intermediate cover is evaluated based on the maximum soil loss of 50 tons per acre per year.
2. Soil loss is calculated using the Universal Soil Loss Equation (USLE) by following NRCS procedures. The soil loss is based on 60 percent vegetative cover as recommended in the TCEQ, Use *of the Universal Soil* Loss *Equation in Final Cover/Configuration Design Procedural Handbook* (October 199~~3~~7). The pages from the NRCS manual are included in Appendix C1-E. These results of the calculations show that erosion controls must be placed on maximum 400 feet spacing on the sideslopes.

**SOIL EROSION**
**(RUSLE)**

| A = R*K*L*S*C*P | | |
|---|---|---|
| R | 265 | Figure 2-1 Isoerodent Map, USDA 1997 |
| K | 0.32 | Monsic Clay Loam (more conservative than clay factor in Schertz Texas) |
| LS | 13.53 | Using the value of LS that you find go to table 4-3 and use the LS and slope to find bench distance. |
| C | 0.042 | (should be different for Intermediate and Final Cover) (Type G, 60% grass - 0.042) |
| P | 1 | Usually 1 for landfills (conservative case from the table provided in "P" Tab) |
| **A (tons/acre/year)** | **48.188** | 50 tons/ac/yr max for Intermediate Cover, 3 tons/ac/yr max for final cover |
| **Control Seperation** | **400** | Required Berm, Bench, or Other Control Horizontal Spacing |

3. Temporary vegetation for the intermediate cover areas will be native and introduced grasses with root depths of six inches to eight inches.

Native and introduced grasses will be hydroseeded, drill seeded, or broadcast seeded with fertilizer on the disked (parallel to contours) intermediate cover layer as soon as practical following placement of intermediate cover and will be documented in the site operating record. All intermediate cover areas will be managed to control erosion and achieve a predicted soil loss of less than 50 tons per acre per year. Temporary erosion and sediment control features (including at least 60 percent vegetative cover) will be installed within 180 days from when the intermediate cover is constructed. Areas that experience erosion or do not readily vegetate will be reseeded and additional temporary erosion control measures will be implemented until vegetation is established or the soil will be replaced with soil that will support the grasses.

The facility will utilize a combination of vegetation and interim and permanent structural controls to control sediment creation. Soil loss calculations above demonstrate that the expected worst-case conditions for the interim phases of the landfill produce less sediment than the maximum recommended values provided in Section 2.5 of TCEQ guidance document RG-417. The site operations are regulated through the Texas Pollutant Discharge Elimination System program for stormwater discharges and interim controls will be continuously evaluated to ensure that the minimum amount of sediment possible will be discharged from the site.

Table 4-3.
Values for topographic factor, LS, for high ratio of rill to interrill erosion.[1]

| Slope (%) | Horizontal slope length (ft) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | <3 | 6 | 9 | 12 | 15 | 25 | 50 | 75 | 100 | 150 | 200 | 250 | 300 | 400 | 600 | 800 | 1000 |
| 0.2 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.05 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 | 0.06 |
| 0.5 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.07 | 0.08 | 0.08 | 0.09 | 0.09 | 0.10 | 0.10 | 0.10 | 0.11 | 0.12 | 0.12 | 0.13 |
| 1.0 | 0.09 | 0.09 | 0.09 | 0.09 | 0.09 | 0.10 | 0.13 | 0.14 | 0.15 | 0.17 | 0.18 | 0.19 | 0.20 | 0.22 | 0.24 | 0.26 | 0.27 |
| 2.0 | 0.13 | 0.13 | 0.13 | 0.13 | 0.13 | 0.16 | 0.21 | 0.25 | 0.28 | 0.33 | 0.37 | 0.40 | 0.43 | 0.48 | 0.56 | 0.63 | 0.69 |
| 3.0 | 0.17 | 0.17 | 0.17 | 0.17 | 0.17 | 0.21 | 0.30 | 0.36 | 0.41 | 0.50 | 0.57 | 0.64 | 0.69 | 0.80 | 0.96 | 1.10 | 1.23 |
| 4.0 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.26 | 0.38 | 0.47 | 0.55 | 0.68 | 0.79 | 0.89 | 0.98 | 1.14 | 1.42 | 1.65 | 1.86 |
| 5.0 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.31 | 0.46 | 0.58 | 0.68 | 0.86 | 1.02 | 1.16 | 1.28 | 1.51 | 1.91 | 2.25 | 2.55 |
| 6.0 | 0.26 | 0.26 | 0.26 | 0.26 | 0.26 | 0.36 | 0.54 | 0.69 | 0.82 | 1.05 | 1.25 | 1.43 | 1.60 | 1.90 | 2.43 | 2.89 | 3.30 |
| 8.0 | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 | 0.45 | 0.70 | 0.91 | 1.10 | 1.43 | 1.72 | 1.99 | 2.24 | 2.70 | 3.52 | 4.24 | 4.91 |
| 10.0 | 0.35 | 0.37 | 0.38 | 0.39 | 0.40 | 0.57 | 0.91 | 1.20 | 1.46 | 1.92 | 2.34 | 2.72 | 3.09 | 3.75 | 4.95 | 6.03 | 7.02 |
| 12.0 | 0.36 | 0.41 | 0.45 | 0.47 | 0.49 | 0.71 | 1.15 | 1.54 | 1.88 | 2.51 | 3.07 | 3.60 | 4.09 | 5.01 | 6.67 | 8.17 | 9.57 |
| 14.0 | 0.38 | 0.45 | 0.51 | 0.55 | 0.58 | 0.85 | 1.40 | 1.87 | 2.31 | 3.09 | 3.81 | 4.48 | 5.11 | 6.30 | 8.45 | 10.40 | 12.23 |
| 16.0 | 0.39 | 0.49 | 0.56 | 0.62 | 0.67 | 0.98 | 1.64 | 2.21 | 2.73 | 3.68 | 4.56 | 5.37 | 6.15 | 7.60 | 10.26 | 12.69 | 14.96 |
| 20.0 | 0.41 | 0.56 | 0.67 | 0.76 | 0.84 | 1.24 | 2.10 | 2.86 | 3.57 | 4.85 | 6.04 | 7.16 | 8.23 | 10.24 | 13.94 | 17.35 | 20.57 |
| 25.0 | 0.45 | 0.64 | 0.80 | 0.93 | 1.04 | 1.56 | 2.67 | 3.67 | 4.59 | 6.30 | 7.88 | 9.38 | 10.81 | $\boxed{13.53}$ | 18.57 | 23.24 | 27.66 |
| 30.0 | 0.48 | 0.72 | 0.91 | 1.08 | 1.24 | 1.86 | 3.22 | 4.44 | 5.58 | 7.70 | 9.67 | 11.55 | 13.35 | 16.77 | 23.14 | 29.07 | 34.71 |
| 40.0 | 0.53 | 0.85 | 1.13 | 1.37 | 1.59 | 2.41 | 4.24 | 5.89 | 7.44 | 10.35 | 13.07 | 15.67 | 18.17 | 22.95 | 31.89 | 40.29 | 48.29 |
| 50.0 | 0.58 | 0.97 | 1.31 | 1.62 | 1.91 | 2.91 | 5.16 | 7.20 | 9.13 | 12.75 | 16.16 | 19.42 | 22.57 | 28.60 | 39.95 | 50.63 | 60.84 |
| 60.0 | 0.63 | 1.07 | 1.47 | 1.84 | 2.19 | 3.36 | 5.97 | 8.37 | 10.63 | 14.89 | 18.92 | 22.78 | 26.51 | 33.67 | 47.18 | 59.93 | 72.15 |

[1]Such as for freshly prepared construction and other highly disturbed soil conditions with little or no cover (not applicable to thawing soil)

# TEMPORARY DRAINAGE BERM DESIGN

The temporary drainage berm design for intermediate cover areas is presented for the typical berm flowline of 2 percent. The procedures in the TxDOT Hydraulic Design Manual were used to determine peak flow, flow depth, flow velocity, and berm capacity. The temporary berms will be located on the intermediate cover to prevent erosion as follows:

All temporary berms shall be designed to minimize erosion and provide a maximum flow depth of two feet. The total height of the berms at the flowline is a minimum of three feet. A detail for the temporary drainage berm is provided on Figure C3-4, in Appendix C-3. As noted in the calculations, the velocities in the berms are less than permissible non-erodible velocities. If sustained erosion is observed, facility management will evaluate and construct additional temporary drainage berms. Example drainage berm calculations for a grassed intermediate cover are provided below.

| Berms | |
|---|---|
| Bottom width | 0 ft |
| Side slope 1 (horiz./vert.) | 4/1 |
| Side slope 2 (horiz./vert.) | 3/1 |
| Manning roughness, n | 0.03 |
| Channel slope | 2% |
| Flow depth | 2 ft |

| Results | | |
|---|---|---|
| Flow area | 14 | ft^2 |
| Wetted perimeter | 14.57 | ft |
| Hydraulic radius | 0.96 | ft |
| Velocity, v | 6.82 | ft/sec |
| Flow, Q | 95.49 | cfs |
| Velocity head, $h_v$ | 0.72 | ft |
| Top width, T | 14 | ft |

The cross-sections for the temporary berms is three feet height, two feet top width, 3:1 uphill sideslopes and 2:1 downhill sideslopes. A detail for the temporary drainage berm is provided on Figure C3-4, in Appendix C-3. Based on the Rational Method parameters developed in Appendix C1-D, the maximum drainage area allowable for a temporary berm is 15 acres.

$Q_{25} = CIA$

95 cfs= (0.7)(8.8 in/hr)(A)

A= 15 acres

## TEMPORARY DRAINAGE DOWNCHUTE DESIGN

The temporary downchute design is applicable for external side slopes of the landfill with intermediate cover. Temporary downchutes will typically consist of channels lined with erosion control material. The flow capacity of the downchute structures was determined based on the Manning's Equation. The maximum flow calculated from the Manning's Equation is used to determine the maximum drainage area based on the NRCS Method. The design calculations presented below represent typical calculations for temporary downchutes on a 25 percent slope. If sustained erosion is observed, facility management will evaluate the use and construction of temporary letdowns.

| Chute Design | | |
|---|---|---|
| Bottom | ft | 20 |
| Depth | ft | 2 |
| Side slope | % | 25 |
| Channel slope | % | 25 |
| Roughness | Natural channel, very poor condition | 0.06 |

| Capacity (max) | | |
|---|---|---|
| Q | cfs | 922.54 |
| V | fps | 16.47 |
| D | ft | 2 |

| Parameters | | |
|---|---|---|
| Flow area | 56.00 | ft^2 |
| Wetted perimeter | 36.49 | ft |
| Hydraulic radius | 1.53 | ft |
| Velocity, v | 16.47 | ft/sec |
| Flow, Q | 922.54 | cfs |
| Velocity head, $h_v$ | 4.22 | ft |
| Top width, T | 36.00 | ft |

The cross-sections for the temporary downchutes is shown above. A detail for the temporary drainage berm is provided on Figure C3-4, in Appendix C-3. Based on the Rational Method parameters developed in Appendix C1-D, the maximum drainage area allowable for a temporary ~~berm~~downchute is 149 acres.

$Q_{25}$ = CIA

922.5 cfs= (0.7)(8.8 in/hr)(A)

A= 149 acres

## DESIGN SUMMARY

Beck Landfill will implement the erosion and sediment control features on the intermediate cover as the landfill develops. The following items will be implemented, as filling operations are ongoing:

- Intermediate cover will be established on all areas that have received waste but will remain inactive for periods greater than 180 days.
- Sufficient permanent and temporary erosion and sediment control features shall be constructed to redirect surface water and prevent erosion.
- Temporary erosion and sediment control features shall be constructed within 180 days of placement of intermediate cover.
- Temporary erosion control structures (e.g., rock check dams, filter berms) may be established along the toe of existing vegetated intermediate cover areas with approximately 70-90 percent coverage.
- Final cover may be constructed as the site develops. Temporary erosion control features will be removed as permanent erosion controls are constructed.

The facility will utilize a combination of vegetation and interim and permanent structural controls to control sediment creation. Soil loss calculations previously provided demonstrate that the expected worst-case conditions for the interim and final phases of the landfill produce less sediment than the maximum recommended values provided in Section 2.5 of TCEQ guidance document RG-417. The site operations are regulated through the Texas Pollutant Discharge Elimination System program for stormwater discharges and interim controls will be continuously evaluated to ensure that the minimum amount of sediment possible will be discharged from the site.

# MUNICIPAL SOLID WASTE PERMIT
# MAJOR AMENDMENT

## PART III-ATTACHMENT C2 - FLOOD CONTROL ANALYSIS

BECK
COMPANIES

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: Revised September~~July~~ 2023*

Prepared by:


CEC
Civil & Environmental Consultants, Inc.

Texas Registration Number F-38
1221 S MoPac Expressway
Suite 350,
Austin, Texas 78746
(512) 329-0006


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**APPENDIX C2-A**

LOMR Application

**APPENDIX C2-B**

No-Rise Certification for Proposed Stormwater Pond

**APPENDIX C2-C**

FEMA Correspondence

STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED
PROFESSIONAL ENGINEER

9-15-23

# BECK LANDFILL
# APPENDIX C2-C
# FEMA Correspondence

July 18, 2023

Adam W. Mehevec, P.E.
Civil and Environmental Consultants, Inc.
3711 South Mopac Expressway
Building 1, Suite 550
Austin, TX 78745

IN REPLY REFER TO:
Case No.: 22-06-2567P
Communities: City of Schertz and Unincorporated Areas of Bexar County, Texas
Community Nos.: 480269 and 480035

316-AD

Dear Adam Mehevec:

This is in regard to your request dated August 5, 2022, that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) issue a revision to the Flood Insurance Rate Map (FIRM) for the above-referenced communities. Pertinent information about the request is listed below.

| | |
|---|---|
| Identifier: | Beck Landfill |
| Flooding Source: | Cibolo Creek |
| FIRM Panel Affected: | 48187C0220F and 48029C0295F |

The data required to complete our review, which must be submitted within 90 days of the date of this letter, are listed on the attached summary.

If we do not receive the required data within 90 days, we will suspend our processing of your request. Any data submitted after 90 days will be treated as an original submittal and will be subject to all submittal/payment procedures.

FEMA receives a very large volume of requests and cannot maintain inactive requests for an indefinite period of time. Therefore, we are unable to grant extensions for the submission of required data/fee for revision requests. If a requester is informed by letter that additional data are required to complete our review of a request, the data **must** be submitted within 90 days of the date of the letter. Any fees already paid will be forfeited if the requested data are not received within 90 days.

If you have general questions about your request, FEMA policy, or the National Flood Insurance Program (NFIP), please contact the FEMA Mapping and Insurance eXchange (FMIX), toll free, at 1-877-FEMA MAP (1-877-336-2627). If you have specific questions concerning your request, please contact your case reviewer, M. Tariq Makhdoom, Ph.D., CFM, by e-mail at TMakhdoom@taylorengineering.com or by telephone at (904) 553-5760, or the Revisions Coordinator for your state, Sushban Shrestha, P.E., CFM, by e-mail at sushban.shrestha@aecom.com or by telephone at (682) 316-7670.

Sincerely,

Benjamin Kaiser, P.E., CFM
Revisions Manager
Compass PTS JV

Attachments:
Summary of Additional Data

cc: Doug Letbetter, CFM
Floodplain Administrator
City of Schertz, Texas

Robert Brach, P.E., CFM
Development Services Engineer / Floodplain Administrator
Bexar County

Summary of Additional Data Required to Support a
Letter of Map Revision (LOMR)

Case No.: 22-06-2567P

Requester: Adam W. Mehevec, P.E.

Communities: City of Schertz, and Unincorporated Areas of Bexar County, Texas

Community Nos.: 480269 and 480035

The issues listed below must be addressed before we can continue the review of your request.

1. Subparagraph 65.6(a)(2) of the National Flood Insurance Program (NFIP) regulations states that to avoid discontinuities between revised and unrevised flood data, hydraulic analyses must have a logical transition between revised elevations of the 1-percent-annual chance (base) flood and those developed previously for areas not affected by the revision. Therefore, revised base flood elevation (BFE) must tie-in to the effective BFE within 0.5 feet, or within 0.0 feet if practical, at the upstream and downstream ends of the revised reach. The graphical tie-in between the post-project and effective delineations of the base floodplain, 0.2-percent-annual-chance floodplain and regulatory floodway can be shown at, or just upstream and downstream of, the BFE tie-in locations at both ends.

   Our review of the submitted post-project conditions model revealed no BFE tie-in at the upstream end. The submitted topographic work map showed limits of the revised reach at the upstream end at Cross Section 446236, which is located at the downstream side of FM 78 Bridge. However, there was no BFE tie-in within 0.5 feet until Cross Section 454165.

   A revised post-project conditions hydraulic analysis was submitted on July 10, 2023, in response to our e-mail of July 7, 2023. Our review of the submitted revised post-project conditions model indicates that:

   a. The limit of the revised reach at the upstream end is shown at Cross Section 446478 which is located just upstream of FM 78 Bridge, where the difference between post-project and effective BFE is 0.49 feet. However, BFE difference between the post-project and effective BFEs are 0.53 and 0.93 feet, respectively, at the upstream cross sections, which are located just downstream and upstream of the Southern Pacific Railroad, respectively.
   b. The revised hydraulic analysis used effective topography for all cross sections upstream of Cross Section 445335.
   c. The revised hydraulic analysis used higher flow compared to the effective flows at all cross sections except two downstream cross sections where the revised analysis used lower flows compared to the effective.

   Please extend the limit of the revised reach to Cross Section 454165, where there is a BFE tie-in as indicated above and submit revised post-project conditions hydraulic analyses or provide justification for using lower or higher flows compared to the effective flows without providing any supporting hydrologic analysis and use of old effective topographic data upstream of Cross Section 445335 instead of new topography.

2. Please submit a revised copy of the topographic work map and annotated Flood Insurance Rate Map (FIRM). Please also provide a copy of the Geographic Information System (GIS) data that reflects the revised topographic work map.

3. Please note that the submitted copy of the draft property owner notification will be reviewed after all technical comments have been addressed. Please do not distribute the final notification letters until we have approved the revised draft notice.

Please upload the required data using the Online LOMC website at https://hazards.fema.gov/femaportal/onlinelomc/signin.

For identification purposes, please include the case number referenced above on all correspondence.

# MUNICIPAL SOLID WASTE PERMIT MAJOR AMENDMENT

## PART III-ATTACHMENT C3
## DRAINAGE SYSTEM PLANS AND DETAILS

BECK
COMPANIES

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: Revised September~~July~~ 2023*

Prepared by:


CEC
Civil & Environmental Consultants, Inc.

Texas Registration Number F-38
3711 S MoPac Expressway
Building 1 Suite 550,
Austin, Texas 78746
(512) 329-0006


STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED
PROFESSIONAL ENGINEER

9-15-23

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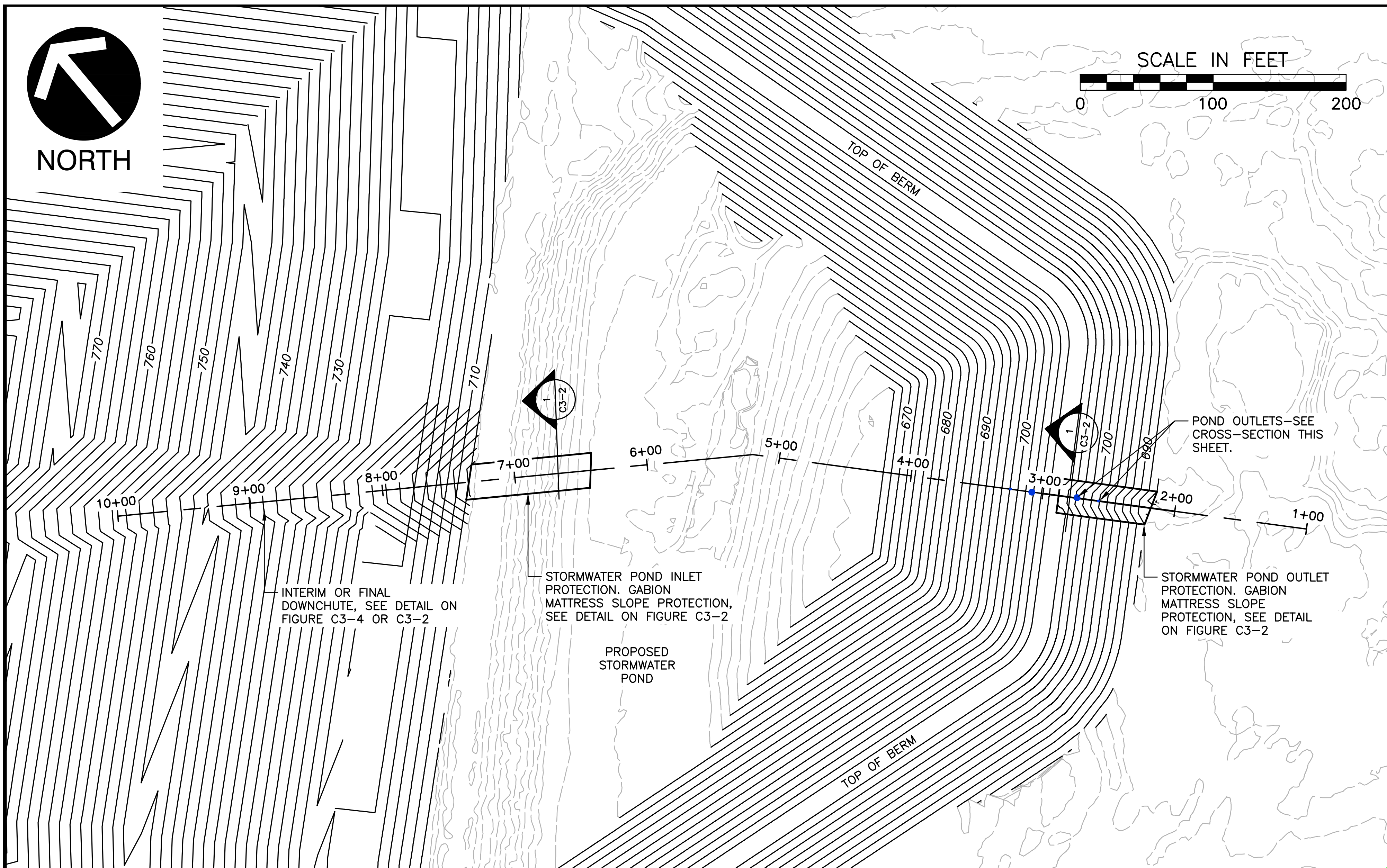
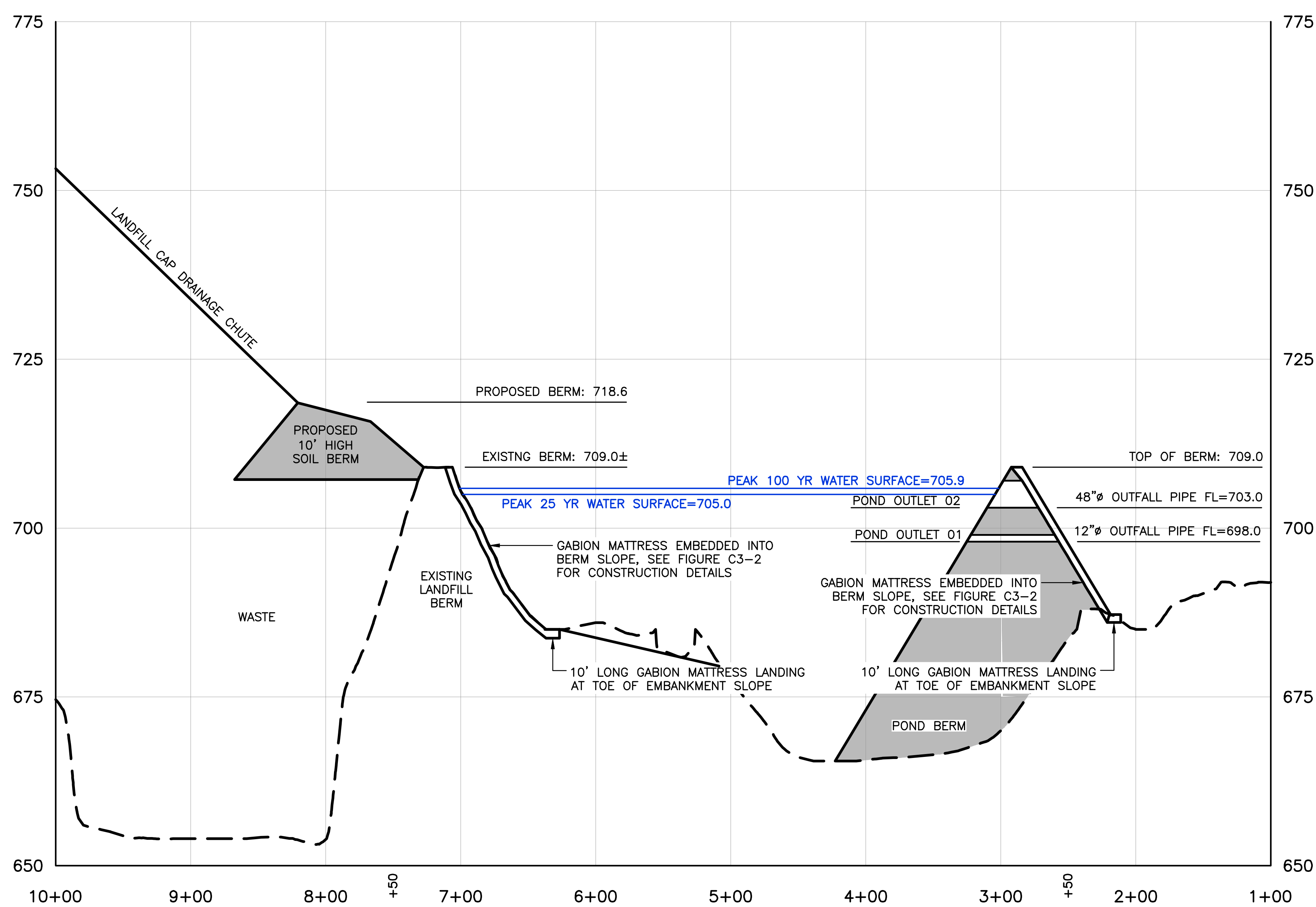
STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED
PROFESSIONAL ENGINEER

9-15-23




## PROFILE VIEW

SCALE H:1"=100'; V:1"=20'

STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED PROFESSIONAL ENGINEER
9-15-23

### REFERENCE

TOPOGRAPHIC INFORMATION FROM AERIAL SURVEY BY FIRMATEK: (SEPTEMBER 15, 2021) AUGMENTED WITH A PORTION OF THE EXISTING GROUND SURFACE PREPARED BY CEC.

**REVISION RECORD**

| NO | DATE | DESCRIPTION |
|---|---|---|
| 1 | 09/15/23 | RESPONSE TO TECH NOD 4 |
| | | |
| | | |
| | | |

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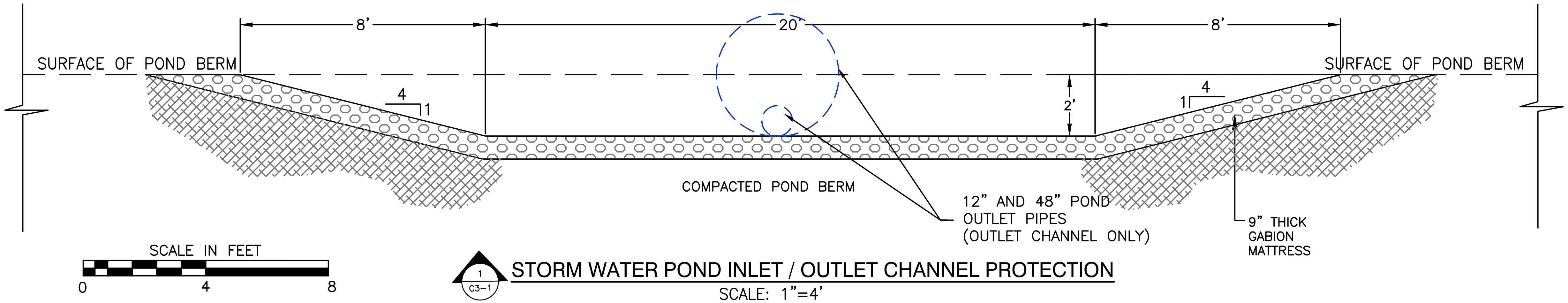
Texas Registered Engineering Firm F-38

BECK COMPANIES

NIDO, LTD
BECK LANDFILL
GUADALUPE COUNTY, TEXAS

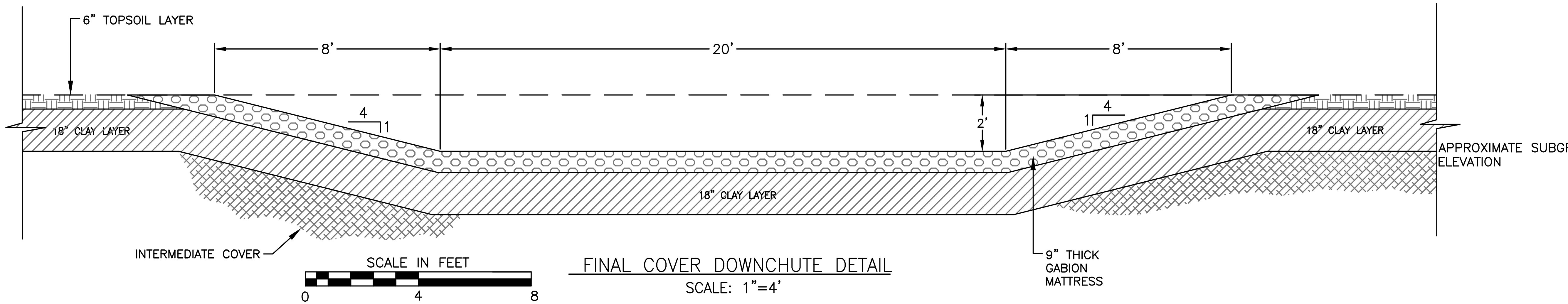
DETENTION POND PLAN

| | | | | | | |
|---|---|---|---|---|---|---|
| DRAWN BY: MFV | CHECKED BY: AWM | APPROVED BY: AWM | FIGURE NO.: |
| DATE: 08/2022 | DWG SCALE: 1" = 100' | PROJECT NO: 311-653 | **C3-1** |

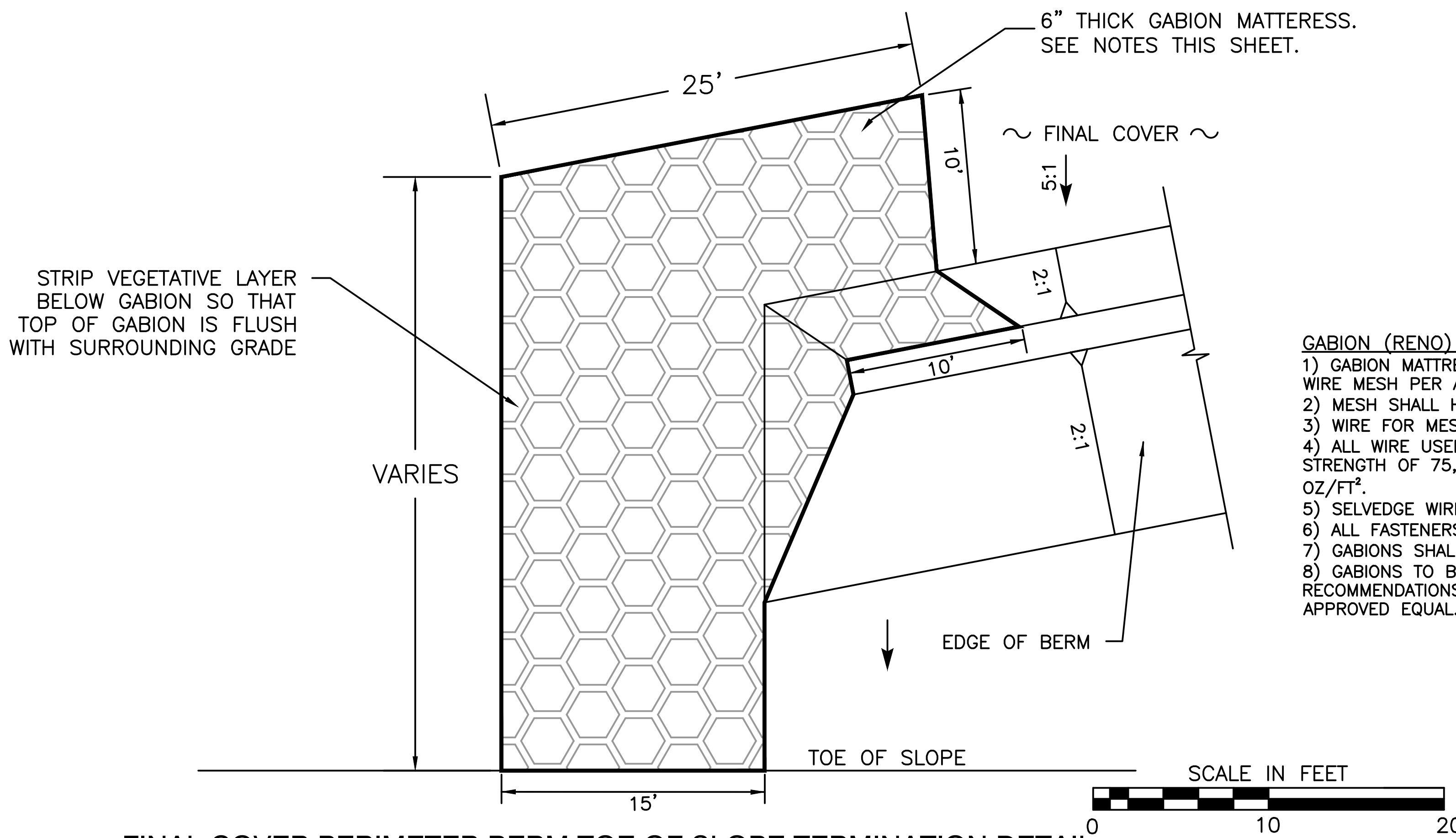

1 C3-1 STORM WATER POND INLET / OUTLET CHANNEL PROTECTION

SCALE: 1"=4'



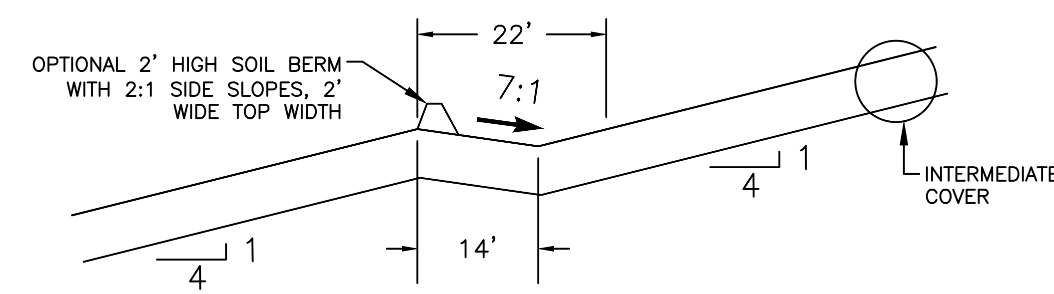

FINAL COVER DOWNCHUTE DETAIL

SCALE: 1"=4'




FINAL COVER PERIMETER BERM TOE OF SLOPE TERMINATION DETAIL

SCALE: 1"=10'




TYPICAL INTERIM COVER BENCH

N.T.S.

GABION (RENO) MATTRESS NOTES:

1) GABION MATTRESSES SHALL BE MADE OF 6x8 DOUBLE TWISTED HEXAGONAL WOVEN STEEL WIRE MESH PER ASTM A975-97.
2) MESH SHALL HAVE A NOMINAL OPENING SIZE OF 2.5 INCHES.
3) WIRE FOR MESH SHALL HAVE A MINIMUM DIAMETER OF 0.087.
4) ALL WIRE USED IN GABION MATTRESS CONSTRUCTION SHALL HAVE A MINIMUM TENSILE STRENGTH OF 75,000 PSI AND SHALL BE GALVANIZED WITH A MINIMUM ZINC COATING OF 0.7 $OZ/FT^2$.
5) SELVEDGE WIRE FOR GABION ASSEMBLY SHALL HAVE A MINIMUM DIAMETER OF 0.106 INCHES.
6) ALL FASTENERS SHALL COMPLY WITH ASTM A975-97.
7) GABIONS SHALL BE FILLED WITH 3" TO 5" LIMESTONE AGGREGATE.
8) GABIONS TO BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND SHALL BE AS MANUFACTURED BY MACCAFERRI, INC. OR ENGINEER APPROVED EQUAL.

REVISION RECORD

| NO | DATE | DESCRIPTION |
|---|---|---|
| 1 | 03/17/2023 | TECH NOD 2 |
| 2 | 07/05/2023 | ADD BAR SCALES TO DETAILS |
| 3 | 09/15/2023 | REVISE POND INLET/OUTLET PROTECTION DETAIL FOR NOD4 |
| | | |

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Texas Registered Engineering Firm F-38

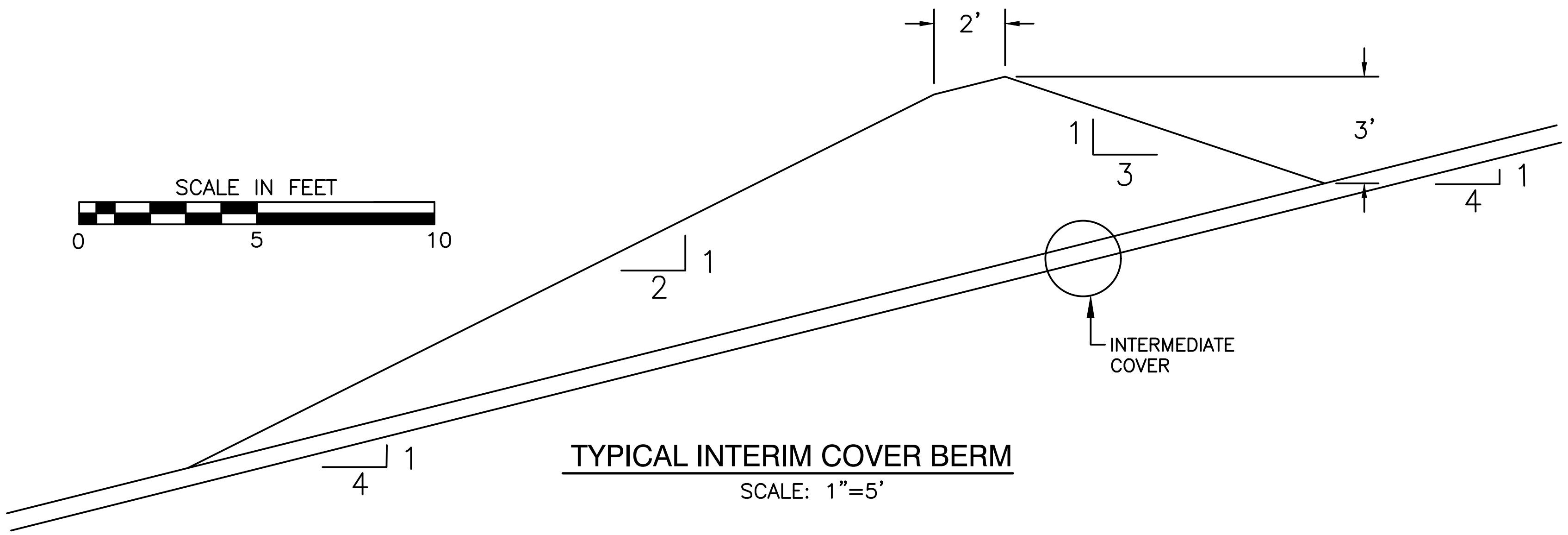
BECK COMPANIES

NIDO, LTD
BECK LANDFILL
GUADALUPE COUNTY, TEXAS

DRAINAGE DETAILS

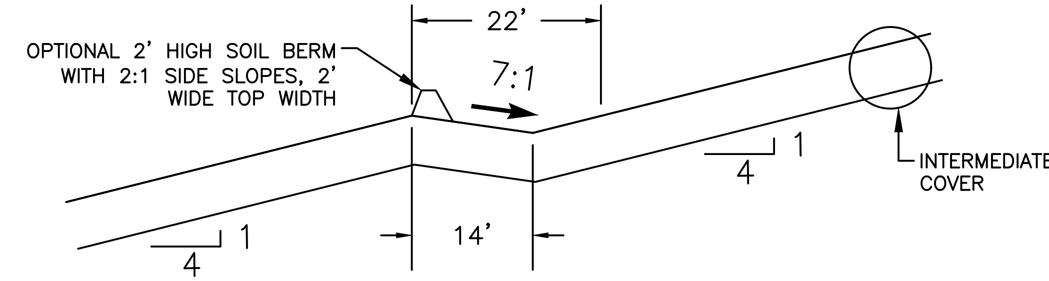
| | | | | | | | |
|---|---|---|---|---|---|---|---|
| DRAWN BY: | MFV | CHECKED BY: | AWM | APPROVED BY: | AWM | FIGURE NO.: | C3-2 |
| DATE: | 08/2022 | DWG SCALE: | AS SHOWN | PROJECT NO: | 311-653 | | |

P:\310-000\311-653\-CADD\Dwg\SW01\311653-BECK LANDFIL POND PLAN C3-1.dwg{C3-2} LS:(9/11/2023 - amehevec) - LP: 9/11/2023 2:17 PM



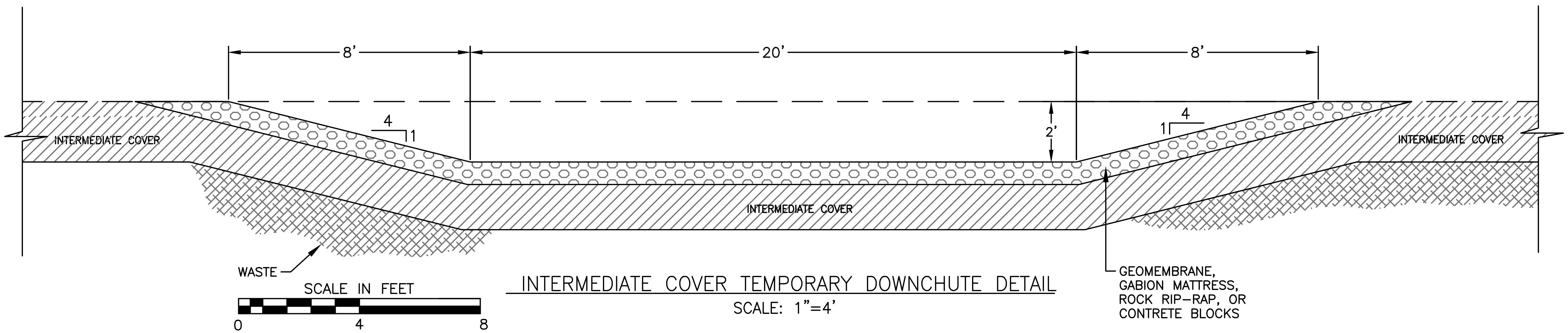

TYPICAL INTERIM COVER BERM

SCALE: 1"=5'




TYPICAL INTERIM COVER BENCH

N.T.S.




INTERMEDIATE COVER TEMPORARY DOWNCHUTE DETAIL

SCALE: 1"=4'

GABION (RENO) MATTRESS NOTES:
1) GABION MATTRESSES SHALL BE MADE OF 6x8 DOUBLE TWISTED HEXAGONAL WOVEN STEEL WIRE MESH PER ASTM A975-97.
2) MESH SHALL HAVE A NOMINAL OPENING SIZE OF 2.5 INCHES.
3) WIRE FOR MESH SHALL HAVE A MINIMUM DIAMETER OF 0.087.
4) ALL WIRE USED IN GABION MATTRESS CONSTRUCTION SHALL HAVE A MINIMUM TENSILE STRENGTH OF 75,000 PSI AND SHALL BE GALVANIZED WITH A MINIMUM ZINC COATING OF 0.7 OZ/FT$^2$.
5) SELVEDGE WIRE FOR GABION ASSEMBLY SHALL HAVE A MINIMUM DIAMETER OF 0.106 INCHES.
6) ALL FASTENERS SHALL COMPLY WITH ASTM A975-97.
7) GABIONS SHALL BE FILLED WITH 3" TO 5" LIMESTONE AGGREGATE.
8) GABIONS TO BE ASSEMBLED AND INSTALLED IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS AND SHALL BE AS MANUFACTURED BY MACCAFERRI, INC. OR ENGINEER APPROVED EQUAL.

STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED PROFESSIONAL ENGINEER
9-15-23

REVISION RECORD

| NO | DATE | DESCRIPTION |
|---|---|---|
| 1 | 09/15/2023 | TECH NOD 4 |

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BECK COMPANIES

NIDO, LTD
BECK LANDFILL
GUADALUPE COUNTY, TEXAS

INTERIM DRAINAGE DETAILS

| | | | | | |
|---|---|---|---|---|---|
| DRAWN BY: MFV | CHECKED BY: AWM | APPROVED BY: AWM | FIGURE NO.: C3-4 |
| DATE: 09/2022 | DWG SCALE: AS SHOWN | PROJECT NO: 311-653 | |

P:\310-000\311-653\-CADD\Dwg\SW01\311653-BECK LANDFIL POND PLAN C3-1.dwg{C3-4} LS:(9/10/2023 - amehevec) - LP: 9/10/2023 11:33 PM

# MUNICIPAL SOLID WASTE PERMIT MAJOR AMENDMENT

## PART III-ATTACHMENT D1
## SITE LAYOUT

BECK COMPANIES

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: Revised ~~January~~ September 2023*

Prepared by:

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STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED
PROFESSIONAL ENGINEER

9-15-23

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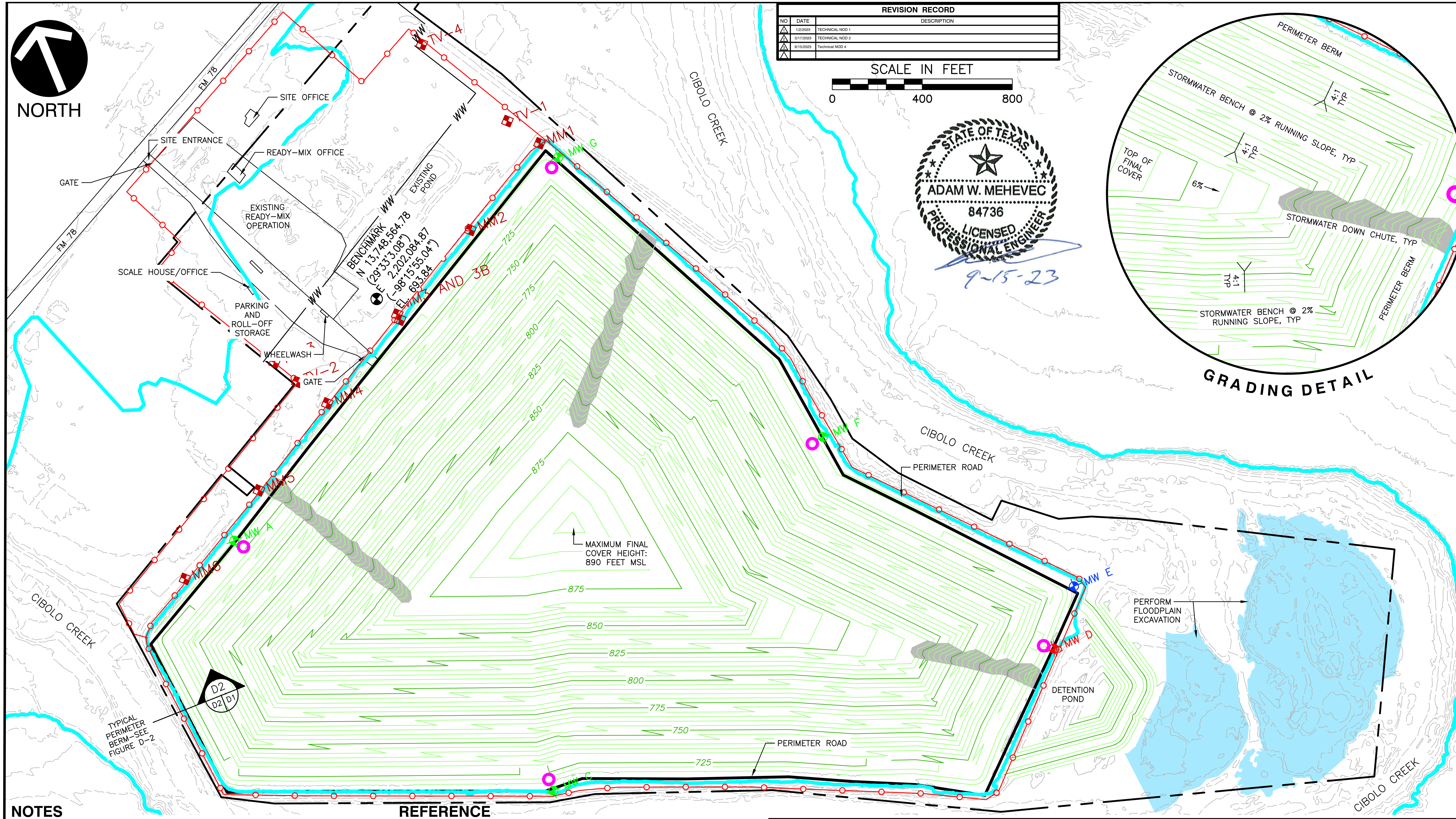
STATE OF TEXAS
ADAM W. MEHEVEC
84736
LICENSED
PROFESSIONAL ENGINEER
9-15-23

| REVISION RECORD | | |
| --- | --- | --- |
| NO | DATE | DESCRIPTION |
| 1 | 1/2/2023 | TECHNICAL NOD 1 |
| 2 | 3/17/2023 | TECHNICAL NOD 2 |
| 3 | 9/15/2023 | Technical NOD 4 |
| | | |




## NOTES

1. ALL AREAS WITHIN THE LANDFILL FOOTPRINT THAT DO NOT HAVE FINAL COVER MAY BE USED FOR SOIL STOCKPILES, BRUSH STORAGE AND GRINDING, OR VEHICLE PARKING AND MAINTENANCE.
2. ALL MONITOR WELLS AND GAS PROBES HAVE BEEN PREVIOUSLY INSTALLED. MONITOR WELL D IS BEING RELOCATED AND WILL BECOME MONITOR WELL E.
3. INTERIOR ACCESS AND PERIMETER ROADS SHALL BE SURFACED WITH CRUSHED STONE, GRAVEL, RECYCLED CONCRETE, OR EQUIVALENT ALL-WEATHER SURFACE.
4. SITE PERIMETER FENCING OR NATURAL BARRIERS WILL BE USED ALONG THE ENTIRE PERMIT BOUNDARY.
5. SOLID WASTE STORAGE AND PROCESSING AREAS WILL BE PLACED OUTSIDE OF THE 100-YEAR FLOODPLAIN OR WILL BE PROTECTED WITH A LEVEE THAT EXTENDS A MINIMUM OF ONE FOOT ABOVE THE FLOODPLAIN ELEVATION.
6. THERE ARE NO NATURAL WINDBREAKS, SUCH AS GREENBELTS, OR SCREENING PROPOSED FOR THE FACILITY.

## REFERENCE

TOPOGRAPHIC INFORMATION FROM AERIAL SURVEY BY FIRMATEK: (SEPTEMBER 15, 2021) AUGMENTED WITH A PORTION OF THE EXISTING GROUND SURFACE PREPARED BY CEC.

## LEGEND

- EXISTING MONITOR WELL
- EXISTING GAS PROBE
- EXISTING PIEZOMETER
- MONITOR WELL TO BE REMOVED
- PROPOSED MONITOR WELL
- LANDFILL PERMIT BOUNDARY
- LANDFILL FOOTPRINT BOUNDARY
- 100 YEAR FLOODPLAIN BASED ON LOMR APPLICATION
- LANDFILL CONTOURS ARE TOP OF FINAL COVER.
- FENCE (BARBED-WIRE OR CHAIN LINK)

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Texas Registered Engineering Firm F-38

BECK COMPANIES

NIDO, LTD
BECK LANDFILL
BEXAR COUNTY, TEXAS

SITE LAYOUT PLAN

| | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| DRAWN BY: | MFV | CHECKED BY: | AWM | APPROVED BY: | AWM | FIGURE NO.: |
| DATE: | 08/2022 | DWG SCALE: | 1" = 400' | PROJECT NO: | 311-653 | D1.1 |

P:\310-000\311-653\-CADD\Dwg\SW01\311653-BECK LANDFIL SITE LAYOUT PLAN D1-1.dwg{D1-1} LS:(9/6/2023 - amehevec) - LP: 9/6/2023 4:39 PM

# MUNICIPAL SOLID WASTE PERMIT MAJOR AMENDMENT

## PART III-ATTACHMENT E
## ~~GEOLOGY~~ Geology ~~REPORT~~Report

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: September 2022*

Prepared by:

POWER ENGINEERS

PROJECT NUMBER: 150051.05.01
PROJECT CONTACT: Julie Morelli
EMAIL: Julie.Morelli@powereng.com
PHONE: 210-951-6424

~~REVISED JANUARY 2, 2023MARCH 17~~JULY 5, 2023

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Style Definition: Body

Style Definition: TOC 2: Tab stops: 6.38", Right,Leader: … + Not at 6.49"

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# 1.0 ~~1.0~~ GEOLOGY REPORT (§330.63(E))

This portion of the application applies to owners or operators of MSW landfills, compost units, and if otherwise requested by the executive director. The geology report has been prepared and signed by a qualified groundwater scientist. The previously prepared permit documents relating to Geology, Aquifers, Groundwater, etc. are included as Appendices to this Report for continuity with prior permitting actions, as noted below. ~~The following prior documents are included by reference to this report:~~

- ~~*Appendix E-1 – Snowden, 1989, Attachment 11 and Supplements*~~
- *Appebdux E-1 Letter to TCEQ from January 27, 1999*
- *Appendix E-2 – Snowden, 1989, Attachment 3C – Water Wells*
- ~~*Appendix E-3 – Supplemental Boring Plan*~~
- *Appendix E-~~4~~ 3 – Cross Sections*

## 1.1 Regional Geology (§330.63(e)(1))

The regional geology described herein includes from the ground surface to the base of the lowermost aquifer capable of providing usable groundwater within Guadalupe County, Texas. Those regional formations and structural features of significance to the Beck Landfill site are discussed below. **Figure E~~3~~-1** shows the surface geology of the subject area of Guadalupe County and adjoining counties and mapped fault lines of the Balcones Fault Zone. The Balcones Fault Zone has been inactive for nearly 15 million years (Cretaceous) and is considered a very low risk for earthquake hazard by the Federal Emergency Management Agency (FEMA).

**Figure E~~3~~-2** is a generalized stratigraphic column of the region that indicates the geologic age, range of thickness, formation lithology and water supply usage.

Quaternary, Tertiary and Cretaceous System formations outcrop within the region of review. These formations are mainly comprised of sand, sandstone, gravel, clay, mudstone, shale, and marl. The stratigraphic sequence of formations that outcrop in the review region from the land surface to the base of the lowermost aquifer capable of providing usable groundwater is shown on the generalized stratigraphic column on **Figure E~~3~~-2**.

As indicated on the stratigraphic column, the youngest formation that outcrops in the area is the Holocene Series alluvium consisting of clay, silt, sand, and gravel deposited in the floodplain along major stream channels in the southern portion of the subject region. The Holocene Series alluvium is documented to be



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as much as 25 feet in thickness.  The Holocene alluvium lies unconformably over the older Pleistocene Series Leona Formation, and Tertiary and Cretaceous series formations where Leona Formation beds have been eroded away.

Two Pleistocene Series formations outcrop within the mapped region. From youngest to oldest these are the fluviatile terrace deposits and Leona Formation. The fluviatile terrace deposits in the region of review are comprised of sand, silt, clay, and some gravel that were laid down as point bars, oxbows and abandoned channel fill. These fluviatile terrace deposits generally occupy a positioned above the Holocene floodplains of entrenched streams and may obtain a thickness of up to 30 feet based on a review of State Water Well Reports for wells drilled in Guadalupe County. The Pleistocene Series terrace unconformably overlie the older Pleistocene Series Leona Formation, where not eroded away, or Tertiary and Cretaceous system formations where the Leona was removed by erosion.

The Leona Formation of the review region consist of gravel, sand, silt, and caliche deposited as wide fluviatile terraces. The gravel and sand beds of the Leona are stratified and partly cross bedded with lenses of caliche and silt. The Leona is believed to obtain a maximum thickness of about 60 feet. The Leona Formation rests unconformably on top of Tertiary and Cretaceous system formations.

The youngest of the Tertiary System formations that outcrops within the review region is the Pliocene Series Uvalde Gravel; the deposition of which may have also occurred during the early Pleistocene. This formation is comprised of caliche-cemented gravel, cobbles, and some small boulders. Uvalde Gravel sediments were deposited as terraces and occupies topographically high areas that are not associated with present-day drainage. The thickness of this formation ranges from several feet to about 20 feet plus or minus. In the review region, the Uvalde Gravel unconformably overlies Tertiary and Cretaceous system formations.

Eocene and Paleocene series formations of the Tertiary System outcrop at the southeastern portion of the review region. These formations from youngest to oldest are:

- The Eocene Series Wilcox Group; and,
- The Paleocene Series Midway Group.

Both groups outcrop in the southeastern portion of the review region.

Within the review region, the Wilcox Group outcrops as a wide belt trending from the northeastward to the southwest. The Wilcox strata consists mostly of mudstone with some silt and very fine sand laminae. Variable amounts of sandstone and lignite also occur within the Wilcox Group. The sediments that comprise the Wilcox Group were deposited in palustrine and fluvial environments. The maximum thickness of this group is around 1,420 feet. The Wilcox Group grades vertically into the Midway Group resulting in a conformable contact.

The sediments that make up the Midway Group were deposited in coastal and marine environments. This group is predominately comprised of clay and silt with some lenses of sand and limestone. The Midway Group is about 500 feet thick and unconformably overlies the undivided Cretaceous System Navarro Group and Marlbrook Marl.

Gulf and Comanche series formations of the Cretaceous System outcrop throughout the majority of the review region. These formations from youngest to oldest are:

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- Gulf Series
  - Navarro Group and Marlbrook Marl (upper Taylor Group) undivided
  - Pecan Gap Chalk (Lower Taylor Group)
  - Austin Chalk
  - Eagle Ford Group
  - Del Rio Clay
- Comanche Series
  - Buda Limestone
  - Del Rio Clay
  - Edwards Limestone undivided

The Navarro Group and Marlbrook Marl undivided outcrops through the middle of the review region. The lithology of this undivided assemblage of formations includes marl, clay, sandstone, and siltstone. The sandstone beds are discontinuous and of limited lateral extent. This undivided assemblage is thought to be deposited in a shallow water, marginal marine environment. The Navarro-Marlbrook Marl is up to 580 feet in thickness and may rest conformably upon the Pecan Gap Chalk. This undivided assemblage of formations is unconformably overlain by Holocene and Pleistocene series formations at the Beck Landfill site and is the formation into which the landfill excavation will terminate.

The Pecan Gap Chalk outcrops in the northwestern portion of the review region, ~~well~~ within the Balcones Fault Zone. This formation is composed of chalk and chalky marl deposited in shallow shelf, shoreface and transgressive marine environments. The Pecan Gap ranges from 100 feet to 400 feet in thickness and unconformably overlies the Austin Chalk.

The Austin Chalk further northwest of ~~b~~Beck Landfill site in a highly faulted area of the Balcones Fault Zone. The lithology of this formation includes chalk and marl with localized occurrences of bentonitic seams. The Austin carbonates accumulated in a low-energy shallow to open – shelf and shoal environment. The Austin Chalk thickness ranges from 350 feet to 580 feet and unconformably overlies the Eagle Ford Group.

The oldest formation of the Gulf Series is the Eagle Ford Group which is also referred to as the Eagle Ford Shale. Outcroppings of the Eagle Ford Group are limited to the highly faulted portion of the Balcones Fault Zone in the northwestern area of the review region. The Eagle Ford lithology includes shale, siltstone and flaggy limestone deposited as deltaic and marine sediment. The Eagle Ford Group contact with the underlying Buda Limestone is unconformable and is 30 feet to 75 feet thick.

The Buda Limestone is the upper formation of the Comanche Series. As with the Austin Chalk and Eagle Ford Group, outcroppings of Buda Limestone are mostly restricted to the highly faulted portion of the Balcones Fault Zone within the northwestern limits of the review region. Sediments for this limestone formation were deposited in an open-shelf marine environment. The formation lithology is fine grained poorly bedded to nodular limestone that becomes argillaceous near its upper contact. The contact between the Buda Limestone and the Del Rio Clay is unconformable. The thickness of the Buda strata ranges from 60 feet to 100 feet within the review region.



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Outcroppings of the Del Rio Clay, formally called the Grayson Formation, are restricted to the highly faulted area of the Balcones Fault Zone within the northwestern portion of the review region. The depositional environment for Del Rio sediments were lagoonal and nearshore shallow marine. Calcareous and gypsiferous clay with some thin lenticular beds of calcareous siltstone make up the Del Rio lithology. The thickness of this formation ranges from 60 feet to 120 feet. The Del Rio Clay conformably overlies the undivided Edwards Group.

The undivided Edwards Group outcrops in the far northwestern portion of the review region and is within the northwestern extent of the Balcones Fault Zone. The lithology of this undivided formation consists of fine to coarse grained massive limestone with abundant chert and solution zones deposited in a shallow water marine environment. The undivided Edwards Group ranges from 300 feet to 500 feet.

## ~~3.1.1~~1.2 Local Geological Processes (§330.63(e)(2))

30 TAC 330.559 defines an unstable area as a location that is susceptible to natural or human-induced events or forces capable of impairing the integrity of some or all landfill structural components responsible for preventing releases from the landfill. Unstable areas can include poor foundation conditions, areas susceptible to mass movement, and karst terrains. The Beck Landfill was excavated through alluvial materials (sand and gravel) to the undivided Navarro Group and Marlbrook Marl, which consist of clay and shale material (impermeable). Evidence of active detrimental on-site geologic activity has not been documented within the landfill area. No on-site or local human-made features or events were observed to have created unstable conditions.

~~The Beck Landfill is located within the Balcones Fault Zone as show on **Figure 3-2.**~~ The Balcones Fault Zone is a system of normal faults that traverses the review region from the northeast to the southwest. This fault zone is associated with the Paleozoic-age Ouachita Fold Belt, a remnant of an ancient highly eroded mountain range which is buried beneath the Balcones Fault Zone. Movement along the Balcones faults took place mainly during the Miocene Epoch. Data contained within the USGS Quaternary Fault and Fold Database indicates that no Holocene displacement of faults within the Balcones Fault Zone has occurred. The Beck Landfill (shown with a star) is not located within the Balcones Fault Zone as shown in the image below.

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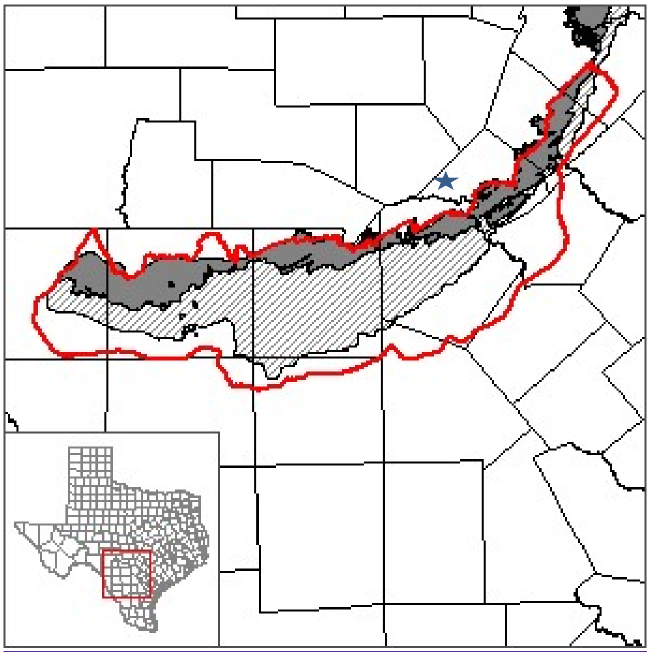

FIGURE ABOVE DEPICTS THE BALCONES FAULT ZONE AND THE LOCATION OF THE BECK LANDFILL (STAR) LOCATED TO THE NORTH.

The Ouachita Fold Belt caused regional tilting and uplifting of Paleozoic rocks that underlie the review region. Pre-Cretaceous erosion of the uplifted Paleozoic rocks created a southeast dipping regional erosional surface or unconformity upon which Cretaceous System sediments were deposited. This regional unconformity and extensive faulting are the most significant structural features affecting the Cretaceous System and Paleocene Series formations within the review region. The Ouachita Fold Belt regional unconformity affected the deposition of both Cretaceous and Tertiary system sediments bringing about the creation of wedge-shaped formation bodies that thicken southeastward towards the Gulf Coast. **Figure E~~3~~-3** is a simplified down-the-coast oriented regional stratigraphic cross-section through central Guadalupe County which illustrates the geometry and dip of the review region formations.

The Beck Landfill and adjacent areas is documented to be devoid of Holocene displacement along those faults of the Balcones Fault Zone or active land surface subsidence and does not appear to meet the definition of an "unstable area". **Figure E~~3~~-4** shows the landfill location in relation to areas of known Holocene fault displacement. **Figures ~~*3*~~E-*8* and E-9** shows the landfill location relative to the seismic risk, which is "very low" according to the Federal Emergency Management Agency (FEMA) National Risk Index for earthquakes.

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## ~~3.1.2~~1.3 Regional Aquifers (§330.63(e)(3))

Four aquifers are utilized for water supplies within the review region. The four aquifers that outcrop and/or subcrop the review region are: the Carrizo – Wilcox, Edwards, Austin, and the Leona aquifers. The Carrizo – Wilcox and Edwards aquifers are classified by the Texas Water Development Board (TWDB) as major aquifers, with the Leona and Austin being classified as "other" by the TWDB. No aquifers classified as minor outcrop or subcrop the review region. A map depicting the location of the Beck Landfill relative to the Carrizo – Wilcox, zones of the Edwards, Austin and Leona aquifers is provided as Figure E~~3~~-5. Those geologic formations and groups associated with the above referred aquifers and the rock/sediment makeup of each aquifer are listed from youngest to oldest in geologic age in Table ~~3-~~1 below.

**TABLE 1** ~~**TABLE 3-1**~~ **REGIONAL AQUIFERS**

| Aquifer Name | Associated Geologic Formation or Group | Rock/Sediment Makeup |
|---|---|---|
| Leona | Leona Formation | Gravel and sand with lenses of caliche and silt |
| Carrizo – Wilcox | Wilcox Group within the Review Region | Mostly mudstone with some silt and very fine sand laminae and variable amounts of sandstone and lignite |
| Austin | Austin Chalk | Chalk and marl |
| Edwards | Edwards and Associated Limestones | Fine to coarse grained massive limestone with abundant chert and solution zones |

Of these four aquifers, the Leona, Austin, and Edwards either outcrop near the Beck Landfill site boundary or underlie it. The Carrizo – Wilcox outcrops approximately 7.75 miles southeast of the landfill site and it highly unlikely to be affected by landfill activities. Therefore, no further discussion regarding the Carrizo – Wilcox follows this text. Figure E~~3~~-5 shows the outcrop areas of the above referenced aquifers in relation to the landfill location.

As shown in ~~**table**~~ **Table** 1 above, the Leona Aquifer is comprised of gravel and sand with lenses of caliche and silt. Hydraulic properties data for the Leona Aquifer within the review region and Guadalupe County appears to be nonexistent in readily available State groundwater reports. However, data pertaining to the range of the average hydraulic conductivity for the Leona Aquifer in neighboring Caldwell County was obtained. According to the source, the average Leona hydraulic conductivity ranged from 37 feet/day to 397 feet/day. Yields for water well producing from the Leona range from 1 gallon/minute (gpm) to 500 gpm are reported on State Water Well Reports obtained from the TWDB for wells producing for the Leona Aquifer and State groundwater reports.

The Leona Aquifer is under water table conditions. Recharge to this aquifer occurs where precipitation infiltrates Leona strata that outcrops within the review region. Additional recharge may also be received from streams entrenched in the Leona outcrop area during flood events. The Leona may provide some recharge to the Carrizo Willcox where Leona strata directly rest upon the Wilcox Group outcrop area in the southeastern corner of the review region. Recharge from the Leona to the Austin Aquifer is impeded



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by two aquitards that separate the Leona and Austin. These two aquicludes are the Cretaceous Series Pecan Gap Chalk and undivided Navarro Group and Marlbrook Marl, which underlie the Leona at the Beck Landfill site.

Maps showing the regional Leona water table surface were not identified during a review of readily available regional hydrogeologic literature. Being unconfined and assuming the absence of pumping well interference, the Leona water table surface most likely mimics the land surface topography flowing in the direction of lower topographical elevations and entrenched stream channels. Historical water table elevation measurements taken at the Beck Landfill site during groundwater monitoring events indicate groundwater flow in the Leona is towards Cibolo Creek supporting the regional flow direction conclusion. Regional rates of groundwater flow through the Leona Aquifer were not found in the reviewed readily available regional hydrogeologic literature. Using the range of average Leona hydraulic conductivities presented earlier, an estimated effective porosity of 0.25 for sand and gravel and an assumed hydraulic gradient of 0.003feet/foot (based on Beck Landfill historical water table elevation measurements), the estimated groundwater flow rate would range from 0.44 feet/day to 4.8 feet/day.

A review of State Water Well Reports for those water wells producing from the Leona Aquifer within the review region showed total dissolved solids (TDS) concentrations to be less than 500 mg/L. Historical groundwater monitoring data for the Beck Landfill shows TDS concentrations ranged from 502 mg/L to 3460 mg/L (see **Part III, Attachment F, Appendix F-~~1~~2**). These TDS concentrations indicate that groundwater in the Leona Aquifer can be categorized as fresh to moderately saline. Groundwater withdrawn from the Leona Aquifer is utilized for public supply, domestic, irrigation and livestock purposes.

The Austin Aquifer is comprised of chalk and marl, which outcrop west and northwest of the Beck Landfill site within the Balcones Fault zone. These outcrop areas are highly faulted and of limited extent in the review region. Recharge to the Austin Aquifer occurs by direct infiltration of precipitation on its outcrop area and by limited seepage from streams that cross the outcrop areas. The Austin is most likely under water table conditions in its outcrop area but goes to a confined (artesian) condition southeast (downdip) of its outcrop areas where it is overlain by the Pecan Gap Chalk and undivided Navarro Group and Marlbrook Marl strata that form aquitards hydraulically separating it from the overlying Leona Aquifer. The Austin is underlain by strata belonging to the Eagle Ford Group, Buda Limestone and Del Rio Clay which form aquitards that separate it from the deeper Edwards Aquifer.

Maps showing the Austin Chalk regional water table surface and potentiometric surface, where confined, were not included in the reviewed, readily available regional hydrogeologic literature. However, the regional hydrogeologic literature reviewed did state that the predominate direction of groundwater flow within the Austin Aquifer is southeastward toward the Gulf Coast. The regional hydrogeologic literature also pointed out that localized variations in flow direction occur due to fault barriers or withdrawals of groundwater by pumping water wells. Where groundwater movement comes under the influence of pumping water wells, groundwater flow is towards the wells from all directions.

Hydraulic properties data for the Austin Aquifer within the review region was not found in readily available State groundwater reports or other hydrogeologic literature. However, data regarding well yield for water well producing from the Austin Aquifer were obtained from State Water Well Reports and one TWDB groundwater report. According to these sources, well yields range from 2 gpm to 60 gpm.

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Data pertaining to TDS concentrations in groundwater withdrawn from the Austin Aquifer were obtained from State Water Well Reports for water wells producing from the Austin within the review region and reviewed TWDB groundwater reports. According to this data, TDS concentrations in Austin Aquifer groundwater range from 385 mg/L to 1,528 mg/L. These TDS concentrations indicate that groundwater in the Austin Aquifer mostly fresh but can be moderately saline at some locations. Groundwater withdrawn from the Austin is used for public supply, domestic and livestock purposes.

As pervious stated, the Edwards Aquifer is classified by the TWDB as a major aquifer and located northwest of the ~~underlies the~~ Beck Landfill site. This major aquifer is comprised of fine to coarse grained massive limestone with abundant chert and solution zones. The Edwards outcrops northwest of the Beck Landfill site within the Balcones Fault zone. Recharge to the Edwards Aquifer occurs by direct infiltration of precipitation on its outcrop area and some seepage from streams that cross its outcrop area. The Edwards is under water table conditions in its outcrop area but becomes confined southeast of it outcrop area being overlain by strata of the Eagle Ford Group, Buda Limestone and Del Rio Clay which form aquitards that hydraulically separate it from the overlying Austin Aquifer.

The Leona Aquifer and associated Leona Formation consists of several isolated alluvial deposits at the edge of the Edwards Plateau. It is mapped as existing beneath the Beck Landfill (see **Figure ~~3~~E-5**). This alluvium aquifer is recharged by infiltration of precipitation and is discharged by numerous springs and seeps. The saturated thickness is rarely greater than ten feet. The saturated zone varies seasonally. Groundwater flow and hydraulic conductivity is influenced by the heterogeneous nature of the alluvium deposit. The arithmetic mean of hydraulic conductivity in vertical profiles ranges from 0.013 cm/sec to 0.14 cm/sec[1]. Elevated nitrate levels are common ranging from 4 parts per million to 70 parts per million. Due to activity at the landfill, the Leona Aquifer has been removed within the embankment of the Beck Landfill. No information on the potentiometric surface or specific hydraulic dynamics in Guadalupe County was identified. The Guadalupe County Groundwater Conservation District (GCGCD) studies, conserves, preserves, and protects the Carrizo and Wilcox Aquifers, but makes no mention of the Leona.

To demonstrate regional groundwater trends, Figure E~~3~~-6 shows the regional water table surface and potentiometric surfaces of the Edwards Aquifer in July 1974, republished in 1986. No changes in regional groundwater flows since this time are known at the time of this application. As shown on this figure, the direction of groundwater flow within the unconfined portion of the Edwards is southeastward toward the Gulf Coast, then turning to the northeast upon transitioning to confined conditions. Where groundwater movement locally comes under the influence of pumping water wells, groundwater flow is towards the wells from all directions.

The hydraulic conductivity of the Edwards Aquifer is documented as ranging from 2 feet/day to 31 feet/day, with transmissivities ranging from "negligible" to 2 million feet$^2$/day. Well yield for water well producing from the Edwards Aquifer within the review region range from 15 gpm to 160 gpm. The estimated rates of groundwater flow through the Edwards range from 2 feet/day to 31 feet/day.

TDS concentrations data for groundwater withdrawn from the Edwards Aquifer were taken from State Water Well Reports for water wells producing from the Edwards within the review region and reviewed TWDB groundwater reports. This data shows that TDS concentrations in Edwards Aquifer groundwater range from 247 mg/L to 8,249 mg/L. The distribution of these TDS concentrations across the review region show that Edwards groundwater at the northwestern half of the review region can be categorized as

[1] Hydrogeology of heterogeneous alluvium in the Leona aquifer, Caldwell County, Texas. Sharp, John Malcolm. May 2005.



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be fresh to slightly saline and moderately saline in the southern half of the review region. Groundwater withdrawn from the Edwards is used for public supply, domestic and livestock purposes.

A list of all water wells located within one mile of the Beck Landfill from which groundwater is withdrawn of use is provided in **Table ~~3-~~2** below. The locations of these water wells are shown of Figure E~~3~~-7.

**TABLE 2 ~~TABLE 3-2~~ WATER WELLS WITHIN ONE MILE OF THE BECK LANDFILL BOUNDARIES**

| TWDB Well Report Number | Location | Bore Depth (ft.) | Use | Aquifer Name |
|---|---|---|---|---|
| 297428 | 29.531667°, -98.259445° | 35 | Domestic | Leona |
| 297432 | 29.532222°, -98.257778° | 34 | Domestic | Leona |
| 288275 | 29.53334°, -98.265834° | 41 | Domestic | Leona |
| 268534 | 29.565556° -98.256111° | 380 | Domestic | Austin Chalk |
| 6830603 | 29.558612°, -98.260001° | 550 | Irrigation | Edwards |
| 6830605 | 29.567778°, -98.261667° | 116 | Domestic | Austin Chalk |
| 6830606 | 29.565834°, -98.266944° | 295 | Domestic | Austin Chalk |
| 6831702 | 29.535° -98.245278° | 35 | Public Supply | Leona |
| 68306A | 29.550161° -98.273573° | 35 | Domestic | Leona |
| 68306C | 29.550643° -98.268175° | 390 | Domestic | Edwards |
| 68306D | 29.550645° -98.268163° | 75 | Domestic | Leona |
| 68314 | 29.555336° -98.264186° | 55 | Domestic | Leona |
| 68317 | 29.536302° -98.247536° | 33 | Domestic | Leona |

Sources: Texas Water Development Board (TWDB) Groundwater Data Viewer and Texas Commission on Environmental Quality (TCEQ) Water Well Report Viewer, Accessed on April 19, 2021

## ~~3.1.3~~1.4 Subsurface Conditions (§330.63(e)(4))

~~1.1.1~~ The original geotechnical analysis and supplemental borings drilled in 2020 are presented under **Part III, Attachment D5, Appendix D5-C**~~Part III, Attachment D-5~~. Additional geotechnical information is provided in that attachment in support of this application. The information provided below synthesizes information submitted with the original application (Snowden, 1989) as relevant to this rule requirement, as supplemented by borings advanced in 2020.

Per Snowden (Subsurface Conditions, 1989), a series of borings, along a 400 foot grid layout within the confines of the project area was proposed to the Texas Department of Health (TDH). The TDH approved the investigative proposal with the understanding that some individual boring locations were subject to equipment accessibility and thus may be delated. Omission of boring could not however compromise the development of an adequate subsurface stratigraphic relationship.

A total of fifty-four (54) borings were advanced. Each of the proposed boring locations is indicated on the original boring plan, but only those designated by grid numbers were actually drilled. A continuous flight auger system, either of a solid or hollow stem type, was employed in the advancement of the borings. An updated cross-sectional analysis of this boring plan and boring lot set is provided as ~~**Appendix E-**~~**Part III4** of this Report. The locations and elevations are approximated based on best available information today. A Table is provided for references.

Representative samples of the subsurface sediments were obtained from selected borings. Undisturbed or Shelby tube samples were recovered to represent much of the clay-shale penetration as recorded on the accompanying logs. Auger samples were generally recovered to represent the stream deposited stratum. All samples were immediately sealed to preserve in-situ states and moisture conditions as near as possible.

The analysis of the soil samples was performed in a soils laboratory. Testing generally conformed to an appropriate A.S.T.M specification as per the soil property being determined. The values of permeability, each expressed as centimeters per second, were derived by a constant head method utilizing flexible wall permeameters. The recompacted samples were also tested by the same method. Permeability was determined for selected clay samples from six (6) widely spaced borings. The samples were chosen as to be representative of the entirety of the clay formation underlying the proposed site and/or to confirm the impermeable nature of the natural clay. Atterberg Limits were determined from un-tested portions of the permeability samples, in order to formulate a basis of comparison, with the plasticity indexes, as determined from other sampled borings. A comparison of this nature should support the suitability of the particular natural clay, as relevant to the proposed site usage. Sieve and Hydrometer analysis were not performed, as the majority of the laboratory investigation was concentrated on materials predominantly of clay minerals. Such clay materials would generally pass the #200 sieve.

The conclusions of the laboratory testing are given on the tables included in **Part III, Attachment D-5, Appendix D5-C**~~Attachment D-5~~. The findings of the exploratory borings as depicted by the boring logs, along with the other aspects of the field accumulated datum, allowed an analysis of the subsurface conditions existing at the proposed site.

A supplemental geotechnical investigation was conducted by Terracon in the southeast portion of the landfill in September 2020 to revisit the findings of the original investigation. The investigation was conducted in accordance with 30 TAC §330.63(e)(4) and §330.63(e)(5). A total of eight borings were advanced in the approximately 12-acre area, consistent with the guidance of 6-10 borings in 30 TAC §330.63(e)(4)(B) for a study area of 10-20 acres. A boring plan detailing the proposed investigation was submitted by POWER Engineers, Inc. to the TCEQ Municipal Solid Waste Permits section on August 17, 2020. No changes to the proposed number and depth of the borings were requested due to site conditions in the proposed boring plan. No geophysical methods, such as electrical resistivity, were proposed for use as part of this study to reduce the number of required borings. The TCEQ received the boring plan for

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review on August 31, 2020, and issued an approval letter dated September 3, 2020. A copy of the approved boring plan and TCEQ approval letter are included with this submittal as ~~**Appendix E-3**~~**Part III, Attachment D5, Appendix D5-C**.

The Terracon Geotechnical Data Report indicates that borings were advanced with a truck-mounted drill rig utilizing continuous flight augers. Samples were obtained by Terracon continuously in the upper 10 ft. if each soil boring and at intervals of 5 ft. thereafter. A thin-wall tube or split-barrel tube was utilized. In the thin-walled tube sampling procedure, a thin-walled, seamless steel tube with a sharp cutting edge was pushed hydraulically into the soil to obtain a relatively undisturbed soil sample. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was utilized by Terracon and driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration was recorded by Terracon as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the Terracon boring logs at the test depths. Terracon observed and recorded groundwater levels during drilling and sampling. Terracon backfilled all borings with bentonite chips after their completion.

**Table 3**~~-3~~ below summarizes the subsurface findings at each boring location. The Terracon Geotechnical Data Report with detailed information presented for each boring, including Unified Soil Classification System findings is included in Part III Attachment D-5. A discussion of the laboratory soil tests and findings by Terracon following boring activities is presented below. Cross-sections prepared from the findings are attached as **Appendix E-**~~3~~4 to this Report.

**TABLE 3** ~~TABLE 3-3~~ **SUMMARY OF SUBSURFACE SOIL FINDINGS**

| Boring No. | Generalized Soil Findings and Depths Below Ground Surface | | | | | |
|---|---|---|---|---|---|---|
| FB-1 (Terminated at 45 ft.) | 0-4 ft. Fill - Fat Clay (CH) | 4-13 ft. Fill- Fat Clay (Reworked Clay-Shale) | 13-23 ft. Fill- Clayey Sand (SC) | 23-33 ft. Clayey Gravel (GC) | 33.0-38 ft. Lean Clay (CL) | 38-45 ft. Clay-Shale |
| FB-2 (Terminated at 45 ft.) | 0-3 ft. Fill- Fat Clay (CH) | 3.0-13.0 ft. Fill- Fat Clay (Reworked Clay-Shale) (CH) | 13.0-38.0 ft. Fat Clay (CH) | 38.0-45.0 ft. Clay-Shale | N/A | N/A |
| FB-3 (Terminated at 50 ft.; Groundwater encountered at 38 ft.) | 0-6 ft. Fill- Lean Clay (CL) | 6-18 ft. Fill-Fat Clay (Reworked Clay-Shale) (CH) | 18-20 ft. Lean Clay (CL) | 20-35 ft. Clayey Gravel (GC) | 35-43 ft. Fat Clay (CH) | 43-50 ft. Clay-Shale |
| FB-4 (Terminated at 35 ft.) | 0-35 ft. Clay-Shale | N/A | N/A | N/A | N/A | N/A |
| FB-5 (Terminated at 35 ft.) | 0-35 ft. Clay-Shale | N/A | N/A | N/A | N/A | N/A |
| FB-6 (Terminated at 35 ft.) | 0-35 ft. Clay-Shale | N/A | N/A | N/A | N/A | N/A |



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| **Boring No.** | **Generalized Soil Findings and Depths Below Ground Surface** | | | | | |
|---|---|---|---|---|---|---|
| FB-7 (Terminated at 50 ft.; Groundwater Encountered at 9ft. and stabilized at 12 ft.) | 0-4. ft. Fill - Lean Clay (CL) | 4.0-14.0 ft. Fill – Clayey Gravel (GC) | 14-50 ft. Clay-Shale | N/A | N/A | N/A |
| FB-8 (Terminated at 50 ft.) | 0-18 ft. Fat Clay (CH) | 18-50 ft. Clay-Shale | N/A | N/A | N/A | N/A |

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## ~~3.1.5~~1.5 Geotechnical Data (§330.63(e)(5))

~~1.1.2~~ The original geotechnical analysis and supplemental borings are presented under **Part III, Attachment D-5**. Additional geotechnical information is provided in that attachment in support of this application. The information provided below synthesizes information submitted with the original application (Snowden, 1989) as relevant to this rule requirement, as supplemented by borings advanced in 2020.

The various soil layers identified in the soil borings were tested and evaluated to determine their index properties and their in situ undisturbed permeabilities. Clause 325.74 (b) (5) (I) (iii) of the TDH Municipal Solid Waste Regulations was used as a guide for these evaluations. This clause states as follows:

*A laboratory report of soil characteristics shall be submitted consisting of a minimum of one sample from each soil layer that will form the bottom and sides of the proposed excavation. The design engineer should have as many additional tests performed as necessary to provide a typical profile of the soil stratifications within the site. No laboratory work need be performed on highly permeable soil layers which obviously will require lining. The soil samples shall be tested by a competent soils laboratory. The soil tests shall consist of the following:*

1. *Permeability tests, to be performed according to one of the following standards on undisturbed soil samples. Where excavations already exist on the site that are to be used for waste disposal, undisturbed samples shall be taken from the sidewalls of those excavations and said permeability tests made on the horizontal axis. All test results shall indicate the type of test used and the orientation of each sample.*

   *Constant Head—ABTM D 2434; or*

   *Falling Head—Appendix VII of the Corps of Engineers Manual EM 1110-2-1906, 30 Nov. 70, Laboratory Soils Testing.*

2. *Sieve analysis and hydrometer analysis: No.4, No.10, No.40, No.200, —200, and hydrometer analysis on —200 fraction—ASTM D422.*
3. *Atterberg Limits—ASTM D 423 and D 424.*
4. *Moisture - Density Relations—ASTM D 69B.*
5. *Moisture Content—ASTM D 2216.*

*All soils bounded within the following range of values shall be tested in a soils laboratory for the coefficient of permeability. Normally all soils below the range of values stated in this subclause are very sandy and will require lining, unless additional test data support a deviation. Those soils which exceed the range of values are high in clay and do not require additional testing to prove their adequacy for sanitary landfill purposes. The physical parameters stated are to be considered as guidelines for soil sample testing. Engineering judgement must be used on those samples which exhibit some but not all of the boundary limits stated.*



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*Plasticity Index 15 to 25, Liquid Limit 30 to 50, Percent Passing 30 to 50, No.200 Mesh Sieve (-200)*

The sandy clays exhibit Liquid Limits (LL) of 26 to 46 and Plasticity Indices (PI) of 11 to 30. This soil layer requires testing to determine the coefficient of permeability. Samples from the silty clays were tested for permeability and were found to be well within required characteristic qualities when mixed with clays and bentonite as proposed as for use in the dike.

The clay and shale deposits exhibit Liquid Limits of 53 to 72 and Plasticity Indices of 37 to 52. This soil layer does not require additional permeability testing and is considered suitable for use as a natural liner.

The permeability test results from this project are presented in the Geotechnical Investigation Attachment 11 (Snowden, 1989 presented in **Part III, Attachment D-5**). It should be noted that soils with a high Plasticity Index may also exhibit substructures of seams or joints which may have an effect upon permeability. The gray shale beneath this project was not however observed to have significant permeable substructure. Based on our observations and the permeability test results, the Navarro & Taylor Deposits are expected to be suitable as natural liners provided that the slurry trench key is extended a minimum of five (5) feet into this shale.

The design as proposed for this project then will require the establishment of the soil bentonite slurry trench keyway to be excavated a minimum of 5 feet into the underlying shale, to insure against any substructure permeability and afford the greatest degree of integrity.

A supplemental Geotechnical Investigation was conducted by Terracon at the southeast portion of the Beck Landfill in September 2020. A general overview of the geotechnical data associated with the investigation is presented below. The full Terracon Geotechnical Data Report is attached as **Part III, Attachment D5, Appendix D5-C** ~~**Appendix E-2**~~.

### ~~330.63(e)(5)(A) –~~ Overview of Laboratory Investigation and Findings (330.63(e)(5)(A))

### 1.5.1

Samples collected by Terracon during the field exploration were taken to the laboratory for further observation by the Terracon project geotechnical engineer and were classified in accordance with the United Soil Classification System (USCS). The following laboratory test methods were conducted by Terracon on selected soil samples from this investigation:

- Moisture Content (ASTM D2216);
- Atterberg Limits (ASTM D4318);
- Gradation of Soils using Sieve Analysis (ASTM D422);
- Percent Passing No. 4 and No. 200 Mesh Sieves (ASTM D1140); and

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- Permeability Tests (ASTM D5084).

A grain size analysis through the use of ASTM D422 and ASTM D1140 was conducted for each boring location, including that represent the side and bottom of the landfill. A summary of grain size analysis findings is presented in **Tables ~~3-~~4 to ~~3-~~1~~2~~1** below. Terracon runs all the sieves on the first portion of sample and then for the other two, they run the #4 and #200 screens, only. Any unreported percentages are larger than the #4 screen but are not listed as a size because they are not "graded". Further information on the grain size analysis is available in the Terracon Geotechnical Data Report. Cross sections are provided in ~~Appendix E-4~~**Part III, Section D-5**.

**TABLE 4 ~~TABLE 3-4~~4 – SUMMARY OF BORING FB-1 GRAIN SIZE ANALYSIS (SIDE OF LANDFILL)**

| Boring Depth (ft. below ground surface) | % Cobbles | % Gravel | % Sand | % Silt | % Fines | % Clay | % No. 4 Sieve | % No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|
| 4-5 | N/A | N/A | 4.4 | N/A | 95.4 | N/A | 99.74 | 95.37 |
| 6-7 | N/A | N/A | 7.1 | N/A | 91.7 | N/A | 98.88 | 91.73 |
| 13.5-15 | N/A | N/A | 34.8 | N/A | 46.5 | N/A | 81.3 | 46.51 |
| 23.5-25 | 0.0 | 44.7 | 37.4 | N/A | 17.9 | N/A | 55.33 | 17.93 |

**TABLE 5 ~~TABLE 3-5~~ – SUMMARY OF BORING FB-2 GRAIN SIZE ANALYSIS (SIDE OF LANDFILL)**

| Boring Depth (ft. below ground surface) | % Cobbles | % Gravel | % Sand | % Silt | % Fines | % Clay | % No. 4 Sieve | % No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|
| 0-1.5 | N/A | N/A | 18.4 | N/A | 50.2 | N/A | 68.61 | 50.22 |
| 5-6 | N/A | N/A | 4.5 | N/A | 92.0 | N/A | 96.52 | 92.02 |
| 13-15 | N/A | N/A | 13.7 | N/A | 57.8 | N/A | 71.55 | 57.84 |
| 23.5-25 | N/A | N/A | 28.2 | N/A | 66.7 | N/A | 94.83 | 66.67 |
| 38-40 | N/A | N/A | N/A | N/A | 99.7 | N/A | N/A | 99.69 |

**TABLE 6 ~~TABLE 3-7~~6 – SUMMARY OF BORING FB-3 GRAIN SIZE ANALYSIS (SIDE OF LANDFILL)**

| Boring Depth (ft. below ground surface) | % Cobbles | % Gravel | % Sand | % Silt | % Fines | % Clay | % No. 4 Sieve | % No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|
| 2-3 | N/A | N/A | 17.5 | N/A | 69.9 | N/A | 87.4 | 69.94 |



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| Boring Depth (ft. below ground surface) | % Cobbles | % Gravel | % Sand | % Silt | % Fines | % Clay | % No. 4 Sieve | % No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|
| 9-10 | N/A | N/A | 7.1 | N/A | 91.4 | N/A | 98.57 | 91.43 |
| 23.5-25 | 0.0 | 36.4 | 36.6 | N/A | 27.0 | N/A | 63.56 | 26.97 |

**TABLE 7 ~~TABLE 3-8~~7 – SUMMARY OF BORING FB-4 GRAIN SIZE ANALYSIS (BOTTOM OF LANDFILL)**

| Boring Depth (ft. below ground surface) | % Cobbles | % Gravel | % Sand | % Silt | % Fines | % Clay | % No. 4 Sieve | % No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|
| 1-2 | N/A | N/A | N/A | N/A | 99.0 | N/A | N/A | 99.02 |
| 5-6 | 0.0 | 0.0 | 1.1 | N/A | 98.9 | N/A | 100.0 | 98.93 |
| 18.5-19.7 | 0.0 | 0.0 | 3.9 | N/A | 96.1 | N/A | 100.0 | 96.12 |

**TABLE 8 ~~TABLE 3-9~~8 – SUMMARY OF BORING FB-5 GRAIN SIZE ANALYSIS (BOTTOM OF LANDFILL)**

| Boring Depth (ft. below ground surface) | % Cobbles | % Gravel | % Sand | % Silt | % Fines | % Clay | % No. 4 Sieve | % No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|
| 0-1.4 | 0.0 | 0.0 | 3.2 | N/A | 96.8 | N/A | 100.0 | 96.84 |
| 6.5-7 | 0.0 | 0.0 | 2.7 | N/A | 97.3 | N/A | 100.0 | 97.35 |
| 23.5-24.8 | 0.0 | 0.0 | 1.2 | N/A | 98.8 | N/A | 100.0 | 98.84 |

**TABLE 9 ~~TABLE 3-10~~9 – SUMMARY OF BORING FB-6 GRAIN SIZE ANALYSIS (BOTTOM OF LANDFILL)**

| Boring Depth (ft. below ground surface) | % Cobbles | % Gravel | % Sand | % Silt | % Fines | % Clay | % No. 4 Sieve | % No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|
| 2-4 | 0.0 | 0.0 | 1.5 | N/A | 98.5 | N/A | 100.0 | 98.54 |
| 6-8 | N/A | N/A | N/A | N/A | 98.0 | N/A | N/A | 98.01 |
| 18.5-19.5 | N/A | N/A | 1.1 | N/A | 98.2 | N/A | 99.31 | 98.23 |



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**TABLE 10 ~~TABLE 3-11~~10 ~~–~~ SUMMARY OF BORING FB-7 GRAIN SIZE ANALYSIS (BOTTOM OF LANDFILL)**

| Boring Depth (ft. below ground surface) | % Cobbles | % Gravel | % Sand | % Silt | % Fines | % Clay | % No. 4 Sieve | % No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|
| 4.5-6 | N/A | N/A | 28.6 | N/A | 17.8 | N/A | 46.47 | 17.82 |
| 8.5-10 | N/A | N/A | 20.1 | N/A | 38.9 | N/A | 58.97 | 38.89 |
| 18-20 | N/A | N/A | N/A | N/A | 95.7 | N/A | N/A | 95.74 |
| 38.5-39.8 | 0.0 | 0.0 | 2.0 | N/A | 98.0 | N/A | 100.0 | 97.97 |

**TABLE 11 ~~TABLE 3-12~~11 ~~–~~ SUMMARY OF BORING FB-8 GRAIN SIZE ANALYSIS (BOTTOM OF LANDFILL)**

| Boring Depth (ft. below ground surface) | % Cobbles | % Gravel | % Sand | % Silt | % Fines | % Clay | % No. 4 Sieve | % No. 200 Sieve |
|---|---|---|---|---|---|---|---|---|
| 6.5-8 | N/A | N/A | 17.2 | N/A | 68.9 | N/A | 86.11 | 68.86 |
| 33.5-34 | 0.0 | N/A | 3.6 | N/A | 68.9 | N/A | 100.0 | 96.43 |
| 49-50 | 0.0 | 0.0 | 1.6 | N/A | 98.4 | N/A | 100.0 | 98.43 |

## 1.5.2 Overview of ~~330.63(e)(5)(B) – Overview of~~ Permeability, Atterberg Limits and Moisture Content Test Results (330.63(e)(5)(B))

An analysis for soil moisture content (ASTM D2216), Atterberg Limits (ASTM D4318) and permeability tests (ASTM D5084) was conducted on samples obtained by Terracon during this investigation. Borings from the landfill side wall were tested on the horizontal axis and those from the bottom were tested on the vertical axis. A summary of findings for each test is presented in the tables below. Further information detailing these findings is available in the Terracon Geotechnical Data Report in **Part III, Attachment D5- Geotechnical Reports** ~~Appendix E-2~~.

**TABLE 12 ~~TABLE 3-13~~12 ~~- S~~ SUMMARY OF BORING FB-1 SOIL MOISTURE CONTENT, ATTERBERG LIMITS, AND PERMEABILITY**

| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI)[2] | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 0-1.5 | 16.4 | 50-19-31 | |
| 2.5-4 | 12.6 | N/A | |
| 4-5 | 17.1 | N/A | |
| 5-6 | 17.7 | N/A | N/A |
| 6-7 | 17.8 | 52-20-32 | N/A |
| 7-8 | 19.5 | N/A | N/A |

[2] LL- Liquid Limit; PL – Plastic Limit; PI – Plasticity Index



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| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI)[2] | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 8-9 | 20.6 | N/A | N/A |
| 9-10 | 23.2 | N/A | N/A |
| 13.5-15 | 11.6 | N/A | N/A |
| 18.5-20 | 19.5 | N/A | N/A |
| 23.5-25 | 6.0 | N/A | N/A |
| 28.5-30 | 3.6 | N/A | N/A |
| 33.5-34.5 | 3.9 | N/A | N/A |
| 38.5-40 | 19.6 | N/A | N/A |
| 43.5-45 | 16.1 | N/A | N/A |

**TABLE 13 ~~TABLE 13~~-14 - SUMMARY OF BORING FB-2 SOIL MOISTURE CONTENT, ATTERBERG LIMITS, AND PERMEABILITY**

| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI) | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 0-1.5 | 13.8 | N/A | N/A |
| 2-3 | 14.4 | 54-21-33 | N/A |
| 3-4 | 12.8 | N/A | N/A |
| 4-5 | 14.7 | N/A | N/A |
| 5-6 | 19.0 | N/A | N/A |
| 6-7 | 18.4 | N/A | N/A |
| 7-8 | 18.7 | 61-23-38 | N/A |
| 8.5-10 | 18.9 | N/A | N/A |
| 13-15 | 17.5 | N/A | N/A |
| 18.5-20 | 25.3 | 54-22-32 | N/A |
| 23.5-25 | 17.5 | N/A | N/A |
| 28.5-30 | 16.3 | N/A | N/A |
| 33.5-35 | 15.4 | N/A | N/A |
| 38-40 | 18.6 | 62-17-45 | 1.8E-09 |
| 43.5-45 | 18.0 | N/A | N/A |

~~**Table 4**~~

**TABLE 14 ~~TABLE 3~~-15 - 14 SUMMARY OF BORING FB-3 SOIL MOISTURE CONTENT, ATTERBERG LIMITS, AND PERMEABILITY**

| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI) | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 0-1.5 | 14.6 | N/A | N/A |
| 2-3 | 11.8 | N/A | N/A |
| 3-4 | 12.5 | 40-18-22 | N/A |
| 4-5 | 13.4 | N/A | N/A |
| 5-6 | 12.5 | 46-18-28 | N/A |
| 6-7 | 16.2 | N/A | N/A |
| 7-8 | 16.2 | N/A | N/A |
| 8-9 | 15.1 | N/A | N/A |

| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI) | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 9-10 | 14.0 | N/A | N/A |
| 13-15 | 10.1 | N/A | N/A |
| 18-20 | 7.4 | 33-16-17 | N/A |
| 23.5-25 | 10.2 | N/A | N/A |
| 28.5-30 | 9.5 | N/A | N/A |
| 33.5-34 | 3.9 | N/A | N/A |
| 37-39.5 | 34.4 | 54-19-35 | N/A |
| 43.5-45 | 18.6 | N/A | N/A |
| 49.5-50 | 14.9 | N/A | N/A |

TABLE 15 ~~TABLE 3-115~~ 6 - **SUMMARY OF BORING FB-4 SOIL MOISTURE CONTENT, ATTERBERG LIMITS, AND PERMEABILITY**

| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI) | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 0-1 | 18.4 | N/A | N/A |
| 1-2 | 19.0 | 59-17-42 | 2.5E-09 |
| 2-3 | 19.8 | N/A | N/A |
| 3-4 | 20.2 | N/A | N/A |
| 4-5 | 19.8 | N/A | N/A |
| 5-6 | 18.7 | 61-24-37 | N/A |
| 6.5-8 | 18.3 | N/A | N/A |
| 8.5-10 | 17.6 | N/A | N/A |
| 13.5-14 | 14.6 | N/A | N/A |
| 18.5-19.5 | 14.8 | 47-21-26 | N/A |
| 23.5-24.5 | 10.1 | N/A | N/A |
| 28.5-29.5 | 9.4 | N/A | N/A |
| 35-36 | 7.7 | N/A | N/A |

TABLE 16 ~~TABLE 3-17~~ - 16 **SUMMARY OF BORING FB-5 SOIL MOISTURE CONTENT, ATTERBERG LIMITS, AND PERMEABILITY**

| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI) | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 0-1.5 | 14.3 | 52-18-34 | N/A |
| 2.5-3.5 | 12.3 | N/A | N/A |
| 6.5-7.5 | 11.3 | 64-15-49 | N/A |
| 8.5-10 | 13.5 | N/A | N/A |
| 13.5-15 | 11.3 | N/A | N/A |
| 18.5-20 | 14.2 | N/A | N/A |
| 23.5-25 | 14.9 | N/A | N/A |
| 28.5-30 | 14.3 | N/A | N/A |
| 34-35 | 15.8 | 63-21-42 | N/A |

**TABLE 17 ~~TABLE 3-18 - 17~~ SUMMARY OF BORING FB-6 SOIL MOISTURE CONTENT, ATTERBERG LIMITS, AND PERMEABILITY**

| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI) | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 0-1.5 | 15.6 | N/A | N/A |
| 2-4 | 14.9 | 55-17-38 | N/A |
| 4-6 | 14.7 | N/A | N/A |
| 6-8 | 14.4 | 48-16-32 | 4.3E-09 |
| 8.5-10 | 15.6 | N/A | N/A |
| 13.5-14.5 | 13.2 | N/A | N/A |
| 18.5-19.5 | 12.4 | N/A | N/A |
| 23.5-24.5 | 15.1 | 53-19-34 | N/A |
| 28.5-29.5 | 15.9 | N/A | N/A |
| 34.5-35 | 14.7 | N/A | N/A |

**TABLE 18 ~~TABLE 3-19 - 18~~ SUMMARY OF BORING FB-7 SOIL MOISTURE CONTENT, ATTERBERG LIMITS, AND PERMEABILITY**

| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI) | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 0-1.5 | 9.5 | N/A | N/A |
| 2.5-3.5 | 7.5 | 35-15-20 | N/A |
| 4.5-6 | 2.8 | N/A | N/A |
| 6.5-8 | 3.7 | N/A | N/A |
| 8.5-10 | 19.0 | N/A | N/A |
| 13.5-15 | 23.2 | N/A | N/A |
| 18-20 | 18.1 | 56-17-39 | 3.0E-09 |
| 23.5-25 | 17.4 | N/A | N/A |
| 28.5-29.5 | 22.4 | N/A | N/A |
| 33.5-34.5 | 18.4 | N/A | N/A |
| 38.5-40 | 21.8 | 57-20-37 | N/A |
| 43.5-44.5 | 20.1 | N/A | N/A |
| 49.5-50 | 20.9 | N/A | N/A |

**TABLE 19 ~~TABLE 3-20 - 19~~ SUMMARY OF BORING FB-8 SOIL MOISTURE CONTENT, ATTERBERG LIMITS, AND PERMEABILITY**

| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI) | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 0-1.5 | 8.4 | N/A | N/A |
| 2.5-4 | 8.6 | N/A | N/A |
| 4.5-6 | 15.4 | 49-19-30 | N/A |
| 6.5-8 | 13.2 | N/A | N/A |
| 8-9 | 21.8 | 62-23-39 | N/A |
| 9-10 | 16.6 | N/A | N/A |



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| Boring Depth (ft. below ground surface) | Water Content % | Atterberg Limits (LL-PL-PI) | Coefficient of Permeability (cm/sec) |
|---|---|---|---|
| 13-15 | 21.4 | 58-22-36 | N/A |
| 18-20 | 15.3 | N/A | N/A |
| 23.5-25 | 17.7 | N/A | N/A |
| 28-30 | 17.3 | N/A | N/A |
| 33.5-34.5 | 14.0 | 43-17-26 | N/A |
| 43.5-44.5 | 12.3 | N/A | N/A |
| 49-50 | 13.9 | N/A | N/A |

## 1.6 ~~330.63(e)(5)(C) –~~ Overview of Encountered Groundwater (330.63(e)(5)(C))

~~As noted in the Snowden, 1989 application~~During initial geotechnical investigations, groundwater was encountered by the exploratory borings in the alluvium terrace deposits. Water levels proved to be the equivalent of the static water level. An exception would be the few borings in which clay cuttings sealed off the water bearing zone. Generally, the static water level stabilized in the open bore holes within minutes of completion. As exploratory borings are small diameter excavations, and the thickness of the water bearing stratum was typically just a few feet, only low yield bailers could be used. In those borings in which bailing was attempted, the removal of water, equivalent to a bore volume, reflected no change in the static water elevation. The elevation of the ground water shortly after completion, was thus established as the static water elevation.

In 1989, recorded water well datum, as available at the Texas Water Commission, indicated two domestic wells to have been completed within an Alluvial aquifer in the proximity of the project area. The two wells (see **Appendix E-~~2~~2**) ~~are not~~ within 500 feet of the project area are described in Part II of this report. These two wells appear to have been completed in the ~~It is probable that these wells could be completed in a~~ Leona Formation just above the Navarro Shale and were developed to produce private water supplies. ~~Pleistocene deposit rather than the predominate Holocene deposits as encountered beneath this project. The geologic structure of the two deposits would normally indicate an interconnection of any saturated zones. The potential for recharge and/or discharge along Cibolo Creek, which generally separates the two age deposits, would make it difficult to verify the interconnection of saturated zones.~~

The perched ground water table, or Alluvial aquifer, though of significance to this proposed development, is not considered the primary use aquifer of the immediate area. The majority of the recorded water wells within a five mile radius of the project are producing from the Edwards aquifer. The Edwards aquifer should be in excess of approximately 500 feet beneath the site of this investigation. Seventy (70) feet of Navarro shale and an underlying 110 feet of Taylor shale is indicated by the log of well Kx 68-30-603. Equivalent shales should extend beneath this project and thus preclude any connection between the Edwards aquifer and the development of this project. The Navarro Shale was shown by the laboratory portion of this investigation to be relatively impermeable.

Groundwater was encountered during the supplemental field investigation in 2020 at borings FB-3 and FB-7 as noted in the Terracon Geotechnical Data Report in **Part III, Attachment D5, Appendix D5-C**



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~~Appendix E-3~~. Groundwater level information is presented in the below table. A cross-section of the investigation area, including groundwater information is included with this report as **Appendix E-~~3~~4**.

**TABLE 20 ~~TABLE 3-21~~20 ~~–~~ GROUNDWATER LEVELS AT BORINGS FB-3 AND FB-7**

| Boring Number | Groundwater Level | Comment |
|---|---|---|
| FB-3 | 38 ft. below ground surface | Groundwater level remained static from initial detection to completion of drilling |
| FB-7 | 9 ft. below ground surface (initial)<br>12 ft. below ground surface (completion) | N/A |

## 1.7 ~~330.63(e)(5)(D) –~~ Records of Groundwater Level Measurements in Wells (330.63(e)(5)(D))

Five monitoring wells (MW) were installed outside the slurry wall, coupled with twin piezometer wells on the inside of the slurry wall on May 20, 1998. Due to the drought conditions at the time of installation, the wells were dry and could not be developed. Flooding in October of 1998 delayed monitoring further and badly damaged prior records at the landfill, as documented to the Texas Natural Resource Conservation Commission (TNRCC) on January 27, 1999.~~Five monitoring wells are in use at the Beck Landfill and are tested annually.~~ The well on Line D (MW-D) was replaced on February 29, 2000. The Groundwater Sampling and Analysis Plan (GWSAP) was approved by the TNRCC on July 12, 2000 as a Class I Permit Modification to the Site Operation Plan (SOP).

The initial sampling event was conducted on August 4, 2000. Subsequent monitoring occurred annually through 2022, though some historic records appear to be lost or destroyed. Available information is provided in **Table ~~3-22~~21** below which presents historic water-level measurements from past annual groundwater monitoring events.

**TABLE 21 ~~TABLE 3-22~~21 ~~-~~ HISTORIC GROUNDWATER MONITORING DATA AT THE BECK LANDFILL**

| Year | MW-A Water Elevation (ft. above msl) | MW-C Water Elevation (ft. above msl) | MW-D Water Elevation (ft. above msl) | MW-F Water Elevation (ft. above msl) | MW-G Water Elevation (ft. above msl) |
|---|---|---|---|---|---|
| 2020 | 680.71 | 675.55 | 671.90 | 667.22 | 672.19 |
| 2019 | 682.73 | 676.89 | 673.46 | 667.69 | 671.68 |
| 2018 (resample) | 680.47 | 678.14 | Not sampled | Not sampled | 671.22 |
| 2018 | 679.36 | 675.17 | 671.12 | 667.37 | 670.74 |
| 2017 | 679.79 | 676.34 | 672.23 | 667.22 | 670.53 |
| 2016 | 681.32 | 680.03 | 677.10 | 672.68 | 670.15 |
| 2015 | 681.05 | 680.34 | 678.17 | 672.75 | 670.39 |
| 2014 | 679.94 | 675.96 | 672.72 | 668.62 | 338.95 |
| 2013 | 678.43 | 675.4 | 674.99 | 666.71 | 670.06 |

| Year | MW-A Water Elevation (ft. above msl) | MW-C Water Elevation (ft. above msl) | MW-D Water Elevation (ft. above msl) | MW-F Water Elevation (ft. above msl) | MW-G Water Elevation (ft. above msl) |
|---|---|---|---|---|---|
| 2012 | 679.22 | 678.11 | 674.99 | 668.04 | 670.06 |
| 2011 | 673.80 | 673.65 | 669.33 | 670.23 | 669.66 |
| 2010 | Not Available | - | - | - | - |
| 2009 | Not Available | - | - | - | - |
| 2008 | Not Available | - | - | - | - |
| 2007 | Not Available | - | - | - | - |
| 2006 | Not Available | - | - | - | - |
| 2005 | Not Available | - | - | - | - |
| 2004 | Not Available | - | - | - | - |
| 2003 | Not Available | - | - | - | - |
| 2002 | Not Available | - | - | - | - |
| 2001 | 680.61 | 676.65 | 674.05 | 670.52 | 673.59 |
| 2000 | 687.61 | 679.65 | 673.22 | 676.19 | 675.09 |

## 1.8 ~~330.63(e)(5)(E) –~~ Records of Groundwater Monitoring Data (330.63(e)(5)(E))

Available ~~H~~historical annual groundwater monitoring data from 2005 to 2022 for the Beck Landfill at each monitoring well is presented in the table in Part III, Attachment F (Groundwater Characterization Report), Appendix F-2 (Historical Groundwater Data). ~~.~~

## 1.9 ~~330.63(e)(5)(F) –~~ Identification of Uppermost Aquifer (330.63(e)(5)(F))

The uppermost aquifer at the Beck Landfill site may have been the Leona Aquifer which is comprised of gravel and sand with lenses of caliche and silt of the Pleistocene Series Leona Formation. The identification of the Leona as the uppermost aquifer at the site is based on review of region groundwater reports published by the Texas Water Development Board (TWDB), surface geology maps and monitoring well logs. However, due to the similarity between the Holocene alluvial terrace deposits and the Leona Formation and the intervening Cibolo Creek, it is likely that the Holocene alluvial deposits contained perched water from infiltrated rainwater and early communication with the Cibolo Creek. The Beck Landfill as constructed has an impermeable slurry trench to prevent hydraulic connection with the Cibolo Creek and the Holocene alluvial deposits are removed.

The Leona Aquifer is not hydraulically connected to the deeper ~~Austin~~ Edwards Aquifer due to the presence of two aquitards creating hydraulic separation. ~~separating these two aquifers.~~ These aquitards consist of undivided Navarro Group and Marlbrook Marl and Pecan Gap Chalk strata. The Edwards Aquifer would likely be considered the uppermost aquifer beneath Beck Landfill in the absence of the Leona Aquifer.

A review of historical groundwater elevation measurements taken from the landfill monitoring wells show that groundwater in the uppermost aquifer typically flows from the northwest to the southeast



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toward Cibolo Creek. The site-specific hydraulic conductivity of the uppermost aquifer has not been measured; therefore, the rate of groundwater flow cannot be calculated at this time.

## ~~3.1.6~~1.10 Groundwater Certification Process for Arid Exemption (§330.63(e)(6))

Not applicable - Beck is not seeking an arid exemption for the landfill, therefore this section does not apply.

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# ~~FIGURES~~

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## FIGURE E-1 SURFACE GEOLOGY

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**FIGURE E-2 STRATIGRAPHIC COLUMN**

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**FIGURE E-3 REGIONAL CROSS SECTION**

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## FIGURE E-4 QUATERNARY FAULT MAP

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**FIGURE E-5 REGIONAL AQUIFERS**

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**FIGURE E-6 EDWARDS POTENTIOMETRIC MAP**

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**FIGURE E-7 WATER WELLS WITHIN 1 MILE**

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**FIGURE E-8 SEISMIC IMPACT**

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**FIGURE E-9 SEISMIC IMPACT (REGIONAL)**

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# ~~APPENDIX E-1~~
# ~~ATTTAACHMENT 11 AND GEOLOGY (SNOWDEN, 1989)~~



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# ~~APPROVED SUPPLEMENTAL BORING PLAN~~

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# APPENDIX E-~~2~~1

## ~~ATTACHMENT 3-C WATER WELLS (SNOWDEN, 1989)~~Letter to TCEQ January 27, 1999

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# Appendix E-2 Texas Water Well Information

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# ~~APPENDIX E-3~~
# ~~SUPPLEMENTAL BORING PLAN~~

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# APPENDIX E-34
# CROSS-SECTIONS

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MUNICIPAL SOLID WASTE PERMIT

MAJOR AMENDMENT

**Part III – Attachment F**

**Groundwater Characterization Report**

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: September 2023*

Prepared by:


PROJECT NUMBER: 150051.05.01
PROJECT CONTACT: Julie Morelli
EMAIL: Julie.Morelli@powereng.com
PHONE: 210-951-6424

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APPENDIX F-2 HISTORIC GROUNDWATER DATA
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# 1.0 Groundwater Certification Process for Arid Exemption (§330.63(e)(6))

Not applicable - Beck is not seeking an arid exemption for the landfill, therefore this section does not apply.

## 1.1. Groundwater Sampling and Analysis Plan (§330.63(f))

*(f) Groundwater sampling and analysis plan. The groundwater sampling and analysis plan for landfills and if otherwise requested by the executive director for other MSW units must be prepared in accordance with Subchapter J of this chapter (relating to Groundwater Monitoring and Corrective Action).*

Beck Landfill is a Type IV Landfill subject to the groundwater monitoring requirements promulgated in 30 TAC 330, Subchapter J, and more specifically those outlined in 30 TAC 330.417. The Facility revised the Groundwater Sampling and Analysis Plan (GWSAP) (TCEQ Minor Modification approved 2013) in compliance with the monitoring requirements for Type IV Landfills in 30 TAC §330 Subchapter J. The full GWSAP is attached as **Appendix F-3**, for consistency with the application format.

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### 1.1.1 Applicability Statement (§330.401(f))

*(f) Once established at a solid waste management unit, groundwater monitoring must be conducted throughout the active life and any required post-closure care period of that solid waste management unit as specified in §330.463 of this title (relating to Post-Closure Care Requirements).*

Beck Landfill has an existing groundwater monitoring system, installed in 1998 and 2000. Background monitoring was performed quarterly from August 2000 to August 2001. Annual detection monitoring has been performed each year since then. Beck Landfill will conduct groundwater monitoring throughout the active life and any required post-closure care period, as required by MSW Permit No. 1848A.

## ~~1.1.~~1.2. Groundwater Monitoring System (§330.403)

*(a) A groundwater monitoring system must be installed that consists of a sufficient number of monitoring wells, installed at appropriate locations and depths, to yield representative groundwater samples from the uppermost aquifer as defined in §330.3 of this title (relating to Definitions)*

An existing, TCEQ-approved groundwater monitoring system ~~in~~ is in place and in use at the Facility (TCEQ Class I Permit Modification dated July 12, 2000). The System is comprised of five (5) monitoring wells installed on the outside of the flood control dike (impermeable barrier to prevent migration of contaminants from with the landfill) and installed at a depth to intersect the confining layer (the Navarro Formation) of the perched alluvial water table. The monitor wells are screened to intercept the saturated zone of the alluvium. Wells are provided with a protective, steel collar and stick up approximately 36" from the concrete pad. Each well is protected with a lockable, water-tight cap and enclosed within a lockable steel collar.

In addition, Beck Landfill installed five (5) piezometer wells in correlation with the five (5) monitor wells. The piezometer wells are installed between the landfill and the flood control dike (inside the landfill), at a depth to intersect the confining layer (the Navarro Formation), identical to its corresponding monitor well. These wells are similarly screened. No concrete pad was installed with the piezometer wells. Each well is flush-mounted and is protected with a lockable, water-tight cap. The well is protected by a flush mount iron collar with a bolted on lid.

All parts of the monitoring system shall be operated and maintained so they perform as designed. **Table ~~3-~~1** below documents the relevant information regarding the monitor and piezometer wells approved for use at Beck Landfill.

Beck proposes to plug and abandon MW-D and install a replacement well along Line E (MW-E) in accordance with the design criteria established above. The current MW-D well location is situated in proximity to the proposed stormwater collection pond and may not be as representative of groundwater conditions due to potential influence from the proposed pond.

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**TABLE 1 MONITOR AND PIEZOMETER WELLS AT BECK LANDFILL** ~~TABLE 3-1~~

| Well ID No. | Installation Date | Well Pad Elevation (ft. above msl) | Well Depth Elevation (ft. above msl) | Total Depth (feet) | Monitoring Performed |
|---|---|---|---|---|---|
| MW-A | May 20, 1998 | 712.61 | 673.93 | 38.68 | Annual Detection Monitoring; Background in 2000 |
| 712.61PZ-A | May 20, 1998 | 712.59 | 673.13 | 39.46 | Informational only |
| MW-C | May 20, 1998 | 712.65 | 666.56 | 46.09 | Annual Detection Monitoring |
| PZ-C | May 20, 1998 | 712.85 | 671.46 | 41.39 | Informational only |
| MW-D (to be replaced by MW-E) | February 29, 2000 | 708.05 | 665.67 | 42.39 | Annual Detection Monitoring |
| PZ-D (to be replaced by PZ-E) | May 20, 1998 | N/A | | 38.15 | Informational only |
| MW-E | Proposed | TBD | TBD | TBD | To replace MW-D |
| PZ-E | Proposed | TBD | TBD | TBD | To replace PZ-D |
| MW-F | May 20, 1998 | 702.52 | 666.00 | 36.52 | Annual Detection Monitoring |
| PZ-F | May 20, 1998 | 702.51 | 669.2 | 33.31 | Informational only |
| MW-G | May 20, 1998 | 700.59 | 663.61 | 36.98 | Annual Detection Monitoring |
| PZ-G | May 20, 1998 | 700.54 | 668.09 | 32.45 | Informational only |

## ~~c.~~1.3. Groundwater Monitoring at Type IV Landfills (§330.417)

*(b) At the discretion of the executive director, the owner or operator of a Type IV landfill may be required to installed groundwater monitoring systems and to monitor on a regular basis the quality of groundwater at the point of compliance.*

See Section ~~3.~~1.2 above.

*(3) Groundwater sampling and analysis requirements shall be in accordance with §330.405(a)-(d) of this title (relating to Groundwater Sampling and Analysis Requirements).*

The ~~approved~~ GWSAP conforms to the requirements set forth in 30 TAC 330.405(a)-(d) **(see Appendix F-3)**.

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*(4) Each monitoring well or other sampling point shall be sampled and analyzed annually, or on some other schedule but not less frequently than annually as determined by the executive director, for the following constituents: chloride, iron, manganese, cadmium, zinc, total dissolved solids, specific conductance (field and laboratory measurements), pH (field and laboratory measurements), and non-purgeable organic commands.*

The ~~approved~~ GWSAP identifies annual detection monitoring and includes required parameters as outlined in this rule.

*(5) Not later than 60 days after each sampling event, the owner or operator shall determine whether the landfill has released contaminants to the uppermost aquifer. The owner or operator shall provide an annual detection monitoring report within 60 days after the facility's annual groundwater monitoring event that includes the following information determined since the previously submitted report:*

*(A) the results of all monitoring, testing, and analytical work obtained or prepared in accordance with the requirements of this permit, including a summary of background groundwater quality values, groundwater monitoring analyses, any statistical calculations, graphs, and drawings;*

*(B) the groundwater flow rate and direction in the uppermost aquifer. The groundwater flow rate and direction of groundwater flow shall be established using the data collected during the preceding calendar year's sampling events from the monitoring wells of the Detection Monitoring Program. The owner or operator shall also include in the report all documentation used to determine the groundwater flow rate and direction of groundwater flow;*

*(C) a contour map of piezometric water levels in the uppermost aquifer based at a minimum upon concurrent measurement in all monitoring wells. All data or documentation used to establish the contour map should be included in the report;*

*(D) recommendation for any changes; and*

*(E) any other items requested by the executive director.*

Beck Landfill submits an Annual Groundwater Monitoring Event Report that conforms with the required elements above.

*(6) The executive director may require additional sampling, analyses of additional constituents, installation of additional monitoring wells or other sampling points, and/or other hydrogeological investigations if the facility appears to be contaminating the uppermost aquifer.*

No additional constituents are included in MSW Permit No. 1848A.

## ~~d.~~1.4. Monitor Well Construction Specifications (30 TAC §330.421)

~~As noted in the original application (Snowden, 1989), m~~Monitor wells were installed for the purpose of sampling and testing groundwater adjacent to the landfill as a provision of quality assurance. The protection of the groundwater quality in the area of the landfill is a major concern of the landfill operator, the ~~TDH~~TCEQ, and the public. Monitor wells on this site were installed ~~only~~ by Jedi Drilling, a licensed Texas Water Well Driller in February 1998, with a replacement of Monitor Well D (MW-D) installed on February 20, 2000. The wells were completed in accordance with Texas Water Commission regulations in place at the time of installation. The wells are used to monitor the quality of water found in the shallow, perched Alluvial system. Water associated with the Edwards Aquifer, ~~some~~ located approximately 500 feet beneath the site, is not to ~~be~~ monitored, as interconnection is not anticipated.

The gradient of the shallow groundwater beneath the landfill site currently exists as depicted in **Part III-~~E~~F, Figure 3-F-1~~-5~~,** based on historic annual detection monitoring at the landfill. The installation of the slurry wall creates a hydraulic barrier between the Landfill and the Cibolo Creek, effectively stopping the hydraulic connection inside the Landfill. ~~The basic northeasterly flow pattern as currently indicated will be diverted by the slurry wall as said wall, serves to preclude infiltration of groundwater as well as exfiltration of any landfill leachate.~~ Groundwater ~~will thus~~is ~~be~~ directed around the slurry wall rather than beneath the site. ~~The path or flow pattern of groundwater post slurry wall installation will predominately parallel Cibolo Creek.~~

Monitor well MW-A as depicted on **Part III, Figure ~~2-4~~ 3-F-1** is the primary upgradient well. Wells MW-C and MW-G are predominately upgradient but are situated so as to detect and aid in

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isolating any leachate, should such ever become apparent. Wells MW-D and MW-F are downgradient.

The monitor wells ~~will be somewhat~~are variable in depth corresponding to the existing strata variations ~~depicted by the original "Geotechnical Investigation" (Snowden, 1989, See Part III, Attachment E-1)~~in the alluvial aquifer and underlying shale. An approximate 20-foot depth plus the height of the dike, was considered as an average for the proposed wells, or an average of 40 feet. The static water table, or the first potable aquifer being the Alluvial aquifer comprised of the sand and gravel deposits overlying the shales beneath the site, is the zone to be monitored. ~~No dynamic head characteristics are expected to prevail though static level variations will occur corresponding to the rather rapid recharge and/or discharge directly related to the adjacent Cibolo Creek.~~ The rate of groundwater flow ~~will likewise~~ relates to the flow of Cibolo Creek and ~~be corresponding~~ is variable.

Details of proposed monitor well construction were provided by Snowden. These well construction details have been updated to more closely represent the wells installed at the Landfill, based on surface observations (see **Appendix F-1**). The top of the wells were ~~to be~~ completed a minimum of 24 inches above the finish grade of the dike, which ~~as specified~~at the time, ~~will~~ required the dike to be above the (then) 100-year flood plain. A 4-ft square by 4-inch minimum thickness sloped concrete sealing block was cast around the monitor wells at the top of the dike. Other construction parameters were as per the Water Well Drillers Act, Chapter 319-Standards for Completion with the most stringent of these standards being applicable. Permanent well identification plates are installed on each stick-up on each well.

The monitor wells were located upon an extended section of the dike. Such location ~~does~~ did not comply with the specifications of the Water Well Drillers Act in terms of horizontal separation. The location is however the only method by which the monitor wells could be maintained above the 100-year flood plain and allow accessibility for sample extraction. The required horizontal separation is further inappropriate and otherwise differed as said separation would require location in Cibolo Creek and/or beyond the boundaries of the landfill property.

The monitor wells have an extended screened or blank section of schedule 40-ft PVC extending below the saturated zone to a depth equivalent to that of the slurry wall key. Said extended screen-

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blank section of pipe is a minimal provision of storage, as it is possible that during certain periods of any given year a low yield characteristic could occur in the vicinity of some monitor wells. Provisions to assure sample freshness, with regards to the blank section, are addressed within Groundwater Sampling and Analysis Plan (GWSAP) (~~**Attachment**~~ **Appendix F-3**~~2~~ of this Report).

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Background data was generated through the use of samples recovered directly from Cibolo Creek. Records of these samples were not located in this amendment application and are believed to have been destroyed during flooding. However, background monitoring is included, as well as all detection data gathered since the monitor wells were installed. ~~A background well, in excess of the five minimum monitor wells, and as within the upgradient vicinity from the proposed landfill, was evaluated through samples obtained with owners permission. Existing wells, as similarly completed within the Alluvial aquifer or as to be constructed on property other than the landfill property, within a reasonable distance from the landfill, are envisioned for these purposes. Background data was additionally generated through the use of samples recovered directly from Cibolo Creek, or in lieu of a background well if an appropriate well location cannot be obtained.~~

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### 1.4.1 Monitoring Well and Piezometer Data Sheets

On May 20th, 1998, Jedi (TNRCC Driller License No. 50205-M) installed a series of five monitoring wells and five piezometers at the Beck Landfill under the supervision of Harley Weld. The well on Line D (MW-D) was replaced on February 20, 2000. The TNRCC MSW-SE67 monitor well data sheets for each monitoring well and piezometer are attached as **Appendix F-1** and have been updated with survey elevations on the stick-up collars taken on September 10, 2023. Included in the TNRCC data sheets is relevant information pertaining to the construction of monitoring well and piezometer on-site including elevations, depths, cross sections, and dimensions. Each monitoring well and piezometer was reported to have been dry following installation.

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The locations of all existing and abandoned wells at the Beck Landfill are depicted in **Table ~~3~~2** below. The on-site wells are utilized for groundwater quality monitoring in accordance with the existing MSW permit. No other active or historical wells within the Beck Landfill facility are depicted on the Texas Water Development Board (TWDB) Groundwater Data Viewer (TWDB, accessed September 6, 2022). Beck will replace MW-D and Piezometer D with a similar well installed along Line E to accommodate the installation of the proposed stormwater drainage pond.

**TABLE 2 WATER WELLS AT BECK LANDFILL ~~TABLE 3-2 – WATER WELLS AT THE BECK LANDFILL~~**

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| Well | Use | Latitude and Longitude |
|---|---|---|
| MW-A | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.548880°, -98.268411° |
| MW-C | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.544524°, -98.265643° |
| MW-D | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.543768°, -98.258393° |
| MW-F | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.547263°, -98.260227° |
| MW-G | Groundwater monitoring of perched aquifer outside of landfill dike-line. | 29.551674°, -98.262166° |
| Piezometer A | Groundwater monitoring of leachate inside of the landfill dike-line | 29.548868°, -98.268394° |
| Piezometer C | Groundwater monitoring of leachate inside of the landfill dike-line | 29.544557°, -98.265645° |
| Piezometer D | Groundwater monitoring of leachate inside of the landfill dike-line | 29.543796°, -98.258427° |
| Piezometer F | Groundwater monitoring of leachate inside of the landfill dike-line | 29.547273°, -98.260264° |
| Piezometer G | Groundwater monitoring of leachate inside of the landfill dike-line | 29.551662°, -98.262213° |

**FIGURE 3-F-1 GROUNDWATER GRADIENT MAP**

# APPENDIX F-1 MONITOR WELL INSTALLATION INFORMATION

This seal indicates that the following sheets are as provided to TCEQ at well installation.

Additional survey information has been obtained to clarify the elevations of the stick-up collars and lockable metal protective covers that are installed to prevent inundation to the existing wells.

The following table provides the survey information collected on September 10, 2023.

| NORTHING | EASTING | ELEVATION | DESCRIPTION |
|---|---|---|---|
| 13748867.35 | 2203077.243 | 700.82 | MONITORING WELL-G |
| 13747267.63 | 2203707.327 | 702.657 | MONITORING WELL-F |
| 13745998.19 | 2204296.054 | 710.028 | MONITORING WELL-D |
| 13746249.68 | 2201982.801 | 711.914 | MONITORING WELL-C |
| 13747842.9 | 2201097.146 | 712.164 | MONITORING WELL-A |

# APPENDIX F-2 HISTORIC GROUNDWATER DATA

# APPENDIX F-3 GROUNDWATER SAMPLING AND ANALYSIS PLAN

# MUNICIPAL SOLID WASTE PERMIT MAJOR AMENDMENT

## Groundwater Sampling and Analysis Plan

## (TAC Title 30 Rule §330.63(f))

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848A***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: September 2022*

Prepared by:

POWER ENGINEERS
*PROJECT NUMBER: 150051.05.01*
*PROJECT CONTACT: Julie Morelli*
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PHONE: 210-951-6424

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# Groundwater Sampling and Analysis Plan

## OVERVIEW

The following Groundwater Sampling and Analysis Plan (GWSAP) is prepared for the Beck Landfill, Nido, LTD. Type IV Landfill (Beck Landfill), MSW Permit No. 1848A, located in Schertz,, Guadalupe County, Texas in accordance with the regulations in 30 TAC §330.417 (relating to Groundwater Monitoring at Type IV Landfills).

This GWSAP is included as Attachment F, Appendix F-~~2~~ 3 of Part III of the Beck Landfill permit application submitted in September 2022. It is intended to provide a consistent sampling and analysis procedure and is designed to ensure that ground-water data accurately represents actual groundwater quality and can be used to reliably evaluate the groundwater conditions at this site.

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Attachment 1 – Field Log Data Sheets for Purging and for Sampling

Attachment 2 – Chain of Custody Form for San Antonio Testing Lab

Attachment 3 – San Antonio Testing ~~Lab~~Laboratories, Ltd.
Quality Assurance Plan (QAP) Standard
Operating Procedures (SOPs)

Beck Landfill, Nido, LTD.
Type IV Landfill
Schertz, Guadalupe County, Texas
MSW Permit No. 1848
Groundwater Sampling and Analysis Plan (GWSAP)

Beck Landfill, Nido, LTD. has developed the following Groundwater Sampling and Analysis Plan (GWSAP) for the Guadalupe County Landfill in Schertz, MSW Permit No. 1848, in accordance with the regulations in 30 TAC §330.417 (relating to Groundwater Monitoring at Type IV Landfills). This GWSAP is submitted as a modification to the Site Operating Plan and is intended to provide a consistent sampling and analysis procedure. It is designed to ensure that ground-water data accurately represents actual groundwater quality and can be used to reliably evaluate the groundwater conditions at this site.

PROCEDURES:

*I* *Timing and Order of Purging or Sampling*

The elapsed time between well purging and sample collection should be as short as possible to avoid temporal variations in water levels and water chemistry. Sampling should be done preferably within 24 hours of purging. If a well is very slow to recharge, it should be sampled as soon as practicable; a maximum of seven days may be acceptable with prior TCEQ approval.

The wells will be sampled from the up-gradient well to the down-gradient well, sequentially beginning with the well on Line A and proceeding as follows: Line A to Line C to Line D to Line F to Line G. See gradient map attached directly behind this page.

If contamination is known to be present, sampling should proceed from the monitoring well least or not contaminated to the well with the most contamination.

*II* *Well Inspection*

Inspect the integrity of the monitoring well prior to commencement of purging and/or sampling the well. The inspection of the well should be documented on a Field Log Data Sheet.

- Check the casing and concrete pad for cracks or fissures. Be sure that vandalism, animals, heavy equipment, etc have not damaged the well.
- Check that the cap is locked.
- Check that the well plug cap is tightened to prevent surface runoff infiltration into the well.
- Note the proximity of the well to potential sources of contamination on a Field Log Data Sheet.
- If insects are found in or on the well casing, do NOT use organic sprays or other potential contaminants to remove them.
- Similarly, organic lubricants should not be used on well components such as locks.

### III *Water-Level Measurements*

Prior to purging or sampling of a well, measure the depth to water to determine water level and to be sure that enough water is present for sampling. Follow these steps for proper measurements.

- Decontaminate the measurement probe prior to use in each well by washing with a phosphate-free soap and rinsing with reagent grade water, obtained from the laboratory, or commercially distilled water.
- Calibrate measurement probes regularly to determine the stretch of suspended measuring tapes, wires, or cables.
- Measure from the top of the well casing, identified on the Monitor Well Data Sheets, for each well. Record the depth to water to the nearest hundredth of a foot.
- Calculate the elevation of the water level with respect to mean sea level (msl) and record it to the nearest hundredth of a foot.

### IV *Well Purging*

- Wells should be purged of stagnant water with a bailer (or a pump) 24 hours prior to sampling to obtain a chemically representative ground water sample from each well.
- To assure comparability of the ground-water samples collected from the site, the same type of purging equipment should generally be used in each of the site wells.
- Each well will be purged with a disposable bailer or using a submersible pump and disposable tubing, so that the well does not become contaminated during sampling.
- Bailers should be bottom-emptying devices, so that the bailer can be emptied slowly, with minimum aeration.
- Care should be taken during purging to avoid introducing contaminants to the water in the well. Use disposable, plastic or vinyl gloves, changed between each well, to avoid cross-contamination. Latex gloves can cause contamination.
- Purging should be performed in such a way as to minimize the stirring of sediments with the waters in the well. Lower the bailer (or pump) gently. Do NOT drop the bailer (or pump) to the bottom of the screen in the well. Pull the bailer (or pump) to the surface slowly. (If a pump is used, pump intakes should not be set too close to the bottom of the well.)
- If possible, purge at least three times the total volume of water determined to be in the well casing from the measurements made in Section II.

Example: Volume = pi * r2 * h

Where -
pi = 3.14159265
r = radius of the casing
h = height of the water column in the well

V = pi * (.17')2 * (4') = .36 cu. ft.

Conversion to gallons (7.48052 gallons per cubic foot)
0.36 cu. ft * 7.48052 = 2.7 gallons Volume * 3 = 8.1 gallons

Note: The casing volume is the amount of water in the casing itself prior to purging and does not include the volume of water in the filter pack.

These wells recharge very slowly. If insufficient water is available to be removed from the well, purging to dryness is sufficient to remove stagnant water.

Allow the well to recover enough to allow collection of samples. Where possible, the water level should be allowed to recover to within 90% of the water level established prior to purging.

Record the following data collected on a Field Purging Log Data Sheet (See Attachment 1):

- The initial depth to water (DTW),
- measured well depth (total depth (TD)),
- height of the water column,
- well purging time,
- volume of water purged from the well,
- purging discharge rate, and
- information from the well inspection.

Purged water should be containerized and ~~may be returned to the landfill or~~ disposed of through the local POTW, with written permission. ~~Purged water should be placed inside the landfill perimeter, such that it will not commingle with or discharge via surface runoff.~~

## V *Sample Collection and Preservation*

Sample collection, preservation and shipment to the laboratory are important steps in the sampling process. Physical or chemical changes occur in ground-water samples no matter how carefully sampling is done. Inappropriate sampling devices, collection procedures, preservatives and temperature controls, or inadequate shipment can damage sample quality, giving inaccurate results.

### V.1 Sample Collection and Preparation

The need to minimize turbulence and aeration of the sample can not be overemphasized.

- Fill sample containers directly from the bailer (or pump tubing) when possible. Transfer containers are not recommended for sample collection because of the likelihood of cross-contamination.

- Do not reuse soiled sample containers, bailers and bailer rope, disposable tubing, or plastic (or vinyl) gloves.
- Where possible, keep clean equipment off the ground to prevent contamination once the equipment is cleaned.
- Handle water removed during sampling and not saved in the same way as purged water.
- Do not allow the sampling device to touch the sampling container, but hold the two as close as possible to reduce aeration.
- Check the area around the sampling point for possible sources of air contamination.

### V.2 Field Measurements

- The equipment used for field measurements should be calibrated at least daily during sampling.
- Slowly pour an unfiltered portion into a clean container for field measurement of temperature, specific conductance, and pH.
- Measure and record the temperature immediately.
- Measure and record the specific conductance of the sample to avoid any effect on the sample from salts from the pH probe.
- Measure and record the pH.
- Record the color, odor, foaming, presence of more than one phase of liquid, and turbidity of the sample.

### V.3 Sample Containers

The volume of samples and types of sample containers needed are described in Table 1 below. Volumes and containers have been selected in accordance with methods specified in "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods" (United States Environmental Protection Agency (EPA) Publication Number SW-846). To avoid confusion, the number of containers collected from each well will be minimized.

Label all sample containers with indelible ink for identification purposes. Alternatively, cover the sample label with clear packing tape and place the sample container inside a ziplock bag before placing on ice. The label information should include:

- sample number,
- well number,
- site identification,
- analysis to be performed,
- preservatives used,
- date and time of sample collection, and
- name of sampler.

Fill the sample containers in the following order:

1) Non-Purgeable Organics (NPOC)
2) Metals
3) Other Inorganic Parameters

Fill replicate sample containers for NPOC from a single bailer to improve homogeneity in the samples.

V.4 Sample Containers, Preservation and Holding Times

Holding times and sample volumes required for each analysis have been reviewed with the laboratory. Sample preservation is intended to 1) retard biological action, 2) retard hydrolysis, and 3) reduce sorption effects. Preservation methods are generally limited to pH control, chemical addition, refrigeration, and protection from light. Specific preservation methods presented in Table 1, below, are in accordance with the EPA requirements of SW-846, "Test Methods for Evaluating Solid Waste", 3rd Edition as revised and updated or Standard Methods for the Examination of Water and Wastewater, 21st Edition as revised and updated.

**Table 1 Annual Detection Monitoring Sample Containers, Preservation & Holding Time**

| Parameter | Sample Container | Preservative | Replicate-s | Holding Time |
|---|---|---|---|---|
| pH | 1 Liter Glass Bottle | Ice | No | Analyze Immediately |
| Specific Conductance | 1 Liter Plastic Bottle | Ice | No | 28 days |
| Non-Purgeable Organics (TOC) | 100 mL Amber VOA | Ice, HCL or H2SO4 | Three | 2 hours (28 days if acidified) |
| Total Dissolved Solids | 1 Liter Plastic Bottle | Ice | No | 7 days |
| Chloride | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| Iron (dissolved) | 1 Liter Plastic Bottle | Ice, (HNO3 if filtered) | No | 6 Months |
| Manganese (dissolved) | 1 Liter Plastic Bottle | Ice, (HNO3 if filtered) | No | 6 Months |
| Cadmium (dissolved) | 1 Liter Plastic Bottle | Ice, (HNO3 if filtered) | No | 6 Months |
| Zinc (dissolved) | 1 Liter Plastic Bottle | Ice, (HNO3 if filtered) | No | 6 Months |

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Note: See Table 4 at the end of this report for Background Parameters

### V.5 QC Samples (Trip Blanks, Field Blanks, Replicates)

- One field blank will be used during each sampling event to identify possible sources of air pollutant contamination originating at the onsite ready mix plant.
- Three Replicate samples will be collected during each sampling event for analysis of Non-Purgeable Organic Compounds.
- One sample duplicate will be collected for analysis of Volatile Organic Compounds during Background Sampling.

### V.6 Sample Storage and Transport

- All samples should be kept cold, ideally at 4°C, and transported to the laboratory within 2 days of sampling.
- Samples should be kept in re-sealable bags, then in an ice chest and packed with sufficient ice or re-freezeable materials to keep then as near 4°C as possible. DON'T USE DRY ICE TO CHILL THE SAMPLES BECAUSE THE SAMPLES WILL FREEZE AND THE CONTAINERS
- WILL BREAK.
- If the samples are shipped, they and the insulated container should first be chilled with ice. Pour off the ice and water, and keep cold during shipment with frozen packages of re-freezeable materials such as "blue ice."
- The insulated container needs to be packed inside with foam, newspaper, or an absorbent material such as vermiculite to prevent or minimize the likelihood of container breakage, then thoroughly sealed with cloth tape or reinforced shipping tape.
- Inexpensive foam chests are NOT suitable for shipping.
- Under NO circumstances, should water, ice, or dry ice be used for samples shipped via public transportation (i.e. the bus).

### V.7 Chain-of-Custody Documentation

- A suitable chain-of-custody (COC) document must accompany the samples at every step from field to laboratory and must be signed by each party handling the samples, from sampler through transporter to the laboratory, to document the possession of the samples at all times. Proper COC procedures are essential to ensure sample integrity and to provide legally and technically defensible data.
- The person collecting the sample starts the COC procedure.
- Individuals relinquishing and receiving the samples sign, date, and note the time of the transfer on the COC form (see attachment 2).
- Packages sent by mail should be certified with return receipt requested to document shipment.
- For packages sent by common carrier, a copy of the bill of lading will suffice.

- Copies of the return receipt or bill of lading should be attached to the COC document.
- The COC document must accompany the sample during transport and shipping, and should be protected from moisture using sealable plastic bags.

### V.8 Documentation of Sampling

- Information related to a sampling event should be recorded in a bound, permanent field log book or on Field Sampling Log Data Sheets (see Attachment 1).
- All entries should be legible and made in indelible ink.
- Entry errors should be crossed out with a single line, dated, and initialed by the person making corrections.
- Record sufficient information so that the sampling situation can be reconstructed without relying on the sampler's memory.
- Location, date, time, weather conditions, name and identity of sampling personnel, all field measurements, including numerical values and units, comments about the integrity of the well, etc., should be recorded.
- These records may be the only acceptable record for legal purposes. Protect it and keep it in a safe place.

## *VI Sample Filtration*

As stated in §330.405(c), samples shall **not** be field filtered prior to laboratory analysis. Laboratory filtering of samples for metals analysis is ~~-~~permitted if necessary to protect analytical equipment. Because of chemical or physical changes that may occur during shipping or transport, the interpretation of "total" metals is questionable if the samples are filtered in the laboratory. ~~It is the Commission's opinion that d~~Dissolved metals are better indicators than "total" metals, and owners and operators are encouraged to analyze samples for both "total" and dissolved metals, especially for sites that have large amounts of suspended sediments in the samples. If dissolved metals are to be analyzed, the samples should be properly filtered in the field. If field filtering is not practical, the samples should be filtered in the lab as soon as possible. Samples to be analyzed for inorganic parameters other than metals may also be filtered for the sake of consistency. A note indicating whether or not the samples were filtered and the place where they were filtered must accompany the results of the ground-water analyses.

- The ~~dissolved~~ metals (Fe, Mn, Cd, and Zn) to be analyzed as total metals at this site will not be filtered in the field~~filtered in the laboratory~~.
- ~~When samples are to be filtered, acid preservatives should be added after filtration to avoid breaking down clay molecules or placing adsorbed ions into solution, which could result in the generation of artificially high concentrations of metals.~~
- Neither field nor lab filtering is permitted for samples that are to be analyzed for NPOC. Many organic compounds are attached to solid particles, and filtering would remove them, yielding false, negative results.

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- ~~A note indicating whether or not the samples were filtered and the place where they were filtered must accompany the results of ground-water analyses.~~

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## VII Analytical Parameters

Ground-water sampling and analysis requirements shall be in accordance with §330.417 of this title (relating to Ground-Water Monitoring at Type IV Landfills).

The following constituents will be tested for: chloride, iron (~~dissolved~~total), manganese (~~dissolved~~total), cadmium (~~dissolved~~total), zinc (~~dissolved~~total), total dissolved solids, specific conductance (field and laboratory measurements), pH (field and laboratory measurements), and non-purgeable organic compounds (analysis of three replicate samples).

Not later than 60 days after each sampling event, the owner or operator shall submit to the Executive Director for review and approval a report containing the results of the analyses. If the facility is found to have contaminated or be contaminating the shallow water-bearing zones, the Executive Director may order corrective action appropriate to protect human health and the environment up to and including that in §§330.411, 330.412, and 333.415 of this title (relating to Assessment of Corrective Measures; Selection of Remedy; and Implementation of Corrective Action Program). See Section XI of this report for a discussion of Corrective Action.

## VIII Analytical Methods

This ground-water monitoring program will incorporate appropriate analytical methods that accurately measure monitoring parameters in ground-water samples.
Among acceptable analytical methods are those in Standard Methods for the Examination of Water and Wastewater, 21st Edition, or those listed in SW-846.

- EPA Method 8270 may be used to analyze samples for Non-Purgeable Organic Compounds
- Most heavy metals can be analyzed by inductively coupled plasma-atomic emission spectrometry (ICP).
- Other metals will be analyzed using anion chromatography.
- Attachment 3 contains the Laboratory Standard Operating Procedures for methods employed.

**~~See~~ Table 2 Annual Detection Monitoring ~~for the m~~Methods and ~~reporting~~ Reporting ~~limits~~ Limits (RL)~~.~~**

| Parameter | Method | RL (mg/L) |
|---|---|---|
| Chloride | Method E300 | 1 |
| ~~iron~~ Iron (total~~dissolved~~) | Method E200.7 | 0.03 |
| ~~manganese~~ Manganese | Method E200.7 | 0.005 |
| Cadmium (~~dissolved~~total) | Method E200.7 | 0.002~~3~~ |
| Zinc (~~dissolved~~total) | Method E200.7 | 0.001~~2~~ |
| ~~total~~ Total ~~dissolved~~ Dissolved | Method E160.1 | 10 |
| ~~specific~~ Specific | Method E120.1 | 1 umhos/cm |
| pH | Method E150.1 | 1 |
| ~~non~~Non-purgeable ~~o~~Organi | Method E415.1 | 0.5 |

*IX Background Samples~~ — Not Revised during January 2008 Updates~~*

~~A minimum of f~~Four background samples, one per calendar quarter, ~~will be~~were taken, for one year. ~~If possible~~As required, 45 days ~~shall~~ existed between sampling events. The following table lists the background parameters that ~~will be~~ were analyzed for during this first year.

**Table 3 Background Sampling Parameters**

~~**Table 3: Background Sampling Parameters**~~

| Parameter | Total or Dissolved | Method | MDL mg/L | RL mg/L |
|---|---|---|---|---|
| Cobalt | Total | 219.1 | 0.04 | 0.10 |
| Arsenic | Total | 206.2 | 0.01 | 0.02 |
| Mercury | Total | 245.1 | * | 0.0005 |
| Barium | Total | 208.1 | * | 1.0 |
| Silver | Total | 272.1 | 0.02 | 0.10 |
| Chromium | Total | 218.1 | 0.05 | 0.10 |
| Zinc | Total | 289.1 | 0.05 | 0.10 |
| Lead | Total | 239.2 | 0.004 | 0.015 |
| Cadmium | Total | 213.2 | 0.001 | 0.005 |
| Selenium | Total | 270.2 | 0.01 | 0.02 |
| Copper | Total | 220.1 | * | 0.10 |
| Manganese | Total~~Dissolved~~ | 243.1 | 0.02 | 0.05 |
| Iron | Total~~Dissolved~~ | 236.1 | 0.14 | 0.3 |
| Alkalinity | N/A | 310.1 | NA | 5 |
| Carbonate | N/A | 310.1 | NA | 5 |
| Hardness | N/A | Calculation | NA | 10 |
| Potassium | N/A | 258.1 | * | 1.0 |



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| ~~**Table 3: Background Sampling Parameters**~~ | | | | |
|---|---|---|---|---|
| **Parameter** | **Total or Dissolved** | **Method** | **MDL mg/L** | **RL mg/L** |
| Phenophthalein alkalinity | N/A | | | |
| Bicarbonate | N/A | 310.1 | NA | 5 |
| anion-cation ration | N/A | Calc. | NA | NA |
| Calcium | N/A | 215.1 | * | 1.0 |
| Magnesium | N/A | 242.1 | 0.24 | 1.0 |
| Sulfate | N/A | 375.4 | 0.84 | 5.0 |
| total dissolved solids | N/A | 160.1 | NA | 10 |
| | N/A | 4500-Cl- B | | |
| Sodium | N/A | 273.1 | 2.3 | 5.0 |
| Fluoride | N/A | 340.2 | 0.02 | 0.10 |
| pH (field & lab) | | | | 1.0 S.U. |
| Specific Conductance (field & | | | | 10umhos |
| nitrate as nitrogen or ammonia as | N/A | | | |
| total organiccarbon (3 replicates) | | | See | See LSOP |
| VOCs | N/A | Best Available | ** | ** |

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| ~~Table 3: Background Sampling Parameters~~ | | | | |
|---|---|---|---|---|
| **~~Parameter~~** | **~~Total or Dissolved~~** | **~~Method~~** | **~~MDL mg/L~~** | **~~RL mg/L~~** |
| ~~anion-cation ration~~ | ~~N/A~~ | ~~Calc.~~ | ~~NA~~ | ~~NA~~ |
| ~~Calcium~~ | ~~N/A~~ | ~~215.1~~ | ~~*~~ | ~~1.0~~ |
| ~~Magnesium~~ | ~~N/A~~ | ~~242.1~~ | ~~0.24~~ | ~~1.0~~ |
| ~~Sulfate~~ | ~~N/A~~ | ~~375.4~~ | ~~0.84~~ | ~~5.0~~ |
| ~~total dissolved solids~~ | ~~N/A~~ | ~~160.1~~ | ~~NA~~ | ~~10~~ |
| ~~Chloride~~ | ~~N/A~~ | ~~4500-Cl- B~~ | ~~5.4~~ | ~~15~~ |
| ~~Sodium~~ | ~~N/A~~ | ~~273.1~~ | ~~2.3~~ | ~~5.0~~ |
| ~~Fluoride~~ | ~~N/A~~ | ~~340.2~~ | ~~0.02~~ | ~~0.10~~ |
| ~~pH (field & lab)~~ | ~~N/A~~ | ~~Meter~~ | ~~NA~~ | ~~1.0 S.U.~~ |
| ~~Specific Conductance (field & lab)~~ | ~~N/A~~ | ~~Meter~~ | ~~NA~~ | ~~10umhos /cm~~ |
| ~~nitrate as nitrogen or ammonia as nitrogen~~ | ~~N/A~~ | ~~353.3~~ | ~~0.02~~ | ~~0.10~~ |
| ~~total organic carbon (3 replicates)~~ | ~~N/A~~ | ~~5310 C~~ | ~~See LSOP~~ | ~~See LSOP~~ |
| ~~VOCs~~ | ~~N/A~~ | ~~Best Available~~ | ~~**~~ | ~~**~~ |

*Current MDL not available.
**See Table 5: VOC Breakdown and Reporting Limits

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## X *Detection Monitoring*

Twelve months after the completion of the last quarterly background sampling event, annual monitoring will begin. Analysis will be in accordance with the requirements of 30 TAC §330.417. The monitoring parameters are discussed in Section VII.

The goal of detection monitoring is finding specific constituents that may be leaking from the site. If a breach is suspected, leachate may be analyzed for the detection monitoring parameters. Leachate analysis data can be helpful in supporting a reduction of the number of parameters monitored from the monitoring wells and may be crucial in showing that an anomalous reading was probably not from the landfill.

## XI *Corrective Action*

The Executive Director may require additional sampling, analyses of additional constituents, installation of additional monitoring wells or other sampling points, and/or other hydro-geological investigations if the facility appears to be contaminating the shallow water-bearing zone(s).

If the facility is found to have contaminated or be contaminating the shallow water-bearing zone(s), the Executive Director may order corrective action appropriate to protect human health and the environment up to and including that in §§§§330.411, 330.412, and
333.415 of this title (relating to Assessment of Corrective Measures; Selection of Remedy; and Implementation of Corrective Action Program).

## XII *Quality Assurance and Quality Control (QA/QC)*

All analytical data submitted under the requirements of this permit will be examined by the owner and/or operator to ensure that the data quality objectives are considered and met prior to submittal for the commission to review. The owner or operator will determine if the results representing the sample are accurate and complete. The quality control results, supporting data, and data review by the laboratory must be included when the owner/operator reviews the data. Any potential impacts will be reported such as the bias on the quality of the data, footnotes in the report, and anything of concern that was identified in the laboratory case narrative.

The owner or operator will ensure that the laboratory documents and reports all problems observed anomalies associated with the analysis. If analysis of the data indicates that the data fails to meet the quality control goals for the laboratory's analytical data analysis program, the owner or operator will determine if the data is usable. If the owner and/or operator determines the analytical data may be utilized, any and all problems and corrective action that the laboratory identified during the analysis will be included in the report submitted to the TCEQ.

A Laboratory Case Narrative (LCN) report for all problems and anomalies observed must be submitted by the owner and/or operator. The LCN will report the following information:

1. The exact number of samples, testing parameters and sample matrix.
2. The name of the laboratory involved in the analysis. If more than one laboratory is used, all laboratories shall be identified in the case narrative.
3. The test objectives regarding samples.
4. Explanation of each failed precision and accuracy measurement determined to be outside of the laboratory and/or method control limits.
5. Explanation if the effect of the failed precision and accuracy measurements on the results induces a positive or negative bias.

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 non-compliance 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.

The San Antonio Testing ~~Lab~~Laboratory Quality Assurance Plan (QAP) and Standard Operating Procedures (SOPs) are included as Attachment 3 to this GWSAP.

## XIII *Reporting and Submittals*

The results of the analyses of ground-water samples collected during detection monitoring will be submitted to the Commission that includes all information required by §330.417(b)(5)(A)-(E). Not later than 60 days after each sampling event, Beck Landfill shall determine whether the landfill has released contaminants to the uppermost aquifer. . Triplicate copies of the results are to be submitted.

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

1. A table identifying the field sample name with the sample identification in the laboratory report.
2. Chain of custody.
3. An 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.
4. A release statement must be submitted from the laboratory. This statement must state, "I am responsible for the release of this laboratory data package. This data package has been reviewed by the laboratory and is complete and technically compliant with the requirements of the methods used, except where noted by the laboratory in the attached exception reports. By my signature below, I affirm to the best of my knowledge, all problems/anomalies, observed by the laboratory as having the potential to affect the quality of the data, have been identified by the laboratory in the Laboratory Review Checklist, and no information or data have been knowingly withheld that would affect the quality of the data."
5. A laboratory checklist. 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 that the laboratory use the checklist and do an equivalent of an EPA level 3 review regarding quality control analysis.

The submittal, including a cover letter, will be in triplicate (one original and two copies). The original is to be filed in TCEQ Central Records in Austin, one copy is sent to the appropriate Regional office, and one copy is used as a work copy by the Commission staff.

## XIV *Safety Plan*

~~Beck Readymix Concrete Company, Inc.~~ Beck Landfill and/or all of its subcontractors performing functions specific to activities associated with and identified in the GWSAP will establish, implement, and maintain appropriate health and safety plans.

- When sampling at the site, avoid the introduction of contaminants into the body by ingestion, absorption, or respiration.
- Smoking, chewing, drinking, and eating are all prohibited at a waste site.
- Monitor-well water should not be allowed to come in contact with the eyes, mouth, or skin.
- Special care is necessary when handling sample containers, some cleaning solutions, and sample preservatives.
- Combination of reagents may result in a violent reaction.
- Read all warning labels carefully.
- Walk carefully and be aware of steep slopes, unstable ground, poison ivy, fire ant mounds, debris piles, poisonous snakes and spiders, stinging insects, ticks, and mosquitoes.
- Wear proper garments such as boots, hats, gloves, and safety glasses, to protect from exposure.
- Watch out for heavy equipment moving around the site.
- Bring a partner who can help with sampling and transport and will be ready to render aid to the second person or go for help if it becomes necessary.

**Table 4: Background Sampling**

| Parameter | Sample Container | Preservative | Replicates | Holding Time |
|---|---|---|---|---|
| Cobalt | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Arsenic | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Mercury | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 28 Days |
| Barium | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Silver | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Chromium | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Zinc | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Lead | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Cadmium | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Selenium | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Copper | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Manganese | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Iron | 1 Liter Plastic Bottle | Ice (HNO3 if filtered) | No | 6 Months |
| Alkalinity | 1 Liter Plastic Bottle | Ice | No | 200 mL |
| Carbonate | 1 Liter Plastic Bottle | Ice | No | 6 Months |
| Hardness | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| Potassium | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| Phenophthtalein alkalinity | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| Bicarbonate | 1 Liter Plastic Bottle | Ice | No | 28 Days |

**Table 4: Background Sampling**

| Parameter | Sample Container | Preservativ-e | Replicates | Holding Time |
|---|---|---|---|---|
| anion-cation ration | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| Calcium | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| Magnesium | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| Sulfate | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| total dissolved solids | 1 Liter Plastic Bottle | Ice | No | 7 Days |
| Chloride | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| Sodium | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| Fluoride | 1 Liter Plastic Bottle | Ice | No | 28 Days |
| pH (field & lab) | 25 mL Plastic Bottle | None | No | Immedia-tely |
| Specific Conductance (field & lab) | 100 mL Plastic Bottle | None | No | Immedia-tely |
| nitrate as nitrogen or ammonia as nitrogen | 100 mL Plastic Bottle | Ice | No | 48 Hours |
| total organic carbon (3 replicates) | 100 mL Amber Glass | Ice, (HCl, if filtered) | One | 48 Hours (28 Days if acidified) |
| VOCs | 40 mL glass, Teflon lined septa | Ice, (HCl, if filtered) | Two | 48 Hours (28 Days if acidified) |

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**Table 5: VOCs and RL~~seporting~~ ~~imits~~**

| Analysis: | Reporting Limit ug/L |
|---|---|
| 1,1,1,2 Tetrachloroethane | 5 |
| 1,1 ,1-Trichloroethane | 5 |
| 1,1 ,2,2-Tetrachloroethane | 5 |
| 1,1 ,2-Trichloroethane | 5 |
| 1 ,1-Dichloroethane | 5 |
| 1 ,1-Dichloroethene | 5 |
| 1,2 Dichloropropane | 5 |
| 1 ,2,3-Trichloropropane | 5 |
| 1 ,2-Dibromo-3-Chloropropane | 2* |
| 1 ,2-Dibromoethane | 2* |
| 1 ,2-Dichlorobenzene | 5 |
| 1 ,2-Dichloroethane | 5 |
| 1 ,4-Dichlorobenzene | 5 |
| 2-Butanone (MEK) | 10 |
| 2-hexanone | 10 |
| 4-Methyl-2pentanone | 10 |
| Acetone | 10 |
| Acrylonitrile | 30 |
| Benzene | 5 |
| Bromochloromethane | 5 |
| Bromodichloromethane | 5 |
| Bromoform | 5 |
| Bromomethane | 10 |
| Carbon Disulfide | 5 |
| Carbon tetrachloride | 5 |
| Chlorobenzene | 5 |
| Chlorodibromomethane | 5 |
| Chloroethane (Ethyl Chloride) | 10 |
| Chloroform | 5 |
| Chloromethane | 10 |
| cis-1 ,2-Dichloroethene | 5 |
| cis-1 ,3-Dichloropropene | 5 |
| Dibromomethane | 5 |
| Dichloromethane | 5 |
| Ethylbenzene | 5 |
| Iodomethane | 5 |
| Styrene | 5 |

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| **Table 5: VOCs and RLs Continued~~eporting Limits~~** | |
|---|---|
| | **Reporting Limit** |
| **Analysis:** | **ug/L** |
| Tetrachloroethene | 5 |
| Toluene | 5 |
| trans-1 ,2-Dichloroethene | 5 |
| trans-1 ,3-Dichloropropene | 5 |
| trans-1 ,4-Dichloro-2-Butene | 10 |
| Trichloroethene | 5 |
| Trichlorofluoromethane | 5 |
| Vinyl Acetate | 5 |
| Vinyl Chloride | 2* |
| Xylene | 10* |

* Lower reporting limits are available using a purge volume of 25mL (Cost of analysis will increase) J-Flags (Data Flag) are also possible to indicate the compound is present but below reporting limit.

# Attachment 1 – Purging Worksheets and Sampling Worksheets (24 hours after Purging)

Beck Landfill, Nido, LTD.
Type IV Landfill
Schertz, Guadalupe County, Texas
MSW Permit No. 1848
Groundwater Sampling and Analysis Plan (GWSAP)

# Attachment 2 – Chain of Custody Form

Beck Landfill, Nido, LTD.
Type IV Landfill
Schertz, Guadalupe County, Texas
MSW Permit No. 1848
Groundwater Sampling and Analysis Plan (GWSAP)

# Attachment 3 – QAPP and SOP

Beck Landfill, Nido, LTD.
Type IV Landfill
Schertz, Guadalupe County, Texas
MSW Permit No. 1848
Groundwater Sampling and Analysis Plan (GWSAP)

MUNICIPAL SOLID WASTE PERMIT
MAJOR AMENDMENT

**Part IV Application for Permit Amendment**

**(TAC Title 30 Rule §330.65))**

***NAME OF PROJECT: Beck Landfill***

***MSW PERMIT APPLICATION NO.: 1848AA***

***OWNER: Nido, LTD (CN603075011)***

***OPERATOR: Beck Landfill (RN102310968)***

***CITY, COUNTY: Schertz, Guadalupe County***

*Major Amendment: ~~September 2022~~~~July~~ September2023*

Prepared by:

PROJECT NUMBER: 150051.05.01
PROJECT CONTACT: Julie Morelli
EMAIL: Julie.Morelli@powereng.com
PHONE: 210-951-6424

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# 1.0 INTRODUCTION

## 1.1 Introduction (§330.127)

The Beck Landfill Site Operating Plan (SOP), in accordance with 30 TAC §330.127, includes provisions for site management and site operating personnel to meet the general and site- specific requirements of for the day-to-day operation of the Beck Landfill. This SOP will be retained onsite throughout the active life of the Beck Landfill and throughout the post-closure care maintenance period. This SOP also includes provisions for site management and site operating personnel to meet the general and site-specific requirements for the waste acceptance rate established in the SOP.

The operational requirements for Beck Landfill, including the existing Site Development Plan (SDP), Site Operating Plan (SOP), Final Closure Plan, Post-Closure Maintenance Plan (PCMP) and all other documents and plans required by this chapter are defined in the previously approved TCEQ Permit No. 1848A. Additional TCEQ approved revisions and/or required documents shall be incorporated into the operational requirements and shall be considered a part of the operating record of the Beck Landfill.

## 1.2 General Information

Beck Landfill is an existing Type IV landfill (TCEQ Permit No. MSW-1848A) operated by Beck Landfill, Nido, LTD. (Beck Landfill or BLF). Beck Landfill is a privately owned and operated Type IV landfill that provides Type IV acceptable waste disposal capacity primarily for Guadalupe and Bexar Counties, and surrounding areas. Beck Landfill is located in southwestern Guadalupe County, Texas. The facility is located at 550 FM 78, Schertz, TX 78154, primarily within the south part of the City of Schertz, 1,400 feet southeast of the junction of FM 1518 and FM 78.

## 1.3 Wastes Authorized for Disposal

Beck Landfill is a Type IV landfill unit and may only accept brush, construction and/or demolition waste (C&D waste), and/or rubbish, as described in 30 TAC §330.5(a)(2).

In accordance with 30 TAC §330.171 (Disposal of Special Wastes) and §330.173 (Disposal of Industrial Wastes) Beck Landfill may also accept special wastes consistent with the limitations of 30 TAC §330.5(a)(2) and the Waste Acceptance Plan required by §330.61(b). Special wastes must be handled in accordance with waste-specific provisions, as described in the Waste Acceptance Plan. Special wastes may include, but are not limited to:

- Non-regulated asbestos-containing materials (non-RACM)
- Soils contaminated by petroleum products ,crude oils, or chemicals in concentrations of greater than 1,500 milligrams per kilogram (mg/kg) total petroleum hydrocarbons; or contaminated by constituents of concern that exceed the concentrations listed in Table 1, §335.521(a)(1) (subject to provisions of 30 TAC §330.171(b)(4))
- Class 2 industrial solid waste
- Class 3 industrial solid waste

## 1.4 Pre-Operation Notice (§330.123)

Beck Landfill will provide ongoing cell construction notification to the TCEQ MSW Permits Section, in the form of a "30-DAY NOTICE OF CELL COMPLETION" letter. This notification will include a site layout map identifying the area(s) being excavated, along with acknowledgement that the cell has been excavated into the gray shale formation. The notification submittal will be in triplicate (one original and two copies), one copy being sent to the appropriate TCEQ Regional Office. The executive director has 14 days to provide a verbal or written response. If no response has been received by the end of the fourteenth day following the executive director's receipt of the report, the operator may begin placing waste in the new cell areas.

The entire liner system for the landfill has been constructed and 30-Day Notice of Cell Completion letters have been submitted for all of the disposal cells. In the event that the soil liner needs to be repaired as described in Attachment D-7 in the future, written notice in the form of a soil liner evaluation report (SLER), as described in §330.341, will be submitted to the TCEQ at the completion of the liner construction.

## 2.0 RECORDKEEPING REQUIREMENTS (30 TAC §330.125)

During the operating life of the landfill, Beck Landfill will maintain a written site operating record (SOR). This record will be retained for the life of the facility including the post-closure care period. The SOR is a complete collection of facility permit documents, designs, operating procedures, monitoring data and waste receipt information as required by 30 TAC §330.125.

## 2.1 Documents (§330.125(a))

Beck Landfill will maintain the SOR on site. Consistent with §330.125(a), copies of documents that are part of the approved permitting process that are considered part of the SOR are listed in **Table ~~2-~~1**.

**TABLE 1 DOCUMENTS THAT ARE PART OF THE SOR (FORMERLY TABLE 2.1)**

| **Site Operating Records** | **Frequency** |
|---|---|
| Access Control Inspections | Monthly |
| Access Control Repairs not completed within 8 hours | As required |
| Alternate Schedules | Per Occurrence |
| Closure and Post-Closure Plans | Submittal of PA and within 7 days after receipt of TCEQ approval of changes |
| Cost Estimates for Closure and Post-Closure | As required and within 7 days after receipt of TCEQ approval of changes |
| Cover Inspection Reports | Daily on days when cover soil being placed |
| Facility Operation, PM Approvals, and Technical Assistance Correspondence & Responses | Per occurrence and within 7 days after receipt of TCEQ approval of changes or receipt from TCEQ |
| Financial Assurance Documents for Closure & Post-Closure including Inflation Adjustments | Annually and within 7 days after receipt of TCEQ approval of changes |
| Fire Occurrence Notices | As needed |
| Gas Monitoring Results | Quarterly and within 7 days of completion |
| Groundwater Monitoring and Corrective Action Demonstration, Certification, Monitoring, Testing & Analytical Data, if applicable | Monitoring – Semi-Annual, Corrective Action – as required and within 7 days of completion or receipt of analytical data |
| Landfill Gas Management Plan | Submittal of PA and after receipt of TCEQ approval of changes |
| Landfill Inspections | As required |
| Landfill Marker Inspections | Monthly |
| Leachate and Contaminated Water Plan | Submittal of PA and after receipt of TCEQ approval of changes |
| Litter Pickup | As required |
| Location Restriction Demonstrations | Submittal of PA and after receipt of TCEQ approval of changes |
| Other Documents specified in the Permit or by the ED | Submittal of PA and after receipt of TCEQ approval of changes |
| Personnel Operator Licenses | As required |
| Personnel Training Records 335.586(d)-(e) | As required |
| Pesticide Use for Vector Control | As required |
| Ponded Water Inspection Records | Monthly |
| Post-Closure Monitoring, Testing and Analytical Data, if applicable | As required and within 7 days of completion or receipt of analytical data |
| Quarterly and Annual Waste Receipt Reports | Quarterly |

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| **Site Operating Records** | **Frequency** |
|---|---|
| Remediation Plans for Explosive and Other Gasses, if applicable | As required within 7 days after receipt of TCEQ approval of changes |
| SDP | Submittal of PA and after receipt of TCEQ approval of changes |
| Site Permit | After approval of Permit Application |
| SOP | Submittal of PA and after receipt of TCEQ approval of changes |
| Special Waste Documentation, Manifests, and all other documents relating to Special Waste | As required |
| Spray Applied Alternate Daily Cover (ADC) Material | Not applicable |
| Surface Water Protection and Drainage Plan Required Receipts and Submittals | As required |
| Unauthorized Waste Receipts/Removal | As required |
| Unauthorized, Regulated/Hazardous, and Prohibited PCB Waste Inspection Records, Training, Receipt, Removal, and Notification Reports | As required and within 7 days after completion |

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## 2.2 Analytical Data (§330.125(b))

Beck Landfill, in accordance with §330.125(b), within seven working days following completion or receipt of analytical data, will record and retain in the SOR those items as listed in **Table ~~2-~~1**.

## 2.3 Notification (§330.125(c))

Beck Landfill, in accordance with §330.125(c), will place the items included in **Table ~~2-~~1** into the SOR within the specified time period. Beck Landfill will maintain the SOR in an organized format, where information is easily locatable and retrievable. The SOR will be furnished to the executive director upon request, and will be made available on site for inspection by the authorized TCEQ representatives.

## 2.4 Record Retention (§330.125(d))

Beck Landfill, in accordance with §330.125(d), will retain all information contained within the SOR and all plans required for the life of the site, including the post-closure care period.

## 2.5 Personnel Training Records and Licenses (§330.125(e)(f))

In accordance with §330.125(e), Beck Landfill will maintain personnel training records in accordance with §335.586(d) and (e). Personnel training requirements will be consistent with Section 3.1 of this SOP, "Personnel and Training". Personnel training records for current Beck Landfill personnel will be maintained until closure of the site. Records of former employees will be maintained for three years from the date the employee last worked at the Beck Landfill. Records for each personnel will include name, job title, job description, introductory training, continuing training, and documentation of training. In accordance with §330.125(f), the Beck Landfill will maintain personnel operator licenses issued in accordance with Chapter 30, Subchapter F, relating to Municipal Solid Waste Facility Supervisors. Personnel training records and operator licenses will be maintained in the SOR.

## 2.6 Annual Waste Acceptance Rate (§330.125(h))

Beck Landfill will maintain, as part of the SOR, documentation of the annual waste acceptance rate for Beck Landfill in accordance with §330.125(h). Records will include maintaining the quarterly solid waste summary reports and the annual solid waste summary report as required by §330.675. The annual waste acceptance rate, as established by the sum of the previous four quarterly summary reports, will be evaluated by Beck Landfill to determine if the waste acceptance rate exceeds the rate estimated in the approved permit and SDP. Should an increase in waste acceptance be established, the Beck Landfill will determine if the increase is due to a temporary occurrence. Should the waste acceptance rate exceed that established in the approved permit, a permit modification will be prepared in accordance with the current applicable TCEQ regulations to propose changes, if required, to manage the increased waste acceptance rate.

Beck Landfill anticipates that the site's waste acceptance rate will increase during the life of the site. Based on the volumes submitted for inclusion in the Beck Landfill TCEQ "FY 2011 MSW Annual Report", Beck Landfill accepted 182,267 tons for FY 2011.

This SOP includes variable provisions to manage the increased waste acceptance rate to protect public health and the environment.

# 3.0 PERSONNEL AND TRAINING (30 TAC §330.127)

Beck Landfill will provide on-site management of the landfill operations. The level of employment at the landfill will be determined by the waste acceptance volume, and shall be sufficient to comply with the requirements of the site-operating plan and with the provisions of the site permit.

## 3.1 Personnel (§330.127(1))

Beck Landfill will be staffed with qualified individuals experienced with municipal solid waste disposal operations and/or earthmoving construction projects. See Table ~~3.1~~2,which outlines landfill staffing levels.

**TABLE 2 LANDFILL STAFFING LEVELS (FORMERLY TABLE 3.1)**

| Landfill Position | Min # | Max # |
|---|---|---|
| Landfill Facility Manager (LFM) | 1 | 1 |
| Landfill Supervisor (LS) | 1 | 1 |
| Equipment Operators | 3 | 5 |
| Gate Attendants | 1 | 2 |
| Landfill Spotters | 2 | 5 |
| Other Personnel (laborers) | 1 | 3 |

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### 3.1.1 Landfill Facility Manager (LFM)

The LFM is the individual having managerial oversight of the landfill and is responsible for management of the entire site. The LFM is responsible for assuring that adequate personnel and equipment are available to provide for site operations in accordance with SDP, SOP, and TCEQ regulations. The LFM will, at a minimum, have a high school diploma or equivalent, experience in municipal solid waste disposal operations.

### 3.1.2 Landfill Supervisor (LS)

Under the general direction of the LFM, the Landfill Supervisor (LS), is responsible for daily operations, site personnel, administration of the SOP, and will also serve as the emergency coordinator. The LS may designate other personnel to assist with the daily site operating requirements. The LS will designate an individual to fulfill his duties in the event that they are unavailable during waste acceptance hours. When the LS is unavailable during waste acceptance hours, the LS's designee will have the same basic on-site training as required for the LS. The LS and his alternate, at a minimum, will have experience in earthmoving operations, and experience in municipal solid waste disposal operations. The LS and his alternate will obtain and maintain a license consistent with the requirements of §§30.201, 30.207, 30.210, and 30.212.

### 3.1.3 Equipment Operators

Equipment operators are responsible for the safe operation of their equipment, and depending on their job responsibility, may be trained to recognize unauthorized waste. Equipment operators, when necessary, will monitor and direct the unloading of vehicles, and they may also perform random load inspections, general site maintenance, construction, litter abatement, and general site cleanup. Equipment operators will participate as necessary to prevent accidents and report unsafe conditions to the LS.

At a minimum, all applicable equipment operators shall be qualified to safely and effectively operate equipment normally operated at Type IV landfills, have the ability to be trained to operate other heavy equipment on-site, and have the ability to receive and comprehend on the job training in landfill operations, health and safety, and waste identification.

### 3.1.4 Gate Attendants

Gate attendant(s) stationed at the gatehouse, under the direction of the LS, are primarily responsible for maintaining records of vehicles and solid waste entering the landfill. Gate attendants will be trained in site safety procedures, to visually check for unauthorized wastes, to determine waste volumes, and to collect disposal fees. A gate attendant will be present during hours that the landfill is open to the public. Gate attendants will report to the Landfill Supervisor, and at a minimum, will have a basic understanding of landfill related accounting principles, and communication skills.

### 3.1.5 Landfill Spotters

Landfill Spotters may be employed at the landfill working face. These personnel ~~shall~~shall be responsible for the directing of trucks backing up for unloading. The spotters will also be responsible for visually screening each load as it is unloaded. In the event that unauthorized or prohibited waste is observed, procedures outlined in section 5.0 of this SOP will be followed by applicable site personnel.

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### 3.1.6 Other Personnel

Other site personnel and/or laborer(s) may be employed from time to time in other categories such as maintenance, construction, litter abatement, and general site cleanup. These personnel must have appropriate training for the tasks to which they are assigned. Site personnel may be permanent, part-time or temporary employees.

## 3.2 Training (§330.127(4))

Beck Landfill personnel will be trained consistent with the applicable training requirements as defined in §335.586(a) and (c). Personnel will receive training through a combination of on-the- job training, company-provided training and classroom instruction as necessary. The training program will be directed by a person trained in waste management procedures and will include instruction that teaches facility personnel waste management procedures, including contingency plan implementation, relevant to the position(s) in which they are employed.

At a minimum, the training program will be designed to ensure that personnel are able to respond effectively to emergencies by familiarizing site personnel with emergency procedures, emergency equipment, and emergency systems.

Facility personnel must successfully complete the program required within six months after the date of their employment or assignment to a new position at the facility, whichever is later. Employees must not work in unsupervised positions until they have completed the training requirements.

Beck Landfill will ensure that facility personnel take part in an annual review of the initial training as required.

# 4.0 EQUIPMENT (§330.127)(2)

Sufficient equipment will be provided to conduct site operations in accordance with the site design and permit conditions. Equipment requirements may vary in accordance with landfill operations and/or the waste acceptance rate at any given time. Other equivalent types of equipment may be substituted on an as-needed basis. A description, including the minimum number, size, type, and function, of the equipment to be utilized at the facility based on the estimated waste acceptance rate and other operational requirement is listed in **Table 3~~4.1~~**. Provisions for back-up equipment during periods of breakdown or maintenance of equipment listed in **Table ~~4.1~~3** include the onsite availability of a comparable or alternately acceptable piece of equipment to ensure the continuation of site operations in accordance with permit conditions. As a back-up provision, in the case that such equipment is not readily available, appropriate equipment will be rented until such a time that company owned or leased equipment is available.

**TABLE 3 LANDFILL EQUIPMENT LIST (FORMERLY TABLE 4.1)**

| **Equipment Description** | **Number of Units per** | | **Equipment Size** | **Equipment Function** |
|---|---|---|---|---|
| | **< 1.5 million cyds/yr** | **>1.5 million cyds/yr** | | |
| Landfill Compactor | 1 | 2 | Minimum weight of 50,000 pounds | Waste compaction and fire protection |
| Bulldozer | 1 | 1 | Caterpillar D6 or equivalent | Waste spreading, waste compaction, cover soil spreading, slope maintenance and fire protection |
| Excavator | 1 | 1 | Minimum weight of 20,000 pounds | Cover soil excavation, cell excavation construction, and fire protection |
| Front End Loader | 1 | 2 | John Deere 544 Equivalent or larger | Loading of soil, fire protection, retrieval of recyclable materials and removal of non-conforming wastes from working face, road maintenance |
| Dump Truck | 1 | 2 | Minimum heaped capacity of 10 cubic yards | Hauling of cover soil, hauling of excavated cell materials and fire protection |
| Motor Grader/Maintainer | 1 | 1 | Minimum weight of 10,000 pounds | Site road maintenance, slope maintenance |
| Water Pump | 1 | 1 | 4" or 6" Pump | Removal of below grade stormwater and perched groundwater |
| Water Truck | 1 | 1 | Minimum 1,500 gallon tank capacity | Site maintenance, dust control, and fire protection |
| Sweeper | 1 | 1 | Minimum 4-ft broom width | Site maintenance, hard surface sweeping, dust and mud control |

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# 5.0 DETECTION AND PREVENTION OF DISPOSAL OF PROHIBITED WASTES (30 TAC §330.127(5))

## 5.1 General Procedures

Beck Landfill, in accordance with 30 TAC §330.127(5), has established procedures for the detection and prevention of the disposal of unauthorized or prohibited wastes, including regulated hazardous waste, and polychlorinated biphenyls (PCB) wastes. The detection and prevention program will include training of site personnel to recognize and reject prohibited wastes, how to perform a random inspection, how to control site access, what training will be provided for site personnel, and what procedures are required in the event of identification of prohibited wastes.

The detection and prevention program includes the following steps:

- Observation of each load that is disposed of at the active face.
- Random inspections of incoming loads.
- Records of inspections.
- Training for appropriate landfill personnel to recognize unauthorized, prohibited waste, regulated hazardous waste, and PCB waste.
- Notification to the TCEQ Executive Director of any incident involving the receipt or disposal of regulated hazardous waste or PCB waste.
- Provisions for remediation of the incident in accordance with applicable regulations.
- Signs prohibiting the receipt of unauthorized and prohibited wastes including hazardous waste and PCB waste will be posted on-site.
- Informing waste haulers of wastes unauthorized and/or prohibited for acceptance and disposal at the site.

## 5.2 Load Inspection at the Active Face (§330.127(5)(A))

Loads at the active working face of the landfill will be directed by a trained landfill spotter or equipment operator. These personnel will visually inspect waste as it is unloaded from vehicles. Should any indication of unauthorized and/or prohibited waste be detected, appropriate landfill personnel will stop the unloading of the vehicle to allow for a thorough inspection of the load. The driver will be directed to a load inspection area located near the working face, where the load will be discharged from the vehicle. The load inspector will break up the waste pile and inspect the material for any unauthorized, prohibited and/or regulated hazardous waste.

## 5.3 Random Inspections (§330.127(5)(A))

Beck Landfill will perform documented random inspections as required by §330.127(5)(A) on a minimum of 1% of incoming loads. Loads selected for random inspections will be directed to a specified area close to but separate from the active waste disposal area. The load will be inspected by the Landfill Supervisor and/or qualified landfill personnel. The random load inspector(s) will manually and visually inspect the load and take appropriate action(s) based on the inspection findings. Conforming loads that have been randomly inspected will be sent for final disposal at the landfill active face. In the event that non-conforming materials are discovered during the random inspection, those materials will be properly and safely segregated and handled appropriately as detailed in section 5.7 of the SOP. The random inspection will be documented on a Random Inspection Form as specified in ~~Figure 5-1~~Appendix A (Forms).

## 5.4 Recordkeeping (§330.127(5)(B))

The LS is required to maintain and include in the SOR the following:

- Load inspection reports
- Records of regulated hazardous or PCB waste notifications
- Personnel training records

Load inspection reports will be completed for each inspected load. The reports will include at a minimum, the date and time of inspection, the name and address of the hauling company, driver name, the type of vehicle, the size and source of the load, contents of the load, indicators of unauthorized and/or prohibited waste, and results of the inspection.

## 5.5 Training (§330.127(5)(C))

The LFM, LS, equipment operators, and gate attendants will maintain a thorough understanding of waste screening procedures and will be trained as necessary in the following areas:

- Load inspection procedures
- Identification of unauthorized, prohibited and regulated hazardous and/or PCB wastes
- Waste handling procedures
- Health and safety procedures
- Recordkeeping

Documentation of this training will be placed in the SOR.

## 5.6 Notification (§330.127(5)(D))

TCEQ notification is required if regulated hazardous waste or PCB waste is received or disposed of in the landfill. When notification is required, records of the notifications will be kept in the SOR and will include the date and time of notification, the individual contacted, and the information reported.

## 5.7 Managing Prohibited Wastes (§330.127(5)(E))

Unauthorized and/or prohibited waste detected during inspections will be returned immediately to the waste hauler. If the waste hauler is not available, the prohibited waste will be stored in such a manner to protect human health and the environment until provisions for proper removal can be arranged.

In the event that regulated hazardous or PCB wastes are detected, the TCEQ will be notified and as soon as is practical, the hauler will be required to properly contain and remove the hazardous or PCB waste from the site.

In the case of putrescible waste being detected, the putrescible waste may either be returned to the waste hauler at time of unloading or if hauler is unavailable, the putrescible waste may be temporarily managed in an appropriate Type I waste container onsite Putrescible waste will not be disposed of onsite and will be removed from the facility and disposed of at a facility authorized to accept such waste within 24 hours.

## 5.8 Special Procedures for Waste in Enclosed Containers or Enclosed Vehicles

As indicated in 30 TAC §330.169, stationary compactors permitted in accordance with 30 TAC

§330.7 and municipal transporter routes permitted in accordance with 30 TAC §330.103 are exempt from the requirements identified in 30 TAC §330.169(1)-(3) and transporters will be allowed to discharge waste from these stationary compactors at the Beck Landfill. However, the landfill will obtain, from the transporter, load documentation for a municipal transporter route or a stationary compactor, as appropriate, prior to allowing discharge of the waste at the landfill. The load documentation will be maintained as a part of the SOR.

Other waste received in enclosed containers or enclosed vehicles will only be accepted per provisions identified in 30 TAC §330.169(1)-(3).

# 6.0 SITE SAFETY (30 TAC §330.127(6))

## 6.1 General Site Safety

Site safety will be promoted by properly trained personnel using well-maintained equipment to perform standard work procedures. Site safety will be enhanced by limiting access to the active areas only to authorized personnel. In the event of an emergency, planned emergency response procedures will be followed.

All site personnel will receive site-specific training consisting, but not limited to, the following:

- Safe work practices
- Nature of anticipated hazards
- Equipment and vehicle safety
- Site access controls
- Hazardous material identification and communication
- Fire safety
- Emergency response
- Employee rights and responsibilities

A record of training will be maintained in each employee's personnel file to confirm that each employee has received the proper training.

In the event of an emergency, site personnel will assess the situation, notify the LS or designated supervisor, and take appropriate actions. Emergency numbers will be posted in the landfill gatehouse as indicated below.

### 6.1.1 Emergency Numbers

| Office | Phone |
|---|---|
| Ambulance | 911or 210-619-1400 |
| Schertz Fire Department | 911 or 210-619-1300 |
| Schertz Police Department | 911 or 210-619-1200 |
| Guadalupe County Sheriff's Office | 911 or 830-379-1224 |

## 6.2 Preparedness and Prevention Measures

Preparedness and prevention measures have been developed to minimize both frequency and severity of accidents and emergency situations. These measures depend on the attentiveness and state of readiness of site personnel. Preparedness and prevention measures have been developed for one general category and two specific areas of the site: the gatehouse and the onsite access routes. These preparedness and prevention measures are detailed in the following sections.

### 6.2.1 General

General preparedness and prevention measures that will be followed shall include:

- Employee breaks or rest periods will be provided to minimize fatigue, improve alertness, and thereby reduce accident potential.
- Access controls will provide for the safety of non-landfill personnel.
- Routine preventive maintenance of equipment will be provided.
- Daily and weekly site inspections of the working areas will be performed by the Landfill Supervisor or designated employee.
- Appropriate personal protection equipment (PPE) will be kept onsite and maintained in good repair.
- Adequate turning area for hauling vehicles will be provided.
- Scavenging and unauthorized salvaging will not be allowed.
- Waste unloading will be restricted to designated areas only.
- Site personnel will be alert for possible hazardous or other unauthorized wastes.
- Unauthorized and/or prohibited wastes will be controlled or contained and removed as necessary.

### 6.2.2 Gatehouse

Preventative measures that will be followed in the gatehouse include the following:

- Verbally and/or visually screen all incoming waste loads for unauthorized wastes.
- Monitor to see that all incoming wastes loads are adequately covered, or otherwise protected or contained.
- Visually observe incoming vehicles for evidence of improper operation, faulty equipment, or other conditions that could be hazardous to personnel or other persons onsite.
- Maintain access to appropriate emergency equipment and first-aid materials.
- Display signs warning transporters that wastes including regulated hazardous wastes and other non-allowable wastes are prohibited.

### 6.2.3 Landfill Entrance Road, Haul Road, and Access Road

Landfill haul road and access road preventative measures include the following:

- Display speed limit, directional, and other precautionary signs.
- Provide road passable for two-way traffic.
- Maintain roadway free from obstructions.

## 7.0 FIRE PROTECTION PLAN (30 TAC §330.129)

A Fire Protection Plan (FPP) shall be established and followed as shown in the following subsections.

### 7.1 Fire Prevention Procedures

The following steps will be taken regularly by designated landfill personnel to prevent fires:

- Open burning of waste is prohibited at all times.
- Burning waste from incoming waste loads will be prevented from being dumped in the active area of the landfill. The gate attendant and equipment operators will be alert for signs of burning waste such as smoke, steam, or heat being released from incoming waste loads.
- Fuel spills will be contained and cleaned up immediately.
- Landfill equipment will not remain directly on the active working face of the site overnight.
- Dead trees, brush, or vegetation adjacent to the active waste disposal area will be removed, and grass and weeds managed so that forest, grass, or brush fires cannot easily spread to the landfill.
- Smoking is not allowed on the active areas of the landfill.
- Waste material will be properly compacted and covered with compacted earthen material.

The site will be equipped with fire extinguishers of a type, size, location, and number as recommended by the local fire department. Each fire extinguisher will be fully-charged and ready for use at all times. Each extinguisher will be inspected on an annual basis and recharged as necessary. These inspections will be performed by a qualified service company, and all extinguishers will display a current inspection tag. Inspection and recharging will be performed following each use. At a minimum, the gatehouse, equipment and maintenance area, and all landfill equipment and vehicles will be equipped with fire extinguishers.

A soil stockpile and site equipment (e.g., front-end loaders, haul trucks, excavators) will be maintained at all times to extinguish an onsite fire. A soil stockpile will be provided within 1,000 feet of the active working face and any other areas actively receiving materials for disposal, processing, temporary storage or recycling. Loaders and haul trucks will be used together to deliver sufficient soil to extinguish the file.

The stockpile(s) of earthen material available will be sized to cover the working face with a minimum six-inch layer of earthen material within one hour as shown in ~~t~~**Table ~~7-1~~5**.

**TABLE 5 FIRE PROTECTION STOCKPILE CALCULATION (FORMERLY TABLE 7.1)**

| Size of Working Face | | Area of Working Face | | | Total of Stockpile Size |
|---|---|---|---|---|---|
| L | W | LxW (Sq Ft) | Cu Ft | Cu Yd | Cu Yd x 1.15 |
| 150 | 100 | 15,000 | 7,500 | 278 | 320 |
| 150 | 125 | 18,750 | 9,375 | 347 | 400 |
| 150 | 150 | 22,500 | 11,250 | 417 | 480 |

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The Fire Suppression Calculations below are based upon the use of:

Two (2) five cubic yard loaders = 10 cubic yards transfer capacity

15 cubic yard haul truck and 25 cubic yard haul truck = 35 cubic yards haul capacity

**TABLE 6 ~~TABLE 7-1~~ FIRE SUPPRESSION SOIL REQUIREMENTS (FORM TABLE 8.1)**

| Length (feet) | Height (feet) | Depth (feet) | Volume of Soil (cubic yards (CY)) |
|---|---|---|---|
| 100 | 50 | 0.5 | 93 |
| 150 | 100 | 0.5 | 278 |
| 200 | 150 | 0.5 | 556 |

**Response Time Calculation Scenarios Assumptions:**
Front End Loader Capacity is 10 CY Haul Truck
Capacity is 35 CY
Haul Truck Speed is 10 MPH
Distance to soil stockpile is 1,000 feet (0.19 miles) Load time for trucks is 2 minutes

**Therefore:**
Travel time = 0.19 miles / 10 miles per hour = 1.14 minutes per load (one way)
= 1.14 minutes round trip + 2 minute load time = 3.14 minutes per load
93 CY / 35 CY/Load = 2.7 Loads x 3.14 minutes = 8.3 minutes
278 CY/35 CY/Load = 7.9 Loads x 3.14 minutes = 24.7 minutes
556 CY/35 CY/Load = 15.9 Loads x 3.14 minutes =49.9 minutes

## 7.2 Specific Fire-Fighting Procedures

The following procedures will be followed in the event of a fire:

If a fire occurs on a vehicle or piece of equipment, the equipment operator should bring the vehicle or equipment to a safe stop. If safety of personnel will allow, the vehicle must be parked away from fuel supplies, uncovered solid wastes, and other vehicles. The engine should be shut off and the brake engaged to prevent movement of the vehicle or piece of equipment. Fire extinguishers should be used to extinguish fire, if possible, without undue risk to the equipment operator.

If a fire is in the working face, the working face should immediately be covered with earthen material from the stockpile to smother the fire.

Firefighting methods include smothering with soil, separating burning material from other waste, and spraying with water from the water truck or water pumped from nearby water sources. If detected soon enough, a small fire may be fought with a hand-held fire extinguisher. A fire extinguisher will be located at the gatehouse and on each piece of equipment.

## ~~7.1~~7.3 General Rules for Fires

The following rules will be implemented in the event of a fire at Beck Landfill:

- Contact the City of Schertz Fire Department by calling 911.
- Immediately contact the gatehouse and LS.
- Equipment operators will be equipped with two-way radios or cell phones.
- Alert other site personnel.

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- Assess extent of fire, possibilities for the fire to spread, and alternatives for extinguishing the fire.
- If it appears that the fire can be safely fought with available ~~fire fighting~~firefighting devices until arrival of the Fire Department, attempt to contain or extinguish the fire.
- Upon arrival of Fire Department personnel, direct them to the fire and provide assistance as appropriate.
- Do not attempt to fight the fire alone.
- Do not attempt to fight the fire without adequate personal protective equipment.
- Be familiar with the use and limitations of firefighting equipment available onsite.

## ~~7.2~~7.4 Fire Protection Training

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Landfill personnel will be trained in the contents of the FPP. The following topics will be addressed:

- Fire prevention
- Fire safety
- Firefighting procedures

## ~~7.3~~7.5 TCEQ Notification

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Beck Landfill will make every reasonable effort to contact the TCEQ regional office immediately upon detection of a fire, if the fire is not extinguished within ten minutes of detection. At a minimum, the TCEQ regional office will be contacted no later than four hours by phone, and in writing within 14 days of the fire. The notification will include a description of the fire and resulting response.

# 8.0 OPERATIONAL PROCEDURES (30 TAC §330.127(3))

## 8.1 Access Control (§330.131)

Various measures are in place to control access to the Beck Landfill and other operations located within the facility boundary. Access controls are designed to prevent unauthorized access to operational areas in an effort to protect human health and safety and the environment. Additionally, site security measures are in place in an effort to reduce vandalism or disruption of Beck Landfill operations caused by unauthorized site entry.

Public access to the landfill is permitted via a gated entrance from Farm to Market Road (FM)

78. This gate will remain closed and locked when the facility is closed for business. Chain link fencing is installed parallel to FM 78. The Beck Landfill direct entrance is located approximately 630 feet southeast of FM 78, south of the co-located ready mix concrete facility. A scale and office are positioned such that all traffic entering and exiting the Beck Landfill can be monitored by site personnel.

No other public roadway intersects the Beck Landfill facility boundary. The operational areas of the landfill are located approximately 1,230 feet south of FM78. The site is surrounded by Cibolo Creek to the southwest and south. Zuehl Road parallels Line A of the landfill perimeter. Barbed wire fencing, expanded metal fencing and debris screens provide limited access controls from Zuehl Road to the northwest of the operational area. Barbed wire fencing is also currently installed around the entire perimeter of the active areas of the Beck Landfill.

### 8.1.1 Site Security

Unauthorized entry into the site is minimized by controlling access to the landfill site with perimeter fencing and a lockable steel security gate at the entrance.

Entrance to the landfill is monitored by a gatehouse attendant during site operating hours. Outside of normal operating hours, the site access gate will be locked and/or monitored by onsite personnel. Security cameras are installed to record vehicle traffic at the scalehouse.

Entry to the active disposal area of the site is restricted to designated personnel, approved waste haulers, and properly identified persons whose entry is authorized by appropriate site personnel. Visitors may be allowed in active areas only when accompanied by a site representative.

### ~~8.1.1~~8.1.2 Traffic Control

Public access to the landfill site is provided via the main public entrance road from FM

78. Signs are located along the entrance road, directing traffic to the gatehouse. The gate attendant will restrict site access to authorized vehicles and direct vehicles appropriately. To minimize incoming landfill traffic from queuing on FM 78, landfill personnel may direct traffic to form multiple lines upon entering the main access gate, prior to ticket processing at the gatehouse.

Authorized waste haulers will be directed to the appropriate waste disposal area by signs located along the designated landfill haul road and/or access road. Authorized waste transporters will deposit their loads as

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Roads not being used for access to disposal areas will be blocked or otherwise marked for no entry.

### ~~8.1.2~~8.1.3 Inspection and Maintenance Schedule

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The LFM and the LS conduct daily perimeter inspections along the perimeter of the operational areas of the Beck Landfill. Maintenance is conducted, as necessary, to ensure the effectiveness of perimeter controls.

### ~~8.1.3~~8.1.4 Access Breach

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Breaches to perimeter fencing or road barricades will be repaired as soon as practicable. Temporary repairs will be installed within 24 hours of detection. If a permanent repair ~~can not~~cannot be completed within 8 hours, the TCEQ Region 13 office (and any local pollution agency with jurisdiction that has requested notification) will be notified and a timeline for corrective action proposed. Permanent repairs that can be completed within 8 hours of detection do not need to be reported to the TCEQ Region 13 office.

## 8.2 Unloading of Waste (§330.133)

Trained personnel will monitor the incoming waste on the trucks at the gatehouse, prior to unloading. A trained staff person shall also be on duty during operating hours at each area where waste is being unloaded to direct and observe the unloading of solid waste. These personnel will be familiar with the rules and regulations governing the various types of waste that can or cannot be accepted for disposal.

The unloading of waste in unauthorized areas is prohibited. Waste unloading will be controlled to prevent disposal in locations other than those specified by site management. Any otherwise acceptable waste deposited in an unauthorized area will be promptly removed and properly disposed of at the working face. Signs with directional arrows and portable traffic barricades will help to restrict traffic to designated disposal locations.

Written procedures for the unloading of waste, in accordance with 30 TAC §330.133(f), will be retained onsite and made available for review by the executive director.

Refer to Section 5.0 of this SOP, "Detection and Prevention of Disposal of Prohibited Wastes" for additional waste handling procedures. The owner or operator is not required to accept any solid waste that the owner or operator determines will cause or may cause problems in maintaining full and continuous compliance with these sections.

### 8.2.1 Landfill Working Face (§330.133)

The unloading of solid waste shall be confined to as small an area as practical. The active landfill working face will be confined to an area consistent with the rate of incoming waste, while allowing for safe and efficient operation. The active landfill working face will be maintained not to exceed a maximum size of 150 feet by 150 feet.

### 8.2.2 Other Possible Unloading Areas

Designated Wet Weather Area
Designated Public Drop Off Area
Designated Asphalt Shingle Recycling Area
Designated C&D Recycling Area Designated
Wood Recycling Area

### 8.2.3 Transporter Requirements (§330.133(h))

As a requirement, it is the responsibility of all transporters to secure all incoming loads to prevent to occurrence of windblown wastes and to provide properly executed documentation, as necessary, for all incoming loads. This documentation includes, but is not limited to the following;

- Manifests for authorized Special Wastes
- Manifests for Non-Regulated Asbestos Containing Materials.
- Permits for enclosed containers

Penalties may, at the discretion of the operator, be imposed in the event transporters do not meet these requirements.

## 8.3 Hours of Operation (§330.135)

The waste acceptance hours for Beck Landfill will be from 7:00 a.m. to 7:00 p.m., Monday through Friday and 7:00am to 12:00pm on Saturday. The site is closed to the public on Sunday. Beck Landfill will post the authorized waste acceptance hours on the site sign as specified in §330.137.

There is no individual hourly limitation on conducting waste acceptance, filling, construction, earthmoving, or other activities that take place within the landfill waste acceptance hours. Operations separate from actual waste acceptance activity may be conducted as necessary except for between the hours of 9:00pm and 5:00am, seven days a week.As allowed in 30 TAC §330.135(c), temporary waste acceptance hours may be established for emergencies at the executive directors discretion. In the event of temporary waste acceptance hours are established, adequate records will be maintained per the requirements of 30 TAC §330.135(d)

Alternate operating hours for special occasions, special purpose events, holidays, or other special occurrences may be designated (up to five days per year).

## 8.4 Site Sign (§330.137)

A sign will be displayed at the gated entrance to the site. This sign will measure at least 4 feet by 4 feet, and have lettering of at least 3 inches in height. The sign will state the name of the site, type of site, hours and days of operation, and the TCEQ permit number. An emergency 24-hour contact phone number and the local emergency fire department phone number will also be included. The emergency contact phone number will reach an individual with the authority to obligate the Beck Landfill at all times the landfill is closed. The site sign will be readable from the site's main entrance.

Signs prohibiting receipt of prohibited wastes including putrescible waste, hazardous waste and PCB waste, closed drums, smoking, and un-tarped loads will be posted at the gatehouse.

## 8.5 Control of Windblown Solid Waste and Litter (§330.139)

The site will be operated in such a way as to minimize windblown material. The working face will be maintained and operated in a manner to control windblown solid waste. Windblown material and litter will be collected and properly managed to control unhealthy, unsafe, or unsightly conditions by the following methods:

- Waste transportation vehicles using this Beck Landfill will be required to use adequate covers or other means of covering and securing loads. The adequacy of covers or securing of incoming wastes will be checked at the gatehouse. A sign will be prominently displayed at the gatehouse stating that all loads shall be properly covered and secured.
- The active working face will be limited to as small an area as practical for the safe operation of the incoming waste hauling vehicles, and operation of compaction equipment, and delivery and placement of weekly cover soil.
- Excess working face area will be covered as frequently as needed, to assist with the control of windblown waste.
- The Beck Landfill will provide litter control fences, as necessary, at appropriate locations near the working face and elsewhere. The litter control fences will be constructed of wire or plastic mesh screens attached to portable or permanent frames or temporary fences. The litter control fence will be of sufficient height and will be located as close as practical to the active area to control windblown waste and litter.
- Windblown waste and litter along the entrance road, the gatehouse area, within the permit boundary, and that has accumulated along the permit boundary will be collected once a day and returned to the active working face. Should windblown waste cross the permit boundary onto adjacent property, landfill personnel, with landowner permission, will access the property and conduct litter pickup. Some adjacent properties around the landfill permit boundary is owned by Beck Landfill related companies, therefore permission is not required for personnel to enter those adjacent properties for litter pick- up,
- Adjacent filled areas and the landfill flood control dike system will provide protection from the prevailing winds. If additionally necessary, earthen berms will be used to assist in control of windblown wastes by providing a windbreak against prevailing winds.

## 8.6 Easements and Buffer Zones (§330.141)

### 8.6.1 Easements (§330.141(a))

Solid waste unloading, storage, disposal, or landfill operations will not occur within any easement, buffer zone, or right-of-way that crosses the site. No solid waste disposal will occur within 25 feet of the centerline of any utility line or pipeline easement, unless otherwise authorized by TCEQ. All easements will be clearly marked as specified in Section 8.7 of this SOP. Pipelines and utility easements will be marked with posts extending a minimum of six feet above ground surface at intervals that do not exceed 300 feet. There are currently no easements or right-of-ways located within the permit boundary.

### 8.6.2 Buffer Zones (§330.141(b))

The buffer zone is defined as the area between the permit boundary and the limit of waste disposal. The limit of waste is located along the inside edge of the perimeter road. No solid waste unloading, storage, disposal, or processing operations will occur within any buffer zone. The buffer zones will provide for safe passage for fire-fighting and other emergency vehicles. The buffer zones vary around the perimeter of the site, but in no case are they less than 50 feet. All buffer zones will be clearly marked as specified in Section 8.7 of this SOP.

## 8.7 Landfill Markers and Benchmark (§330.143)

Landfill markers will be installed to clearly identify significant features. The markers will be steel, wooden, or other durable material posts, and will extend at least 6-ft above the ground surface. The markers will not be obscured by vegetation and will be placed in sufficient numbers to clearly show the required boundaries. Markers will be inspected on a monthly basis and markers that are removed or destroyed will be replaced within 15 calendar days of discovering a marker does not meet regulatory requirements. A permanent concrete set benchmark monument, as required by 30 TAC §330.143(8) and indicated in **Figure** ~~8.3~~1 will be installed and maintained within the landfill permit boundary. Records of all marker and benchmark inspections will be maintained at the facility. Markers will also be repainted as needed to retain visibility. Guidelines for type, placement, and color-coding of markers are outlined below.

1. **Site Boundary:** Site boundary markers will be installed and will be painted black. The markers are placed at each corner of the site and along the permit boundary at intervals no greater than 300 ft.
2. **Buffer Zone:** Buffer zone markers will be painted yellow. Markers identifying the buffer zone will be placed a minimum of 50 ft from the permit boundary and at the buffer zone corners and along the buffer zone boundary at intervals of no greater than 300 ft.
3. **Easement and Right-of-Way:** If and where applicable, easement and right-of-way markers will be painted green. The markers will be placed along the boundary of easement and right-of-way. Markers will be placed at each corner within the site and at the intersection of the site boundary.
4. **Landfill Grid System:** Landfill grid system markers will be painted white. The grid system will consist of black lettered markers along two opposite sides and numbered markers along the other two sides. The markers will be spaced no greater than 100 ft apart measured along perpendicular lines. Intermediate markers will be installed in the case where markers cannot be seen from opposite boundaries.
5. **Flood Protection Markers:** If and where applicable, flood protection markers will be painted blue. The markers identifying the flood protection zone will be placed at each corner of the site and along the limits of the zone, at intervals of no greater than 300 ft.
6. **Point of Compliance for Groundwater Monitoring System (§330.403(a)(2)**: The Beck Landfill consists of individual waste cells situated within an elevated bermed perimeter. Impermeable slurry-walls constructed within the elevated bermed perimeter, creating a continuous barrier between the contents of the landfill and the surrounding environment. In order to determine whether the landfill has released contaminants to the uppermost aquifer, five (5) monitoring wells are installed along the exterior of the dike line perimeter and associated

piezometer wells are installed along the interior of the dike line perimeter. Annual water quality testing is conducted in each of the monitoring wells and the results are compared to historical data collected at these points. If an anomaly is detected from historical results, monitor wells are re-tested and additional testing may be performed at each of the associated piezometer wells to determine whether constituents of concern are detectable within the dike line. Additional sampling may be conducted in the Cibolo Creek, which surrounds the landfill on three sides to determine if constituents of concern are detectable in surrounding surface water.

## FIGURE 1 BECK LANDFILL MARKERS AND BENCHMARK

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## 8.8 Material along the Route to the Site (§330.145)

Beck Landfill will take steps to ensure that vehicles hauling waste to the site are covered with a tarp, net, or other means to properly secure the load. These steps are necessary to prevent the escape of any part of the load. Signs are posted at the landfill entrance gate and gatehouse notifying haulers of this requirement. Enforcement of this rule may include 1) reporting offenders to proper law enforcement officers, 2) adding surcharges, or 3) prohibiting haulers access to the landfill.

Beck Landfill will provide for the cleanup of Type IV compatible waste materials spilled along and within the right-of-way of FM 78 (or any future entrance to the landfill from a public access road) for a distance of 2 miles in either direction from the entrance road connection to FM 78. Cleanup for the spilled materials will be performed once per day. The LFM or LS will consult with TxDOT officials concerning cleanup of state highways and right-of-ways consistent with §330.145.

## 8.9 Disposal of Large Items (§330.147)

Most non-recyclable large items can be placed and compacted during normal site disposal operations. Large items that cannot be recycled may require crushing with a landfill compactor or bulldozer to reduce the potential for voids within the waste cell. If the handling and crushing of large items interferes with normal operations, the items shall be temporarily stored near the working face until scheduling allows for their proper disposal. Such items will be removed often enough to prevent the items from becoming a nuisance and to avoid an excessive accumulation of the items. All such temporarily stored items shall also be stored in an area so as to minimize interference with the working face operations.

Refrigerators, freezers, air conditioning units, or other items that may contain chlorinated fluorocarbon (CFC) refrigerant will be handled in accordance with 40 CFR §82.156(f).. Refrigerators, freezers, air conditioning units, or other items containing CFC will not be accepted unless the CFC contained in the item has been captured and sent to an approved CFC disposal or recycling facility and the generator or transporter provides written certification that the CFC has been evacuated from the unit. Items such as electrical equipment, which may contain PCBs, will not be knowingly accepted for disposal or recycling.

## 8.10 Odor Management Plan (§330.149)

The Beck Landfill will implement an odor management plan (OMP) to control odors resulting from site operations. This OMP addresses the identification of potential sources of odors and includes methods to minimize odors or sources of odors.

### 8.10.1 Sources of Odor

Sources of odor that emanate from a landfill can vary considerably and may include the wastes being delivered to the landfill, the open working face, ponded water, or contaminated water. Since putrescible waste is not accepted at site, the potential generation of odors is limited.

### 8.10.2 Odor Minimization

The primary objective of this Odor Management Plan is to minimize odor generation and odor emissions. Methods used to achieve this objective include waste handling procedures, the placement of cover materials, contaminated water handling procedures, and the elimination of ponded water.

### 8.10.3 Waste Handling Procedures

Wastes are to be deposited at the working face, spread into layers that can be readily compacted and covered. While weekly cover is required at the site, wastes with odors may be placed at the working face in a manner that allows for immediate cover.

### 8.10.4 Cover

Weekly cover will limit odor generation by preventing air and water from further impacting the wastes. If odors persist, soil covers may be placed more frequently than weekly. If odors persist after placement of 6 inches of soil cover, additional cover soils may be placed.

### 8.10.5 Contaminated Water Handling Procedures

Contaminated water may become a source of odors and will be segregated from clean storm water. See section 8.23 of this SOP for details regarding the management of contaminated water.

### 8.10.6 Ponded Water

Water ponded over waste disposal areas may become a source of odors and should be eliminated prior to the occurrence of odors. Ponded water areas will be filled in and re- graded within 7 days of the detection, weather permitting.

## 8.11 Disease Vector Control (§330.151)

Type IV landfills, with proper compaction and adequate intermediate and monthly cover, will typically require minimal vector control under normal circumstances. Landfill personnel will be constantly appraising site conditions as they perform their regular duties and should report unusual circumstances or areas requiring maintenance to the landfill operator. The regular basis in order to appraise all circumstances ranging from windblown litter and the condition of drainage features to quality of buffers and fences.

Pest populations primarily including rodents, and mosquitoes, shall be an additional vector item. Currently such species exist at the site but are held within reasonable balance by natural conditions.

Landfill personnel will monitor ongoing operations and be prepared to take additional action should it be required.

These actions may include:

- Temporarily applying cover more frequently than weekly;

- Temporarily applying a thicker layer of weekly cover;
- Use of non-lethal bird control measures such as pyrotechnics, baiting, decoys, etc. to discourage birds at the site and scare them away if they become a nuisance; and
- Contracting with professional exterminators, if necessary, to control rodents or other pests that may appear at the site.

## 8.12 Site Access Roads (§330.153)

The main public landfill entrance road from FM 78 will consist of approximately 1200 feet of concrete surfaced road, from the entrance to the gatehouse, continuing to the main landfill dike- line entrance point. The main internal access roads beyond the end of the concrete surfaced road will be surfaced with crushed rock and secondary internal access roads will be constructed of and maintained with sand and gravel. Disposal operations may be suspended during periods of heavy rain at the discretion of the LFM and/or LS depending on the safe and efficient accessibility of the active disposal area.

Equipment utilized within the site will also be utilized to maintain roadways allowing proper grading and drainage as well as to minimize rutting. The landfill operator shall also be responsible for inspecting Highway78 on a daily basis and during periods of inclement weather and will promptly clear any mud which has been tracked onto FM 78.

Dust control will similarly be the responsibility of the landfill operator. During periods of dry weather, the LS shall direct personnel to utilize a water truck as necessary to wet site roads.

Landfill haul roads, and access roads will be maintained in a reasonably dust-free condition by periodic spraying from a water truck. Grading equipment will be used as needed to control or remove mud accumulations on internal roads including the entrance road. Stockpiles of crushed stone, concrete rubble, used asphalt, masonry demolition debris, or other similar material may be utilized in maintaining passable internal access roads including re-grading to minimize depressions, ruts, and potholes. The site entrance road, landfill haul road, and access roads will be maintained in a clean and safe condition. Litter and debris along site access roads will be picked up daily and returned to the active working face.

## 8.13 Salvaging and Scavenging (§330.155)

Salvaging may be performed by landfill personnel under the direction of landfill management, and shall not be allowed to interfere with prompt sanitary disposal of solid waste or to create public health nuisances. Salvaged materials will be considered as potentially recyclable materials and will be stored in a safe and secure manner. All salvaged material shall be removed from the site as necessary to prevent an excessive accumulation to the material at the site. Salvaged material will be removed often enough to preclude the discharge of any pollutants from the area in accordance with 30 TAC §330.155.

Scavenging will be prohibited at all times.

## 8.14 Endangered Species Protection (§330.157)

No known endangered or threatened species were present at the site during the permitting process. Workers will be instructed to report the sighting of possible endangered species to the Landfill

Supervisor, who shall contact the U.S. Fish and Wildlife Service to help identify any potentially endangered species.

## 8.15 Landfill Gas Control and Management (§330.159 and §330.371)

The LS is responsible for executing the Landfill Gas Management Plan in order to ensure that the concentration of methane gas generated by the facility does not exceed 1.25% by volume in facility structures (excluding gas control or recovery system components, if any), and the concentration of methane gas does not exceed 5% by volume in monitoring points, probes, subsurface soils, or other matrices at the facility boundary defined by the legal description in the permit.

### 8.15.1 Type and Frequency of Monitoring

Beck LF determined the type and frequency of monitoring based upon the factors described herein.

**Soil Conditions:** Within the LF perimeter flood control dike and along Lines D, E, F, G, and the northeastern side of A, the dominant soil type is mapped as Sunev loam, 0 to 1 percent slopes. This well drained soil may be up to 72 inches deep, comprised of up to 70% calcium carbonate, and is defined as Hydrologic Soil Group B. Along the northwestern side of Line A, the dominant soils type is the Barbarosa silty clay (0 to 1 percent slopes). This well drained soil may be up to 72 inches deep, comprised of clayey alluvium, and is defined as Hydrologic Soil Group C. Along Lines B and C, the dominant soil type is the Bosque and Seguin soils, frequently flooded. This well drained soil is typical of floodplains and may be up to 62 inches deep, comprised of up to 20% calcium carbonate, and defined as Hydrologic Soil Group B. These soils are not hydric.

**Hydraulic and Hydrologic Conditions:** The Landfill is constructed within an oxbow of the Cibolo Creek. The floor of the landfill is keyed into the Taylor-Navarro Shale, a clay formation that acts as a natural, impermeable liner. The landfill is enclosed by a slurry trench within a compacted clay embankment. The embankment and slurry trench were designed to isolate the landfill from communication with shallow, perched groundwater associated with the surrounding Cibolo Creek.

**Location of Facility Structures and Property Boundaries:** There are only three, permanent, enclosed structures within the facility boundary: the readymix plant office located approximately 885 feet from the toe of the embankment; the scalehouse located approximately 610 feet from the toe of the embankment, and an uninhabited house located approximately 1,030 feet from the perimeter embankment. All other structures at the facility are temporary. Monitoring of these enclosed structures is not proposed at this time. If the concentration of methane in the landfill gas monitoring probes approaches the LEL monitoring of these enclosed structures will be considered.

**Utility Lines and Pipelines:** There are two utility lines that approximately parallel the northwest side of the landfill (along Lines B and C). One is an old wastewater line, constructed of clay pipe, the other is a cast-iron water line. The clay pipe wastewater line is approximately 75 feet northwest of the toe of the flood-control dike along which the landfill gas monitoring probes will be installed. The water line is about 150 to 200 feet northwest of the toe of the flood control dike. The exact locations of these utility lines are unknown, even to the City of Schertz. Neither landfill gas monitoring probes nor vents along the utility lines are proposed at this time. These will be considered only if the concentration of methane in the landfill gas monitoring probes approaches the LEL.

## 8.16 Landfill Gas Management Plan

### 8.16.1 Introduction

This Landfill Gas Management Plan ("Plan") ~~has been~~was developed for the Beck Landfill, a Type IV landfill in Schertz, Texas, as required by 30 Tex. Admin. Code (TAC) §330.63(g). This Plan addresses the requirements set forth in 30 TAC §330.371. The Plan describes the ~~proposed~~ system, including installation procedures, monitoring procedures, and procedures to assess the need for maintenance, repair, or replacement; and backup plans to be used if the monitoring system becomes ineffective or must be expanded. This Plan also outlines notification procedures and possible remediation activities, if required.

The requirements of this landfill gas management plan will be in effect through the remainder of the operating life of the landfill, landfill closure, and will continue for a period of 5 years after certification of final closure of the facility, unless altered by TCEQ. Any revisions to this plan will be submitted to TCEQ for review and approval.

### 8.16.2 Facility Boundary Monitoring Network

Six landfill gas monitoring probes are ~~to be~~ installed along the northwest exterior toe of the flood control dike surrounding the landfill opposite grid markers 5, 10, 15, 20, 25 and 30 (**Fig~~.~~ure ~~8~~1**). The nominal spacing between the landfill gas monitoring probes is 500 feet as measured along the top of the flood control dike. The probes ~~will be~~are labeled as MM-1 through MM-6 in the order presented above. A single probe is specified at each location to accommodate the heterogeneity of the alluvial deposits through which landfill gas might migrate,

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### 8.16.3 Gas Monitoring Probe Installation

The landfill gas monitoring probes ~~will be~~were drilled and installed by Vortex Drilling, a driller registered in the state of Texas, under the supervision of Kevin K. Bryant (Terracon), a Texas-licensed professional geoscientist~~ or engineer~~. The borings ~~will be~~were advanced using hollow-stem augers with samples visually classified and logged in accordance with the Unified Soil Classification System (ASTM No. D-2487). ~~If in the opinion of~~As directed by the supervising geologist~~ or engineer~~, boring were advanced in locations where subsurface ~~the~~ materials encountered ~~are~~ were not too impermeable to allow migration of landfill gas emissions~~, the borings may be moved left or right along the toe of the flood control dike to find more suitable subsurface conditions for potential gas migration through the vadose zone~~.

The probes ~~(Fig. 9)~~(**Figure 2**) ~~will be~~are screened with factory fabricated 1/2-inch diameter 0.010 inch Schedule 80 PVC screen from the total depth of the probe, less an end cap, to no less than 4 or 5 feet below the ground surface (**Figure 3**) ~~(Fig 8)~~. A solid Schedule 80 PVC riser ~~will~~ extends upward from the screen to approximately 3 feet above the ground surface capped with a quick-connect device to allow purging and monitoring with the gas monitoring meter. All joints ~~will~~ are either be threaded or use compression fittings; no glue or solvent-based welding is permitted.

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A 20-40 mix of silica sand or concrete sand (ASTM C-33), as available, ~~will be~~ was tremied around the probe screen to a minimum of 6 inches above the top of the screen, ~~. F~~followed by hydrated bentonite pellets to 6 inches below the ground surface. A lockable steel well-head protector ~~will be~~is installed over the riser and a 4-foot by 4-foot by 6-inch thick reinforced concrete pad is poured around the steel well-head protector to stabilize and protect the well head. Pea gravel, or the equivalent, ~~will be~~is placed around the riser within the steel well-head protector to stabilize the monitoring probe, and one or more weep holes ~~will be~~are drilled into the bottom of the steel well-head protector to allow drainage of excess moisture. Concrete filled steel bollards ~~will be~~are installed around the surface pad as deemed necessary to provide additional protection to the well-head.

Boring/completion logs for the landfill gas monitoring robes ~~will be~~were prepared~~,~~ and submitted to TCEQ and to the Texas Department of Licensing and Regulation (DLR), and retained in the site operating record. A copy of this record is provided in **Appendix B**.

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Installation of landfill gas monitoring probes around the remainder of the landfill is unnecessary. Should any landfill gas penetrate the slurry wall and flood control dike, it would either be discharged to the atmosphere or enter the vadose zone, which terminates at Cibolo Creek. The creek, then, is a barrier to landfill gas migration. Other than on the northwest side of the landfill, there are no structures in which landfill gas could accumulate between the landfill and the creek.

**FIGURE ~~8~~2 ~~PROPOSED~~ LOCATIONS OF LANDFILL GAS MONITORING PROBES SHOWN ON AERIAL PHOTO**

**FIGURE ~~9~~3 ~~[~~SCHEMATIC DRAWING OF LANDFILL GAS MONITORING PROBE~~]~~**

### 8.16.4 Landfill Gas Monitoring Procedures

The concentration of methane in the landfill gas monitoring probes will be measured on a quarterly basis per calendar year, with two of those monitoring times, to the extent possible, corresponding with sampling of the ground water monitoring wells at the landfill. The integrity and labelling of the monitoring probes, including the integrity of the steel, well-head protectors, locks, and concrete pads, will be inspected during or before each monitoring event and repairs or replacement made as needed. Repair or replacement of any landfill gas monitoring probes will be documented and retained in the site operating record.

Beck Landfill uses a QRAE 3 wireless four-gas monitoring instrument, -- carbon monoxide, hydrogen sulfide, and oxygen in addition to methane and the LEL. This instrument is suitable for surface monitoring and for sampling the landfill gas monitoring probes. Operation of the device should be in accordance with the instrument manual. If at any time the instrument fails, it will be repaired or replaced, TCEQ will be informed in writing, and the repair or replacement noted in the site operating record. Results of all methane monitoring events, including purge volumes, will be retained in the site operating record.

### 8.16.5 Landfill Gas Monitoring Exceedance Record Keeping and Reporting

Results of landfill gas monitoring will be kept in the site operating record; however, If during any monitoring event, the volumetric methane concentration in any landfill gas monitoring probe exceeds the LEL, the probe will be resampled within 24-hours, and again within 7 days to confirm the exceedance. Reporting will be in accordance with 30 TAC §330.371(c). Notifications will be as follows:

MSW Permits Section, MC-124
Texas Commission on Environmental Quality
PO Box 13087
Austin, TX 78711-3087
512-239-6784 (O); 512-239-6000 (Fax)

TCEQ Region 13 – San Antonio Waste Section
14250 Judson Road
San Antonio, TX 78233-4480
210-490-3096 (O); 210-545-4329 (Fax)

Guadalupe County EMS at 911

Schertz EMS
1400 Schertz Parkway, Building 7
Schertz, TX
830-619-1400

A plan to address the exceedance will be formulated and implemented, with TCEQ approval, if possible within 60 days. The precise nature of the plan will depend on which probes show exceedances; those opposite near-by residences or those opposite of commercial businesses. . The potential remedial actions may include precisely locating the utility trenches to install monitoring probes and/or vents, sampling the nearest residences, and installation of additional gas monitoring probes or vents. An alternative schedule may be implemented in accordance with 30 TAC §330.371(d).

## 8.17 Oil, Gas, and Water Wells (§330.161)

### 8.17.1 Water Wells (§330.161(a))

There are no known water wells located within the landfill permit boundary. In the event that a water well is discovered within the landfill permit boundary, Beck Landfill shall provide written notification to the executive director of the location of any and all existing or abandoned water wells situated within the facility upon discovery during the course of facility development. The facility operator shall, within 30 days of such a discovery, provide the executive director with such notification and written certification that such wells have been capped, plugged, and closed in accordance with all applicable rules and regulations of the commission or other state agency. Any water or other type of wells under the jurisdiction of the commission must be plugged in accordance with all applicable state requirements or additional requirements imposed by the executive director. A copy of the well plugging report required to be submitted to the appropriate state agency must also be submitted to the executive director within 30 days after the well has been plugged.

### 8.17.2 Oil and Gas Wells (§330.161(b))

There are no known crude oil or natural gas wells or other wells associated with mineral recovery within the landfill permit boundary. If crude oil or natural gas wells, or other wells associated with mineral recovery are located, the landfill will provide written notification to the TCEQ executive director of their location within 30 days of their discovery. For crude oil or natural gas wells, or other wells associated with mineral recovery, the Landfill Supervisor will provide the executive director of the TCEQ with written certification that all such wells have been properly capped, plugged, and closed in accordance with all applicable rules and regulations of the Railroad Commission of Texas. A copy of the well plugging report to be submitted to the appropriate state agency will also be submitted to the executive director of the TCEQ within 30 days after the well has been plugged. A permit modification will be submitted to the executive director if revisions to the liner installation plan are required as the result of well abandonment.

## 8.18 Compaction (§330.163)

Compaction of waste material will be accomplished by a landfill compactor, dozer or similar equipment. The site dozer will be used to compact waste should the primary landfill compactor be temporarily out of service. Adequate compaction will be accomplished to minimize future consolidation and settlement and provide for the proper application of intermediate and final cover. Incoming waste will be spread in layers and thoroughly compacted.

## 8.19 Landfill Cover (§330.165)

### 8.19.1 Soil Management

Management of soil for use in and around the landfill area will be an ongoing process. In general, soil for use as weekly cover, intermediate cover, final cover, and other uses will be available onsite. This onsite soil will be obtained from excavation that is ongoing as part of the excavation and development of landfill cells.

In addition to this available material located on the landfill property, a stockpile of material will be kept available on site. The stockpile will consist of soil that has not previously come in contact with waste, and will be of sufficient volume to provide at least one day's application of 6 inches of weekly cover over the working face. As this stockpile is used, it will be replenished as soon as practical. The soil may also be used in emergency situations for fire control.

### 8.19.2 Weekly Cover (§330.165(b))

Weekly cover of waste is necessary to control disease vectors, windblown waste, odors, fires, scavenging, and to promote runoff from the fill area. At least 6 inches of well- compacted soil cover material that has not been previously mixed with garbage, rubbish, or other solid waste will be placed over all solid waste received during that same day.

To ensure that the weekly cover soil will be adequate (i.e., minimize vectors, contaminated storm-water runoff, odors, etc.) the following procedures will be followed:

- Cover will be sloped to drain.
- Cover will be compacted with a minimum of two passes with the dozer tracks to minimize infiltration of storm water.

The LS will document weekly cover location and visually inspect during placement that a minimum of 6 inches of cover soil has been placed and that no waste is exposed. The LS shall document, as cover is necessary, on at least a weekly basis, the daily cover placement area and indicate that he has visually verified the thickness and condition in the Cover Inspection Record, After each rainfall event, the Landfill Supervisor will inspect cover areas for erosion, exposed waste or other damage, and repair as necessary.

### 8.19.3 Intermediate Cover (§330.165(c))

Areas that receive waste and subsequently become inactive for longer than 180 days will receive intermediate cover. Intermediate cover must include an additional 6 inches of suitable earthen material, for a total cover thickness of at least 12 inches, capable of sustaining native plant growth. This additional earthen material will be seeded or sodded following application in accordance with 30 TAC §330.165(c). The intermediate cover will be graded to prevent erosion and ponding of water. Storm water runoff from areas that have received intermediate cover are considered to have not come into contact with waste material and are to be managed as necessary as uncontaminated storm water runoff.

### 8.19.4 Final Cover (§330.165(f))

Final cover placement will occur as areas of the site are filled to the maximum waste fill grades. Final cover placement over individual areas will be in accordance with Beck Landfill's existing Final Closure Plan. Surface water will be managed throughout the active life of the site to minimize infiltration into the filled areas and to minimize contact with solid waste. Erosion of final or intermediate cover will be repaired promptly by restoring the cover material, grading, compacting, and seeding it as necessary. Such periodic inspections and restorations are required during the entire operational life and for the post closure maintenance period.

In general, final cover placement over completed portions of the site will consist of the following steps:

- Survey controls will be implemented to control the filling of solid waste to the bottom level of the intermediate cover layer elevation.
- The final cover system layers will be constructed. Testing of the various components of the final cover system will be performed in accordance with the site's existing Final Closure Plan.
- A final cover certification report complete with an as-built survey will be prepared by an independent registered professional engineer and submitted to the TCEQ for approval.
- The TCEQ-approved final cover certification report will be maintained in the SOR. The cover inspection record will be updated to reflect areas where final cover has been placed.

### 8.19.5 Erosion of Cover (§330.165(g))

The LS will inspect intermediate cover at the site on a weekly basis. The final cover system, including erosion control structures will be maintained during and after construction. During the active life of the site, the LS will inspect the final cover system on a weekly basis. During post- closure care, the final cover system will be visually inspected on a monthly basis. In accordance with 30 TAC §330.165(g), eroded or washed-out areas of intermediate or final cover which are deep enough to jeopardize the intermediate or final cover, defined as exceeding four inches in depth as measured from the vertical plane from the erosion feature and the 90 degree intersection of this plane with the horizontal slope face or surface, will be repaired within 5 days of detection. Repair of final cover includes restoring cover, grading, compacting, and seeding as required by 30 TAC §330.165(g) In addition, all cover areas will be visually inspected following significant rainfall events. Documentation of weather delays for the repairs will be included in the cover inspection record. Weekly inspections and restorations are required for the active life of the landfill.

### 8.19.6 Cover Inspection Record (§330.165(h))

A cover inspection record will be maintained and be readily available for inspection in accordance with §330.165(h). For weekly and intermediate cover, the record will specify the date cover was accomplished (no exposed waste), area covered (by use of the grid system), how it was placed, and when it was completed. When applicable, dates of erosion detection and dates of completion of repair will be identified in the cover inspection record. For final cover, the record will show the final cover area completed, date cover was applied and thickness of final cover. The final cover certification report for each area will be referenced in the record. Each entry in the record will be certified by the signature of the Landfill Supervisor that the work was accomplished as stated in the record.

## 8.20 Ponded Water (§330.167)

Beck Landfill will prevent ponding of water over areas that have received waste through site operation practices such as grading and maintenance. The Ponded Water Plan (PWP) provides direction to the landfill operations for the prevention and elimination of ponded water.

The Ponded Water Plan is as follows:

- The landfill will place daily cover, intermediate cover, and final cover in accordance with requirements established in Section 8.18 – Landfill Cover.
- The landfill will inspect the surface of areas that have received waste and landfill cover consistent with Section 8.18 – Landfill Cover and Section 8.24 –Site Inspection and Maintenance Schedule.
- Site grading and maintenance as required by Section 8.18 will minimize the ponding of water over areas containing waste.
- Should ponding of water occur, the ponded water will be removed and the depressions filled within 7 days, weather permitting. Landfill cover will be repaired consistent with procedures specified in Section 8.18.
- If the ponded water has come into contact with waste, or waste-contaminated soils, it will be treated as leachate and handled accordingly

## 8.21 Disposal of Special Wastes (§330.171)

Beck Landfill may accept Special Wastes, as defined in §330.3, assuming their physical nature meets the definition of wastes acceptable for disposal at a Type IV landfill as defined in §330.5(a)(2). Special Wastes may require TCEQ authorization for disposal on a case by case basis. Requests for approval to accept special waste shall include those items specified in §330.171(b)(2)(A), (C) and (D). Requests must be submitted and certified by the generator to the TCEQ executive director or to Beck Landfill for submittal to the TCEQ executive director.

The request must include the following:

A complete description of the chemical and physical characteristics of each waste and the quantity and rate at which each waste is produced and/or the expected frequency of disposal, including a statement that the waste is not a Class I industrial waste as defined in §330.3.

The approval for acceptance and disposal of Type IV landfill compatible special wastes at Beck Landfill will be waste-specific consistent with §330.171(b)(1). The executive director may authorize the receipt of special waste with a written concurrence from Beck Landfill. The landfill is not required to accept the waste.

In addition to authorized special wastes, Beck Landfill may accept non-regulated asbestos- containing materials (NRACM) as follows:

> *Non-regulated asbestos-containing materials 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 of this SOP. 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.*

## 8.22 Disposal of Industrial Wastes (§330.173)

Industrial waste (nonhazardous) 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 I wastes will not be accepted at the Beck Landfill. Class II and Class III industrial solid wastes may be accepted at the Beck Landfill, consistent with the limitations of §330.5(a)(2) and provided that disposal of these wastes does not interfere with proper operation of the Beck Landfill.

## 8.23 Visual Screening of Deposited Wastes (§330.175)

The nature of land use immediately adjacent to the site, and the flood control dike will screen disposal areas from any reasonable site line. The south and west sides of the site border on Cibolo Creek and undeveloped land. The east side and the north side of the site are bordered by the Beck Readymix concrete plant. The site partially borders Zuehl Street on the northeast border of the site. Sufficient separating distance and natural vegetation will be adequately maintained to screen ongoing disposal operations from residences along Zuehl Street. Additional visual screening will be provided if the executive director determines a need for such.

## 8.24 Contaminated Water Discharge

Run-off, which has come into contact with the working face, will be collected in a bermed area near the base of the working face and used for improved compaction of waste and/or for dust control within the permit boundary of the landfill.

If the volume of contaminated water is greater than can be used for improved waste compaction and or dust control as described above, a retention pond located outside the active disposal area, but within the permitted landfill has been designated to receive water for storage. The retention pond will be sized to handle water volume received during the three wettest consecutive months of the year. Any berms around the active working face and/or around the retention pond will be a minimum height of 3 feet with a crest width of 2 feet.

Beck Landfill will take all steps necessary to control and prevent the discharge of contaminated water from the site. Should the discharge of contaminated water become necessary, the LFM will obtain specific written authorization from the TCEQ prior to discharge. All water coming in direct contact with waste will be treated as leachate. 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 Site Inspection and Maintenance Schedule

Beck Landfill will periodically perform inspections of the site, including landfill operations. Inspections will be performed as indicated in **Table ~~8.2~~7**. The LS or designee is responsible for performing the inspections. Records of site inspections will be maintained as part of the SOP.

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## TABLE 7 LANDFILL INSPECTION AND MAINTENANCE SCHEDULE (FORMERLY TABLE 8.2)

| **Item** | **Inspection Area or Activity** | **Frequency** | **Maintenance Activity** |
|---|---|---|---|
| Vectors | Active waste disposal areas | Daily on days when the site is receiving waste | Implement Vector Control described in Section 8.11 of SOP |
| Fence/Gate | Perimeter fence and gate structures | Monthly | Repair and provide notification if required |
| Access Road | Access Road Condition | Monthly | Repair as required |
| Mud Tracking | Mud tracking onto FM 78 | Daily on days when mud is tracked | Remove mud as required |
| Dust | Internal active site access road | Daily on days when the site is receiving waste | Apply water or dust suppressants |
| Windblown waste | Litter or debris from landfill operations, waste vehicles | Daily on days when the site is receiving waste | Pick up litter or debris |
| Waste Spilled on Route to the Site | Litter or debris from waste vehicles along access road | Daily on days when the site is receiving waste | Pick up litter or debris |
| Landfill Markers | Marker damage, color-coding, and general location | Monthly | Repair/replace/perform maintenance within 15-days of detection |
| Weekly Cover | Weekly cover placement, thickness, exposed waste and erosion | Weekly | Add additional soil as required |
| Intermediate Cover | Intermediate cover placement, thickness and erosion | Weekly and within 2 operating days following the end of a rainfall event greater than 1 inch | Add additional soil or regrade as required |
| Seepage from Weekly, Intermediate and Final Cover | Observe presence of contaminated water/leachate | Weekly and within 2 operating days following the end of a rainfall event greater than 1 inch | Isolate, remove and manage liquids and affected soils and replace with clean soil |
| Ponded Water | Ponded water accumulation in waste disposal areas | Weekly | Add additional soil or regrade within 7 days of detection if allowed by weather/site conditions |
| Perimeter Channels and Detention Ponds | Perimeter channels and detention pond excess sediment accumulation, outlet structure conditions, and erosion control requirements | Weekly | Maintain and repair as required |
| Random Load Inspections | Detection of unauthorized waste | Daily on days when the site is receiving waste | Document as identified in SOP. Provide notification and removal of regulated hazardous and prohibited PCB waste as required. |
| Flood Control Dike Structure | Ensure dike integrity, including erosion, vegetative cover, ponded water and dike road conditions | Weekly | Maintain and repair as required. |

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# 9.0 SEQUENCE OF DEVELOPMENT (30 TAC §330.127(2))

Beck Landfill is divided into 41 individual cell areas as shown in **Figure ~~9.1~~4**, ~~located in the Attachments section~~ of this SOP. Per Section 1.4 of this SOP, Beck Landfill, as an attachment to the "30-DAY NOTICE OF CELL COMPLETION" letter sent to the TCEQ MSW Permits Section, includes a continually updated site layout map identifying the cell area(s) being excavated and utilized per site operating requirements. This procedure serves as the mechanism for informing the TCEQ of the landfill's sequence of development.

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# FIGURE 4 SEQUENCE OF DEVELOPMENT

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# 10.0 RECYCLING ACTIVITIES

Beck Landfill includes this Addendum to the Site Operating Plan (SOP) to address management practices to be followed when diverting specific recyclable materials from the solid waste stream received at the facility. These management practices are written in conformance with the Waste Minimization and Recycling rules (30 TAC 328), Composting rules (30 TAC 332), and the Operational Standards for Permitted Solid Waste Landfill Facilities (30 TAC 330).

In accordance with 30 TAC 330.155, scavenging is not allowed and the salvaging of material from the solid waste stream will not be allowed to interfere with the prompt sanitary disposal of solid waste or to create a public health nuisance. Salvaged items will be removed from active areas often enough to prevent the items from becoming a nuisance, to preclude the discharge of any pollutants from the area, and to prevent an excessive accumulation of the material at the facility.

## 10.1 Purpose

Beck Landfill will divert certain recyclable materials from the solid waste stream to promote the economic recovery and reuse of materials, and to support the development of markets for recycled, remanufactured, or environmentally sensitive products or services in a sustainable manner that protects the environment, public health, and safety. This Addendum provides management practices for the temporary storage and processing of recyclable materials.

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## ~~10.1~~10.2 Scrap Tires

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Per 30 TAC 328.53 (relating to Management of Used or Scrap Tires), Beck Landfill (MSW Permit No. 1848A) may store or process whole tires or tire pieces in an unused portion of the property within its permit boundary dedicated to tires only. Scrap tires may not be disposed of within the Beck Landfill unless the tire has been quartered, shredded or split (the sidewalls removed from the tires).

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Authorization for this storage and/or processing activities is conferred through the approval of the Site Development Plan, including this Addendum of the Site Operating Plan. The tire storage and/or processing activity shall not be conducted in a manner that will adversely affect operations of the municipal solid waste disposal site, or otherwise endanger human health or the environment.

Beck Landfill may store up to 500 tires for processing, reuse or sale at any given time.. Processing may include splitting, quartering or shredding of the tires.

The following management practices will be followed:

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### ~~10.1.1~~10.2.1 Tire Storage Criteria

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1. Scrap tire storage areas are designed so that the health, welfare, and safety of operators, transporters, and others who may utilize the site are maintained.
2. No more than three (3) piles of whole or scrap tires will be stored on the ground (stockpiles).
3. A fire lane (40-feet buffer) must encircle the tire piles and be usable as an all-weather road.
4. The roadway must provide a minimum 25-foot turning radii.

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~~5.~~1. The Site Layout Plan shall include this area with appropriate design notes.

~~6.~~2. Indoor storage piles or bins shall not exceed 12,000 cubic feet with a 10-foot aisle space between piles or bins.

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~~7.~~1. Outdoor piles and entire buildings used to store scrap tires or tire pieces shall not be within 40 feet of the property line or easements. This setback will be maintained free of rubbish, equipment, tires, or other materials.

~~8.~~2. Outdoor storage of used or scrap tires or tire pieces at the processing location will be monitored for vector control, and appropriate vector control measures shall be applied when needed, but in no event less than once every two weeks.

~~9.~~3. Scrap tires or tire pieces may be stored in trailers provided the trailer is totally enclosed and lockable.

### ~~10.1.2~~10.2.2 Fire Prevention and Suppression

Dry chemical fire extinguishers are located on the LS and the LFM trucks, as well as on mobile equipment working on or near the tire storage area.

Firewater may also be accessed from on-site ponds through the use of pumps and water trucks.

### ~~10.1.3~~10.2.3 Access Controls

The scrap tire storage area(s) is within the fully-fence perimeter of Beck Landfill. The gate is locked when the facility is closed.

### ~~10.1.4~~10.2.4 Water Quality Protection

Drainage away from the scrap tire storage location will flow into Beck Landfill and be retained in ponds, allowed to infiltrate, or will evaporate. No discharge of water is anticipated from the storage site.

## ~~10.2~~10.3 Asphalt Shingles

Asphalt shingles may be received at Beck Landfill for the purpose of disposal or processing for reuse. Only residential roof tear-off asphalt shingles or sized asphalt shingles may be received for processing and end-use in the production of hot mix asphalt. The feed stocks will be managed for processing. Non-conforming shingles and associated debris will be disposed in Beck Landfill.

At least 50% of shingles accumulated within a six-month period will be recycled or transferred to a different site for recycling. Recycled materials, including processed shingles, are not subject to this time limitation, but should be covered or otherwise protected to prevent degradation, contamination, or loss of value as recyclable material.

The following management practices will be followed:

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### ~~10.2.1~~10.3.1 Recordkeeping and Reporting

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1. Shingles must not contain asbestos or asbestos containing materials (ACM). Analysis or other documentation demonstrating that no asbestos or ACM may be found in shingles proposed for recycling or disposal at Beck Landfill must be maintained.
2. Proof of financial assurance sufficient to cover closure costs.
3. Records indicating the volume of shingles processed for reuse versus volume of shingles land disposed at Beck Landfill. (Note: Follow Air Permit)

### ~~10.2.2~~10.3.2 Shingle Storage Criteria

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1. Shingle storage areas are designed so that the health, welfare, and safety of operators, transporters, and others who may utilize the site are maintained.
2. Incoming loads will be inspected by a person trained to identify asbestos containing shingles. Any material suspected of containing asbestos will be rejected.
3. All visible materials which are not part of the shingle will be removed before grinding, including excess wood, paper, metal, and plastics.
4. A fire lane (40-feet buffer) must encircle the shingle piles and be usable as an all- weather road.
5. The roadway must provide a minimum 25-foot turning radius.
6. Shingle storage piles shall not be within 50 feet of the property line or easements. This setback will be maintained free of rubbish, equipment, tires, or other materials.
7. Shingle piles will be maintained with a pile height no greater than 25 feet.

### ~~10.2.3~~10.3.3 Fire Prevention and Suppression

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Dry chemical fire extinguishers are located on the LS and the LFM trucks, as well as on mobile equipment working on or near the tire storage area.

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Firewater may also be accessed from on-site ponds through the use of pumps and water trucks.

### ~~10.2.4~~10.3.4 Access Controls

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Shingle storage areas will be wholly located within the fully-fenced perimeter of Beck Landfill. The gate is locked when the facility is closed.

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### ~~10.2.5~~10.3.5 Water Quality Protection

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Drainage away from shingle storage area(s) will flow within the Beck Landfill permitted area and be directed to and retained in detention ponds, allowed to infiltrate, or will evaporate. No off-site discharge of water is anticipated from the shingle storage area(s)..

## ~~10.3~~10.4 Wood Materials

Wood, brush and other vegetative debris may be received at Beck Landfill for the purpose of disposal or processing for reuse. Beck Landfill will compost or mulch materials considered to be exempt in 30 TAC §332.3.

The following management practices will be followed:

### ~~10.3.1~~10.4.1 Recordkeeping and Reporting

1. Only untreated lumber and woody debris will be utilized for the manufacture of mulch or compost material. Treated lumber may be disposed in Beck Landfill.
2. Proof of financial assurance sufficient to cover closure costs.

### ~~10.1.1~~10.4.2 Woody Debris Storage Criteria

~~10.~~ Composting, mulching, and land application of material shall be conducted in a sanitary manner that shall prevent the creation of nuisance conditions as defined in

1. §330.2 of this title (relating to Definitions) and as prohibited by the Texas Health and Safety Code, Chapters 341 and 382 (relating to Minimum Standards of Sanitation and Health Protection Measures; and Clean Air Act), the Texas Water Code, Chapter 26 (relating to Water Quality Control), §101.4 of this title (relating to Nuisance), and any other applicable regulations or statutes.

~~11.~~2. Operations shall be conducted in such a manner to ensure that no unauthorized or prohibited materials are processed at the facility. All unauthorized or prohibited materials received by the facility shall be disposed of at an authorized facility in a timely manner.

~~12.~~1. The setback distance from all property boundaries to the edge of the area receiving, processing, or storing feedstock or finished product must be at least 50 feet.

~~13.~~2. All permanent in-plant roads and vehicle work areas shall be watered, treated with dust-suppressant chemicals, or paved and cleaned as necessary to achieve maximum control of dust emissions.

~~14.~~3. Vehicular speeds on non-paved roads shall not exceed ten miles per hour.

~~15.~~1. A fire lane (40-feet buffer) must encircle the woody debris piles and be usable as an all-weather road.

~~16.~~1. The roadway must provide a minimum 25-foot turning radii.

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### ~~10.3.2~~10.4.3 Fire Prevention and Suppression

Dry chemical fire extinguishers are located on the LS and the LFM trucks, as well as on mobile equipment working on or near the tire storage area.

Firewater may also be accessed from on-site ponds through the use of pumps and water trucks.

### ~~10.3.3~~10.4.4 Access Controls

Compost, mulch, and woody debris storage areas will be wholly located within the fenced perimeter of Beck Landfill. The main facility gate is locked when the facility is closed.

### ~~10.3.4~~10.4.5 Water Quality Protection

Drainage away from the woody debris/compost/mulch storage areas will flow within the Beck Landfill permitted area and be directed to and retained in detention ponds, allowed to infiltrate, or will evaporate. No off-site discharge of water is anticipated from the wood storage or operation area(s).

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# APPENDIX A FORMS

# ~~11.0~~ APPENDIX B METHANE MONITORING POINT INSTALLATION REPORT

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